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O PRINCIPAL MOTIVO PARA COLETAR E ARMAZENAR CÉLULAS-TRONCO É A PREVENÇÃO E PLANEJAMENTO COM A SAÚDE.

A CRIOPRESERVAÇÃO, MÉTODO DE CONGELAR MATERIAIS BIOLÓGICOS POR MUITAS DÉCADAS, PERMITE QUE A IDADE DAS CÉLULAS FIQUE PARALISADA.

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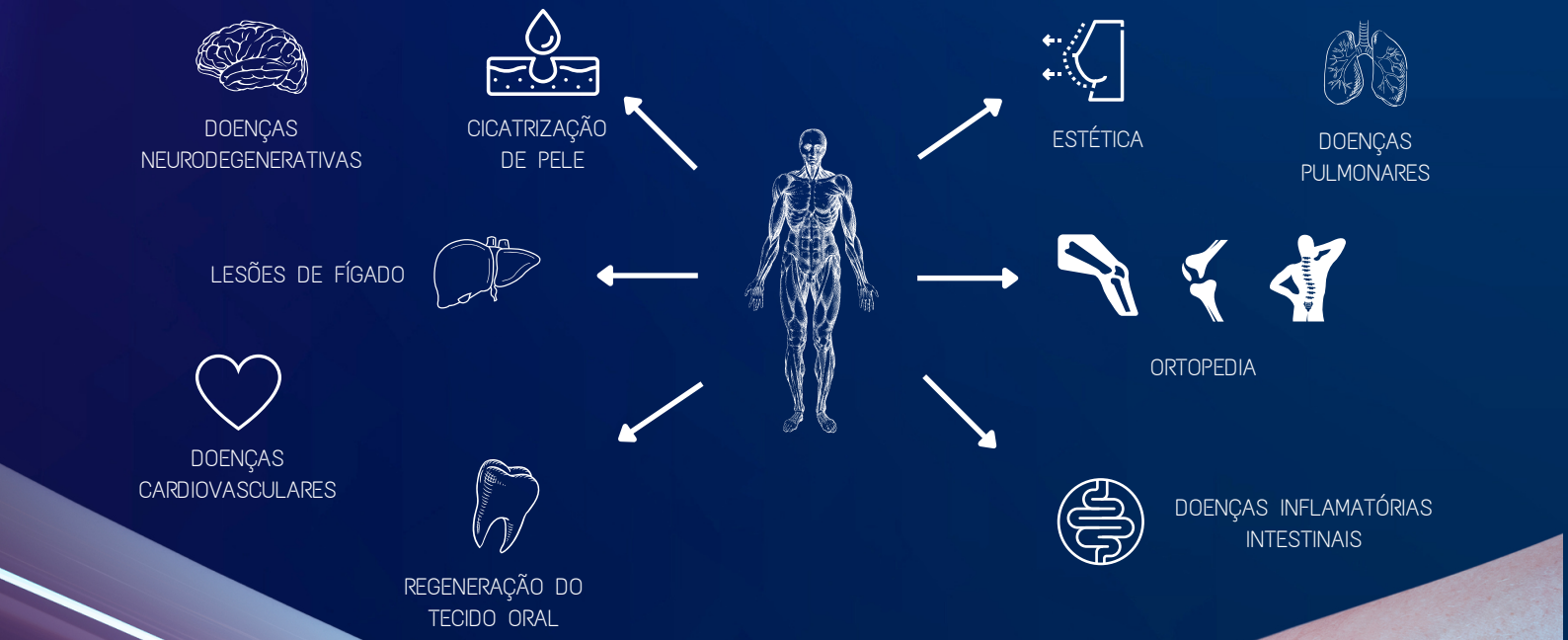

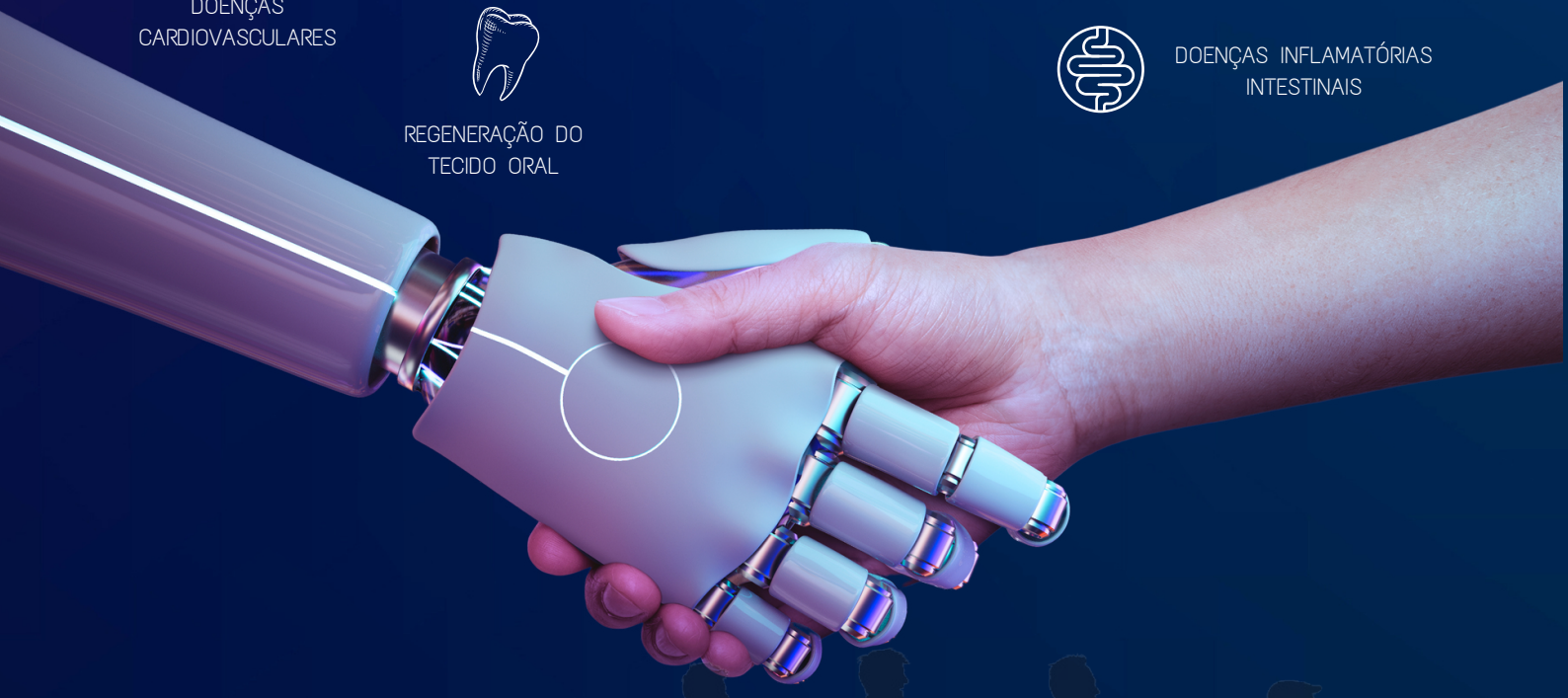

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THE INFLUENCE OF SOCIAL NETWORKS ON THE CHOICE OF FACE SURGERY IN PATIENTS UNDERGOING SURGERY AT HOSPITAL PARANAENSE DE OTORHINOLARYNGOLOGY

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ABSTRACT

Introduction: Social networks are an integral part of contemporary society, influencing the way interpersonal relationships and the doctor-patient relationship occur, showing a possible influence of these means on decision-making for surgical procedures. **Objectives:** To identify the influence of social networks and other factors such as self-perception and functional changes, in the intention to undergo facial surgeries. **Material and methods:** Prospective study carried out from July to September 2022 in patients undergoing facial surgery at the IPO Hospital who were evaluated using a questionnaire. including age, gender, factors that helped in the decision for such procedure, related factors the search for information about the professional and personal preferences in relation to this type of content. **Results:** Among the 49 patients included in the study, 43 were female and 6 were male, with a mean age of 37 years. Of these, 39 underwent rhinoplasty. Self-perception was evaluated as a determining factor for the decision to perform the procedure (79.6%). Patients aged ≤ 30 years are significantly different regarding the use of Instagram (use more), Facebook (use less). **Conclusion:** Social networks are important tools in the decision to undergo facial surgeries, but self-perception was the determining factor. The Instagram platform was the network most sought after by patients when seeking information about their surgeons. The media format preferred by patients is short duration (up to 1 minute).

KEYWORDS

Social media. Social networks. Plastic Surgery. Face surgery.

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INTRODUCTION

Social media platforms are used in a variety of ways and are growing exponentially in numerous social spheres. They are enthusiasts that add up year after year, redefining the way people interact, making it possible to build relationships regardless of demographic barriers.[1]

According to research by the Statista Research Department in 2020, more than 3.6 billion people were using social media worldwide, a number projected to increase to nearly 4.41 billion by 2025.

If previously content related to health, aesthetics and beauty was spread through television and magazines, today with the speed and ease of access to social networks such as Facebook, Instagram, YouTube, TikTok and Twitter, the user has in his hands an active search tool for more targeted interests.[2]

Globally, applications such as Facebook, Twitter, YouTube, and Instagram are the most popular platforms when referring to the term "social media". In these same channels, it is possible to observe two different types of use: direct communication and passive consumption. Direct communication is not just talking one-on-one; it also includes identifying other people in photographs, creating content through texts, videos or images, commenting on publications or writing in profiles. On the other hand, passive consumption includes browsing news feeds and viewing other people's posts and public conversations, without direct interaction.[3] Direct communication is related to the concept of "programmability". Programmability reflects the fact that social networking platforms depend on the user's communicative contributions, in which owners and users jointly shape the communicative environment.[4] Interactivity and feedback are one of the main features that distinguish online media from traditional media. Meanwhile conventional media (such as the press, radio and television) offer passive and unidirectional consumption, social networks allow for interactivity and bidirectionality. It's not just brands that come into contact with consumers (as in traditional media), but consumers also talk to brands. Interactivity allows users to be sources and receivers, sometimes simultaneously. Gone are the days when users were passive recipients of news from conventional media; nowadays, they are an active audience in the information dissemination process.[5]

This ubiquity of social media networks makes them a powerful tool for reaching patients. It is estimated that half of the US plastic surgeons are using digital media to connect directly with the public. With the growing need to attract patients, plastic surgeons are the most likely of the specialties to be on social media. There is a growing interest in its use for medical education, thought leadership, dissemination and reading of scientific articles, patient education and building a private clinic.[6]

By relating this context to the scope of plastic surgery, the popularity that such media are reaching as a way of publicizing professionals and surgical procedures is notorious, requiring studies to clarify the role played by online media in body image and the intention to perform plastic surgery.

In the current literature, there is an extensive investigation that documents the influence of traditional media such as newspapers, magazines, and television programs on the desire to perform

cosmetic surgery.[7] However, there is little research that focuses on the effects of digital media, in particular social networks, on the intention of patients who resort to a surgical procedure to change some specific aspect of the face.

This research aims to better understand how facial plastic surgery patients interact with surgeons on online platforms and their influence on decision-making, analyzing: which social networks are used; what level of interest in different types of posts; the importance given to the professional profile.

MATERIAL AND METHODS

This is a prospective study with a descriptive and exploratory quantitative approach, carried out at the IPO Hospital in Curitiba, in patients who underwent facial surgeries (Rhinoplasty, Blepharoplasty, Otoplasty and Facelift) of both sexes, and with an aged between 18 and 65 years and who fit the criteria described. Inclusion criteria were undergoing facial surgery at the IPO Hospital and wanting to participate in the research. While the exclusion criteria were being under 18 years old or over 65 years old and those who did not wish to participate or did not sign the Free and Informed Consent Form (ICF).

All patients who would undergo facial surgery during the research period from July to September 2022 and who voluntarily showed interest in the study were invited to participate in the study, who were guaranteed the preservation of their data and the your anonymity.

The application of the questionnaire was carried out individually in an inpatient bed during the time the patient was waiting for surgery. After inviting the participants to participate in the research, the informed consent form was read. After signing the ICF, the questionnaire was then applied.

The questionnaire had nine questions involving information such as: age, gender, which facial plastic surgery the patient is interested in, what made him/her decide on the procedure, where he/she sought information about his/her surgeon, how important it is for his surgeon to be in the media social media, what type of media and speed you prefer to see the information, and finally, if you would like your doctor to publish before and after cases if this was authorized by the Federal Council of Medicine.

The information obtained from the questionnaire was used solely for academic purposes. The notes with the results of the questionnaire, and other documents and spreadsheets generated because of these data were used for purposes related to the research, guaranteeing confidentiality in accordance with the legislation.

The collected data were subjected to statistical analysis, with the age results described by mean, standard deviation, minimum and maximum. Categorical variables were described by absolute and percentage frequencies. For the comparison of sexes and age group (<30 years or >30 years). Fisher's exact test was used. Values of $p<0.05$ indicated statistical significance. Data were organized in an Excel® spreadsheet and analyzed using the IBM SPSS Statistics v.20.0 computer program.

All procedures were approved by the institutional ethics committee under CAAE No. 58930422.7.0000.5529 and the Informed Consent Form (ICF) was obtained from all patients prior to effective inclusion in the study.

RESULTS

The analysis presented below was based on data from 49 participants who underwent facial surgery (rhinoplasty, blepharoplasty, otoplasty or facelift) and answered the questionnaire.

Of the 49 patients included in the study, 43 were female, corresponding to 87.8% and only 6 were male, corresponding to 12.2%. The average age was 37 years. The most common facial surgery was rhinoplasty (nose), with a prevalence of 79.6%, followed by blepharoplasty (eyelid) with 6.1%, otoplasty (ears) and facelift with 2.0% each. When asked about the reason that led to the decision to undergo surgery, 79.8% of participants stated that self-perception was a determining factor, followed by functional alteration with 53.1%. The influence of content available on social networks published by other patients corresponded to 10.2% and by physicians to 22.4% (Table 1).

Regarding categorical variables related to social networks, the Instagram platform was the most sought-after network by patients when seeking information about their surgeons, representing a percentage of 75.5%, followed by Facebook at 22.4%. On the scale of importance that the patient gives to the doctor being present on social networks, (scale from 0 to 10, with 0 being little important and 10 very important) 75% consider it very important (grade 10).

The media format preferred by patients are videos (67.3%) rather than texts (32.7%) and the short format (up to 1 minute) was preferred with 68.8% as shown in Table 2.

For each of the analyzed variables, we tested the null hypothesis that the distributions on the variable's ratings are the same for both sexes, versus the alternative hypothesis that the distributions are different. When comparing the sexes in relation to the variables, there was no statistical significance (Table 3).

We tested the null hypothesis that the distributions on variable classifications are the same for age ≤ 30 years and age > 30 years, versus the alternative hypothesis that the distributions are different.

The results presented in the table below (Table 4) indicate that patients aged >30 years, when compared to patients aged ≤ 30 years, are significantly different in terms of the use of social networks. Patients aged >30 years use Instagram less and use Facebook more. Instagram is the platform used as a reference by 100% of patients aged ≤30 years and 63.6% of patients aged >30 years. Facebook is the social network used to search for surgeons only by participants aged >30 years (33.3%).

The score attributed to the importance of the surgeon having a professional profile on social networks, being separated for analysis into <10 or 10, illustrated that patients aged >30 years attribute less score 10 (Table 4)

Table 1: Descriptive statistics.

Variable	Classif	n	%
Age (years)	Mean ± desv pad (min-max)	37.2 ± 12.7	(20-75)
	≤ 30	16	32.7%
	> 30	33	67.3%
Sex	Female	43	87.8%
	Male	6	12.2%
Surgeries	Nose	39	79.6%
	Eyelids	3	6.1%
	Nose and ears	2	4.1%
	Ears	1	2.0%
	Face lifting	1	2.0%
	Face and eyelid lifting	1	2.0%
	Nose and eyelids	1	2.0%
	Eyelids and facelifting	1	2.0%
Nose	No	7	14.3%
	Yes	42	85.7%
Eyelids	No	43	87.8%
	Yes	6	12.2%
Ears	No	46	93.9%
	Yes	3	6.1%
Face lifting	No	46	93.9%
	Yes	3	6.1%
What made you decide to have this surgery?	Self-perception	18	36.7%
	Self-perception and Functional change	11	22.4%
	Functional change and doctor	5	10.2%
	Self-perception, Functional change and doctor	4	8.2%
	Functional change	3	6.1%
	Functional change and patients	2	4.1%
	Self-perception and doctor	2	4.1%
	Self-perception and patients	2	4.1%
	Self-perception and digital influencer	1	2.0%
	Self-perception, Functional change and patient	1	2.0%
Self-perception	No	10	20.4%
	Yes	39	79.6%
Functional change	No	23	46.9%
	Yes	26	53.1%
Patients	No	44	89.8%
	Yes	5	10.2%
Doctor	No	38	77.6%
	Yes	11	22.4%

Table 2: Descriptive statistics.

Variable	Classif	n	%
Are you looking for information about your surgeon on social media and websites?	Instagram	29	59.2%
	Facebook	5	10.2%
	Instagram and Facebook	4	8.2%
	Instagram and website	3	6.1%
	Facebook and Google	2	4.1%
	Google	2	4.1%
	Instagram, website and Google	1	2.0%
	Website and Google	1	2.0%
	Others	2	4.1%
Instagram	No	12	24.5%
	Yes	37	75.5%
Facebook	No	38	77.6%
	Yes	11	22.4%
Google	No	43	87.8%
	Yes	6	12.2%
Website	No	44	89.8%
	Yes	5	10.2%
Tik-Tok	No	49	100%
	Yes	0	0%
Others	No	47	95.9%
	Yes	2	4.1%
Note the importance you give to your doctor for being present on social media* (scale from 0=very little to 10=very much)	10	36	75.0%
	9	4	8.3%
	8	7	14.6%
	6	1	2.1%
Would you prefer the information released by your doctor but mainly through which media?	Video	33	67.3%
	Image	16	32.7%
At what speed do you prefer consumption Information?	Short	33	68.8%
	Medium	12	25.0%
	Large	3	6.3%
Would you like the doctor to release before/after photos? If authorized?	No	1	2.0%
	Yes	48	98.0%

*Median score (min-max): 10 (6-10)

Table 3: Comparison of genders in relation to variables related to perception and social media.

Variable	Classif	Female		Male		p*
		n	%	n	%	
Self-perception	No	9	20.9%	1	16.7%	1
	Yes	34	79.1%	5	83.3%	
Functional change	No	21	48.8%	2	33.3%	0.671
	Yes	22	51.2%	4	66.7%	
Patients	No	39	90.7%	5	83.3%	0.495
	Yes	4	9.3%	1	16.7%	
Doctor	No	33	76.7%	5	83.3%	1
	Yes	10	23.3%	1	16.7%	
Instagram	No	10	23.3%	2	33.3%	0.626
	Yes	33	76.7%	4	66.7%	
Facebook	No	34	79.1%	4	66.7%	0.605
	Yes	9	20.9%	2	33.3%	
Google	No	37	86.0%	6	100%	1
	Yes	6	14.0%	0	0%	
Website	No	38	88.4%	6	100%	1
	Yes	5	11.6%	0	0%	
Note_10	<10	12	28.6%	0	0%	0.315
	10	30	71.4%	6	100%	
Midia	Video	27	62.8%	6	100%	0.159
	Image	16	37.2%	0	0%	
Speed	Short	28	66.7%	5	83.3%	0.650
	Medium/large	14	33.3%	1	16.7%	
Before/after disclosure	No	1	2.3%	0	0%	1
	Yes	42	97.7%	6	100%	

* Fisher's exact test, p<0,05

Table 4: Comparison of age groups in relation to variables related to perception and social media.

Variable	Classif	Age (years)				p*
		≤ 30		>30		
		n	%	n	%	
Self-perception	No	6	37.5%	4	12.1%	0.060
	Yes	10	62.5%	29	87.9%	
Functional change	No	8	50.0%	15	45.5%	1
	Yes	8	50.0%	18	54.5%	
Patients	No	15	93.8%	29	87.9%	1
	Yes	1	6.3%	4	12.1%	
Doctor	No	11	68.8%	27	81.8%	0.466
	Yes	5	31.3%	6	18.2%	
Instagram	No	0	0.0%	12	36.4%	0.005
	Yes	16	100.0%	21	63.6%	
Facebook	No	16	100.0%	22	66.7%	0.009
	Yes	0	0.0%	11	33.3%	
Google	No	16	100.0%	27	81.8%	0.159
	Yes	0	0.0%	6	18.2%	
Website	No	15	93.8%	29	87.9%	1
	Yes	1	6.3%	4	12.1%	
Note	<10	1	6.3%	11	34.4%	0.040
	10	15	93.8%	21	65.6%	
Midia	Video	10	62.5%	23	69.7%	0.748
	Image	6	37.5%	10	30.3%	
Speed	Short	14	87.5%	19	59.4%	0.057
	Medium/large	2	12.5%	13	40.6%	
Before/after disclosure	No	0	0.0%	1	3.0%	1
	Yes	16	100.0%	32	97.0%	

* Fisher's exact test, p<0,05

DISCUSSION

The popularity of facial plastic surgeries grew from the mid-twentieth century onwards and shows a strong growth trend, influenced mainly by the expansion of the beauty industries and social networks. Brazil is currently the second largest market in terms of the number of facial plastic surgeries, second only to the United States. In the present study, we identified that rhinoplasty was the most performed facial plastic surgery, corroborating data from Liu et al.,[8] in which rhinoplasty was the most performed facial aesthetic surgery in the United States, mainly due to its strong aesthetic and functional characteristics.

In this study, females were the most prevalent and the average age was 37 years. Gomes et al.,[9] in an epidemiological analysis of plastic surgeries in Brazil from 2014-2018, observed the epidemiological distribution regarding gender, with females being the gender that continues to seek more aesthetic transformations and perform more interventions

than males, representing 86.9% of total audience. Regarding age, more than 70% of patients who sought a facial plastic surgery procedure were aged between 19 and 50 years.

The determining factor pointed out by the participants for undergoing surgery was self-perception. According to Mazarelo,[5] a negative body image is directly related to the concept of body dissatisfaction – when views of one's own body are negative and involve a perceived discrepancy between and self-perception about the current face versus the ideal face. In this logic, a study developed by Szabó in 2015 determined that the greatest disparities between perceived and ideal body images predicted a greater number of aesthetic procedures.

Numerous publications in the plastic surgery literature praise the benefits of social media for the public, specifically as tools for disseminating information and mass communication. Among social media, Instagram and Facebook were the most used tools in the search for information about the surgeon in this study. Arab et al.[2] demonstrated that Facebook is the most used platform by plastic surgeons in the United States in 2019. In 2017, Sorice et al.[6] found that Facebook and Instagram were the only two networks used multiple times a day by more than 10% of patients surveyed. In this same study, it was seen that despite the importance of social media, patients stated that the surgeon's website was also an important online platform that influenced their decision. The website content that was most important to patients was before and after photos, followed by information about the procedure. Although we did not find a great influence in the search for the websites in our study, the analysis of before and after photos is something that is of great interest to patients. However, up to now, publication is prohibited by resolution of the Federal Council of Medicine (CFM).

The preferred media format for patients to search for information is short videos (up to 1 minute), widely disseminated on Instagram in the form of reels.

Most patients in the present study considered the doctor's presence on social media to be very important. In an article by Montemurro et al.,[10] it was found that almost all patients (95%) used the internet to collect information before the consultation, for 68% of them being their first research method. Social networks were used by 46% of patients and 40% of these were strongly influenced in choosing a specific doctor.

CONCLUSION

It is concluded that social networks are important tools in the decision to undergo facial surgeries, but self-perception was the determining factor in the present study. The Instagram platform was the social network most sought after by patients when seeking information about their surgeons. Patients aged 30 and under prefer Instagram while patients over 30 prefer Facebook. The media format preferred by patients is short videos.

Asking patients about their favorite networks and their preferred type of content can help improve a surgeon's success in building a practice through social media.

REFERENCES

1. KOTLER, P., et al. Marketing 4.0: Moving from traditional to digital. Statista Research Department, Mar 22, 2022

2. ARAB, K. et al. Influence of Social Media on the Decision to Undergo a Cosmetic Procedure. Plastic and Reconstructive Surgery - Global Open [Internet]. Ago 2019 [citado 20 nov 2022];7(8):e2333.

3. KAPOOR, K. et al. Advances in Social Media Research: Past, Present and Future. Information Systems Frontiers, 2018 20(3), 531–558.

4. VAN, D.J. et al. Understanding social media logic. Media and Communication, 2013 1(1), 2–14.

5. MAZARELO, A.B.R.A. . A influência das redes sociais na intenção das mulheres portuguesas em realizar cirurgia plástica. Porto, 2021. Dissertação (Mestrado) - Universidade Católica Portuguesa

6. SORICE, S.C. et al. Social Media and the Plastic Surgery Patient. Plast Reconstr Surg. 2017 Nov;140(5):1047-1056.

7. FURNHAM, A. et al. Factors that motivate people to undergo cosmetic surgery. Canadian Journal of Plastic Surgery, 2012 20(4), 47–50.

8. LIU, T.S. et al. . Economic analysis of the future growth of cosmetic surgery procedures. Plastic and reconstructive surgery, v. 121, n. 6, p. 404e-412e, 2008.

9. GOMES, O.S. et al. Cirurgia plástica no Brasil: uma análise epidemiológica. Revista Eletrônica Acervo Científico. 2021, v. 24, p. e7375.

10. MONTEMURRO, P. et al. The influence of social media and easily accessible online information on the aesthetic plastic surgery practice: literature review and our own experience. Aesthetic Plast Surg. 2015 Apr;39(2):270-7.

EFFECT OF *PIEZO* IN POST-OPERATIVE ECCHYMOSIS DURATION IN CLOSED RHINOPLASTY

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ABSTRACT

Introduction: Rhinoplasty is one of the most performed surgeries all over the world and advances in surgical techniques have been happening progressively, although postoperative skin and soft tissue complications, such as edema and ecchymosis, can induce anxiety for patients. *Piezo*, an instrument that uses ultrasonic vibrations, can provide greater precision and less damage to adjacent soft tissues, causing less surgical trauma and better behavior of soft and hard tissues during healing. **Objective:** To evaluate the effect of *Piezo* in duration of postoperative ecchymosis in closed rhinoplasty and the degree of discomfort of patients with this complication. **Material and methods:** Prospective, longitudinal, analytical, and interventional study in patients undergoing primary closed rhinoplasty, which were divided into 2 groups: Group 1 (control): patients undergoing closed rhinoplasty with conventional osteotomies and Group 2: patients undergoing closed rhinoplasty with osteotomies using *Piezo*. The evolution of ecchymosis was recorded through photographs sent to the research team until it was not present, the degree of discomfort with ecchymosis was graded from 0-10 at the end of the first week. Results: 13 patients were evaluated, 6 in Group 1 (control) and 7 in Group 2 (*Piezo*). Age ranged between 18 and 53 years (mean 33.1 years). We had a prevalence of females (69.2%) and the duration of ecchymosis ranged from 0-16 days. The mean duration of ecchymosis was longer in the control group (8 days) compared to the group that used *Piezo* (4 days). The discomfort in relation to ecchymosis was greater in patients in the control group (5) compared to patients in which *Piezo* was used (3). **Discussion:** *Piezo* has been shown to decrease postoperative morbidity in open and closed rhinoplasties or other surgical procedures. It provides a safe, reproducible and accurate way to perform lateral osteotomies, minor surgical trauma and better soft and hard tissue behavior during healing. In this way, it provides less swelling and ecchymosis compared to conventional osteotomy and can significantly increase overall patient satisfaction. **Conclusion:** *Piezo* helps reduce the duration of postoperative ecchymosis after closed rhinoplasty and can reduce the degree of discomfort with this type of complication.

KEYWORDS

Rhinoplasty. *Piezo*. Post-operative. Ecchimosys.

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INTRODUCTION

Rhinoplasty is one of the most performed surgeries in the world and its performance has changed significantly over the years. Advances in surgical techniques were possible due to a better understanding of anatomical structures and the work of great surgeons according to Totonchi and Guyuron.[1] This surgery has been shown to improve the quality of life of patients, as observed by Rot et al.,[2] but despite advances in recent years, this procedure remains one of the most complex in Plastic Surgery and patient satisfaction rates are lower compared to other aesthetic procedures as noted by Constantian,[3] and Totonchi and Guyuron.[1] Postoperative skin and soft tissue complications, such as edema and ecchymosis, are expected and, although temporary, can generate anxiety for patients,[1,4] and may precipitate psychological and psychiatric disorders related to body image according to Tasman.[5]

Recently, a new method has been used to perform osteotomies in surgical procedures, the *Piezo* method. It is an instrument that uses ultrasonic vibrations during the cutting steps, allowing greater precision and less damage to adjacent soft tissues, causing a decrease in postoperative morbidity.[6,7] Robiony et al.[7] refers that the *Piezo* is an easy-to-handle device, making it possible to obtain direct visibility over the osteotomies, avoiding the use of blind drills and chisels.

Histological findings found by Robiony et al.[7] support the close relationship between minor surgical trauma and better behavior of soft and hard tissues during healing in patients submitted to osteotomies using *Piezo*. The use of this tool is considered by authors such as Filho et al.;[8] Mirza et al.[6] and Robiony et al.,[7] a technique that reduces postoperative pain and edema. Mirza et al.[6] also observed that the use of this instrument does not necessarily prolong the duration of the surgery. In this way, the use of *Piezo* is considered a potentially more promising and effective alternative than conventional osteotomy according to Ghavimi et al.[9] and the time required for the learning curve is counterbalanced by the comfort and satisfaction of patients and surgeons.[10]

Based on the evidence already found in the literature, with this work we sought to evaluate the interference of the use of *Piezo* in the duration of postoperative ecchymosis in closed rhinoplasty, since there are still no studies that demonstrate the role of this device specifically for closed rhinoplasty.

MATERIAL AND METHODS

A prospective, longitudinal, analytical, and interventional study was carried out in patients undergoing primary closed rhinoplasty coordinated by a single surgeon with experience in the area. The study was approved by the Research Ethics Committee (REC) of the hospital. Patients over 18 years of age, of both genders, with a plan to undergo closed rhinoplasty that would be performed during the four months of data collection were included. Patients with coagulation disorders, systemic arterial hypertension or diabetes would be excluded, as well as those with a history of chronic use of corticosteroids, who had undergone a previous non-surgical nasal procedure or who needed changes in the surgical technique during the intraoperative period.

Participants were randomly divided into two groups, without being aware of which group they would be part of:

- Group 1 (control): patients submitted to closed rhinoplasty with osteotomies performed conventionally, using osteotomes.
- Group 2: patients submitted to closed rhinoplasty with osteotomies performed using *Piezo*.

The same anesthetic technique was used, with local anesthesia (2% lidocaine + vasoconstrictor solution) and sedation. Patients in both groups underwent osteotomy through the creation of a fracture along the lateral portion of the nasal process of the maxilla and nasal bones, performed with an osteotome and hammer in group 1 and with the aid of *Piezo* in group 2. At the end of the procedure, all participants underwent the same postoperative dressing with the application of hypoallergenic micropore tape and external thermoplastic splint.

During the postoperative follow-up, the participants daily recorded the evolution of the ecchymosis through photographs that were sent to the research team for analysis until the day that such alteration was no longer present, based on the photographic documentation. In the first post-operative return, after 1 week, the participants were asked about the degree of discomfort in relation to the bruise, grading this complaint from 0-10 using the Visual Analog Scale (VAS).

Statistical analysis

Descriptive statistics were presented to summarize the results for all variables. Mean, standard deviation, median, minimum, and maximum were used for quantitative variables and absolute frequency and percentage for categorical variables. The time of presence of ecchymosis was described by Kaplan-Meier curves and the comparison of groups defined by osteotomy techniques was performed using the Log-rank test. To compare the groups in terms of quantitative variables, Student's t test for independent samples or the non-parametric Mann-Whitney test was used. Regarding categorical variables, comparisons were made using Fisher's exact test. Data were organized in an Excel® spreadsheet and analyzed using the IBM SPSS Statistics v.28.0 computer program. Armonk, NY: IBM Corp.

RESULTS

The analysis presented below was based on data from 13 patients, 6 of whom underwent closed rhinoplasty with osteotomies performed conventionally and 7 who underwent closed rhinoplasty with osteotomies performed using *Piezo*.

General descriptive statistics (n=13)

The age of the patients ranged between 18 and 53 years, with a mean of 33.1 years (Table 1). Most patients were female (69.2%) (Fig. 1) and the duration of ecchymosis ranged from 0-16 days, with a mean of 8.2 days (Table 2).

The graph below shows the Kaplan-Meier curve for the duration of ecchymosis. The estimated median time was 7 days, that is, half of the total number of patients had ecchymosis for up to 7 days and the other half had ecchymosis for more than 7 days (Fig. 2).

Table 1: Age.

	n	Mean	Standard Deviation	Min	Max
Age (years)	13	33.1	9.5	18	53

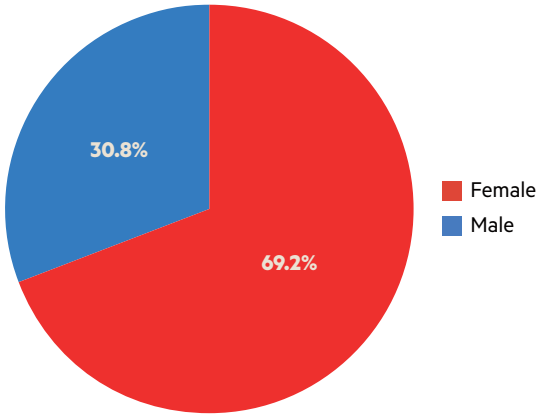

Figure 1: Gender.

Table 2: Duration of ecchymosis in days.

	n	Mean	SD	Median	Min	Max
Days of ecchymosis	13	8.2	6.4	7	0	16

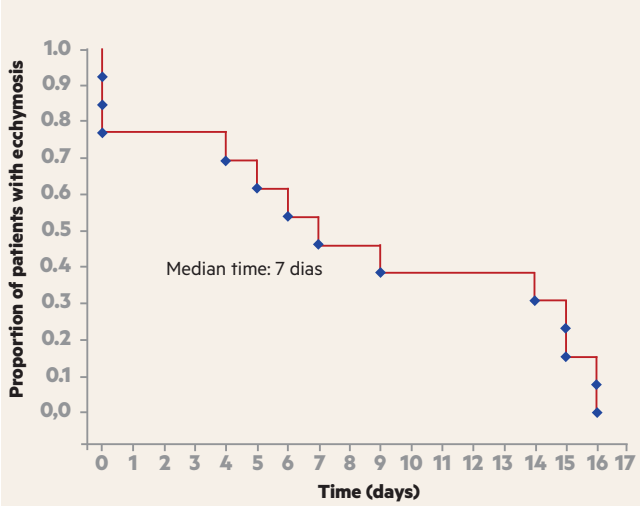

Figure 2: Duration time of ecchymosis.

Of the 13 patients, 9 patients answered about the degree of annoyance with the ecchymosis at the end of the first week. 3 patients did not answer the question because they did not have ecchymosis and 1 because of loss of follow-up. Annoyance could be graded from 0-10, with 10 being the greatest possible annoyance. The degree of annoyance ranged from 0 to 8, with an overall average of 4.4 (Table 3).

Table 3: Annoyance degree.

	n*	Mean	SD	Median	Min	Max
Annoyance rating score (0 to 10)	9	4.4	2.7	5	0	8

*1 missing data, 3 patients without ecchymosis

Comparison of groups defined by technique (osteotomy without *Piezo*=Group 1 and osteotomy with *Piezo*=Group 2)

Evaluation of the homogeneity of the groups in relation to age and gender

We observed a similar mean age in the 2 groups, as well as a prevalence of females in both. Table 4 presents the results obtained in relation to age and sex between the groups with and without *Piezo*.

Table 4: Gender and Age – Control Group X *Piezo* Group.

Variable	Classif	Group 1 Without *Piezo* (n=6)	Group 2 With *Piezo* (n=7)	p*
Age (years)		34.3 ± 8.7	32.0 ± 10.6	0.677
Gender	Female	4 (66.7%)	5 (71.4%)	1
	Male	2 (33.3%)	2 (23.6%)	

*Student T test for independent samples (age); Fisher's exact test (gender), p<0.05

Comparison of groups in relation to days of ecchymosis

The mean duration of ecchymosis was longer in the control group compared to the group that used *Piezo*. Table 5 presents the results obtained.

Table 6 shows the comparison of the groups regarding whether they had ecchymosis (0 days with ecchymosis or at least 1 day with ecchymosis). We observed that in the group in which the *Piezo* was used, it was possible not to present ecchymosis, while in the control group, no patient remained without this alteration.

On the other hand, when we consider how many patients had ecchymosis for less than and for more than 7 days, we observed that most patients in whom *Piezo* was used had ecchymosis for less than 7 days, while in the control group the opposite occurred, that is, most had ecchymosis for more than 7 days, as shown in Table 7.

Table 5: Duration time of ecchymosis - Control Group X *Piezo* Group.

Variable	Group 1 Without *Piezo* (n=6)	Group 2 With *Piezo* (n=7)	p*
Time of ecchymosis (days)	8 (5 - 16)	4 (0 - 16)	0.620

*Log-rank test, p<0.05

Table 6: Presence or absence of ecchymosis - Control Group X *Piezo* Group.

Variable	Classif	Group 1 Without *Piezo* (n=6)	Group 2 With *Piezo* (n=7)	p*
Time of ecchymosis (days)	0	0 (0%)	3 (42.9%)	0.192
	> 0	6 (100%)	4 (57.1%)	

*Fisher's exact test (gender), p<0.05

Table 7: Ecchymosis for at least 7 days - Control Group X *Piezo* Group.

Variable	Classif	Group 1 Without *Piezo* (n=6)	Group 2 With *Piezo* (n=7)	p*
Time of scchymosis (days)	< 7	2 (33.3%)	4 (57.1%)	0.592
	≥ 7	4 (66.7%)	3 (42.9%)	

*Fisher's exact test (gender), p<0.05

Comparison of groups in relation to the annoyance assessment score

Regarding the degree of annoyance with the bruise, there was variation between the 2 groups. The annoyance was greater in patients in the control group compared to patients in which *Piezo* was used (Table 8).

Table 8: Annoyance Degree - Control Group X *Piezo* Group

Variable	Group 1 Without *Piezo* (n=6)	Group 2 With *Piezo* (n=7)	p*
Annoyance rating score (0 to 10)	5 (2 - 8)	3 (0 - 8)	0.413

*Mann-Whitney non-parametric test, p<0.05

DISCUSSION

The development of surgical techniques for rhinoplasty, one of the most performed surgeries in the world, was possible due to a better understanding of anatomical structures and the work of great surgeons in recent years.[1]

Piezo, a surgical instrument that uses ultrasonic vibrations for greater precision and less damage to adjacent soft tissues, has been shown to decrease postoperative morbidity as observed in other studies.

Although the literature compares the use of *Piezo* with the conventional technique in open rhinoplasties or other surgical procedures,[6,7] *Piezo* is also reported in closed rhinoplasties.[11]

Through a study on cadavers, Schlabe et al.[12] observed that *Piezo* provides a safe, reproducible, and precise way to perform lateral osteotomies, in addition to high cutting precision in relation to planning. The study also reported fewer comminuted fractures and fewer bone fragments compared to conventional lateral osteotomy. Histological findings found by Robiony et al.[7] support the close relationship between minor surgical trauma in patients in which *Piezo* is used and better behavior of soft and hard tissues during healing.

In this way, surgery using *Piezo* is a safe osteotomy method, with less edema (in the immediate postoperative period) and ecchymosis compared to conventional osteotomy, in addition to finding evidence that it causes less pain and less damage to the mucosa.[13-16] The use of *Piezo* has been shown to provide not only excellent aesthetic results, but also a significant improvement in nasal breathing.[14] This corroborates what was observed in the present study, where we observed a shorter duration of ecchymosis in patients who used *Piezo*.

Contrary to the results of the present study, there is evidence that showed no significant advantages in terms of postoperative edema and ecchymosis in relation to osteotomy under direct vision,[17] in addition to the correlation between the use of *Piezo* and patency of the nasal airflow, olfactory functions and quality of life have not been established in the long term.[15]

Ultrasonic osteotomy is not completely harmless for soft tissues, a statistically significant increase in subcutaneous necrosis compared to the control group can be observed and explained by the prolonged trauma caused by the vibrations and this can cause problems especially in patients with thin skin.[18]

One of the main disadvantages of using *Piezo* is the expensive equipment, which limits its use to centers with many resources.[8] On the other hand, the use of *Piezo* does not necessarily prolong the duration of the surgery,[6,13] and the time required for the learning curve is counterbalanced by comfort and satisfaction of patients and surgeons.[10]

The use of ultrasonic surgical devices in rhinoplasty has been shown to decrease post-surgical morbidity, as well as significantly increase overall patient satisfaction.[19] According to the results obtained in this study, the degree of discomfort with the ecchymosis was greater in patients in whom the *Piezo* was not used. Indirectly, this data could be correlated with a higher degree of dissatisfaction and anxiety and as observed in other sources, postoperative skin, and soft tissue complications, such as edema and ecchymosis, can generate anxiety for patients,[1,4] which may precipitate psychological and psychiatric disorders related to body image.[5]

Although we found results that point to a beneficial effect of using *Piezo*, among the limitations of the study, we can mention the small sample, which did not allow us to obtain statistically relevant results. In addition, it would be important for the ecchymosis to be evaluated using an objective method, since in this work, this data was measured based on the

subjective assessment of the researchers and individual characteristics such as thickness and skin color were considered in the evaluation of the ecchymosis.

Despite these limitations, we believe that *Piezo* is a promising resource in the postoperative period of closed rhinoplasty as well, offering the patient a therapeutic option that can provide a lower degree of ecchymosis, thus bringing more comfort to the patient. Our team will continue to collect data so that further studies can be carried out with a more consistent focus and present statistically relevant results, helping the medical community and the multidisciplinary teams involved in the postoperative management of these patients.

CONCLUSION

The use of *Piezo* has been shown to help reduce the duration of postoperative ecchymosis after closed rhinoplasty, being a therapeutic option for the patient, also capable of reducing the degree of discomfort with this type of complication. Further studies are needed to prove its benefits according to objective parameters and through data with statistically significant results.

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REFERENCES

1. TOTONCHI, A.; GUYURON, B. Rhinoplasty. Plastic Surgery - Principles and Practice, p. 1082– 1095, 29 jun. 2021.

2. ROT, P. et al. Ocena jakości życia przed i po septorynoplastyce metodą otwartą przy użyciu ankiety WHOQOL-BREF. Otolaryngologia Polska, v. 72, n. 5, p. 1–4, 2018.

3. CONSTANTIAN, M. B. What motivates secondary rhinoplasty? a study of 150 consecutive patients. Plastic and Reconstructive Surgery, v. 130, n. 3, p. 667–678, 2012.

4. CORONEOS, C. J. et al. Perioperative Corticosteroids Reduce Short-Term Edema and Ecchymosis in Rhinoplasty: A Meta-Analysis. Aesthetic Surgery Journal, v. 36, n. 2, p. 136–146, 2016.

5. TASMAN, A. J. Reducing Periorbital Edema and Ecchymosis after Rhinoplasty: Literature Review and Personal Approach. Facial Plastic Surgery, v. 34, n. 1, p. 14–21, 2018.

6. MIRZA, A. A.; ALANDEJANI, T. A.; AL-SAYED, A. A. Piezosurgery versus conventional osteotomy in rhinoplasty: A systematic review and meta-analysis. Laryngoscope, v. 130, n. 5, p. 1158–1165, 2020.

7. ROBIONY, M. et al. Piezosurgery: A new method for osteotomies in rhinoplasty. Journal of Craniofacial Surgery, v. 18, n. 5, p. 1098–1100, 2007.

8. FILHO, M. J. S. F. et al. Comparação De Técnicas Cirúrgicas Convencionais Com a Piezocirurgia: Revisão De Literatura / Comparison of Conventional Surgical Techniques With Piezosurgery: Literature Review. Brazilian Journal of Development, v. 7, n. 2, p. 16963–16974, 2021.

9. GHAVIMI, M. A. et al. Comparison of edema and ecchymosis in rhinoplasty candidates after lateral nasal osteotomy using piezosurgery and external osteotomy. Journal of Advanced Pharmaceutical Technology and Research, v. 9, n. 3, p. 87–93, 2018.

10. KOC, B.; KOC, E. A. O.; ERBEK, S. Comparison of clinical outcomes using a Piezosurgery device vs. A conventional osteotome for lateral osteotomy in rhinoplasty. Ear, Nose and Throat Journal, v. 96, n. 8, p. 318–326, 2017.

11. GÖKSEL, Abdülkadir; PATEL, Priyesh N.; MOST, Sam P. Piezoelectric osteotomies in dorsal preservation rhinoplasty. Facial Plastic Surgery Clinics, v. 29, n. 1, p. 77-84, 2021.

12. SCHLABE, J.; ECHLIN, K.; ATHERTON, D. A comparison of piezo surgery osteotomies with conventional internal osteotomies as performed by trainee surgeons: a cadaveric study. The Annals of The Royal College of Surgeons of England, v. 103, n. 4, p. 272-277, 2021.

13. KOÇAK, I.; DOĞAN, REMZİ; GÖKLER, O. A comparison of piezosurgery with conventional techniques for internal osteotomy. European Archives of Oto-Rhino-Laryngology, v. 274, n. 6, p. 2483-2491, 2017.

14. BARRERA, José Enrique. Application of Ultrasonic Piezoelectric Technology for Rhinoplasty. Facial Plastic Surgery & Aesthetic Medicine, 2022.

15. AYDOGDU, Imran; BAYRAM, Ali Alper. Comparison of early and long-term effects of piezosurgery with conventional techniques for osteotomies in rhinoplasty. Journal of Craniofacial Surgery, v. 31, n. 6, p. 1539-1543, 2020.

16. YAZAR, Sevgi Kurt et al. Comparison of piezosurgery, percutaneous osteotomy, and endonasal continuous osteotomy techniques with a caprine skull model. Journal of Plastic, Reconstructive & Aesthetic Surgery, v. 72, n. 1, p. 107-113, 2019.

17. KIM, Do Hyun et al. Effect of piezoelectric osteotomy on postoperative oedema and ecchymosis after rhinoplasty. Clinical Otolaryngology, v. 44, n. 6, p. 968-974, 2019.

18. DEMIRBILEK, Nevzat; EVREN, Cenk. Is Piezoelectric Surgery Really Harmless to Soft Tissue?. Journal of Craniofacial Surgery, v. 30, n. 7, p. 1966-1969, 2019.

19. TROEDHAN, A. Piezotome Rhinoplasty Reduces Postsurgical Morbidity and Enhances Patient Satisfaction: A Multidisciplinary Clinical Study. Journal of Oral and Maxillofacial Surgery, v. 74, n. 8, p. 1659.e1-1659.e11, 2016.

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MEASUREMENTS OS PROJECTION AND ROTATION OF THE NASAL TIP IN PRIMARY RHINOSEPTOPLASTY: A LITERATURE REVIEW

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ABSTRACT

Introduction: Postoperative scarring can later modify the structure of the nose and there are few articles found in the literature that demonstrate anthropometric measurements in the evolution of the postoperative period of rhinoseptoplasty. **Objective:** To identify variations in projection and rotation results of the nasal tip after primary rhinoseptoplasty with the course of healing. **Materials and methods:** A literature review on projection and rotation of the nasal tip in primary rhinoseptoplasty, in addition to the illustration of three clinical cases of caucasian patients with medium skin who underwent open primary rhinoseptoplasty. Results: In the three illustrated cases, there was an increase in the rotation of the nasal tip in the seven-day postoperative, with an average of 13.68º in the female cases and 5.15º in the male case. There was an average reduction of 2.41º after six months of healing. There was no pattern of variation in the tip projection measurement. **Discussion:** The rotation of the nasal tip is measured from the nasolabial angle and the projection is equivalent to the distance that it projects from the face, which can be measured using the Goode method. Currently, one of the biggest discussions in rhinoplasty is the long-term maintenance of tip rotation and projection in closed access techniques with columellar strut and structured open access techniques using the septal extension graft. **Conclusion:** The rotation of the nasal tip varies considerably in the initial postoperative period, but it drops on average 2-3º six months later. The projection of the nasal tip did not present great differences. For more significant results, studies with a larger number of patients are necessary.

KEYWORDS

Rhinoplasty. Measurements. Facial angles. Projection. Rotation.

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INTRODUCTION

The nose presents great individual aesthetic and structural variations. The patient's motivation for performing a nasal surgical approach ranges from simple respiratory complaints to dissatisfaction with the harmony of the nose in relation to the face, whether congenital or after a traumatic event.

Rhinoseptoplasty encompasses subjective concepts of beauty. The interpretation of the patient's desire versus the real problem of the anatomy of the nose will guide the planning of the necessary structural modifications and the surgical technique to be used to achieve the expected result.

It is known that postoperative scarring can later modify the structure of the nose, leading to deformities of the nasal tip including ptosis, alar collapse, retraction, and pinching. The rate of revision rhinoseptoplasty surgeries varies from 8% to 15% according to Fagundes et al.[1]

In this context, facial aesthetic analysis is essential and includes an accurate assessment of deformities, nasal support structures and the appearance of the skin and soft tissues of each patient. There is, however, a challenge in objectively defining the harmony and, consequently, the beauty of the face, and therefore a combination of angles and measurements are used for a better rationalization of facial symmetry.[2]

There are few articles found in the literature that demonstrate these measures in the postoperative evolution of rhinoseptoplasty.[3]

Thus, this research aimed to identify possible variations in the projection and rotation results of the nasal tip after primary rhinoseptoplasty surgery with the course of healing based on a review of scientific data from the national and international literature, in addition to illustrating three clinical cases of the authors themselves.

MATERIAL AND METHODS

In this study, a review of the literature on projection and rotation of the nasal tip in primary rhinoseptoplasty was carried out. Searches were carried out in three databases: Cochrane, Scielo and Pubmed, to verify the scientific production around the subject studied.

In the first stage, the search results in the databases were identified from the following descriptors: projection, rotation, rhinoplasty, angles. The timeframe for filtering the articles was from January 2000 to October 2022.

Seven articles were found in the total of all scientific databases searched (Table 1).

In addition to the survey of existing scientific data, three illustrative cases were added to the research, randomly selected, of Caucasian patients with medium skin who underwent open primary rhinoseptoplasty, performed by the same surgeon and with the same surgical technique (Table 2), in the period from February to April 2022.

Such patients were photographed by the same researcher, in right profile view, in the pre- and postoperative periods of seven days and six months. Such photos would already be taken for routine pre- and postoperative follow-up.

The images were projected on a metric tool in the Angle Meter application for measuring facial rotation angles (nasolabial angle) and on the Prime Ruler application for calculating the projection of the nasal tip.

Table 1: Articles included in the review.

Authors and Year	Title	Journal
Pasinato et al. (2008)[3]	*"Ângulos faciais pré e pós-operatórios em pacientes submetidos à rinoplastia."*	International Archives of Otorhinolaryngology
Ingels, K.; Orhan, K. (2006)[6]	"Measurement of Preoperative and Postoperative Nasal Tip Pojection and Rotation."	The Archives of Facial Plastic Surgery
Sirinoglu, H. (2017)[8]	"The Effect of the Short and Floating Columellar Strut Graft and Septocolumellar Suture on Nasal Tip Projection and Rotation in Primary Open Approach Rhinoplasty."	Aesthetic Plastic Surgery
Fagundes et al. (2016)[1]	*"Avaliação objetiva da técnica cirúrgica na variação da rotação e projeção nasal."*	The Brazilian Journal of Otorhinolaryngology
Zuliani, G.; Silver, W. (2011)[9]	"Analysis of nasal ptosis correction using lower lateral to upper lateral cartilage suspension."	Archives of Facial Plastic Surgery
Margulis, A.; Harel, M. (2007)[7]	"Management of severe tip ptosis in closedr hinoplasty"	International Journal of Surgical Reconstruction
Patrocinio et al. (2014)[10]	"Evaluation of Lateral Crural Steal in Nasal Tip Surgery."	JAMA Facial Plastic Surgery

Table 2: Open technique rhinoplasty.

Open technique rhinoplasty
Marginal and columellar incisions
Nasal tip dissection
Pitanguy ligament removal
Access to the nasal dorsum
Nasal septum access with bilateral detachment
Simulation of nasal tip projection and rotation
Bone-cartilage back adjustment
Septoplasty and graft harvesting
Lateral and paramedian fractures (when indicated)
Reconstruction of the middle third with *spreaders* or *spreaderflaps*
Latero-lateral septal extension graft (SEG) positioning and fixation
Contralateral support graft (cartilaginous or bone Sleave)
Domal sutures for definition
Fixing the domes at the end of the SEG and the medial crura
Sutures for resting angle adjustment Camouflage with cartilage gel (if necessary) Closing the incisions

For the rotation analysis, a tangent line was drawn to the columella and another to the upper lip and the angle between them determined the nasolabial angle, equivalent to the rotation. To measure the projection of the nasal tip, Goode's method was used, passing a vertical line from the nasium to the alar sulcus, crossed horizontally by another line from the alar sulcus to the end of the nasal tip. Another line bordering the nasal dorsum was drawn, forming the hypotenuse of a right triangle. The division of the horizontal distance by the hypotenuse ideally should be 0.55-0.6:1 (55-60%).[1]

Measurements were analyzed comparatively between pre- and postoperative values in each case.

RESULTS

Seven studies were found that evaluated the measures of rotation and projection of the nasal tip in the pre- and postoperative period of septoplasty rhinoseptoplasty. Some of these with an open approach

and others with a closed approach, in addition to presenting different techniques for modifying the nasal tip. Table 3 describes the main points and conclusion of each article.

Table 3: Main characteristics of the studies included in the review.

Authors and Year	Title	Sample	Conclusion
Pasinato et al. (2008)[3]	*"Ângulos faciais pré e pós-operatórios em pacientes submetidos à rinoplastia."*	37 patients, 64% women, mean age 30 years, underwent closed rhinoseptoplasty associated with interdomal stitch.	The nasolabial and nasofontal angles increased significantly after surgery, while the nasofacial angle decreased. No significant change was observed in the nasomental angle.
Ingels, K.; Orhan, K. (2006)[6]	"Measurement of Preoperative and Postoperative Nasal Tip Pojection and Rotation."	62 patients underwent open rhinoseptoplasty with fixation of the septum in the anterior nasal spine associated with placement of a columellar strut and/or resection of the cephalic portion of the lower lateral cartilages.	There was no reduction in the projection of the nasal tip. According to Goode's method, an isolated strut hardly increases projection. However, the strut did increase the rotation of the nasal tip, which was accentuated by the cephalic removal of the lower lateral cartilage.
Sirinoglu, H. (2017)[8]	"The Effect of the Short and Floating Columellar Strut Graft and Septocolumellar Suture on Nasal Tip Projection and Rotation in Primary Open Approach Rhinoplasty."	44 cases of open primary rhinoplasty, of which 50% had the nasal tip defined by interdomal and transdomal sutures together with two septocolumellar sutures; in the other half a columellar strut was added.	In most primary cases without an extremely underprojected nasal tip or other severe tip deformities, two septocolumellar sutures in conjunction with basic tip maneuvers are sufficient for positioning and stabilizing the nasal tip. However, it should be noted that a long and, in some cases, fixed columellar stem graft is a useful tool for achieving significant tip projection, especially in cases with severely underprojected noses.
Fagundes et al. (2016)[1]	*"Avaliação objetiva da técnica cirúrgica na variação da rotação e projeção nasal."*	27 patients underwent open rhinoplasty with medial intercrural sutures and rotation of the nasal tip.	Medial intercrural sutures and nasal tip rotation sutures are effective in increasing rotation in Caucasian patients.
Zuliani, G.; Silver, W. (2011)[9]	"Analysis of nasal ptosis correction using lower lateral to upper lateral cartilage suspension."	34 patients with nasolabial angles <80o in men and <90o in women who underwent open rhinoplasty associated with suspension of the lower lateral cartilages under the upper ones (LUCS).	The technique studied has durability in correcting ptosis of the nasal tip due to an increase in the nasolabial angle.
Margulis, A.; Harel, M. (2007)[7]	"Management of severe tip ptosis in closedr hinoplasty"	23 patients with severe ptosis of the nasal tip underwent closed rhinoplasty with reduction of the cephalic edge of the alar cartilages and reduction of the upper lateral cartilages associated with a horizontal columellar strut.	The desired rotation and projection were maintained in all, except in three patients during the first year after surgery.
Patrocinio et al. (2014)[10]	"Evaluation of Lateral Crural Steal in Nasal Tip Surgery."	20 patients with hypoprojeceted nasal tips and little rotation underwent closed rhinoplasty with repositioning of the domus and lar strut.	The technique described was effective, with a significant increase in nasal tip rotation, but not a statistically significant increase in nasal tip projection.

Three patients were randomly selected, complaining of a high back and little projection of the nasal tip. Below we illustrate the photographic documentation of each case with the respective markings of the nasolabial angle (rotation) and measurement of the projection of the nasal tip using the Goode method.

CASE 1

The nasolabial angle varied from 95.46º before the procedure to 108.49º seven days after the operation, an increase of 13.3º. However, as healing progressed, the rotation went to 106.50º, a decrease of 1.99º compared to the previous value after surgery (Figs. 1 to 3).

Preoperative nasal projection had a proportion of 61%, when correlating the horizontal distance (alar sulcus to the end of the nasal tip) by the hypotenuse drawn on the nasal dorsum (3.82/6.41=0.61). Seven days after the operation, the horizontal distance had dropped to 4.33cm and the proportion had increased to 67% (4.33/6.46=0.67). Finally, the horizontal distance went to 3.82, having a new proportion of nasal projection of 59% (3.82/6.41=0.59) (Figs. 4 to 6).

Figure 1: Case 1: Preoperative nasal rotation measurement (95.46º).

Figure 2: Case 1: Measurement of nasal rotation seven days after the operation (108.49º).

Figure 3: Case 1: Measurement of nasal rotation six months after the operation (106.50º).

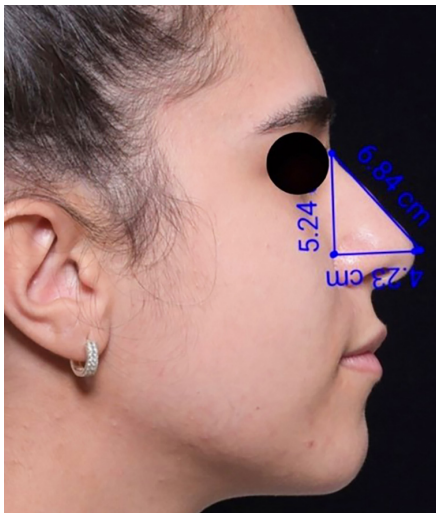

Figure 4: Case 1: Preoperative nasal projection measurement (0.61).

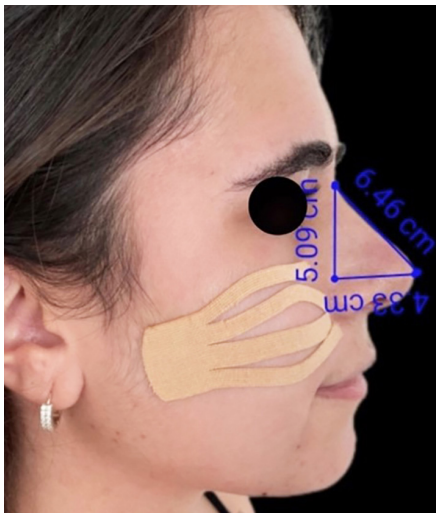

Figure 5: Case 1: Measurement of nasal projection seven days after the operation (0.67).

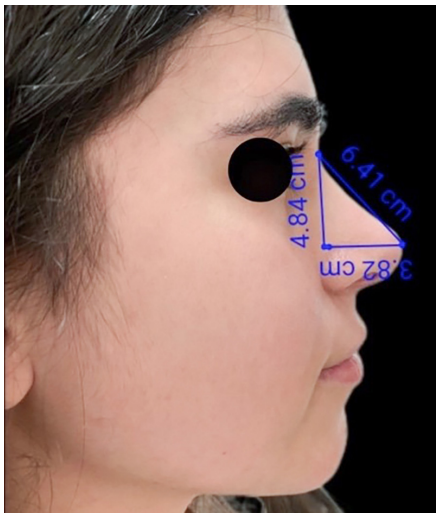

Figure 6: Case 1: Measurement of nasal projection six months after the operation (0.59).

CASE 2

In case 2, the nasolabial angle varied from 102.30º before the procedure to 107.45º seven days after the operation, an increase of 5.15º. However, as healing progressed, the rotation went to 105.35º, a decrease of 2.1º compared to the previous value after surgery (Figs. 7 to 9).

Preoperative nasal projection had a proportion of 57%, when correlating the horizontal distance (alar sulcus to the end of the nasal tip) by the hypotenuse drawn on the nasal dorsum (3.67/6.39=0.57). Seven days after the operation, the horizontal distance dropped to 3.17cm and the proportion increased to 51% (3.17/6.11=0.51). Finally, the horizontal distance reduced by 0.09cm (3.08cm) having a new proportion of nasal projection of 50% (3.08/6.07=0.50) (Figs. 10 to 12).

Figure 7: Case 2: Preoperative nasal rotation measurement (102.30º).

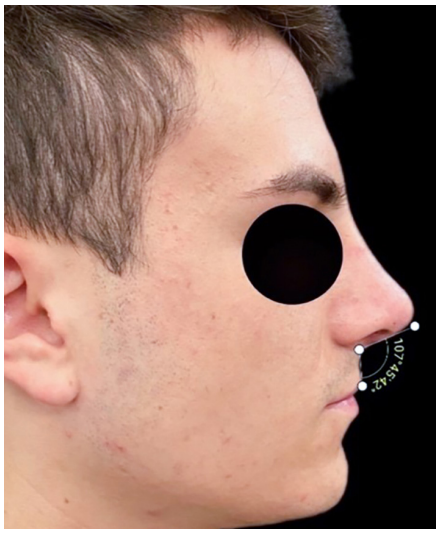

Figure 8: Case 2: Measurement of nasal rotation seven days after the operation (107.45º).

Figure 9: Case 2: Measurement of nasal rotation six months after the operation (105.35º).

Figure 10: Case 2: Preoperative nasal projection measurement (0.57).

Figure 11: Case 2: Measurement of nasal projection seven days after the operation (0.51).

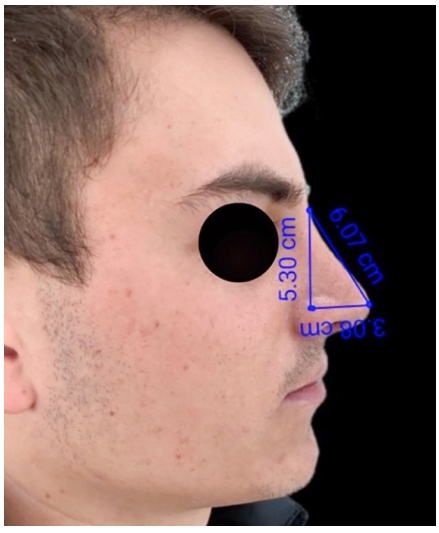

Figure 12: Case 2: Measurement of nasal projection six months after the operation.

CASE 3

In the third case, the nasolabial angle varied from 103.20º before the procedure to 117.26º seven days after the operation, an increase of 14.06º. However, as healing progressed, the rotation went to 114.10º, a drop of 3.16º compared to the previous value after surgery (Fig. 13 to 15).

Finally, the preoperative nasal projection had a proportion of 53%, when correlating the horizontal distance (alar sulcus to the tip of the nasal tip) with the hypotenuse drawn on the nasal dorsum (3.68/6.92=0.53). Seven days after the operation, the horizontal distance dropped to 3.27cm and the proportion increased to 50% (3.27/6.46=0.50). With six months of healing, the horizontal distance increased to 3.67cm (+0.40cm), this is probably due to the position of the patient's head at the time of the photograph. The new proportion of nasal projection was 57% (3.7/6.43=0.57) (Figs. 16 to 18).

Figure 13: Case 3: Preoperative nasal rotation measurement (103.20º).

Figure 14: Case 3: Measurement of nasal rotation seven days after the operation (117.26º).

Figure 15: Case 3: Measurement of nasal rotation six months after the operation (114.10º).

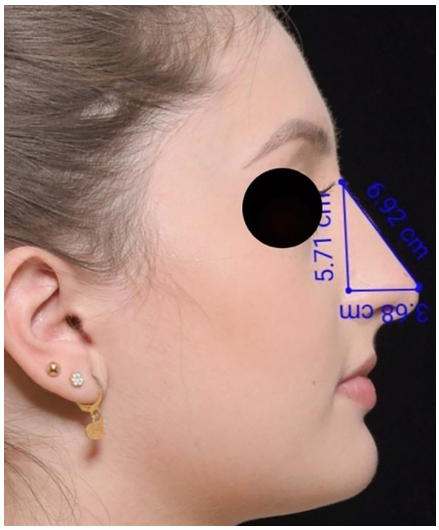

Figure 16: Case 3: Preoperative nasal projection measurement (0.53).

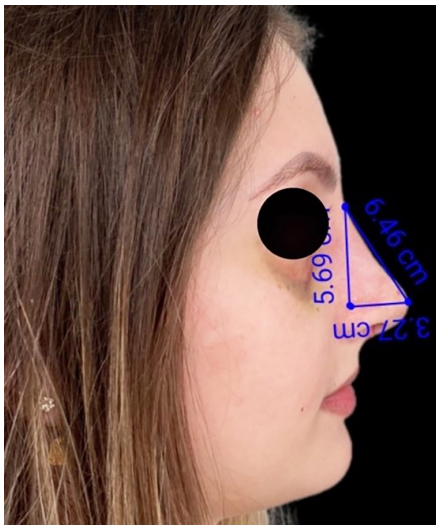

Figure 17: Case 3: Measurement of nasal projection seven days after the operation (0.50).

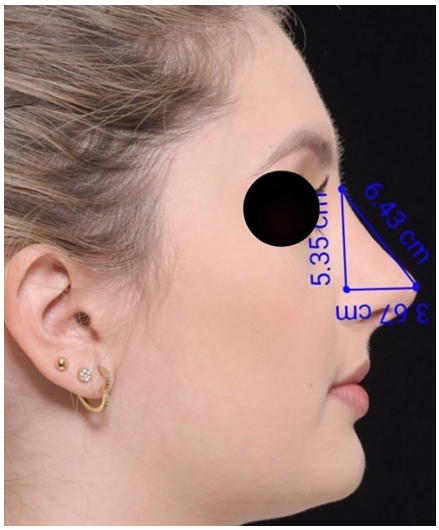

Figure 18: Case 3: Measurement of nasal projection six months after the operation (0.57).

In the three illustrated cases, there was an increase in the rotation of the nasal tip on the seventh postoperative day, with a mean gain of 13.68º in the angle for female patients and 5.15º for the illustrated case of male patients. However, there was an average reduction of 2.41º after six months of healing. As for the measurement of nasal tip projection, there was no pattern of variation, either increase or reduction, in the three moments studied in the above cases.

DISCUSSION

Each civilization and each era develops concepts of beauty according to its culture. A face is interpreted as beautiful when there is proportion and symmetry between the facial structures, composing a harmonic set.[4]

There are aesthetic standards that have prevailed since antiquity. Plato, for example, idealized the structure of the face as a system of "thirds" and the harmony of the different thirds alluded to perfect faces.[2]

Nasal ptosis and lack of tip projection correspond to a large portion of the complaints of patients who undergo rhinoseptoplasty, reaching 72%.[1]

To assess the harmony of the nose in relation to the face, it is essential to observe intrinsic characteristics of the nose, such as skin type, positioning and support of the nasal tip, cartilage shape, presence of other defects, as well as the relationship of nasal proportionality with the other facial structures. Pre- and postoperative photographic documentation are of great help for planning and monitoring the surgical evolution, although it is difficult to measure absolute parameters based on photos if the patient's head position is not identical in both moments.[5] Relative parameters are more feasible and are used in clinical practice, but they have not yet been validated for scientific studies.

Bilateral and base frontal, oblique, and profile photos must be standard. In the profile view, the bony dorsum, the projection and rotation of the nasal tip and the nasal length are analyzed.

When assessing nasal ptosis, the rotation of the nasal tip from the nasolabial angle should be observed. This measurement is defined by calculating the angle between a line tangent to the columella and another tangent infranasal to the upper edge of the upper lip. A nasolabial angle of 90° in men and 100° to 115° in women is considered ideal, although ethnic differences may influence this measure.[2] These values were close to those found in the evolution of healing in the cases illustrated above, with a nasolabial angle six months after the operation of 106.50º in case 1 (female patient), 105.35º in case 2 (male patient) and 114.10º in case 3 (female patient).

The projection of the nasal tip is the distance it projects from the face. There are several methods to evaluate it, including the Goode method. In this, a vertical line is drawn between the nasium and the alar sulcus crossed horizontally by another line from the alar sulcus to the end of the nasal tip to create a triangle whose hypotenuse represents the nasal length. The distance of the tip projection (horizontal) by the nasal length (hypotenuse) ideally should be 0.55 to 0.6 to 1 (55-60%).[1]

Such measures were also close to those found in the evolution of the patients studied in the last photographic documentation (six months): 0.59, 0.50 and 0.57 for cases 1, 2 and 3 respectively.

Allied to the knowledge of nasal support mechanisms, the notion of its dynamics is also important. The idea that changes in the rotation and projection of the nasal tip could occur due to changes in the medial or lateral crura was initially described in 1960, with the tripod concept described by Anderson. In this theory, the anatomy of the two alar cartilages forms a functional tripod that provides support for the tip. The right and left lateral crura comprise two legs of the tripod, and the two medial crura together as the third leg. In this case, changing the length and position of each leg will have repercussions on the positioning of the nasal tip.[1]

For a long time, it was believed that the greater the desired volume reduction and degree of rotation of the nasal tip, the more cartilage should be resected from the cephalic portion of the lower lateral cartilage, to relieve tension on the tip. However, today we know that maneuvers like this destroy one of the main support pillars of the tip, reducing the predictability of the long-term result, and may even lead to asymmetries.[6]

In the structured open technique, the septal extension graft right positioned, as well as the fixation of the domus at its apex, is the main definition of the final position of the tip, including its projection and rotation. Maneuvers such as section of the septum depressor muscle can be used additionally.[7]

The septocolumellar suture joins the medial pillars of the inferior lateral cartilage with the caudal septum. By placing this suture, the surgeon can gently adjust the position of the medial pillars on the caudal septum, and thus the rotation and projection of the nasal tip can be adjusted as desired.[8]

The medial intercrural suture can either increase or decrease the projection of the nasal tip, depending on the position in which the suture is anchored in the nasal septum or in the septal extension graft. Patients who have a nasal base without adequate structure are more susceptible to hypo-projected and hypo-rotated noses, and stabilizing this base is essential in maintaining, in the long term, the position of the nasal tip.[5]

The columellar strut is an autologous graft fixed between the medial crura, serving as a support, and maintaining the projection and rotation of the nasal tip. The graft should not protrude beyond the domus of the lower lateral cartilages to avoid a tent appearance on the skin. Complications encountered in the use of grafts include mal-positioning, displacement, hardening, resorption, visible irregularities, extrusion, infection, atrophy, and soft tissue deformities.[8]

Currently, one of the biggest discussions in rhinoplasty is about the long-term maintenance of rotation and projection of the nasal tip in closed access techniques - which mostly use the columellar strut - and structured open access techniques, which today mostly use the graft of septal extension. There is still a lack of scientific studies that objectively and consistently compare the two techniques and the long-term results of the respective grafts in supporting the tip.

Other grafts can have the effect of increasing the projection of the nasal tip, such as the Shin shield and the cartilage cap. Most surgeons use these other grafts in association with the maneuvers to increase projection and even definition of the tip, rarely being used in isolation for these purposes.[5]

As we discussed, there are numerous techniques described to increase the rotation and projection of the nasal tip, but there are few objective results in the postoperative period, especially in the long term, so that the effectiveness of these techniques can be quantified.[1]

Ingels & Orhan[6] studied the photographs of 62 patients submitted to primary open rhinoseptoplasty with fixation of the septum in the anterior nasal spine associated with the placement of a columellar strut (n=36) or not (n=26), in the pre- and post-operative period. six-month operation. The mean projection measurement preoperatively was 0.58 in both groups, while postoperatively it was 0.60 in the group with columellar strut versus 0.59 in the group without the graft. The difference was statistically significant only in the strut group (p=0.02).

Regarding nasal tip rotation, the group with columellar strut also showed a significant difference (p=0.006). The nasolabial angle had a greater increase in those who kept the inferior lateral cartilage intact (93.06º-100.02º) than those who had the cephalic resection (88.30º-95.06º). The group with only cephalic resection, without graft placement, had a significant increase in rotation from 94.22º to 102.03º (p=0.05).[6]

Sirinoglu[8] observed 44 cases of open primary rhinoplasty with photographs of the right profile one month postoperatively (resolution of most of the edema) and one year later (definitive values). In the photographic documentation, she evaluated the projection by Goode's method and the rotation by measuring the nasolabial angle. Half of the sample had the nasal tip defined by inter-domal and trans-domal sutures together with two septocolumellar sutures (Group 1). In the other half (Group 2), in addition to the previous techniques, a columellar strut made with quadrangular cartilage was performed.

In both groups, a small loss of nasal tip projection (3.8% in Group 1 and 3.5% in Group 2) and nasal tip rotation (4.0% in Group 1 and 4.1% in Group 2) was found, however, these changes were not statistically significant. For the author, in most primary cases, two septocolumellar sutures together with basic tip maneuvers are enough to stabilize the nasal tip. However, the columellar strut is a useful tool to achieve significant tip projection, especially in cases with a severely under-projected nose.[8]

Zuliani et al.[9] used open rhinoplasty associated with suspension of the lower lateral cartilages under the upper ones (LUCS) in cases of nasal ptosis, resulting in a variation in the nasolabial angle from 83.4° preoperatively to 102.3° one year after surgery in 24 patients.

Patrocínio et al.[10] evaluated 20 patients who underwent closed rhinoplasty using the "stealing of the lateral crura" technique to increase nasal rotation in the late postoperative period, showing a mean increase of 20° in the late postoperative period, which was statistically significant.

Pasinato et al.[3] carried out a prospective study with 37 patients, with a mean age of 30 years, 64% female, who underwent primary closed rhinoseptoplasty and subsequent photographic documentation of the right profile for comparison of nasolabial, nasofrontal, nasomental and nasofacial angles (equivalent to the projection of the nose) pre and immediate postoperative. The study showed an average increase of 8.6º in the nasolabial angle (p<0.001) and a decrease of

2.3º in the nasofacial angle (p=0.01), among the other angles addressed. There was no assessment of long-term maintenance of angle measurements.

Fagundes et al.[1] objectively evaluated photographs in right profile preoperatively and after 12 months of 27 Caucasian patients, with a complaint of a hypo-projected nose, who underwent a closed technique with medial intercrural suture associated with a cephalic rotation suture to increase projection and rotation. of the nasal tip. The septocolumellar suture to close the access incision was performed at the same level. To measure nasal rotation, the nasolabial angle was used. To measure nasal projection, Goode's method was used.

Nasal rotation showed a statistically significant increase. There were no statistically significant changes in relation to nasal projection. It is concluded that the medial intercrural and nasal tip rotation sutures are only effective in increasing the nasolabial angle in Caucasian patients undergoing primary endonasal rhinoplasty. There was no difference in nasal projection.[1]

CONCLUSION

Maintaining long-term rotation and projection of the nasal tip in a predictable manner is certainly one of the biggest challenges in rhinoplasty. Added to this is the ever-increasing demand from patients to obtain increasingly refined results.

We observed many studies so far analyzing tip rotation and projection in endonasal or open technique with columellar strut. However, we currently see a growing trend towards the use of septal extension grafts in structured open rhinoplasties. Would this graft be objectively capable of maintaining projection and tip rotation in the long term better than other techniques used? Or even an ultra-structured technique, with a more rigid tip, also lose projection and angle of rotation with time?

In our brief analysis of three cases, we noticed that the rotation of the nasal tip varies considerably in the initial postoperative period when compared to the measures taken before rhinoseptoplasty, however, it presented an average decrease of 2-3º in the illustrated cases with six months of healing evolution. The projection of the nasal tip did not present great differences.

A bias to be considered was the lack of method used in the photograph. Positioning the patient for photographic follow-up both pre- and postoperatively is essential, as variations can interfere with the measurements to be analyzed.

Our purpose in this study was just to briefly illustrate with surgical cases the discussion about the projection and rotation of the nasal tip in the open structured technique. For significant results and more solid conclusions on the subject, studies with a larger number of patients are necessary.

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REFERENCES

1. FAGUNDES, M.S.C. et al. Objective assessment of surgical technique in rotation and nasal projection variation. Braz J Otorhinolaryngol, v.82, n.1, p. 47-55, 2016.

2. PIGNATARI, S.S.N. et al. Tratado de Otorrinolaringologia. 3. ed. Rio de Janeiro: Elsevier, 2018.

3. PASINATO, R. et al. Pre and post-operative facial angles in patients submitted to rhinoplasty. Intl Arch Otorhinolaryngol, v. 12, n.3, p. 393-6, 2008.

4. TORIUMI, D.M. Structure approach in rhinoplasty. Facial Plast Surg Clin North Am, v. 10, p. 1-21, 2002.

5. DANIEL, R.K. Rinoplastia – básica e avançada. 2. ed. Rio de Janeiro: Revinter, 2012, p. 13-67; 101-55.

6. INGELS, K.; ORHAN, K.S. Measurement of preoperative and postoperative nasal tip projection and rotation. Arch Facial Plast Surg, v.8, p. 411-15, 2006.

7. MARGULIS, A. et al. Management of severe tip ptosis in closed rhinoplasty: the horizontal columellar strut. J Plast Reconstr Aesth Surg, v. 60, p. 400-6, 2007.

8. SIRINOGLU, H. The effect of the short and floating columellar strut graft and septocolumellar suture on nasal tip projection and rotation in primary Open approach rhinoplasty. Aesthetic Plastic Surgery, v. 41, p. 146-152, 2017.

9. ZULIANI, G.F. et al. Analysis of nasal ptosis correction using lower lateral to upper lateral cartilage suspension. Arch Facial Plast Surg, v. 13, p. 26-30, 2001.

10. PATROCINIO, L.G. et al. Evaluation of lateral crural steal in nasal tip surgery. JAMA Facial Plast Surg, v. 16, p. 400-4, 2014.

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COMPARATIVE ANALYSIS OF PRICK TEST PRE AND POST SUBLINGUAL IMMUNOTHERAPY FOR ALLERGIC RHINITIS

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ABSTRACT

Introduction: Allergic rhinitis is an immune-mediated reaction, the diagnosis of which can be complemented with the immediate hypersensitivity skin test using the prick test. Allergen-specific immunotherapy (AIT) is indicated for specific cases and is the only disease-modifying treatment. So far, there is not a biomarker to objectively monitor its evolution. **Objectives:** To compare the degree of pre- and post-sublingual immunotherapy (SLIT) skin sensitization in patients with allergic rhinitis, in order to validate the prick test as an objective measure of response to treatment. **Material and methods:** Observational, analytical and retrospective study, which compared, for each allergen, the skin reactions of the prick test before and after starting sublingual immunotherapy. **Results:** 71 patients were included. There was a reduction in skin sensitization in patients undergoing SLIT to grasses ($p<0.05$). The same statistical relevance was not found for those submitted to SLIT for mites ($p>0.05$). A positive correlation was found between the interval of skin tests and the reduction of skin sensitization to Dermatophagoides pteronyssinus. **Discussion:** The prick test can be considered an objective marker of response to treatment only for patients with seasonal allergic rhinitis. The present study suggests that the longer the SLIT, the greater the reduction in skin sensitization, evidencing the importance of completing the treatment for a better outcome. **Conclusion:** Studies are still needed to determine an objective marker of treatment response that reliably correlates with the patient's clinical response.

KEYWORDS

Skin prick test. Sublingual immunotherapy. Allergic rhinitis.

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INTRODUCTION

Allergic rhinitis consists of an inflammation and dysfunction of the nasal cavity mucosa, resulting from an immune-mediated reaction to inhaled allergens in genetically predisposed individuals.[1]

The diagnosis of allergic rhinitis is based on clinical history and confirmed by complementary tests that show the presence of allergen-specific IgE. In the anamnesis, the patient usually reports cardinal symptoms – sneezing in clusters, hyaline rhinorrhea, intense nasal itching, and nasal obstruction – when exposed to an allergen. The most relevant complementary exams for its diagnosis consist of the immediate hypersensitivity skin test using the prick test and the evaluation of serum levels of specific IgE.[2]

The treatment of allergic rhinitis is based on 4 pillars: patient education, environmental control, pharmacotherapy, and immunotherapy.[2] Allergen-specific immunotherapy (AIT), is indicated for cases of moderate/severe intermittent allergic rhinitis or all cases of persistent allergic rhinitis, if there is allergen-specific sensitization proven by *in vivo* or *in vitro* exams.[1] AIT consists of administering increasing amounts of allergenic extracts to sensitized individuals, with the aim of inducing hypo-sensitization via the immunological tolerance mechanism.[3] It is the only treatment that modifies the natural course of the disease, capable of providing long-term benefits and preventing disease progression, including the development of asthma or new sensitization.[1]

So far, the management of immunotherapy does not have a biological marker capable of objectively monitor the response to treatment.[4] Thus, the aim of the present study is to compare the degree of skin sensitization to specific allergens before and after the start of sublingual immunotherapy in patients with allergic rhinitis. So that if a lower skin sensitization is confirmed after treatment, the prick test will compose an objective data of response to treatment.

MATERIAL AND METHODS

This is an observational, analytical, and retrospective study, in which the results of pre- and post-initiation of treatment of patients undergoing sublingual immunotherapy (SLIT) for allergic rhinitis were compared. Patients from a specialized rhinitis and allergy center in the city of Curitiba-PR, Brazil, who underwent SLIT between January 2017 and April 2021, had their medical records reviewed. Those with pre- and post-SLIT prick test records were included in the study. Data such as age, sex, immunotherapy formula and adherence to treatment were also collected. Patients with records of regular returns to the immunotherapy prescribing physician configured good adherence. Patients whose return records were irregular or absent configured poor adherence. The study was approved by the Ethics and Research Committee of Hospital IPO (CAAE: 58926422.9.0000.5529).

All patients included in the study underwent the same Multi-Test® skin test, both before and during treatment. The allergens tested in each prick test were: *Blomia tropicalis, Dermatophagoides farinae, Dermatophagoides pteronyssinus*, mix fungi (*Aspergillus fumigatus, Penicillium notatum, Alternaria alternata, Cladosporium herbarum*), *Cynodon dactylon*, mix grasses (*Dactylis glomerata, Festuca pratensis, Lolium multiflorum, Phleum pratense, Poa pratensis*), dog epithelium, cat

epithelium, cockroach mix (*Blatella germanica, Periplaneta americana*), mosquito mix (*Aedes communis, Culex pipiens*), cow's milk, chicken egg, wheat and crustacean mix (lobster, oyster, crab, shellfish). The patient's degree of sensitization to each allergen is determined by the diameter of the papule formed 20 minutes after puncturing the skin with the allergenic extract, as follows: 0-2 mm, a negative response; 3-4 mm, a weak response (+); 5-6 mm, moderate (++); 7-9 mm, strong (+++); and ≥10 mm, a very strong response (++++).

Also, all patients used vaccines from the same supplier (ALC), varying their formulations according to the sensitization profile obtained in the first prick test.

Statistical analyzes were performed separately for the results of each allergen, considering only data from patients who had the allergen in question included in the formulation of the SLIT itself.

The results of quantitative variables were described by mean, standard deviation, median, minimum, and maximum. Categorical variables were described by frequencies and percentages. To compare the results of the pre- and post-SLIT skin tests, in relation to the size of the formed wheal (mm) and the intensity of the reaction (crosses) for each allergen, the Wilcoxon non-parametric test was used. Additionally, the comparison of these same results, stratified by gender or adherence (good or poor), was performed using the non-parametric Mann-Whitney test. The condition of normality of continuous quantitative variables was evaluated using the Kolmogorov-Smirnov test. Data were organized in an Excel® spreadsheet and analyzed using the IBM SPSS Statistics v.20.0 computer program.

RESULTS

A total of 71 patients were included in the study, 33 female (46.5%) and 38 male (53.3%). The mean age of patients who started SLIT was 19.5 ± 13.2 years (minimum age 4.4 and maximum age 60.8). The mean time between the first and second skin test was 25.3 ± 10.5 months. As for adherence to treatment, 58 patients had good adherence (81.7%), while 13 had poor adherence (18.3%).

Regarding the composition of the sublingual immunotherapy, only 2 patients were treated with a single allergen extract, while 69 patients were treated for more than one allergen. All patients were treated for at least one of the following agents: *Blomia tropicalis* (n=34), *Dermatophagoides farinae* (n=46), *Dermatophagoides pteronyssinus* (n=57), grass mix (n=26), *Cynodon dactylon* (n= 2), dog epithelium (n=4), cat epithelium (n=4). Table 1 shows the frequencies and percentages of patients according to the SLIT formulation.

Table 1: Composition of sublingual immunotherapy.

Treated agents	n	%
D. farinae, D. pteronyssinus***	13	18.3
Blomia tropicalis, D. farinae, D. pteronyssinus	10	14.1
Blomia tropicalis, D. pteronyssinus	7	9.9
D. pteronyssinus, Grass mix	7	9.9
Blomia tropicalis, D. farinae	6	8.5
D. farinae, D. pteronyssinus, Grass mix	6	8.5
Blomia tropicalis, D. farinae, Grass mix	4	5.6
Blomia tropicalis, D. pteronyssinus, Grass mix	4	5.6
D. farinae, Dog epithelium	2	2.8
Blomia tropicalis	1	1.4
Blomia tropicalis, D. farinae, D. pteronyssinus, Grass mix	1	1.4
Blomia tropicalis, D. pteronyssinus, Cat epithelium	1	1.4
D. farinae, D. pteronyssinus, Dog epithelium	1	1.4
D. farinae, D. pteronyssinus, Cynodon dactylon	1	1.4
D. farinae, D. pteronyssinus, Cat epithelium	1	1.4
D. farinae, Grass mix	1	1.4
D. pteronyssinus	1	1.4
D. pteronyssinus, Cynodon dactylon, Grass mix	1	1.4
D. pteronyssinus, Cat epithelium	1	1.4
D. pteronyssinus, Grass mix, Dog epithelium	1	1.4
D. pteronyssinus, Grass mix, Cat epithelium	1	1.4
Total	**71**	**100**

**D. farinae: Dermatophagoides farinae*
***D. pteronyssinus: Dermatophagoides pteronyssinus*

Blomia tropicalis

The analysis of the skin test results of 34 patients submitted to SLIT for *Blomia tropicalis*, observed a mean reduction of the wheal related to the allergen of 1.4±3.6mm after the start of immunotherapy, although not statistically significant (p=0.089). However, when comparing the intensity of sensitization measured in crosses, in fact, no differences were observed between the values of the first and second prick test (p=0.042).

Dermatophagoides farinae

Data from the 46 patients submitted to SLIT for *Dermatophagoides farinae,* showed a mean reduction of the wheal related to this allergen of 0.4±3.4mm after the start of immunotherapy (p=0.464). When comparing the intensity of sensitization measured in crosses, no statistically significant differences were observed between the values of the first and second prick test (p=0.605).

Dermatophagoides pteronyssinus

Data from 57 patients submitted to SLIT for *Dermatophagoides pteronyssinus* showed a mean reduction of the wheal related to this allergen of 0.5±2.9mm after the start of immunotherapy (p=0.283). When comparing the intensity of sensitization measured in crosses, no statistically significant differences were observed between the values of the first and second prick test (p=0.302). However, a positive correlation (Spearman correlation coefficient=0.36) was found between the difference in the degree of sensitization (crosses) and the interval (months) between the first and second skin test (p=0.007).

Grass mix

On the other hand, the 26 patients submitted to immunotherapy for mix grasses, presented a statistically significant average reduction of 5±6.5mm in the size of the wheal related to these allergens after the beginning of the treatment (p=0.002). There was also a significant reduction in the degree of sensitization measured in crosses in these patients (p=0.001). No statistically significant correlation was found between the reduction in sensitization (whether in mm or in crosses) and age (p=0.095 and p=0.172), time between tests (p=0.206 and p=0.153), gender (p=0.362 and p=0.287), adherence (p=0.753 and p=0.850).

Dog and cat epithelium

Patients submitted to SLIT for dog epithelium showed an average reduction of 1.8±2.4mm in the size of the papule referring to this allergen. Those submitted to SLIT for cat epithelium, in turn, showed an average increase of 2.3±5.9mm in the size of the papule referring to cat epithelium. No statistical test was applied due to the small number of cases.

DISCUSSION

The present study showed an adherence rate to sublingual immunotherapy of 81.7%, data consistent with the literature. Studies in the area have shown that the regular use of sublingual therapy ranges from 50% to 90%, but sales data from SLIT distributors have revealed that most patients abandon treatment within the first year, and only up to the 3rd year of treatment 15% persists.3 It should be noted that the high adherence rate in this study does not portray the reality of all patients at the center specialized in rhinitis and allergy, as only those who returned to the prescribing physician and underwent a second prick test were included.

As for the allergen sensitization profile of the sample, all patients had a skin reaction to at least one mite, with Dermatophagoides pteronyssinus being the most prevalent mite (80%). A cross-sectional study, which observed the profile of allergic sensitization in the city of Curitiba-PR, through the prick test, also showed that Dermathophagoides pteronyssinus was the most prevalent mite, with approximately 60% positivity in the entire sample.[5]

All mites (*Blomia tropicalis, Dermatophagoides farinae, Dermatophagoides pteronyssinus*) analyzed showed a tendency to reduce the size of the papule with the start of immunotherapy, although none of them showed statistical relevance. Tahamiler et al.,[6] unlike the present study, found a statistical difference between the means of pre- and post-immunotherapy skin test results for *Dermatophagoides farinae* and

Dermatophagoides pteronyssinus. Aydogan et al.,[7] found a significant reduction in the skin reaction to Dermatophagoides pteronyssinus after one year of SLIT, whereas for *Dermatophagoides farinae* they did not obtain any difference - thus reflecting the heterogeneity of these data in the literature.

Patients undergoing immunotherapy to grass mix, however, showed a significant reduction in sensitization to these allergens after initiation of treatment. Consequently, the use of the prick test as an objective measure of response to treatment would be justified by the present study only in patients with seasonal allergic rhinitis. This result, however, raises the question of the quality of the allergen extracts used in the prick test. It is known that, during its production and handling, several factors can influence its quality and immunogenicity, such as: storage temperature, time, contamination, dilution, preservatives used, among others.[8] Although the tests in the present study were performed with extracts of the same origin, the existence of less immunogenic grass mix extracts may be one of the explanations for the finding of reduced skin sensitization only for these allergens.

There was also a positive correlation between the change in the intensity of sensitization to Dermatophagoides pteronyssinus and the time interval between the first and second prick test. This data suggests that the longer the treatment time with SLIT, the greater the reduction in sensitization. A randomized clinical trial, which compared groups submitted to 2 and 3 years of SLIT for mites, showed that patients submitted to a longer treatment period had a significantly greater reduction in the size of the prick test papule than those who underwent only 2 years, corroborating the finding of the present study.[9]

Data in the literature on the evolution of the skin test during SLIT are still conflicting, making it impossible to justify its routine use. Efforts to find a biological marker to monitor the response to immunotherapy for allergic rhinitis, however, continue. It is known that the immunological tolerance mechanism by which immunotherapy acts consists of the inversion of the pattern of Th2 cytokines (IL-4/5/13) to Th1, where there is a reduction in the production of specific IgE and an increase in the production of specific IgG4 (sIgG4).[4]

In this sense, some recent studies have shown that patients undergoing SLIT expressed significantly higher levels of sIgG4 compared to the placebo group.[10] Also, sIgG4 levels have already been negatively correlated with clinical post-immunotherapy allergic rhinitis and may - in the future - even be considered an objective marker of response to immunotherapy for allergic rhinitis.[6]

One of the limitations of the present study is the lack of correlation between the prick test results and the symptomatology reported by the patient, a limitation due to the retrospective nature of the work, in which the records on the symptomatology of each patient during treatment were not reported in detail, objective and consistent way.

CONCLUSION

The present study showed a reduction in skin sensitization after the initiation of sublingual immunotherapy only for patients treated with grass extract mix. Thus, the use of the prick test as an objective marker of response to treatment could only be justified

in patients with seasonal allergic rhinitis. Although these results were statistically relevant, attention should be paid to the quality of the extracts used in the prick test, which could have had their immunogenicity reduced, leading to the finding of the present study. Also, the present work shows that the longer the treatment time with SLIT for *Dermatophagoides pteronyssinus*, the greater the reduction of skin sensitization, showing the importance of completing the treatment for a better result. Further studies are still needed to find a reliable SLIT response marker that correlates with the patient's clinical response.

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REFERENCES

1. SAKANO, E. et al. IV Brazilian Consensus on Rhinitis – an update on allergic rhinitis. Braz J Otorhinolaryngol, v. 84, n. 1, p. 3–14, 2018. DOI: 10.1016/j.bjorl.2017.10.006.

2. GREINER, A.N. et al. Allergic rhinitis. Lancet, v. 378, n. 9809, p. 2112–2122, 2011. DOI: 10.1016/S0140-6736(11)60130-X.

3. PASSALACQUA, G. et al. 30 years of sublingual immunotherapy. Allergy, v. 75, n. 5, p. 1107–1120, 2020. DOI: 10.1111/all.14113.

4. JAT, K.R. et al. Sublingual Immunotherapy in Allergic Rhinitis: Search for a Suitable Biomarker Continues! Indian J Pediatr, v. 85, n. 10, p. 834–835, 2018. DOI: 10.1007/s12098-018-2773-2.

5. MANIGLIA, S. et al. Sensitization Profile to Allergens in Patients Using Multi-Test II. Int Arch Otorhinolaryngol, v. 18, n. 04, p. 391–397, 2014. DOI: 10.1055/s-0034-1385845.

6. TAHAMILER, R. et al. Long-term immunotherapy for perennial allergic rhinitis: relationship of specific IgG levels to skin-prick test results and clinical symptoms and signs. Ear Nose Throat J, v. 87, n. 12, p. E29, 2008. Disponível em: http://europepmc.org/abstract/MED/19105132.

7. AYDOGAN, M. et al. Sublingual immunotherapy in children with allergic rhinoconjunctivitis mono-sensitized to house-dust-mites: A double-blind-placebo-controlled randomised trial. Respir Med, v. 107, n. 9, p. 1322–1329, 2013. DOI: 10.1016/j.rmed.2013.06.021.

8. ARIAEE, N. et al. Preparation allergenic pollen extracts; the points should be considered to make high-quality products. J Immunoassay Immunochem, v. 40, n. 1, p. 26-39, 2019. DOI: 10.1080/15321819.2018.1543705.

9. TAHAMILER, R. et al. Long-Term Efficacy of Sublingual Immunotherapy in Patients With Perennial Rhinitis. Laryngoscope, v. 117, n. 6, p. 965–969, 2007. DOI: 10.1097/MLG.0b013e31804f8141.

10. HUANG, Q. et al. [Effect of sublingual immunotherapy with Dermatophagoides Farinae on the expression of specific IgG4 in patients with allergic rhinitis in Hainan area]. J Clin Otolaryngol Head Neck Surg, v. 34, n. 2, p. 135–139, 2020. DOI: 10.13201/j.issn.1001-1781.2020.02.009. Disponível em: http://europepmc.org/abstract/MED/32086918

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USE OF THE NUCLEUS SMARTNAV® SYSTEM IN INTRAOPERATIVE TELEMETRY OF COCHLEAR IMPLANT

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ABSTRACT

Tests performed intraoperatively are routine tools in cochlear implant (CI) programs worldwide. Recently, Cochlear™ launched the Nucleus Smartnav® system that describes new parameters measured during insertion of the electrode array into the cochlea, verifies its position, tests impedance and AutoNRT. **Objective:** To describe the use of the Cochlear™ Nucleus SmartNav® system as an intraoperative measurement tool in cochlear implant surgery. **Material and Methods:** Patient with bilateral and congenital profound prelingual deafness. He has been using an individual sound amplification device (PSAD) bilaterally since childhood, has reasonable speaking skills and good understanding of others' speech. Although IC was previously indicated, he chose to keep the hearing aid. However, given the inefficient gain, mainly in the left ear, a bimodal adaptation was suggested: CI in the left ear and hearing aids in the right. At the age of 48, he underwent CI surgery on the left, using the Cochlear™ CI622 model with CP1001 speech processor and intraoperative measurements performed by the Nucleus® SmartNav system. The impedance test and NRT were also performed intraoperatively using the Nucleus® SmartNav system, after reviewing the insertion of the electrodes. **Result:** The measurements obtained during the insertion of the electrode array in the cochlea allowed greater intraoperative control by enabling fine adjustments in the surgical technique. **Conclusion:** The Nucleus Smartnav® system endorses technologies that aim to increase surgical precision and reduce complications.

KEYWORDS

Cochlear implant. Intraoperative metrics. Automated systems. Angular depth. Average speed. Insertion time.

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INTRODUCTION

Tests performed intraoperatively are routine tools in cochlear implant (CI) programs worldwide. Such measures according to Bento et al.[1] allow the analysis of the integrity of the internal device, the coupling of the parts, the functionality of the auditory nerve, confirming the proper positioning of the electrode bundle and the permeability of the auditory nerve to electrical stimulation.[2] It also represents an option to monitor auditory nerve responses over time and serve as a basis during CI activation and programming.

The synchronized response of the auditory nerve to the electrical current emitted by an intracochlear electrode is the electrically evoked compound action potential (ECAP). The feasibility of ECAP has enabled Cochlear™ to release Neural Response Telemetry (NRT), NRT software (version 2.04), to quantify the longitudinal propagation of neural excitation in the Nucleus Cochlear Implant CI24M.[3] From then on, neural tests became a reality and a valuable tool, both intraoperatively and postoperatively.

Typically, intraoperative neural testing is performed either after insertion or after suturing. Recently, Cochlear™ launched the Nucleus Smartnav® system which describes new parameters measured during insertion: real-time measurement of angular insertion depth and final electrode position, speed and consistency of electrode insertion, verification of correct electrode position, impedance testing and NRT (AutoNRT).

The electrodes compatible with the Nucleus Smartnav® system are the perimodiolar electrodes (Slim Modiolar/Contour Advance) and the lateral wall electrodes (Slim Straight). Aschendorff et al.,[2] Skarzynski et al.,[4] describe the types of electrodes: the Slim Modiolar has the reloaded characteristic and uses half-band electrodes with a diameter of 0.5 mm and 0.4 mm at the apex, decreasing trauma and translocation of the scala tympani and maintain constant modiolar proximity; Slim Straight is seen as the most suitable option for preserving residual hearing, straight and extremely thin electrode, it has two insertion markings in its beam, 20 mm and 25 mm, which allows for a more or less deep insertion.

Thus, objective tests have been studied and developed with the aim of predicting the levels of stimulation of the auditory pathway and detailing the intraoperative measures also used in the postoperative period in the dynamics of auditory rehabilitation with CI.[5]

MATERIAL AND METHODS

The work consists of a non-concurrent prospective observational study, of the CASE REPORT type of cochlear implant surgery using the Cochlear™ Nucleus SmartNav® system, as an intraoperative measurement tool, which describes new parameters measured during electrode insertion. In the case of this study, the patient underwent cochlear implantation of the Cochlear™ Nucleus® CI632, performed at the Hospital de Otorrinolaringologia IPO, in May 2022. Data collection will be in the medical record, without requesting the waiver of the ICF, with guidance via telephone to clarify the term, to authorize the use and dissemination of information, without identifying the participant. The measurements made in real time by Nucleus SmartNav® will be described in this case: final angular insertion depth, total time and average

speed of electrode insertion, review of placement, impedances, and neural response telemetry (NRT) and AutoNRT®. It will also contain the characteristics of the study participant regarding age, gender, and laterality of the hearing loss.

CASE REPORT

KC, 48 years old, female, born and raised in Curitiba (PR), with bilateral profound prelingual deafness of congenital etiology. She has been using an personal sound amplification device (PSAD) bilaterally since childhood. During consultation, she presented reasonable oral skills and good understanding of the speech of others.

Although a cochlear implant (CI) was previously indicated, the patient chose to keep the PSAD. However, it showed inefficient gain over time, mainly in the left ear. Given this scenario, a bimodal adaptation was indicated: CI in the left ear and PSAD in the right.

Thus, for the procedure to be carried out, computed tomography of the mastoids and magnetic resonance of the temporal bones were performed, both within normality standards, speech-language evaluation and vaccination card.

Thus, the patient underwent CI in the left ear, using the Cochlear model CI622 with speech processor CP1001. During surgery, after opening the round window, intraoperative telemetry was started with the Nucleus® SmartNav system, with the following metrics measured in real time: angular insertion depth of 461º, average insertion speed of 0.26 mm/s, total time of 03:24 min and verification of the positioning of the arrangement of electrodes (Fig. 1). Immediately after insertion, an impedance test was performed, confirming the integrity of the electrodes' contact, and the AutoNRT® was verified, with adequate neural response in all electrodes (Fig. 2 to 4).

Figure 1: Post-insertion diagnosis of the electrode array to verify positioning, with the measurements observed during the intraoperative period: Angular depth 461º, Total time 03:24 minutes, Average speed 0.26 mm/s.

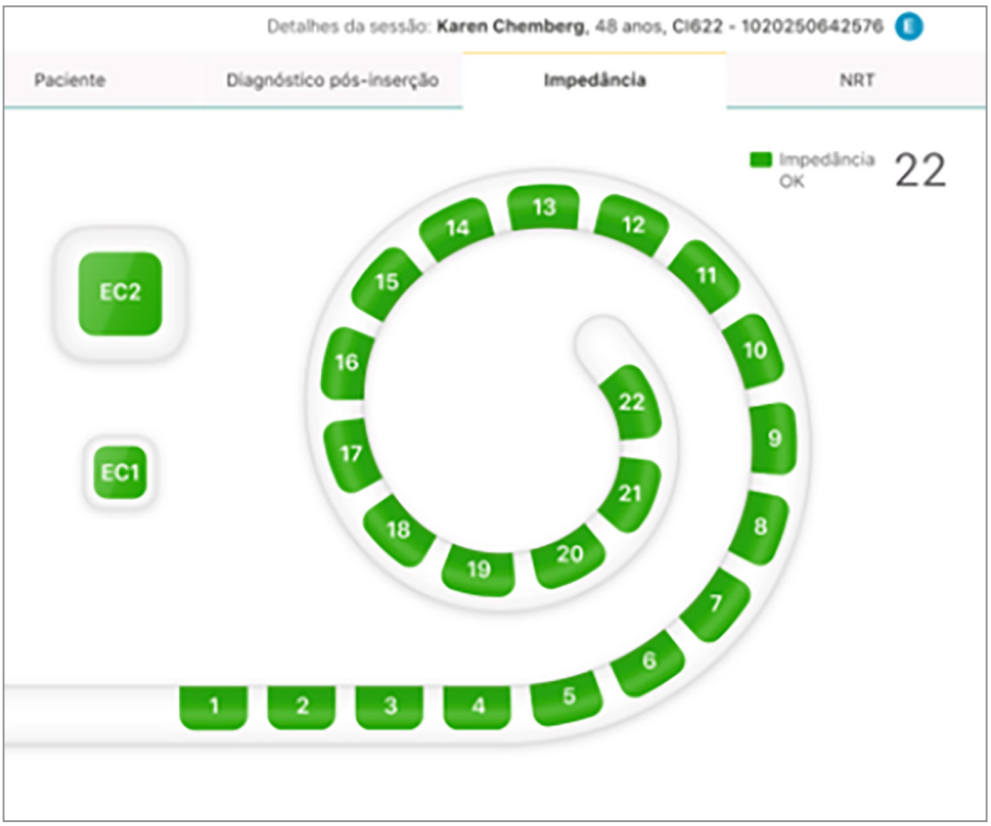

Figure 2: Real-time impedance measurement verifying the contact integrity of the electrodes.

Figure 3: AutoNRT® graphically demonstrating neural response, adequate across all electrodes.

Figure 4: AutoNRT® demonstrating the last 3 responses for the current electrode tested at fatigue intensity individually and with adequate response in all.

DISCUSSION

Cochlear implant surgery is relatively safe, but it can be associated with complications, as with any surgical procedure.[1,6]

Cohen[8] states that the popularization of the cochlear implant and the expansion of both indications and eligible candidates for surgery are changes that directly affect the techniques and safety of the surgery.

The possibility of surgery in malformations of the inner ear, in unilateral hearing loss or with significant residual hearing, and in certain indications of disabling tinnitus, reiterate intraoperative care and demand a less traumatic surgical technique.[8,1,7,9]

Dhanasingh et al.,[10] discussed intracochlear trauma during electrode insertion based on the 5 grades according to the Eshraghi scale: grade 0 corresponds to atraumatic insertion, grade 1 refers to lifting of the basilar membrane, grade 2 corresponds to rupture of the basilar membrane or the spiral ligament, grade 3 depicts the displacement of the electrode from the scala tympanic to the scala buccal and grade 4 represents the fracture of the bone spiral lamina or modiolus wall. According to the authors, grades 2 to 4 are considered irreversible since they can cause the scala tympanic endolyphus to mix with the scala tympanic perilymph. In addition to the trauma, Aschendorff et al.,[8] and Jwair, et al.,[9] point out that the translocation between the scales unfavorably positions the electrode array, which can compromise cochlear nerve stimulation and negatively affect the results, hearing aids.

Imaging exams, high-resolution computed tomography of the temporal bone and magnetic resonance imaging of the auditory canals are fundamental for anatomical evaluation and, thus, scheduling surgery or even contraindicating it. The image study allows evaluating the morphology and size of the cochlea (Fig. 5), whose measurements Rajan et al.[11] demonstrate to be highly variable between individuals, with sizes from 25mm and that can reach 45mm. Rajan et al.[11] also states that the exact dimensions of the cochlea obtained are of great value during the introduction

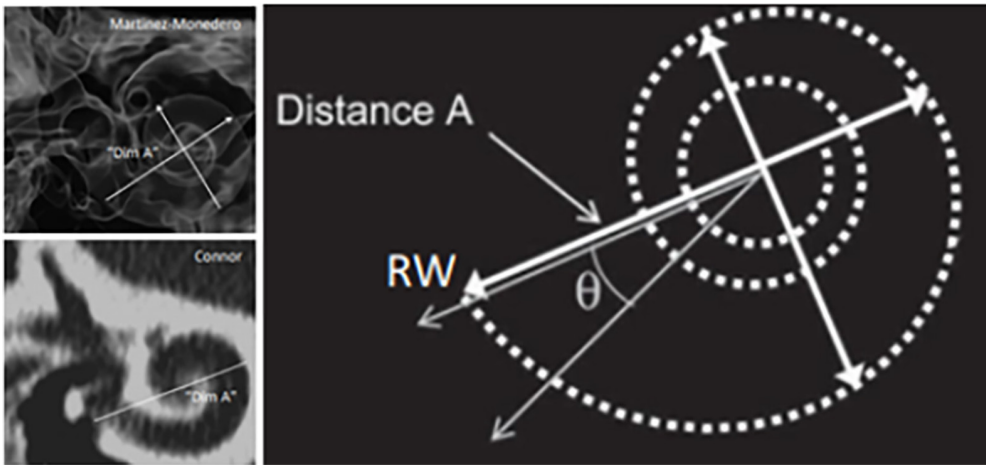

Figure 5: Sizes and variations of the cochlea. "Dim A": length of the cochlea; RW: Round Window. Distance A: length of the roundwindow line, through the modifier axis ending at the farthest point on the sidewall.[12]

of electrodes in the round window, since shallow insertions, despite better ensuring the preservation of residual hearing because it is less traumatic, limit the range of neural stimulation and increase pitch-place mismatch.

Oyanguren[12] explains that the angular insertion depth is calculated by the Nucleus® SmartNav system in real time at a rate of 4 times per second. The measurement resolution achieved is 250 milliseconds, sensitive enough to give direct control of the insertion to the surgeon. It is important to emphasize that the angular insertion depth is measured only in straight electrodes, particularly more flexible ones.

Although there is a white mark on the electrodes indicating the insertion measure in the cochlea, the pre-established length runs through a variable fraction of the cochlea. Rajan et al.[11] explains that this standardization can negatively affect the functionality of the CI by restricting neural stimulation and accentuating pitch mismatch.

Based on the individual measurements of CI users, the Nucleus® SmartNav system employs an algorithm, demonstrated by Oyanguren,[12] to calculate the linear distance along the lateral wall (L/mm) and thus allow greater coverage of the duct electrode cochlear:

$$L = 2.62\ (\mathbf{A})\ \text{x}\ \log e\ \text{x}\ (1.0 + \theta/235)$$

L Linear distance along the side wall

(**A**) Cochlear length

Several studies have recognized the importance of preserving residual hearing in cochlear implants[4,8,7,9,10,13-15] Kontorinis et al.[14] demonstrates that by combining low-frequency residual hearing with electrical stimulation through the cochlear implant, benefits are obtained for speech in noise perception, sound localization and music perception. In addition to the angular depth, the insertion speed and time are also of paramount importance in the conservation of residual hearing.[14,11,16] Such metrics also occur in real time with the Nucleus® SmartNav system.

The slow insertion speed provides a smoother and more fluid introduction of the electrodes, with much less resistance when compared to conventional insertion speeds, as demonstrated by Kontorinis et al.[14] in 2011, who observed an average insertion speed of 96.5 mm/min during cochlear implants. Rajan et al.,[11] also confirmed that the electrode insertion speed has a significant impact on hearing preservation and vestibular function, by defining an average insertion speed of 60 mm/min for the control group and 15 mm/min for the control group, interventionist group. In both studies, the insertion speed was measured using videos of the surgeries, with lower reliability when compared to the measurement of the Nucleus® SmartNav system, whose metric established by Oyanguren[12] was 1 electrode per second, resulting in a speed of approximate insertion of 0.70 - 0.80 mm/s (42 – 48 mm/min, respectively).

The reduction of mechanical trauma to the basilar membrane and organ of Corti during slow insertion of the electrode occurs by reducing intracochlear pressure peaks, which facilitates pressure equalization, allowing the gradual leakage of the perilymph while the electrode is introduced into the intracochlear space. Another finding related to the insertion speed is the insertion depth, whose complete introduction of the electrode was more commonly achieved with a slow speed.[11,14] Garaycochea et al.[17] adds lead tip bending due to higher insertion speed and increased force used by the surgeon.

After introducing the electrode through the round window, the Nucleus® SmartNav system verifies the placement of the electrodes and provides information about the tip fold-over (TFO). TFO or bending of the tip of the electrode array inside the cochlea is yet another surgical complication of the cochlear implant, which can also impair the auditory results (Fig. 6).

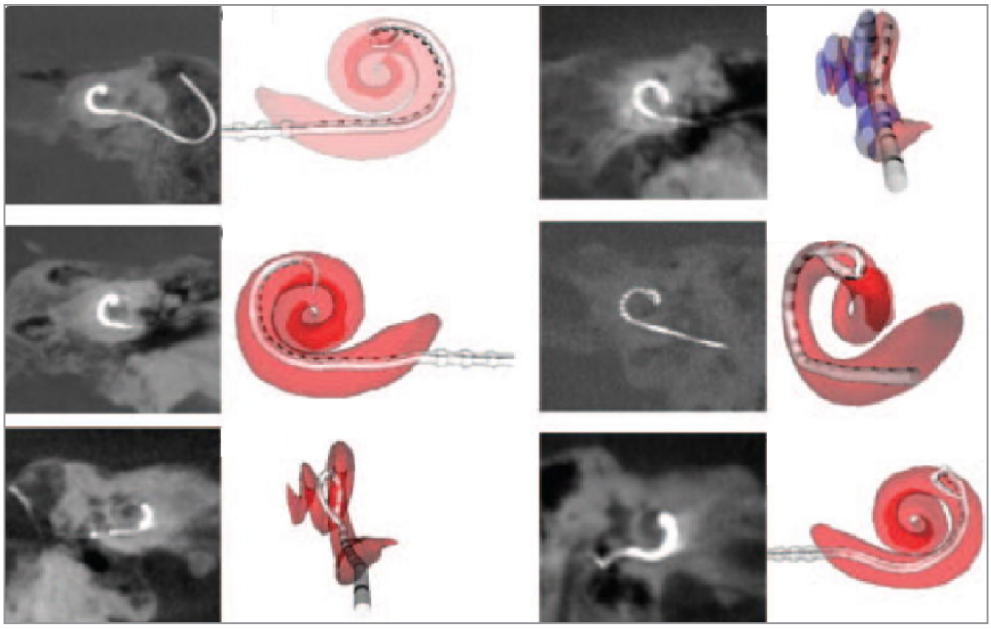

Figure 6: CT images illustrating six cases with a bent electrode next to the respective reconstructed three-dimensional image showing the location of the cochlear implant tip bend. Scala tympani represented in Red.[18]

Currently, there are two arrays of electrodes developed to reduce insertion trauma and optimize the electrode-nerve interface, the lateral wall and perimodiolar arrays, which were described by Jwair et al.[9] and Morrel et al.[15] Perimodiolar arrays are pre-curved, memory electrodes designed to decrease the distance to the modiolar wall. Lateral wall arrangements are straight electrodes, of less rigidity and follow the lateral wall of the cochlear duct. Given the particularities of each electrode array, both are regularly used and allow the verification of their positioning by the Nucleus® SmartNav system (Fig. 7) and the detection of folds of two or more electrodes, in their most apical region up to E20.

The final position of the electrodes inside the cochlea plays a very important role in the auditory result 11, 17, 18. Dhanasingh & Jolly[10] reported that the detection of TFO can be done through imaging studies, Neural Response Threshold (NRT) and Electrocochleography (ECochG). However, alterations or normality in the results of electrophysiological tests according to Zuninga et al.[18] do not guarantee the correct detection of the intracochlear positioning of the electrode array. Intraoperative radiological control, in turn, is still controversial, despite enabling TFO correction in the same procedure or in revision surgery when detected postoperatively.[10,18]

The placement check proposed by the Nucleus® SmartNav system must occur immediately after insertion of the electrodes, to ensure routine detection for electrode bending and allow correction in the same surgery, thus reducing the need for a revision surgical approach.

The verification of the electrical state of the electrodes individually is performed intraoperatively through impedance analysis. Hamerschmidt et al.[13] claim in 2012 and Garaycochea et al.[17] corroborates in 2020 that the programming of each CI electrode is essential to achieve appropriate levels of electrical stimulation and a satisfactory CI functional result. The impedance test provided by the Nucleus® SmartNav system (Fig. 8) is performed at the end of insertion of the electrode array and is usually repeated at the end of surgery with the conventional system.

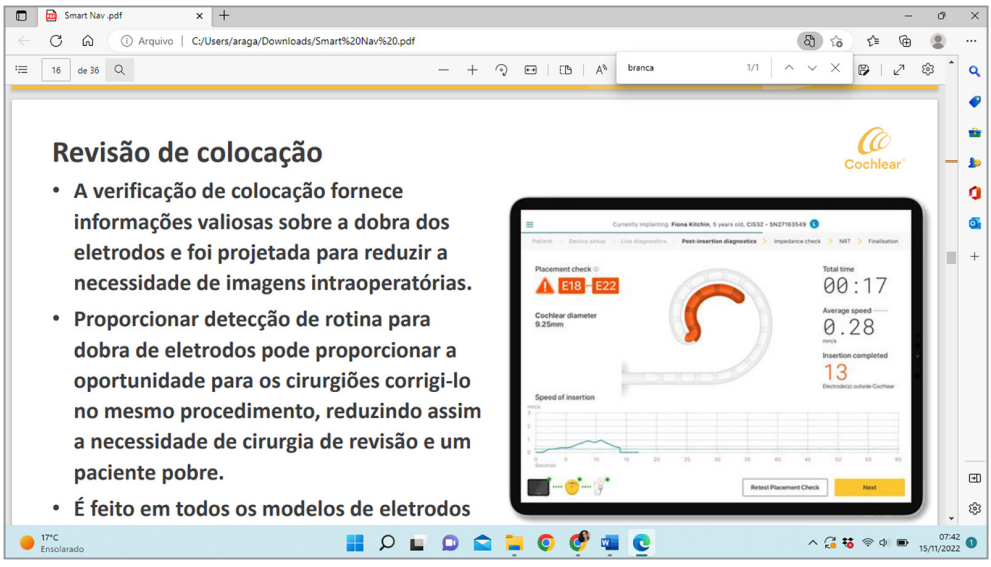

Figure 7: Verification of electrode bundle positioning after complete insertion into the cochlea. Diagnosed tip-folder demo.[12]

Figure 8: Impedance verification finished with the representation of the situation of the electrodes individually.[12]

In addition to the proper performance of the CI electrode array, the functional outcome of the CI encompasses cochlear nerve activity. Neural function must be preserved to receive the electrical stimulus generated by the CI. The functionality of the auditory nerve can be measured directly through the electrically evoked compound action potential (Electrically Evoked Compound Action Potential - ECAP). Neural response telemetry (NRT) is a method that allows objective verification of ECAP, quickly and non-invasively, intra- or postoperatively.[13,12]

The AutoNRT® program was launched by Cochlea in 2005 and first described by Botros et al.[19] in 2006 as an automatic algorithm with a better signal-to-noise ratio. The application of this test, present in the Nucleus® SmartNav system, in addition to confirming the cochlear nerve response to electrical stimulation in the cochlea, also serves as a starting point for PFMs.[12] During the intraoperative use of the program, it is possible to view the neural response profile of the electrode array and its tracking, which demonstrates the 3 last responses for the current electrode tested at the fatigue intensity.

Botros et al.[19] reported a high success rate for AutoNRT® (93% of the electrodes), which, combined with the Nucleus® SmartNav system, optimizes the parameters for recording and analyzing the machine during the intraoperative period.

CONCLUSION

The Nucleus Smartnav® system endorses technologies that aim to increase surgical precision and decrease its complications. Thus, it reduces the chances of a revision surgery and optimizes the auditory results of the CI. In the present case, the data obtained in real time regarding angular depth, average velocity, time taken to insert the electrodes and the subsequent review of their position, allows for fine adjustments in the surgical technique. Impedance testing and NRT performed intraoperatively reinforce adequate activity of the electrode array and cochlear nerve. This intraoperative control makes it possible to reduce the risks that negatively affect the functionality of the CI.

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REFERENCES

1. BENTO, R.F. et al. Tratado de Implante Coclear e Próteses Auditivas Implantáveis. 2ª ed. Rio de Janeiro: Thieme Revinter Publicações LTDA, 2021, p 342-343.

2. ASCHENDORFF, A. et al. Clinical investigation of the Nucleus Slim Modiolar Electrode. Audiology & neuro-otology vol. 22,3, 2017 Disponível em: <https://pubmed.ncbi.nlm.nih.gov/29059669/>. Acesso em 18 de outubro de 2022.

3. FERRARI, D.V. et al., A telemetria de respostas neurais no sistema de implante coclear multicanal nucleus 24: revisão da literatura. Revista Brasileira de Otorrinolaringologia [online]. v. 70, 2004 Disponível em: <https://doi.org/10.1590/S0034-72992004000100019>. Acesso em 16 de outubro de 2022.

4. SKARZYNSKI, H. et al. Partial deafness treatment with the nucleus straight research array cochlear implant. Audiology & neuro-otology vol. 17,2, 2012 Disponível em: <https://onlinelibrary.wiley.com/doi/abs/10.1097/MLG.0b013e318064e891>. Acesso em 16 de outubro de 2022

5. DAHER C.V., BAHMAD JR. F. Cochlear implants in a low-income country: Brazilian public health system (SUS) - a longitudinal analysis since the beginning. Braz J Otorhinolaryngol. 2021 Disponível em: <https://www.scielo.br/j/bjorl/a/KRmtzFMVZTPTPGp44dxRcJC/?lang=pt>. Acesso em 18 de outubro de 2022.

6. BALKANY, T.J. et al. Cochlear implant soft failures consensus development conference statement. Otology & neurotology: official publication of the American Otological Society, American Neurotology Society [and] European Academy of Otology and Neurotology vol. 26,4, 2005 Disponível em: <https://pubmed.ncbi.nlm.nih.gov/17496653/>. Acesso em 08 de outubro de 2022.

7. COHEN, N.L. Cochlear implant candidacy and surgical considerations. Audiology & neuro-otology vol. 9,4 2004 Disponível em: <https://www.sciencedirect.com/science/article/pii/S1672293018300874>. Acesso em 10 de outubro de 2022.

8. ASCHENDORFF, A. et al. Quality control after insertion of the nucleus contour and contour advance electrode in adults. Ear and hearing vol. 28,2, 2007 Disponível em: <https://pubmed.ncbi.nlm.nih.gov/17496653/>. Acesso em 18 de outubro de 2022.

9. JWAIR, S. et al. Scalar Translocation Comparison Between Lateral Wall and Perimodiolar Cochlear Implant Arrays - A Meta-Analysis. The Laryngoscope vol. 131, 2021 Disponível em: < https://onlinelibrary.wiley.com/doi/full/10.1002/lary.29224#:~:text=Meta%2Danalysis%20of%20five%20cohort,pooled%20odds%20ratio%20%3D%200.12).>. Acesso em 08 de outubro de 2022

10. DHANASINGH, A.; JOLLY, C. Review on cochlear implant electrode array tip fold-over and scalar deviation. Journal of Otology, vol 14, Issue 3, 2019 Disnível em: <https://www.sciencedirect.com/science/article/pii/S1672293018300874>. Acesso em 18 de outubro de 2022.

11. RAJAN, G.P.; KONTORINIS, G.; KUTHUBUTHEEN, J. The effects of insertion speed on inner ear function during cochlear implantation: a comparison study. Audiology & neuro-otology vol. 18,1, 2013 Disponível em: <https://pubmed.ncbi.nlm.nih.gov/23006502/>. Acesso em 22 de outubro de 2022

12. OYANGUREN, V. O Sistema Nucleus® SmartNaV: Projetado como A mais nova referência em medição intraoperatória. Internal use only. D1753421 v1 2020-06.

13. HAMERSCHMIDT, R. et al. Comparação da telemetria de resposta neural via cocleostomia ou via janela redonda no implante coclear. Brazilian Journal of Otorhinolaryngology v. 78, n. 4 2012 Disponível em: <https://doi.org/10.1590/S1808-86942012000400014>. Acesso em 22 de outubro de 2022.

14. KONTORINIS, G. et al. Impact of the insertion speed of cochlear implant electrodes on the insertion forces. Otology & neurotology: official publication of the American Otological Society, American Neurotology Society [and] European Academy of Otology and Neurotology vol. 32,4, 2011 Disponível em: <https://pubmed.ncbi.nlm.nih.gov/21478788/>. Acesso em 08 de outubro de 2022

15. MORREL, W.G. et al. Effect of Scala Tympani Height on Insertion Depth of Straight Cochlear Implant Electrodes. Otolaryngology--head and neck surgery: official journal of American Academy of Otolaryngology-Head and Neck Surgery vol. 162,5 2020 Disponível em: < https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7196032/>. Acesso em 22 de outubro de 2022

16. ROLAND, G.P.; CHARLES G.W.; ISAACSON B. Cochlear Implant Electrode Insertion: The Round Window Revisited. The Laryngoscope vol. 117, 2007 Disponível em: <https://onlinelibrary.wiley.com/doi/abs/10.1097/MLG.0b013e318064e891>. Acesso em 08 de outubro de 2022

17. GARAYCOCHEA, O., et al. Intra-operative radiological diagnosis of a tip roll-over electrode array displacement using fluoroscopy, when electrophysiological testing is normal: the importance of both techniques in cochlear implant surgery. Braz J Otorhinolaryngol. 2020 Disponível em: < https://www.scielo.br/j/bjorl/a/nmkTLg37rtjDpX8QCJqpLBP/?lang=pt#>. Acesso em 08 de outubro de 2022.

18. ZUNIGA, M.G. et al., Tip Fold-over in Cochlear Implantation: Case Series. Otology & neurotology: official publication of the American Otological Society, American Neurotology Society [and] European Academy of Otology and Neurotology vol. 38,2, 2017 Disponível em: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5584995/>. Acesso em 20 de outubro de 2022

19. BOTROS, A. et al. AutoNR: an automated system that measures ECAP thresholds with the Nucleus Freedom cochlear implant via machine intelligence. Artificial intelligence in medicine vol. 40,1, 2007 Disponível em: <https://pubmed.ncbi.nlm.nih.gov/16920343/>. Acesso em 12 de outubro de 2022.

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THREE-DIMENSIONAL SCANNING IN RHINOPLASTY AND INDIVIDUAL PATIENT EXPERIENCE

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ABSTRACT

Introduction: Three-dimensional facial scanning has been the object of study for decades and increasingly being used in rhinoplasty, and has recently been applied to surgical simulation. The patient's perspective in this context should be explored, so that surgeons can individualize their approach. **Objectives:** Acess the patient's perspective on three-dimensional scanning in rhinoplasty and their experience during the evaluation and simulation processes in preoperative consultation. **Material and methods:** Longitudinal, prospective and qualitative study, with the application of a questionnaire to patients who searched for rhinoplasty, during the preoperative consultation after obtaining images through 3D scanning and case simulation. **Results:** All participants agreed that three-dimensional scanning optimizes patient-surgeon communication; that it should become routine in the preoperative evaluation of cosmetic surgeries; and they felt more confident about the surgery after this process. None of the interviewees mentioned discomfort while obtaining the images. More than 60% were surprised by the images obtained by the three-dimensional facial scanning and by the result of the simulation. **Discussion:** The use of computerized imaging in the preoperative consultation transforms patients from passive listeners to active participants, who express their intentions and are involved in the discussion of the objectives of the surgery to which they will be submitted. Reservations regarding cost, additional time, and increased patient expectations must be considered. **Conclusion:** Three-dimensional facial scanning is an additional tool in the rhinoplasty preoperative period, bringing benefits to the communication and relationship between physicians and patients.

KEYWORDS

Three-dimensional facial scan. Individual experience. Perspective. Rhinoplasty.

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INTRODUCTION

In recent years, computer graphics technology has been increasingly incorporated as a tool in health care areas that depend on the patient's morphological and anatomical analysis, such as craniomaxillofacial surgery, plastic surgery, and orthodontics.[1] Each human face has its individual characteristics, which determine the identity of each one, covering their cultural characteristics and even aspects of their personality.[2]

Conventional face analysis methods use photographs, caliper rules and compasses, allowing assessment in only two dimensions. A recent survey showed that 63% of surgeons use some type of computerized image during rhinoplasty consultations.[3] The landmarks on each face can be analyzed using two-dimensional photographs, computed tomography, three-dimensional scans constructed using infrared beams, and photogrammetric reconstructions – technology that is advancing to become increasingly precise, accessible, and accurate.

Three-dimensional facial scanning becomes interesting, as it is a tool used in facial recognition, capturing facial emotions, surgical planning, and postoperative follow-up.

In 2013, there was already an understanding in the literature that three-dimensional facial scanning could be used in rhinoplasty planning.[4] Such a tool allows optimizing doctor-patient communication, in addition to enabling planning of surgical steps. It is also possible, through scanning, to monitor the postoperative progress and the desired changes, through quantitative and qualitative evaluation during the process.[5] In addition, the advent of three-dimensional techniques solves the limitation of visualization of certain structures in two dimensions, in addition to allowing more reliable measurements in relation to angles, measurements and areas.[6]

Several studies have already demonstrated the advantage of using three-dimensional capture, analysis, and planning[7-11] but there are few studies that focus on the patient's experience in relation to this technique, and most only address the surgeon's experience. A recent survey approached 172 patients to assess whether the three-dimensional simulation would bring an additional benefit during the rhinoplasty consultation.[12] Ninety-five percent considered the tool more interesting than the traditional two-dimensional simulation and, in patients who would undergo revisional rhinoplasty, 84% of them admitted that the three-dimensional simulation helped them to understand the objectives of the surgery.

Therefore, it is interesting that there is a focus on the personal experience of each patient during the use of three-dimensional facial scanning, focusing on each one's understanding of the technique, the images produced and the proposed changes during the simulation. The patient's perspective in this context should be explored, so that surgeons can individualize the approach during preoperative consultations, ensuring the doctor-patient bond and satisfaction for both.

This study aimed to know the patient's perspective regarding three-dimensional scanning in rhinoplasty and their experience during the process in the preoperative consultation, as well as to increase knowledge regarding the doubts of patients undergoing rhinoplasty, in addition to seeking ways to clarify them. and reassuring patients during this process.

MATERIAL AND METHODS

A prospective, qualitative longitudinal study was carried out, with data collection carried out between August and November 2022, after approval by the Ethics and Research Committee of the Hospital Paranaense de Otorrinolaringologia (IPO Opinion Report No. 5,536,916).

The study consisted of applying an ad hoc questionnaire developed and applied by the researchers themselves, in patients with a desire for rhinoplasty who underwent evaluation by one of the researchers in this study. The questionnaire consisted of eight closed questions and one open question, and was applied during the preoperative consultation for rhinoplasty, in the form of an interview, after obtaining images through 3D scanning and case simulation. Obtaining the images and facial scanning were performed using the Cloner, a facial scanning booth, double capture, with 16 shutters of 8 megapixels in total. On this device, image capture lasts 0.4 seconds, and images are processed in .obj format. The images were then reconstructed using software called Reality Capture and then sent to the Blender program (version 2.91) for image manipulation and simulation of rhinoplasty steps (Figs. 1 and 2).

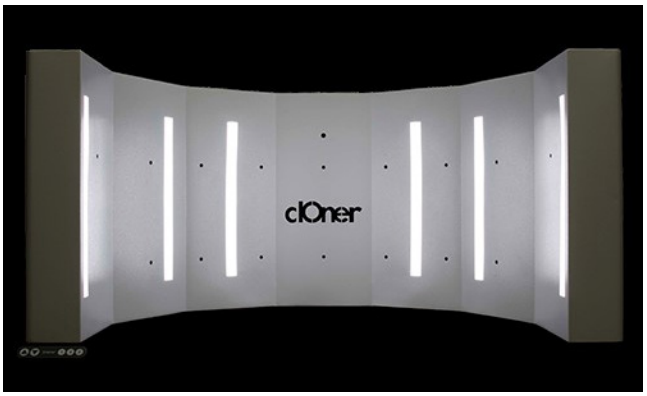

Figure 1: Three-dimensional facial scanning booth.

Figure 2: Examples of photos generated by the scanner used.

Participants who agreed to participate in the research after explanations and signing the informed consent form (ICF) and who had the ability to understand it were included. On the other hand, patients who did not agree to participate in the study or did not feel comfortable during the acquisition of three-dimensional images or even during the application of the questionnaire were excluded. Incompletely or ambiguously answered questionnaires were excluded from the analysis.

The data obtained were evaluated individually and analyzed in a qualitative, descriptive and percentage way, presented through tools available in Microsoft Office Excel 2017 and Microsoft Office Word 2017 programs.

RESULTS

Data were obtained from eight participants: seven females and one male, aged between 14 and 43 years.

One hundred percent of participants agreed that 1) the tool optimizes patient-surgeon communication; 2) three-dimensional scanning should become routine in the preoperative evaluation of all cosmetic surgeries; 3) felt more confident about the surgery after this process. All also agreed that they did not feel any discomfort during the acquisition of images and three-dimensional facial scanning. In addition, all participants were unanimous in confirming that they would go through this process again and would seek this same tool if they had another cosmetic surgery different from the current one.

Most patients (62.5%) were surprised by the images obtained by the three-dimensional facial scanning and by the result of the simulation. Two patients responded negatively to these questions. One of them (J.C, 32 years old, male) even made the following observation in the open question about observation or suggestion to be made: "*I was already expecting the three-dimensional images. The absence would certainly make understanding and the process difficult*".

One participant (S.L, 30 years old, female) observed: "*I really liked it, satisfaction in being able to see the result close to reality*".

DISCUSSION

Three-dimensional technology has been an excellent tool for simulating surgical techniques in hospitals and research centers. The use of three-dimensional technology is still recent. A recent study focusing on the use of computerized imaging in rhinoplasty addressed 238 facial plastic surgeons. Of the 150 surgeons using the tool, only 10% use the three-dimensional technology.[3]

Knowing the anxieties, questions and concerns of patients in this process is beneficial for both the surgeon and the patient, as it allows this experience to be optimized and as pleasant as possible for both. Technology, whether in the form of a two-dimensional or three-dimensional image, is a fundamental tool in the preoperative consultation, since it is through it that patients gain a better understanding of the possible and realistic results after surgery. In addition, through three-dimensional simulation, the surgeon can understand the aesthetic ideal desired by the patient, the result expected by him/her, in addition to identifying unrealistic expectations and acting on them.[14]

There are still few studies available in the literature that focus on the patient's personal perspective during three-dimensional scanning and simulation of results during the preoperative period in rhinoplasty. Lekakis et al. applied a questionnaire to 172 patients who were candidates for rhinoplasty, addressing three-dimensional simulation and its additional value over two-dimensional technology. Ninety-five percent of the respondents considered that the three-dimensional simulation has an additional value over the two-dimensional simulation. Furthermore, of the patients who were candidates for revision rhinoplasty, 84% admitted that the three-dimensional simulation helped them understand the objectives of their second surgery, in contrast to 61% of the group that included primary rhinoplasty patients. The same study also addressed the perspective of the 2 surgeons involved, who also agreed that the three-dimensional simulation is an additional tool in 2/3 of the patients, but emphasize that the repetition of information already obtained by the two-dimensional simulation and the increase in consultation time are reasons for that other surgeons do not consider the use of three-dimensional technology, in addition to the fear that it will greatly increase patient expectations and overload them with too much information.

The questions asked and the percentage of responses are shown in Figure 3.

Still on the patient's perspective, Lekakis et al. point out that the use of computerized imaging in the preoperative consultation in rhinoplasty transforms patients from passive listeners to active participants, who externalize their intentions and are involved in the discussion of the objectives of the surgery to which they will be submitted.[12]

The final three-dimensional simulation associates the patient's desire and the surgical possibilities to achieve it, but it does not guarantee the result, since it depends on unpredictable and individual factors, such as healing, edema and postoperative care by the patient. This must be highlighted during the consultation, both for the patient and for his companion, and documented in the surgical consent form.

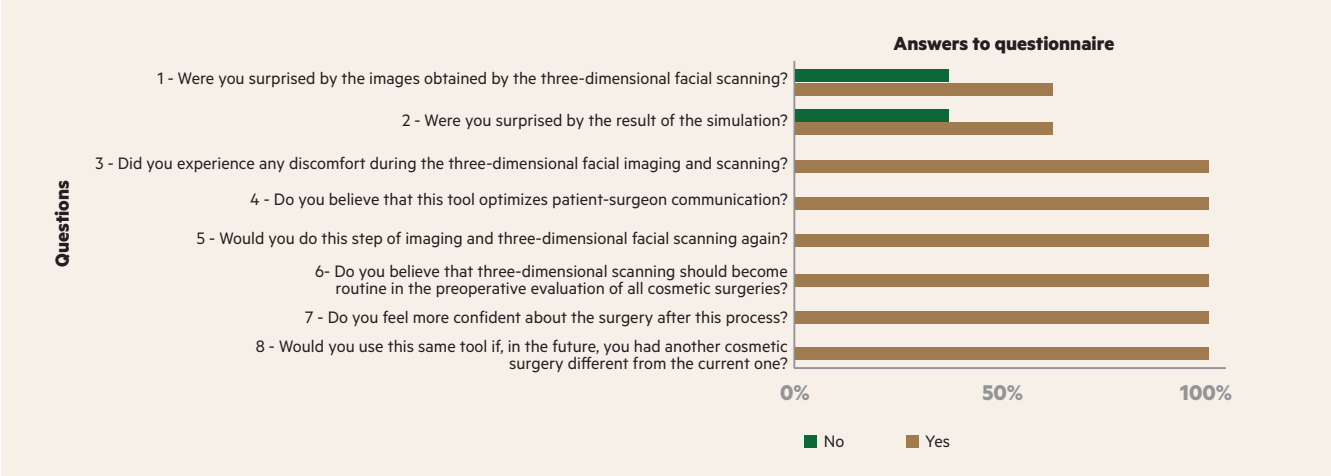

Figure 3: Proportion of responses obtained in the applied questionnaire.

In this research, one of the interviewees reported that he was not surprised by the three-dimensional simulation, as he had already expected such images. This may have resulted from the presence of one of the researchers on social networks, publicizing the three-dimensional scanning in rhinoplasty as an additional tool offered to the patient who chooses him as a surgeon. With social networks being increasingly widespread and present in the medical environment, patients have the power to choose the surgeon and, based on what they see on the networks, they already know what to expect from the experience.

Some points about three-dimensional scanning in rhinoplasty should be considered: the cost of the technology, which involves not only obtaining the scanner, but also the use of paid software to reconstruct and manipulate the images obtained; the additional, albeit short, time involved in the process; the patient's highest level of frustration if the post-surgical result does not exactly match the one programmed using the three-dimensional image. Furthermore, the researchers understand that there is still a need for further studies on the patient's perspective on three-dimensional scanning in cosmetic surgery. Seeking ways to understand what the patient's expectations and experience during the use of this tool should be the focus, as well as understanding how to improve and progress in its use, to increase the level of patient satisfaction during the rhinoplasty process.

Therefore, this project made it possible to optimize the approach to patients during the process of obtaining images and three-dimensional scanning in rhinoplasty, in addition to expanding the knowledge available in the literature on the subject, helping other surgeons.

CONCLUSION

From the patient's perspective, three-dimensional facial scanning is an additional tool in the rhinoplasty preoperative period, bringing benefits in terms of trust and doctor-patient communication. It is a tool that does not cause discomfort to the patient and should be explored in cosmetic surgeries.

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REFERENCES

1. ZHAO, Y., XIONG Y., WANG, Y. Three-Dimensional Accuracy of Facial Scan for Facial Deformities in Clinics: A New Evaluation Method for Facial Scanner Accuracy. PLoS ONE 2017, 12, e0169402.

2. AMORNVIT P., SANOHKAN S. The Accuracy of Digital Face Scans OBtained from Scanners: An In Vitro Study. Int. J. Environ. Res. Public Health 2019, 16, 5061; doi:10.3390/ijerph16245061

3. SINGH P., PEARLMAN S. Use of computer imaging in rhinoplasty: a survey of practices of facial plastic surgeons. Aesthetic Plast Surg, 2017. https://doi.org/10.1007/s00266-017-0858-3

4. SZYCHTA P., WITMANOWSKI H., RYKALA J. Assesment of the usefulness of three-dimensional scanner in aesthetic evaluation of post-traumatic rhinoplasty. J Plast Hand Surg, 2013; 47: 106-112. doi: 10.3109/2000656X.2012.751389

5. SINGH A. et al. Rhinoplasty Using Three-Dimensional Analysis and Simulation. Plast. Reconstr. Surg. 145: 944, 2020; doi: 10.1097/PRS0000000000006687.

6. PERSING S. et al. Three Dimensional Imaging in Rhinoplasty: A Comparison of the Simulated versus Actual Result. Aesth Plast Surg, 2018. doi.org/10.1007/s00266-018-1151-9

7. TORIUMI, D. M. AND T. K. DIXON. Assessment of rhinoplasty techniques by overlay of before-and-after 3D images. Facial Plast Surg Clin North Am, 2011, 19(4): 711-723, ix.

8. KOOK M. et al. A comparison study of different facial soft tissue analysis methods. J Craniomaxillofac Surg, 2014, 42(5):648-656.

9. SALAZAR-GAMARRA R. et al. Monoscopic photogrammetry to obtain 3D models by a mobile device: a method for making facial prostheses. J Otolaryngol Head Neck Surg, 2016 45(1):33.

10. DORNELLES, R., ALONSO N. New virtual tool for accurate evaluation of facial volume. Acta Cir Bras 2017, 32(12): 1075-1086.

11. DORNELLES, R. Avaliação volumétrica da face: validação do sistema de captação de imagem facial tridimensional pela tecnologia de luz estruturada, estudo em cadáver. phD, Universidade de São Paulo, 2019.

12. LEKAKIS G. et al. Three-dimensional Morphing and Its Added Value in the Rhinoplasty Consult. Plast Reconstr Surg Glob Open 2019;7:e2063; doi: 10.1097/GOX.0000000000002063;

13. STEIGER J. The Rhinoplasty Consult. Facial Plastic Surgery, 2011, 27(5).

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INFECTIONS IN FUNCTIONAL AND AESTHETIC RHINOSEPTOPLASTY: NARRATIVE LITERATURE REVIEW

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ABSTRACT

Introduction: Rhinoseptoplasty is among the most performed surgical procedures in the world. Postoperative infection is the second major complication, and there is still no consensus on the use of antibiotics in prophylaxis. **Methodology:** Review articles from the last 10 years to describe and discuss the benefits of using antibiotic prophylaxis in this procedure. **Results:** Found 12 articles on the subject, analyzing the postoperative complications and the use of antibiotics. **Discussion:** Infection, despite being the second main complication after the procedure, is rare. The use of prophylactic antibiotics is recommended in books that describe the procedure, however, studies show that there is no great benefit in its use without a good preoperative evaluation. Two other studies also suggest that the culture of the site to be operated on could better support the use of antimicrobials. **Conclusion:** Antibiotic prophylaxis should be indicated with caution as it may favor antimicrobial resistance. Furthermore, there is no consensus in the literature about the real benefit of its use.

KEYWORDS

Rhinoplasty. Rhinoseptoplasty. Infection. Postoperative Period.

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INTRODUCTION

Rhinoplasty showed exponential growth in demand in 2021. In 2020 alone, according to the International Society of Aesthetic Plastic Surgery (ISAPS), around 852,554 rhinoplasties were performed worldwide, an increase of about 3.7% when compared to the previous year of the survey.[1]

In our reference service, Hospital IPO, since 2007 more than 7500 rhinoplasties have been performed. With an annual growth trend, proof of this is that in 2020 alone, 1175 were performed. The average age of our patients is 29.97, ranging from 7 to 81 years, with a predominance of males. These numbers corroborate the fact that this procedure is increasingly widespread.

The most serious complication of this procedure is surgical site infection, which occurs in approximately 2.6% to 5.3% of rhinoseptoplasties, according to Jo et al.[2] Infection after rhinoseptoplasty varies from soft tissue cellulitis, abscess, or even a severe complication such as brain abscess or meningitis, although extremely rare.[3] Although rare, infections in these surgeries can be extremely disastrous. The main risk factors for this are: open rhinoseptoplasty, reoperations, copious use of grafts, longer intraoperative time, and abusive use of antibiotics.[2]

Infections are first diagnosed and treated by the responsible surgeon in the post septoplasty evaluation. Thus, the medical criteria adopted for diagnosis are the main tools to ascertain whether these risk factors reflect in infection.[2]

For infections like this, incisional deep surgical site, Anvisa imposes that they be classified as an infection if it occurs in the first 30 days after surgery (the 1st day being the date of the procedure), involving soft tissues superficial or deep to the incision and presents at least at least one of the following criteria: I. Purulent drainage from the superficial or deep incision; II. Spontaneous dehiscence or incision opened by the surgeon and culture positive or not performed, when the patient presents at least 1 of the following signs and symptoms: fever (temperature >38ºC), pain or localized swelling. III. Abscess or other evidence of infection involving deep tissues, detected during clinical, anatomopathological or imaging examination. IV. Diagnosis of incisional infection made by the surgeon or other attending physician.[4]

The purpose of this study is to carry out a narrative review of the literature, discussing the benefits and harms of antibiotic therapy and care to avoid infection at the surgical site.

MATERIAL AND METHODS

A non-systematic search was performed using PubMed and Scielo databases. Articles published in the last 10 years, evaluation and selection were steps applied to make use of articles that address rhinoseptoplasties and septoplasties and the use of antibiotics involving these procedures.

Inclusion criteria were (1) Articles that addressed infection in rhinoseptoplasty or septoplasty and use of antibiotic therapy; (2) There was clinical information available. Exclusion criteria were as follows: (1) Articles with duplicate information.

We have also added review articles to create a more comprehensive discussion.

RESULTS

The collected information is summarized in Table 1. We identified 12 articles published in the last 10 years through the PubMed and Scielo database according to the adopted search criteria, in addition the discussion was deepened in selected articles.

Table 1: Articles Analyzed.

Article	Study Model	Conclusion
1. *Complications in septoplasty based on a large group of 5639 patients*[6]	Retrospective cohort	Describes infection as a second cause of postoperative complication.
2. *Discussion: Preoperative Nasal Swab Culture: Is It Beneficial in Preventing Postoperative Infection in Complicated Septorhinoplasty?*[15]	Experience report and response to the article	It is recommended to carry out antibiotic therapy guided by nasal culture, mainly in patients submitted to secondary rhinoplasty or with costal cartilage because the flora itself is the main focus of pathogenic agents - bacteria that are in the nasal vestibule before surgery.
3. *Microbiology and Antibiotic Prophylaxis in Rhinoplasty A Review of 363 Consecutive Cases*[8]	Case report and Literature review	The indiscriminate use of antibiotic therapy in rhinoplasty favors antimicrobial resistance. First report of sepsis resulting in death, described in literature after rhinoplasty.
5. *Transseptal suturing technique in septoplasty: impact on bacteremia and nosocomial colonization*[11]	Randomized clinical trial Compare changes in nasal flora and bacteremia between nasal packing with Merocel (M), nasal splint (S) and transseptal suture (T) in patients after septoplasty.	The M Group increased the methicillin-sensitive Staphylococcus aureus (MSSA) colonization and decreased colonization of normal flora, while Groups S and T did not affect the colonization of MSSA or normal flora. The postoperative increase in MSSA colonization in the nasal cavity of these patients can be prevented by using a transseptal suture or splint technique instead of using Merocel, and instead of using a prophylactic antibiotic. None of the patients showed any signs of infection.
6. *Evaluation of Antibiotic Prophylaxis in Rhinoplasty: A Systematic Review and Meta-analysis*[18]	Systematic and meta-analysis review	First meta-analysis investigating antibiotics preventive in rhinoplasty, no evidence was found in the routine use of antibiotic prophylaxis pre or not postoperative in rhinoplasty.
7. *Incidence and Preoperative Risk Factors for Major Complications in Aesthetic Rhinoplasty: Analysis of 4978 Patients*[13]	Prospective cohort	It comments and analyzes the main complications, it does not discuss the use of antibiotic prophylaxis. It describes infection as the second cause of postoperative complications. The risk increases with age ≥40 years and with the addition of other cosmetic procedures.
8. *Incidence of Post-Operative Adverse Events after Rhinoplasty: A Systematic*[21]	Systematic review	Infection rate of 0% in studies eligible in this review, likely Adverse events be underreported. Soon, evidence is lacking to produce protocols on the use of antibiotics in rhinoplasty.

Table 1: (Continuation) Articles Analyzed.

Article	Study Model	Conclusion
9. *Methicillin-resistant Staphylococcus aureus (MRSA) and antibiotic use in septorhinoplasty: case report and review of literature*[17]	Case Report and Literature Review	Four reported cases in the literature of Infections associated with MRSA in rhinoseptoplasty. Routine use of screening at preoperative and decolonization are not recommended. Antibiotic prophylaxis favors the resistance antimicrobial.
10. *The effects of the time of intranasal splinting on bacterial colonization, postoperative complication, and patient discomfort after septoplasty operations*[19]	Randomized clinical trial: Evaluate the association between packing time with intranasal splints and bacterial colonization, complications in postoperative and patient discomfort - The splints were removed on the 5th, 7th and 10th days postoperative.	No significant difference was found in the rate of bacterial colonization between the different groups. But several pathogenic agents, along with bacteria from the normal flora, were isolated in the cultures. Therefore, the authors consider that prophylaxis with Postoperative antibiotics should be prescribed until nasal splints are removed.
11.*Antibiotics in septoplasty: Evidence of habit?*[14]	Retrospective cohort	Statistically significant effect on the use of prophylactic antibiotics in the preoperative period of septoplasty to prevent infection during the postoperative period, especially when associated to sinus surgery.
13. *Antibiotics prophylasis in septorhinoplasty? A prospective, randomized study*[20]	Prospective, randomized, single-blind clinical trial	It is concluded that a single dose of antibiotic administered preoperatively for endonasal rhinoseptorhinoplasty is sufficient for the prophylaxis of infections.
14. *Prophylactic vs postoperative antibiotic use in complex setorhinoplasty surgery: a prospective, randomized, sigle-blind trial comparing efficacy*[22]	Prospective, randomized, single-blind clinical trial	The authors recommend the use of prophylactic antibiotics rather than empiric postoperative antibiotics for patients undergoing complex septorhinoplasty.

DISCUSSION

The first rhinoplasties date back to 2,500 BC, in Egypt and India, to repair deformities caused by fights and victims of amputation for punishment. Between the 15th and 16th centuries, nasal surgeries began to be performed more frequently, mainly due to the infestation of diseases such as syphilis and leprosy.[5]

Until the end of the 19th century, rhinoplasty had only a repairing purpose, until, at the beginning of the 20th century, the German surgeon Jacques Joseph introduced rhinoplasty with an aesthetic focus, performing the technique, which today bears his name, in which the scar is imperceptible, thus pleasing the patients. Jack Sheen, in 1987, proposed some types of grafts so that rhinoplasty could be structured. Jack Gunter and John Tebbets also advocated grafts to preserve the functional nasal part in rhinoplasty. In view of this, in the 16th century we observed a high degree of development of aesthetic-functional rhinoseptoplasty.[5]

Currently, surgery is widely disseminated and performed mostly for aesthetic reasons. Like any surgical procedure, rhinoseptoplasty has risks of complications in the immediate postoperative period, mainly excessive bleeding and surgical site infections.[6]

As already mentioned, surgical site infection can occur in up to 5% of rhinoplasties.[6,7] When we talk about risk factors, in the literature there was no significant statistical impact, regarding infections, that relate sex, age and comorbidities, according to Donald, B. et al.[8] There is also no correlation between rhinoplasty combined with functional endonasal surgery, according to Benjamin, B. et al.[9] There is a correlation with the number of times the patient underwent surgery, the access route performed, the use of grafts, surgical time, and the use of antibiotic prophylaxis in rhinoseptoplasty.[9]

Rhinoplasty, as it causes tissue trauma, modifies local irrigation and innervation. It is known that in primary rhinoplasty there is prior tissue and irrigation integrity, therefore the chance of an ideal recovery is high. However, in re-operations, there is alteration in tissue nutrition, reducing the chance of an optimal recovery and increasing the rate of infection of devitalized tissues.[6,10]

Regarding the rhinoplasty access route, it can basically be performed through three access routes (in increasing order of tissue damage): closed, delivery (semi-open) and open. The greater the exposure of the nasal cartilages to the environment during the procedure, the greater the risk of contamination and the greater the vascular compromise. Therefore, the open technique, also called external, offers higher reported infection rates.[10]

The graft from the rib is the most related to infection after rhinoplasty, as most surgeons abuse antibiotic prophylaxis, causing selection of resistant bacteria. This practice (pre, intra and/or postoperative) is guided by the fear of infection both in the donor bed, but mainly in the recipient. On the other hand, in grafts from the nasal septum, since the donor area coincides with the recipient area, a more conservative drug use is observed.[11,10]

The intranasal area is a clean contaminated field.[10] The normal nasal flora includes aerobic and anaerobic microorganisms such as *Staphylococcus aureus*, most found, *Staphylococcus epidermidis, Streptococcus viridans, Diphterioides, Neisseria,* among many others. Some potentially pathogenic microorganisms also exist in the nasal flora of healthy individuals.[12,10]

Adopting routine antibiotic prophylaxis - before, during and/or after surgery - can eliminate the patient's endogenous and protective flora, thus increasing the chance of proliferation of more virulent disease-causing pathogens. In addition, adverse reactions (nausea, vomiting, allergy) to medications may occur, providing an even more uncomfortable recovery for the patient.[10,12,13]

Antibiotic therapy after surgery

Antibiotic prophylaxis for surgical procedures is a common practice among otorhinolaryngologists. A survey conducted among members of the American Society of Rhinology showed that 66% of 448 physicians responded that they use antibiotics as a practical routine in the postoperative period of their rhinoseptoplasties.[14] In this same survey, physicians responded that the most common reasons

for antibiotic prophylaxis were the prevention of postoperative infections (60.4%), avoidance of toxic shock syndrome (31.5%) and self-protection against legal medical proceedings (4, 9%).14 However, data on efficacy, class, dosage, and period (pre, intra or postoperative) of antibiotic prophylaxis and the need for this practice in rhinological surgical procedures are controversial.

Current guidelines for rhinoplasty from the American Academy of Otolaryngology – Head and Neck Surgery do not recommend the routine prescription of postoperative antibiotics for more than 24 hours.[3]

Exceptions to this guideline include complicated revision or surgery, patients with methicillin-resistant *Staphylococcus aureus* (MRSA) colonization, extensive cartilage grafting, immunocompromised patients, concomitant medical conditions requiring antibiotic use (such as rhinosinusitis) or nasal packing.[3]

When talking about prophylaxis in procedures such as rhinoseptoplasty, it is known that the previous flora of the nasal cavity exists. Just as there are bacteria that can be brought to the surgical site at the time of the operation.[15]

In addition, the surgical technique is quite variable in this procedure. The literature describes a trend of greater complications for secondary rhinoplasty.[11,15] The location where this procedure is carried out - the nasal cavity - has a rich blood supply, making it easy for bacteria to spread via the hematogenous route. Despite this, death from sepsis after the rhinoseptoplasty procedure is extremely rare, with only one case described in the literature by Kim et al., in 2016.[16]

Dean M. Toriumi published in 2020 in response to a previously conducted retrospective cohort study, the benefits of performing a culture for the management of antibiotic therapy. In his work, he comments that despite the cost of the[15] culture, its performance is compensated, because in this way the surgeon will be aware of the possibly pathogenic agents in the area, thus using guided antimicrobials for these agents. The author comments that the use of topical antibiotics is also beneficial. This, associated with the inclusion of an irrigation catheter in the incision, reduces the formation of crusts, a place that can harbor pathogenic bacteria.[15]

In this line, an American study from 2014[8] agrees that it would be interesting in the preoperative evaluation to know the patient's nasal flora, even more important in case of surgical site infection. Another interesting point of this work published in JAMA Facial Plast Surg, is the criticism of the indiscriminate use and without criteria of antibiotic prophylaxis. A retrospective review of the medical records of 363 adult patients who underwent preoperative nasal swab testing and rhinoseptoplasty in a private practice was performed: 279 women (76.9%) and 84 men (23.1%), age average of patients was 35.9 years - ranging from 17-70 years.[8]

One hundred seventy-four patients (47.9%) underwent primary rhinoplasty and 189 (52%) underwent revision rhinoplasty. The preoperative nasal culture of these patients showed that 284 patients (78.2%) had normal flora; 39 patients (10.7%) had *Staphylococcus aureus*; and only 1 patient (0.28%) had MRSA. In addition, fecal coliforms including *Escherichia coli*, Enterobacter species and Citrobacter species were also found in 7.4% of the patients. It is described in previous studies that more than 80%

of infections in this procedure are agents previously present at the site.

Mupirocin ointment was applied intranasally twice a day for 5 days before surgery. If normal flora was cultivated, no additional antibiotics were administered. However, in the presence of potentially pathogenic bacteria, patients were treated with culture-directed oral antibiotics.8 All patients received a prophylactic dose of intravenous cefazolin 30 minutes before the first incision.[8]

Age, gender, smoking, use of oral contraceptives or presence of seasonal allergies did not significantly alter the nasal flora or the rate of postoperative infection - Patients with adult acne had a higher incidence of colonization by fecal coliforms (43.8%), patients with diabetes had a higher incidence of *S. aureus* colonization.[8] Three patients had type 2 diabetes. Of these patients, 2 cultures (67%) grew S. aureus, and 1 (33%) showed normal flora. There were no postoperative infections in this group (Table 2). Twenty patients were smokers, and *S. aureus* colonization in smokers was 15% (3 of 20), without reaching statistical significance. The rate of postoperative infections among smokers was 10% (2 of 20).[8]

Symptoms leading to re-culture after surgery included pain, discharge, foul odor, septal perforation, and erythema. The overall postoperative infection rate was 3.0% (11 patients). Of these, 1 grew Citrobacter; 2, *E. coli*; 2, *Klebsiella*; 4, *S. aureus* (of these 2 were MRSA); 1, *Pantoea clusters*; 2, Coagulase-negative *Staphylococcus*; and 2, normal flora other than *Staphylococcus*. Of these 11 patients, 2 were using oral contraceptives, 2 had acne, 2 were smokers, 1 had gastroesophageal reflux disease, and 1 had tested positive for human immunodeficiency virus.[8]

The overall infection rate was 3.0% (11 of 363 patients), with 4.0% (7 of 174 patients) seen in primary rhinoseptoplasty and 2.1% (4 of 189 patients) seen in revision cases. Coliforms were responsible for 5 cases (45.5%) of postoperative infections, while *S. aureus* was responsible for 4 cases (36.4%), including 1 case of MRSA.

Risk factors alone may not reliably predict the subgroup of patients in whom antibiotic prophylaxis is indicated.[8] And the generous use of antibiotics before and after surgery is not without its drawbacks. Elimination of endogenous flora can potentially leave an individual susceptible to the proliferation of a

Table 2: Microbiological Colonization by Select Patient Groups[a].

	Patient Group					
Organism	Acne	Allergies	Diabetes	Hormonal Contraception	Smoking	Total
Staphylococcus aureus	4 (12.5)	10 (13.2)	2 (66.7)	4 (5.1)	3 (15)	39 (10.7)
MRSA	0	0	0	0	0	1 (0.28)
Normal flora	12 (37.5)	64 (84.2)	1 (33.3)	61 (78.2)	12 (60)	284 (78.2)
Coliform bacteria[b]	14 (43.8)	4 (5.26)	0	8 (10.3)	5 (25)	27 (7.4)

Abbreviation: MRSA, methicillin resistant Staphylococcus aureus.
[a] All data reported as number (percentage) of patients.
[b] Including Escherichia coli as well as Citrobacter and Enterobacter species.
Source: Yoo DB, et al.[8]

more virulent pathogen. In addition to destroying the patient's protective native flora, antibiotic treatment can promote the selective growth of increasingly resistant organisms.[8]

Regarding MRSA, a pathogenic agent that is challenging to treat and causes concern due to the severity that can develop from its infection, in a literature review, Lohr GD et al. criticize the lack of a protocol for the decolonization of this bacterium, in addition to little evidence and studies for prevention. This is because it is a rare agent in rhinoseptoplasty infection.[17] In addition, the study suggests using antibiotic prophylaxis with caution, as its use favors antimicrobial resistance.[17]

Regarding the technique, Osmu Ismi et al., compared changes in the nasal flora and the rates of occurrence of bacteremia in relation to the septoplasty technique.[11] They observed that the postoperative increase in colonization of MSSA (methicillin-sensitive Staphylococcus aureus) in the nasal cavity, for septoplasty patients, can be prevented by using a transseptal suture or splint technique instead of packing with Merocel, in place of prophylactic antibiotic prophylaxis.[11]

In the first systematic review carried out following the Cochrane protocol evaluating the use of antibiotics in rhinoseptoplasty, the authors - Nuyen B et al. - concluded that no evidence was found to support the routine use of pre- or postoperative antibiotic prophylaxis in rhinoseptoplasty. However, they make reservations for the fact that rhinoseptoplasty is a heterogeneous operation in terms of incisions, duration of surgery and use of grafts or materials used. These factors have not been rigorously explored in this or other studies.[18]

Karatas et al.[19] analyzed the effects of permanence of splints, used in the procedure, on bacterial colonization.[19] They observed that, on the one hand, the recommendations for antibiotic therapy in the postoperative period are contained in the books on Rhinoseptoplasty. On the other hand, studies in the literature are divergent, since the risk of infection is very low in elective nasal surgeries and, therefore, routine antibiotic prophylaxis would be unnecessary. Its use is recommended for cases of complicated revisions.[19]

However, according to the authors' opinion, they advocate that antibiotic prophylaxis in the postoperative period should always be considered until the removal of nasal splints, since pathogenic agents have been isolated in cultures, along with bacteria from the normal flora.[19]

Ricci and D'Ascanio performed a prospective study of 630 patients, 417 male and 213 female patients; mean age, 37.8 years; range, 6 to 67 years, undergoing septoplasty to assess the need for antibiotic prophylaxis. Subjects were randomized to receive no antibiotic prophylaxis (group A - 252 patients), a single intravenous dose at induction - cefazolin (group B - 197 patients), or a single intravenous dose (cefazolin) with an oral course for 7 days (amoxicillin). (group C - 181 patients).14 The rates of postoperative complications and infections were almost identical between all groups and in line with previous studies, leading to the conclusion that the use of prophylactic antibiotics is not necessary.

Therefore, Ricci & D'Ascanio questioned the use of antibiotics as prophylaxis of infections in the nasal procedure, as they did not observe a significant

difference in the rate of infection after septoplasty among patients submitted to perioperative prophylaxis in relation to the placebo group.[14]

A similar prospective study from 2005 - Rajan et al. - submitted 200 patients to rhinoseptoplasty. Patients received prophylactic antibiotics as a single intraoperative intravenous dose or a single intraoperative intravenous dose with a 7-day oral course of antibiotics. No significant difference in postoperative wound infection was observed between the two groups. However, the incidence of antibiotic-related side effects was significantly higher (29% versus 2%) in the combined regimen group, suggesting that prolonged use of antibiotics is not risk-free.[20]

Of the 239 patients who received antibiotics, only 3.3% developed a postoperative infection. While, in the group without prophylaxis (63 patients), the infection rate was 12.7% .[12]

It was found that antibiotic prophylaxis was used at higher rates in septocolumeloplasty compared to septoplasty. In addition, the use of antibiotic prophylaxis was positively associated with the use of splints, longer surgical time, and general anesthesia.[12]

When evaluating septoplasty with additional sinus surgery (n = 115) the postoperative infection rate was 3.3% in the prophylaxis group and 16.7% in the non-prophylaxis group. These results showed a statistically significant effect of pre-surgical prophylactic antibiotics in preventing postoperative infection in septoplasty, especially about associated sinus surgery.[12]

Thus, the authors demonstrated that the use of antimicrobial treatment in the preoperative period, as a prophylactic measure, significantly reduced the rate of surgical site infections and short-term complications (Table 3).[12]

Finally, a retrospective cohort conducted by Kotisalmi et al., published this year, provided another perspective. The authors evaluated 302 medical records of patients who underwent septoplasty or septocolumeloplasty with or without associated endoscopic nasal surgery, operated during 2018 at the Department of Head and Neck Surgery at the University Hospital Hus Helsinki in Finland. Of this total, approximately 239 (71.9%) received antibiotic prophylaxis before and/or after surgery. Two hundred and thirteen patients (70.5%) received only

Table 3: Occurrence of unplanned postoperative visits and postoperative infections with and without prophylactic antibiotic treatment.

Patients	Preoperative antibiotics	Postoperative antibiotics	Unplanned postoperative visit (%)	p value	Postoperative infections (%)	p value
63	No	No	13 (20.6)	CG	8 (12.7)	CG
18	Yes	Yes	1 (5.6)	0.175	0	0.189
8	No	Yes	0	0.336	0	0.584
213	Yes	No	18 (8.5)	**0.007**	8 (3.8)	**0.013**
239	Preoperative and/or postoperative antibiotics		19 (7.9)	**0.004**	8 (3.3)	**0.007**

All other groups were compared with CG
CG – control group
Bold values indicate statistical significance (p< 0.05)
Source: Kotisalmi, I, et al.[12]

preoperative prophylactic antibiotics 30-60 min before the incision. Only postoperative antibiotic treatment was given to 8 patients (2.6%), while 18 patients (6.0%) received pre- and postoperative antibiotics.[12]

It was observed in the studies described above that there is still no consensus on the use of prophylactic antibiotics in the rhinoseptoplasty procedure. The reason for this is the small scale of these studies, the heterogeneity of patient populations, the lack of standardization in surgical techniques, and the differences in routine perioperative care.

There remains a lack of data convincing enough to form a consensus on adequate preoperative screening and the use of prophylactic treatments. Common practice is still to administer empiric perioperative antibiotics according to the surgeon's preference.

Also, no national study was found that evaluated the main postoperative complications and the use of prophylaxis with antibiotics.

CONCLUSION

It is concluded that infection in rhinoseptoplasty, despite being the second main complication, is uncommon. Antibiotic prophylaxis should be indicated with caution as it may favor antimicrobial resistance. Despite this, the use of antibiotics may be related to the decrease in the number of this complication.

The great variability of techniques for these surgeries, and the numerous pre and postoperative antibiotic therapy protocols carried out in research make it difficult to standardize studies that assess the real benefits of using antimicrobials. Furthermore, there is also a lack of Brazilian studies that assess the main agents and the percentage of infections in the postoperative period in our population.

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REFERENCES

1. AMERICAN SOCIETY OF PLASTIC SURGEONS. 2020 Plastic Surgery Statistics Report 2020

2. JOO JO, Lee SJ, Hong SH, et al. The infection after augmentation rhinoplasty using silicone implant. J Korean Soc Aesthetic Plast Surg 2007;13:133-8.

3. EYTAN DF, Wang TD. Complications in Rhinoplasty. Clin Plast Surg. 2022 Jan;49(1):179-189. doi: 10.1016/j.cps.2021.07.009. Epub 2021 Sep 2. PMID: 34782135.

4. MINISTÉRIO DA SAÚDE. BRASIL. Agência Nacional de Vigilância Sanitária - Anvisa. NOTA TÉCNICA GVIMS/GGTES Nº 07/2021: Critérios diagnósticos das Infecções Relacionadas à Assistência à Saúde (IRAS): notificação nacional obrigatória para o ano de . 2022.

5. BELINFANTE LS. History of rhinoplasty. Oral Maxillofac Surg Clin North Am. 2012 Feb;24(1):1-9. doi: 10.1016/j.coms.2011.10.002. PMID: 22284393.

6. DABROWSKA-BIÉN, J., Skarżyński, P.H., Gwizdalska, I. et al. Complications in septoplasty based on a large group of 5639 patients. Eur Arch Otorhinolaryngol 275, 1789–1794 (2018). DOI: 10.1007/s00405-018-4990-8

7. MOON, K. et al, Preoperative Nasal Swab Culture: Is It Beneficial in Preventing Postoperative Infection in Complicated Septorhinoplasty? Plast. Reconstr. Surg. 146: 27e, july 2020. DOI: 10.1097/PRS.0000000000006893.

8. YOO DB, Peng GL, Azizzadeh B, Nassif PS. Microbiology and antibiotic prophylaxis in rhinoplasty: a review of 363 consecutive cases. JAMA Facial Plast Surg. 2015 Jan-Feb;17(1):23-7. doi: 10.1001/jamafacial.2014.1021. PMID: 25503811.

9. BITNER, B. et al, Outcomes of Concurrent Functional Endoscopic Sinus Surgery and Rhinoplasty: A Meta-analysis. American journal of rhinology and allergy 0(0) 1-9, 2020. DOI: 10.1177/1945892420980673.

10. BECK DO, Kenkel JM. Evidence-based medicine: Rhinoplasty. Plast Reconstr Surg. 2014 Dec;134(6):1356-1371. doi: 10.1097/PRS.0000000000000718. PMID: 25415099.

11. ISMI O, Ozcan C, Vayısoğlu Y, Öztürk C, Tek SA, Görür K. Transseptal suturing technique in septoplasty: impact on bacteremia and nosocomial colonization. Eur Arch Otorhinolaryngol. 2017 May;274(5):2189-2195. doi: 10.1007/s00405-017-4479-x. Epub 2017 Feb 20. PMID: 28220309.

12. KOTISALMI, I., Hytönen, M., Mäkitie, A.A. et al. Septoplasty with and without additional sinonasal surgery: postoperative sequelae and the use of prophylactic antibiotics. Eur Arch Otorhinolaryngol 279, 3449–3458 (2022). DOI: 10.1007/s00405-021-07113-9

13. LAYLIEV J, Gupta V, Kaoutzanis C, Ganesh Kumar N, Winocour J, Grotting JC, Higdon KK. Incidence and Preoperative Risk Factors for Major Complications in Aesthetic Rhinoplasty: Analysis of 4978 Patients. Aesthet Surg J. 2017 Jul 1;37(7):757-767. doi: 10.1093/asj/sjx023. PMID: 28472446.

14. RICCI G, D'Ascanio L. Antibiotics in Septoplasty: Evidence or Habit? American Journal of Rhinology & Allergy. 2012;26(3):194-196. doi:10.2500/ajra.2012.26.3755

15. TORIUMI DM. Discussion: Preoperative Nasal Swab Culture: Is It Beneficial in Preventing Postoperative Infection in Complicated Septorhinoplasty? Plast Reconstr Surg. 2020 Jul;146(1):35e-36e. doi: 10.1097/PRS.0000000000006952. PMID: 32590642.

16. KIM, M. et al, Sepsis Leading to Mortality after Augmentation Rhinoplasty with a Septal Extension Graft and Fat Grafting. Arch Plast Surg. 2016 May; 43(3): 295– 296. doi: 10.5999/aps.2016.43.3.295

17. LOHR GD, Hollabaugh B, Waters P, Tiwana PS. Methicillin-resistant Staphylococcus aureus and antibiotic use in septorhinoplasty: case report and review of literature. Oral Surg Oral Med Oral Pathol Oral Radiol. 2017 Jun;123(6):e177-e181. doi: 10.1016/j.oooo.2017.01.002. Epub 2017 Jan 24. PMID: 28396072.

18. NUYEN B, Kandathil CK, Laimi K, Rudy SF, Most SP, Saltychev M. Evaluation of Antibiotic Prophylaxis in Rhinoplasty: A Systematic Review and Meta-analysis. JAMA Facial Plast Surg. 2019 Jan 1;21(1):12-17. doi: 10.1001/jamafacial.2018.1187. PMID: 30489601; PMCID: PMC6439733.

19. KARATAS, Abdullah et al. The effects of the time of intranasal splinting on bacterial colonization, postoperative complications, and patient discomfort after septoplasty operations. Braz J Otorhinolaryngol. 2016, v. 82, n. 6, pp. 654-661. DOI: 10.1016/j.bjorl.2015.11.008.

20. RAJAN GP, Fergie N, Fischer U, Romer M, Radivojevic V, Hee GK. Antibiotic prophylaxis in septorhinoplasty? A prospective, randomized study. Plast Reconstr Surg. 2005 Dec;116(7):1995-8. doi: 10.1097/01.prs.0000191181.73298.b3. PMID: 16327614.

21. SHARIF-ASKARY, B. et al, Incidence of Post-Operative Adverse Events After Rhinoplasty: A Systematic Review. Plastic and Reconstructive Surgery Advance Online Article. 4 de dezembro de 2018. doi: 10.1097/PRS.0000000000006561.

22. ANDREWS PJ, East CA, Jayaraj SM, Badia L, Panagamuwa C, Harding L. Prophylactic vs postoperative antibiotic use in complex septorhinoplasty surgery: a prospective, randomized, single-blind trial comparing efficacy. Arch Facial Plast Surg. 2006 Mar-Apr;8(2):84-7. doi: 10.1001/archfaci.8.2.84. PMID: 16549733.

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COMPARATIVE TOMOGRAPHIC ANALYSIS OF THE FRONTAL BEAK AND ITS CORRELATIONS

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ABSTRACT

Introduction: The frontal sinus has a complex and varied anatomy, being considered challenging in the nasosinusal surgical approach. Tomographic anatomical landmarks, such as the frontal beak (FB), are essential for understanding and planning strategies for the treatment of this region. Objective: to investigate tomographic measurements of the FB and its correlations, focusing on the angle formed between the FB, columella and frontal sinus ostium (FCO). **Methods:** Retrospective and analytical study, based on the review of medical records of computed tomography scans of the paranasal sinuses, independently evaluated by two otolaryngologists. Divergent data were reassessed by a third experienced surgeon. The data were statistically analyzed. **Results:** CT scans of 50 patients aged 19 to 73 years were studied, totaling 100 images. Columella-FB distance and FB thickness were higher in men ($p \leq 0.001$); the size of the frontal ostium (FOD) was smaller the greater the number of frontal cells ($p=0.012$) and FCO angle ($p=0.003$); the FCO angle varied according to the position of the FB (FOG) ($p<0.001$), level of surgical difficulty ($p<0.001$) and columella-FB distance ($p=0.017$); the most prevalent frontal cell was the agger nasi (97%). **Discussion:** Thickness and location of the FB, as well as FOD, are known to be related to the difficulty of surgical access to the frontal recess, and the FCO angle showed a significant correlation with the measures studied. **Conclusion:** The frontal beak is a constant structure, which measurements and correlations, such as the FCO angle, can configure an auxiliary tool for the otolaryngologist and serve as basis for future studies.

KEYWORDS

Frontal beak. Computed tomography. Frontal sinus. Chronic sinusitis. Angle.

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INTRODUCTION

The frontal sinus is often cited as the most challenging approach in sinus endoscopic surgery. The degree of difficulty in accessing the frontal sinus can be explained by the complexity of its anatomical region, located ahead and above the frontal beak (FB), requiring an angular endoscopic approach. In addition, there is a wide range of local anatomical variations, being also surrounded by noble areas, such as the orbit, skull base, olfactory fossa, and the anterior ethmoid artery.[1,2]

The frontal beak is an anterior thickening of the frontal bone, located in the midline, and has been used as one of the anatomical landmarks in the preoperative evaluation of the frontal sinus, and may be a tool for anticipating difficulties in endoscopic access to the frontal sinus – especially when the frontal beak pushes the endoscopic view posteriorly, towards the ethmoid artery, and the frontal sinus is in an anterior position.[3]

Such anatomical characteristics, which often compromise ventilation and drainage of the frontal sinus, also limit the effectiveness of clinical and surgical management, and may serve as a barrier to the arrival of saline solution to the sinus for cleaning during nasal lavage.[4] Still, the relatively small limits of this region are prone to postoperative scarring.[2]

A deep knowledge of the anatomy and physiology of the frontal sinus, and its relationship with the ethmoid complex are of fundamental importance for the understanding of frontal sinus diseases and their surgical treatment, as well as their refractoriness to clinical therapies.[4]

Thus, the objective of this study is to tomographically evaluate the frontal beak and to investigate its anatomical correlations, and to propose a new angular tomographic measurement, to help in understanding the complex anatomy of the frontal sinus.

Furthermore, this research seeks to support future studies on fluid mechanics for the understanding of frontal sinus lavage with saline solution and topical medications, as well as contribute to the enrichment of data that can guide the surgeon to plan intraoperative care and anticipate points of difficulty, aiming to minimize transoperative risks in approaching the frontal recess.

MATERIAL AND METHODS

This is a retrospective and analytical study, based on the review of tomographic studies of the facial sinuses, through electronic medical records of patients with complaints of chronic sinusitis, in a reference center in otorhinolaryngology.

The study was previously approved by the Research Ethics Committee of the Hospital Paranaense de Otorrinolaringologia – Hospital IPO (CAAE: 58930722.7.0000.5529).

A total of 187 examinations of patients of both gender were recruited, at random, carried out from July to September 2022. Of these, 23 were excluded because they were of individuals under 18 years of age, 70 because they did not have the sagittal section, and 44 because of are incomplete. In all, 50 paranasal sinuses CT scans were selected and evaluated, totaling 100 sides for analysis. Each frontal sinus (right or left) was considered as an observation unit, that is, the right and left sides were considered as independent.

All exams were performed by the Imagine One 16 CT – Imex®, 16-channel CT scanner, with 0.25mm

thick slices, from the Água Verde Diagnostic Center (CEDAV). Exams performed by cone beam tomography were excluded because the slices were thicker and had lower quality image definition. Other study exclusion criteria were the presence of endonasal malignancy or previous frontal sinus recess surgery, but these were not found among the selected cases.

The presence of frontal cells was considered according to the standardization of the International Frontal Sinus Anatomy Classification (IFAC), and performed through sagittal, coronal, and axial sections.[2]

The evaluation of the images was carried out online by the institution's system (PACS® software). Measurements were performed according to established standardization and were taken using sagittal slices at the level immediately after the tear duct disappeared, from lateral to medial. The choice of the lacrimal canal as a reference for it is a constant structure, present in all patients, and referenced in the largest studies of anatomy of the frontal sinus as a standard for measurements.

The measurements were performed by two otorhinolaryngologists, independently. The data considered for analysis consisted of the average of the two measurements. Measurements with a difference ≥ 2 mm or ≥ 2 degrees were independently checked by a third evaluator, a more experienced otorhinolaryngologist surgeon, and in these cases, this became the measurement considered for analysis.

The exams were analyzed according to gender, age and presence or absence of frontal sinus disease, with sinusopathy being considered the presence of soft tissue material (filling) inside the sinus in the CT scan. The measures evaluated were: frontal beak thickness; size of the frontal sinus ostium (FOD – frontal ostium diameter), which is the narrowest portion of the sinus drainage; distance between the columella and the frontal beak; and measurement of the angle formed between the frontal beak in its posterior-inferior portion (inferior FB), the columella and the most posterior point of the frontal sinus ostium (FCO angle), proposed by the authors as a new tomographic study parameter for evaluating its association with the level of difficulty of surgical access to the frontal sinus and relationship with the anatomy. We are not aware of studies that have evaluated this measure in the literature.

Measurements of the FCO angle were compared to the size of the FOD and the position of the frontal sinus ostium in relation to the skull base deflection (FOG – frontal ostium grade). A positive FOG means a posteriorized ostium, negative FOG, when the ostium was anterior, and neutral FOG, when the ostium was in the same line of deflection. To assess these levels, a line is drawn between the skull base deflection and the posterior frontal beak. The FOD and FOG measurements made it possible to distribute the exams into groups according to the level of surgical difficulty, in degrees I-IV, with levels I and II being the least complex, and levels III and IV the most difficult to access. by the surgeon, to complement the comparative analysis.[5]

Table 1 represents the legend of the abbreviations used in the text.

Figures 1, 2, 3 and 4 below illustrate examples of measures taken in a standardized way, in CT scans of the facial sinuses, in their sagittal section, for data collection and elaboration of this study.

Table 1: Legend of abbreviations.

Term	Abbreviation
Frontal beak (*bico do frontal*)	FB
Frontal ostium diameter (*diâmetro do óstio do seio frontal*)	FOD
Frontal ostium grade	FOG
Angle between inferior frontal beak, columella and frontal sinus ostium	FCO

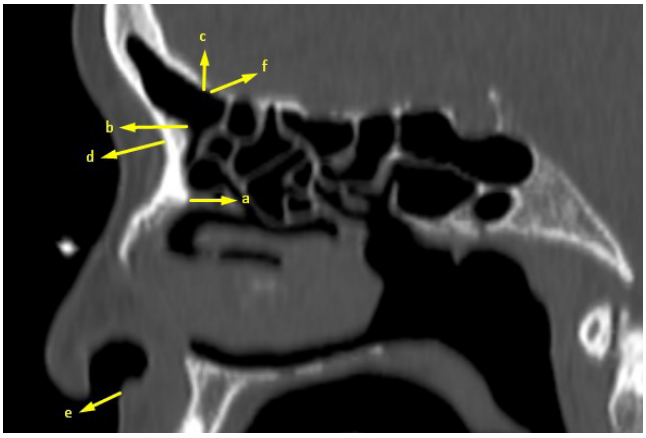

Figure 1: Anatomical landmarks a) inferior frontal beak; b) anterior point of the frontal sinus ostium; c) posterior point of the frontal sinus ostium; d) anterior portion of the frontal beak at the level of the frontal ostium; e) point of the columella (in the region of the nasolabial angle); f) skull base deflection point.

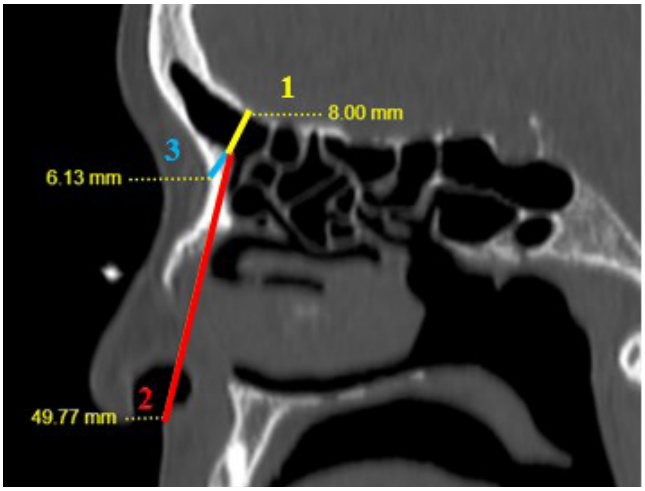

Figure 2: Representation of the measures taken, as follows: 1. FOD (yellow line); 2. Columella distance – FB (red line); 3. FB thickness (blue line).

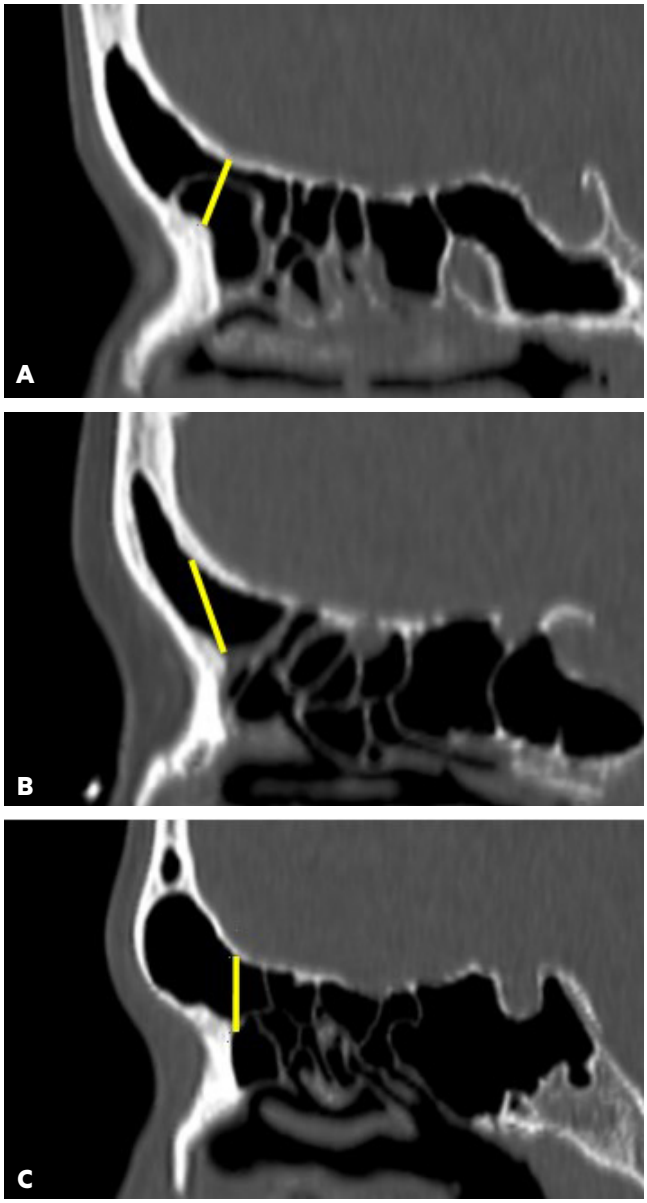

Figure 3: Representation of the FOG classification – **A**) positive FOG; **B**) negative FOG; **C**) neutral FOG.

Figure 4: Representation of the FCO Angle measurement.

Quantitative variables were described by mean, standard deviation and 95% confidence interval for the mean. Categorical variables were described by frequency and percentage. To assess the association between two categorical variables, Fisher's exact test or the chi-square test was used. The comparison of two groups defined by classifications of categorical variables, in relation to quantitative variables, was performed using Student's t test for independent samples. More than two groups were compared using one-way analysis of variance (ANOVA) and Bonferroni's post-hoc test. To compare the right and left sides, in relation to quantitative variables, Student's t test for paired samples was used. Categorical variables were analyzed using the Stuart-Maxwell symmetry test. The condition of normality of the quantitative variables was evaluated using the Kolmogorov-Smirnov test. Data were organized in an Excel® spreadsheet and analyzed using the IBM SPSS Statistics v.20.0 computer program.

RESULTS

The analysis presented below was performed based on data from examinations of 50 patients evaluated regarding measurements of length and angle related to the frontal sinus and frontal beak, measured in CT scans of the facial sinuses, on the right and left sides, totaling 100 images. The mean age of the patients was 41.1 ± 16.5 years, ranging from 19 to 73 years, with 31 (62%) female patients and 19 (38%) male patients.

The presence or absence of frontal sinus disease was assessed on each side separately (Table 2).

Table 2: Prevalence of frontal sinus disease.

Variable	Classification	n	%
Left frontal disease	No	42	84%
	Yes	8	16%
Right frontal disease	No	38	76%
	Yes	12	24%

The prevalence of frontal cells is represented in Figure 5, with 99 exams (99%) having at least one cell, and the Agger nasi cell was the most prevalent (97%). One frontal sinus was hypoplastic and there was no frontal cell. There was a predominance of the presence of anterior cells (ANC, SAC, SAFC), verified in 98% of the patients, in relation to posterior cells (SBC, SOEC, FSBC), present in 46.5% of the patients, and medial (FSC), present in 13.1%.

The exams were classified according to the level of surgical difficulty into four groups, as shown in Table 3 as following.

The average size of the frontal ostium (FOD) was 7.8 ± 3.1 mm. The prevalence of FOD ≥ 7.5mm was 51%, and 49% for <7.5mm. As for the position of

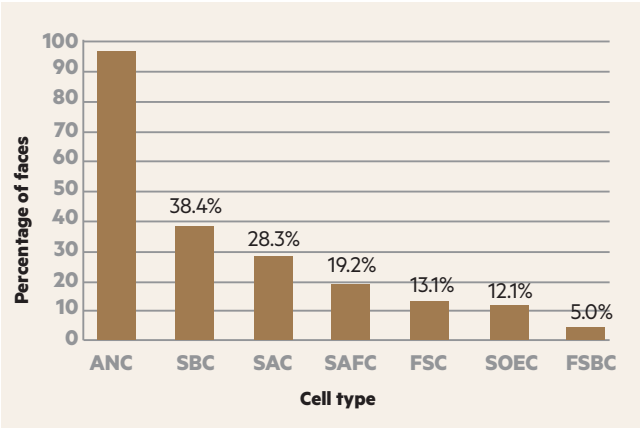

Figure 5: Prevalence of frontal cells, according to the International Classification (IFAC). Legend: ANC (agger nasi cell), SBC (supra bulla cell); SAC (supra agger cell); SAFC (supra agger frontal cell); FSC (frontal septal cell), SOEC (supraorbital ethmoid cell), FSBC (supra bulla frontal cell).

Table 3: Classification according to level of surgical difficulty.

Level of surgical difficulty - FOG; FOD	n	%
Level I Positive; ≥ 7.5mm	33	33%
Level II Positive; <7.5mm or Neutral; ≥ 7.5mm	31	31%
Level III Neutral; <7.5 or Negative; ≥ 7.5mm	16	16%
Level IV Negative; < 7.5mm	20	20%
Total	100	100

the FB in relation to the skull base (FOG), 55% had positive FOG, 27% negative, and 18% neutral. The average thickness of the FB was 6.2 ± 1.6mm. The distance from the columella to the FB was 52.6 ± 4.4mm, and the measurement of the FCO angle was 9.6 ± 3.5 degrees.

The means of the variables were compared, in Table 4, between males and females. A statistically significant difference was observed for measurements of FB thickness and columella-FB distance. Considering the right and left sides separately, the difference in such measures prevailed between genders (p<0.001), both being greater in males. No difference was found in the measures with respect to age.

When comparing the right and left sides, a significant difference was found for FOD (p=0.003) and for columella-FB distance (p=0.014). No significant difference was found for frontal beak thickness, frontal beak - columella - ostium angle (FCO), frontal disease, FOG, FOD and level of surgical difficulty (Tables 5 and 6).

Comparing the number of frontal cells present and the diameter of the drainage ostium (FOD), it was found that in CT scans with a number of frontal cells greater than 1, the FOD was greater (p=0.012), as shown in Table 7 No statistically significant association was found between the number of cells and the FB thickness (p=0.27), nor between the number of cells and the FCO angle (p=0.26). The presence of more superior frontal cells (FSBC and FANC) was not related to the thickness of the FB or the FCO angle (p>0.05).

There was no significant relationship between the presence or absence of frontal sinus disease and the FCO angle, as shown in Table 8.

Table 4: Evaluation of patient-related variables.

Variable	Gender	n	Mean ± standard deviation	95%CI	p*
FOD (mm)	Female	31	8.0 ± 2.8	7.0 - 9.1	0.426
	Male	19	7.4 ± 2.7	6.1 - 8.7	
FB thickness	Female	31	5.7 ± 1.2	5.3 - 6.1	0.001
	Male	19	7.0 ± 1.5	6.3 - 7.7	
Distância columela-FB	Female	31	51.1 ± 3.3	49.9 - 52.3	<0.001
	Male	19	55.2 ± 4.1	53.2 - 57.2	
Angle FCO	Female	31	9.7 ± 3.6	8.4 - 11	0.693
	Male	19	9.4 ± 2.3	8.2 - 10.5	

Table 5: Side comparison according to FOD, FB thickness, columella-FB distance and FCO angle.

Variable	Side	Mean ± standard deviation	95%CI	p*
FOD (mm)	Right	7.3 ± 3.0	6.4 - 8.1	0.003
	Left	8.3 ± 3.1	7.5 - 9.2	
FB thickness (mm)	Right	6.2 ± 1.7	5.7 - 6.7	0.939
	Left	6.2 ± 1.5	5.8 - 6.6	
Distância columela-FB (mm)	Right	52.1 ± 4.7	50.7 - 53.4	0.014
	Left	53.2 ± 4.1	52.1 - 54.4	
Angleo FCO (graus)	Right	9.6 ± 3.4	8.7 - 10.6	0.812
	Left	9.5 ± 3.5	8.5 - 10.5	

*Student T test for paired samples, p<0.05

Table 6: Comparison of sides in relation to frontal disease, FOG, FOD and level of surgical difficulty.

Variable	Classification	Side		p*
		Left	Right	
Frontal disease	No	42 (84%)	38 (76%)	0.102
	Yes	8 (16%)	12 (24%)	
FOG	Negative	13 (26%)	14 (28%)	0.541
	Neutral	10 (20%)	8 (16%)	
	Positive	27 (54%)	28 (56%)	
FOD (mm)	< 7.5	23 (46%)	28 (56%)	0.059
	≥ 7.5	27 (54%)	22 (44%)	
Level of surgical difficulty	I	18 (36%)	15 (30%)	0.544
	II	15 (30%)	16 (32%)	
	III	7 (14%)	9 (18%)	
	IV	10 (20%)	10 (20%)	

*Stuart-Maxwell symmetry test, p<0.05.

Table 7: Comparison of FOD size with the number of frontal cells.

Number of cells	FOD (mm)			p*
	n	Mean ± standard deviation	95%CI	
1	29	6.6 ± 2.7	5.6 - 7.7	0.012
> 1	70	8.3 ± 3.1	7.6 - 9.1	

*Student's t test for independent samples, p<0.05.

Table 8: Association between frontalis disease and FCO angle.

Frontal disease	Angle			p*
	n	Mean ± standard deviation	95%CI	
No	80	9.7 ± 3.3	9.0 – 10.5	0.435
Yes	20	9.0 ± 4.1	7.1 - 11	

A statistically significant relationship was observed between the size of the frontal ostium (FOD) and the FCO angle (Fig. 6).

The association between the FCO angle and the FOG was evaluated, as shown in Table 9. The averages and variations are graphically represented in Figure 7, where an increase in the mean size of the FCO angle can be observed the more anterior the FB (neutral FOG and negative).

Considering that a significant difference was found, the FOG ratings were compared two by two. Table 10 presents the p values of these comparisons.

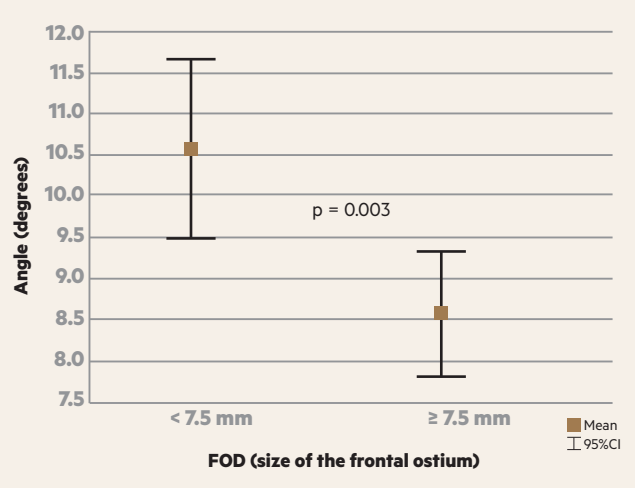

Figure 6: Association between FOD and FCO.

Table 9: Comparison of FOD size with the number of frontal cells.

FOG	Angle			p*
	n	Mean ± standard deviation	95%CI	
Positive	55	8.1 ± 2.7	7.4 - 8.8	<0.001
Neutral	18	9.8 ± 3.8	8.0 - 11.7	
Negative	27	12.4 ± 3.0	11.3 - 13.6	

*ANOVA with one factor, p<0.05

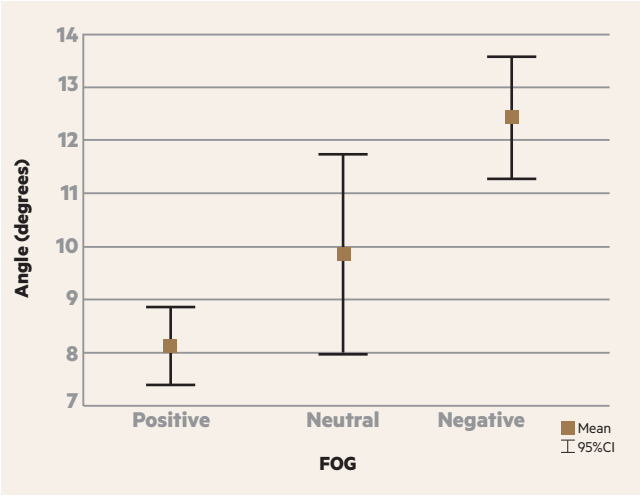

Figure 7: Graphical representation of the means and standard deviations of the FCO angle measurement and its correlation with the FOG.

Table 10: FOG ratings compared two by two, with respect to the measurement of the FCO angle.

FOG Classification Compared	p*
Positive x Neutral	0.103
Positive x Negative	<0.001
Neutral x Negative	0.016

*Bonferroni post hoc test, p<0.05

The measurement of the FCO angle varied according to the level of surgical difficulty (p<0.001), as shown in Table 11, below.

For the quantitative variables, Pearson's linear correlation coefficients were performed, shown in Table 12. An inverse relationship was found between FOD and MBF angle measurements and between columella-FB distance and MBF angle. A directly proportional relationship was found between FB thickness and columella-FB distance.

The scatter plots of the statistically significant measures are shown in Figures 8, 9 and 10.

Table 11: Association between the FCO angle and the level of surgical difficulty.

Level of surgical difficulty – FOG; FOD	Angle		
	N	Mean ± standard deviation	95%CI
Level I Positive; ≥ 7.5mm	33	8.0 ± 2.2	7.2 - 8.7
Level II Positive; <7.5mm or Neutral; ≥ 7.5mm	31	8.6 ± 3.3	7.4 - 9.9
Level III Neutral; <7.5mm or Negative; ≥ 7.5mm	16	10.4 ± 3.6	8.4 - 12.3
Level IV Negative; < 7.5mm	20	13.1 ± 2.7	11.9 - 14.4

Table 12: Pearson's correlation coefficient between quantitative variables.

Variables	N	Pearson's correlation coefficient	P
FOD- x FB thickness	100	-0.03	0.786
FOD x Columella-FB distance	100	-0.16	0.113
FOD x Angle	100	-0.35	<0.001
FB thickness x Columella-FB distance	100	0.38	<0.001
FB-espessura x Angle	100	-0.05	0.603
Columella-FB distance x Angle	100	-0.24	0.017

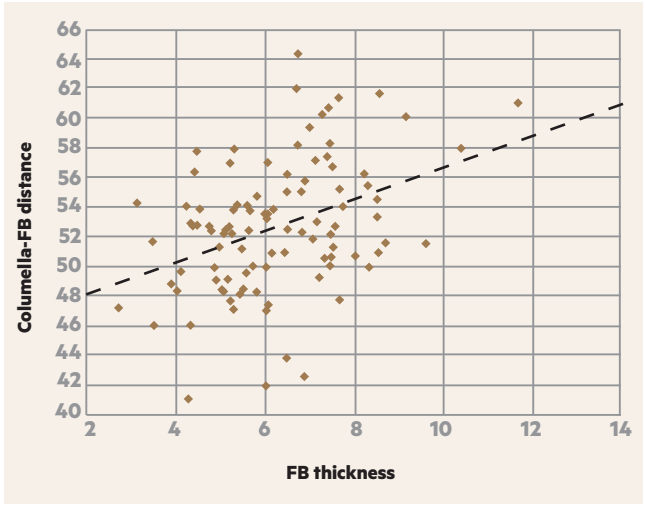

Figure 9: Representation of the correlation between the columella-FB distance and the thickness of the FB.

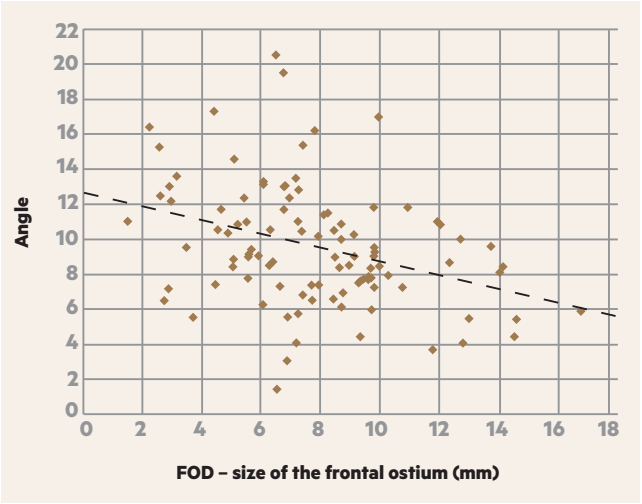

Figure 8: Representation of the correlation between the FCO angle and the FOD.

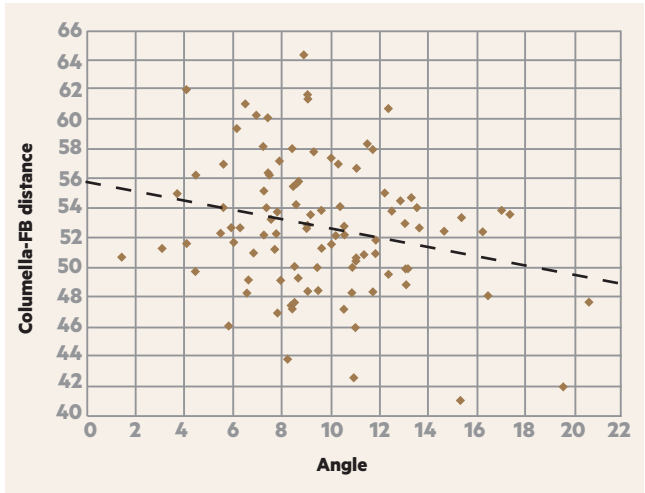

Figure 10: Representation of the correlation between the columella-FB distance and the FCO angle.

DISCUSSION

Nasosinusal endoscopic surgery presents excellent results in the treatment of chronic rhinosinusitis that does not respond to clinical treatment, with success rates between 80-90%. However, it is known that, when it comes to frontal sinus surgery, there is a tendency to reduce the patency of the ostia in the postoperative period, due to the narrow diameter of the frontal ostium and propensity to circumferential scars.[6]

Obstructions in the drainage path are mainly responsible for cases of frontal sinusitis, and frontal recess clearance is a vital part of sinus surgery.[4,2] However, these diseases sometimes persist and are one of the greatest challenges in rhinology, due to a highly variable anatomy, the inaccessible location of some cells in the frontal recess, and the tendency of the frontal sinus to stenosis, as previously mentioned.[7]

Failure to approach such anatomical variations in the frontal infundibulum portion and consequent incomplete clearance of frontal recess cells are the main source of refractoriness and persistent sinusitis after complete approach to the anterior ethmoid.[2,4] Thus, it is evident the importance of deep anatomical knowledge of this region by the otorhinolaryngologist, for adequate surgical planning.[4,8]

The frontal sinus drainage pathway is a functional unit formed by three portions that together have an hourglass shape. The upper part of the hourglass is the frontal infundibulum, the girdle is formed by the frontal sinus ostium, and the lower portion is formed by the frontal recess.[4] The frontal ostium is defined as the narrowest area of the sinus transition zone.[2] The average size of the frontal ostium (FOD) is 7.6mm.[5] In this study, the average FOD was 7.8mm, and most images had an ostium greater than or equal to 7.5mm.

The frontal recess is determined by the structures that surround it, therefore, the degree of patency of the frontal recess is largely determined by these adjacent structures.[4] Its anterior limit is formed by the frontal beak (also known as frontal beak, nasal process of the frontal bone or internal nasal spine), the posterior limit is formed by the base of the skull, the lateral is the lamina papyracea and, the medial, the vertical lamella of the middle turbinate and lateral wall of the olfactory fossa. the direction and position of this drainage route.[4]

According to the IFAC (International Frontal Sinus Anatomy Classification) system, the cells of the frontal recess are classified into agger nasi cells (ANC), supra agger cells (SAC), frontal supra agger nasi cells (SAFC), supra bular cells (SBC), suprabular frontal cells (FSBC), supraorbital ethmoidal cells (SOEC) and frontal septal cells (FSC).[7,2]

The authors found only four studies documenting the prevalence of frontal recess cells according to the IFAC. In all of them, the agger nasi cell was the most prevalent, present in around 95% of the exams evaluated. The other cells showed a wide variation in position in relation to prevalence, according to the studied population.[9,10-12]

In our study, ANC was also the most prevalent cell, present in 97% of patients, followed by SBC (38.4%) and SAC (28.3%).

Coronal computed tomography, which is considered by most authors as the standard for analyzing the paranasal sinuses, and axial tomography alone do not provide adequate information to identify the frontal

sinus drainage route. Parasagittal images reconstructed from high-resolution scans, 1 mm thick or less, are the best option for understanding the anatomy of this region,13 especially for identifying and evaluating the size of the frontal sinus ostium. These cuts facilitate the transposition of a two-dimensional image into a three-dimensional one, contributing to a better preoperative planning.[8,13-15]

Through tomographic analysis, easily identifiable landmarks and measurements can aid in safe entry into the frontal sinus ostium.[3]

In adults, the average dimensions of the frontal sinus differ according to gender, and such standardized measurements, as well as those of the maxillary sinus, have been used in forensic medicine.[16]

Eloy et al.[17] determined the distances from the columella to the frontal beak using high-resolution computed tomography. Mean distance from the columella to the FB was 58.9±2.3 mm in men and 53.0±3.3 mm in women ($p<0.0001$).[17] Similarly, a Koream study determined the distance between the columella and the FB, where a mean distance of 55.3±3.9 mm was found in men and 52.1±4.7 mm in women ($p<0.01$).[18] Also, the average angle between the lines of the columella to the base of the skull and the hard palate was calculated, which was 71.8±4.5° in men and 70.7±4.6° in women ($p>0.05$), with no statistical difference.[18] These data allow the surgeon to estimate a safe working distance to minimize intracranial complications.[17,18]

In the present study, the distance from the columella to the FB varied between genders, being greater in the examinations of male patients, corroborating data in the literature. Measures of the FCO angle, in turn, were not statistically different between genders. Comparatively, other angles already measured by previous studies in the literature, such as those mentioned above, were also not different between men and women.

The thickness of the FB was also the objective of previous studies. The average found was 5.4 mm. The anteroposterior length was 11 mm.[19] In this study, similarly, the average found was 6.2 ± 1.6mm, and did not show variation when comparing the right and left sides. On the other hand, we noticed that the FOD and the columella-FB distance were significantly different between the sides, which justifies the independent analysis of each side in the tomographic studies.

In this study, there was a significant difference in the thickness of the FB when comparing the sexes, being greater in males, and the measurement of the FB varied directly proportional to the columella-FB distance, that is, the greater the anteroposterior diameter of the FB, furthest from the columella was its posterior boundary.

In the study by Makihara et al., there was no correlation between agger nasi size and FB thickness.[19] In contrast, Wormald observed that a large nasi agger and frontal pneumatization of the ethmoid cells were associated with a smaller FB size, while the absence of this cell would produce a thick FB.[20] In our study, there was no significant difference between the number of frontal cells and the FB size. We also found no association between FB thickness and the presence of higher frontal cells (FSBC and SAFC).

In this research, the presence of greater frontal pneumatization, that is, a greater number of cells in the frontal recess, was associated with a larger size

of the frontal sinus ostium (FOD), while the presence of only one frontal cell was related to a FOD smaller.

Gheriani et al.,[5] described a tomographic classification to specify the location of the frontal ostium with the aim of predicting the degree of intraoperative technical difficulty. The parameters used were FOD and FOG, at the level of the lacrimal bone, which is a constant anatomical landmark and is part of the lateral drainage pathway of the frontal sinus below the ostium. The location and diameter of the frontal ostium are directly related to the position of the frontal beak. The smaller the diameter of the frontal sinus ostium and the more anterior its location in relation to the frontal process of the maxilla, the more difficult its surgical access will be, and consequently, the longer the surgical time to clean the frontal recess, and the greater the need for more accurate endoscopes. angulated.[5]

Hosemann et al.,[15] described how the anatomical variability of FB size can affect endonasal surgery of the frontal sinus, where a larger anteroposterior diameter makes it difficult to approach the sinus and may require the use of a drill for access.[15]

The reviewed studies aimed at establishing reference anatomical landmarks for accessing the frontal sinus, due to its complexity, which makes complete surgical clearance difficult and remains the major cause of treatment failure.[2] Although consistent studies have analyzed the distances to the FB, skull base, basal lamella, and sphenoid sinus, and established stable values, variations of up to 2 to 2.5 cm were found, which is a difference significant when the vital structures in this region are considered.[21]

To minimize possible significant variations in measurements, in our study, the measurements were independently made by two otorhinolaryngologists, and measurements considered dispersed, with a difference greater than or equal to 2 mm or 2 degrees, were reassessed by a third evaluator with extensive experience in the field, increasing the reliability of the collected data.

However, as there is no single standard, such measurements should not be used separately for preoperative guidance, but the individual distances of the patient to be operated on, through their paranasal sinuses computed tomography images.[21]

This study evaluated the association of an angular measure correlated to FB (FCO angle) proposed by the authors, and which, until the present moment, we did not find referenced in the literature.

A greater FCO angle was observed for exams with FOD < 7.5mm, and this relationship showed an inversely proportional trend. Also, the angle was progressively larger when the FOG was neutral or negative, respectively. Thus, larger measures of FCO were also related to higher levels of surgical difficulty. The columella-FB distance tended to be inversely proportional to the FCO angle. The smaller the distance, the greater the angle, and the FB was more forward. Therefore, the FCO measurement varies regarding the size of the frontal ostium and the position of the FB in relation to the skull base and can be used as a complementary measure for the tomographic study of the FB and its correlations and serving as an auxiliary tool for the surgeon in planning of the treatment of patients with frontal disease.

The frontal sinus is the most difficult sinus to be reached by nasal drops, spray, douche, or nebulizer, especially in non-operated sinuses, due to mucosal edema and polypoid changes, which can narrow the ostium and prevent the arrival of topical agents.[22,23] Nasal irrigation with saline solution and topical administration of medications, such as steroids, are essential for successful management of chronic rhinosinusitis, and are among the main treatment options to prevent frontal ostium stenosis after endoscopic sinus surgery.[6,22]

Currently, the most evidence recommendation is nasal lavage with high volume and low pressure, especially in cases of patients in the postoperative period of nasosinusal endoscopic surgery.[22] Studies have shown a significant improvement both in surface area and the intensity of postoperative irrigation for the maxillary, ethmoidal and frontal sinus ostia using high-volume lavage.[23]

Several previous studies have shown that the opening of a sinus ostium needs to be 4 mm or more to achieve satisfactory penetration with high-volume nasal irrigation.[22,24,25] In addition, computational fluid dynamics studies show that the head-down position, with the nose pointing towards the floor, is superior in the irrigation of the frontal, maxillary and ethmoid sinuses compared to the position of leaning over the sink.[23,26]

The researchers did not find data in the literature that demonstrate, so far, standardized consistent measurements of the frontal beak, especially considering their anatomoclinical correlations. The thickness and location of the FB are known to be related to the difficulty of surgical access to the frontal recess.[5] However, there is a lack of studies that correlate its angle and diameter as factors influencing fluid dynamics and response to high-volume nasal irrigation, due to the difficulty of getting the drug to this highly complex region. anatomical.

CONCLUSION

The tomographic anatomy of the frontal sinus, especially the detailed analysis of the frontal beak and its correlations, is a complex subject and still little explored in Otorhinolaryngology. The FB is a constant tomographic anatomical landmark, but there are few standardized measurements in the literature, due to the great anatomical variability of this region. The creation and understanding of tomographic anatomical landmarks aim to enrich the surgeon's knowledge and facilitate the planning of the endoscopic approach, allowing the predictability of intraoperative difficulties, which must be analyzed individually for each patient. Still, such references, such as the new angle correlated to the FB proposed by the authors, which showed a significant association with previously studied measurements of the frontal recess region, can serve as a basis for future population studies, with a larger number of participants, and also for studies of fluid dynamics, in order to complement the various gaps in the literature to establish precise anatomoclinical correlations and help in the institution of clinical-surgical therapies for the treatment of the frontal sinus.

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REFERENCES

1. KEW, J. et al. Multiplanar reconstructed computed tomography images improves depiction and understanding of the anatomy of the frontal sinus and recess. American Journal of Rhinology, [s. l.], v. 16, n. 2, p. 119–123, 2002.

2. WORMALD, P. J. et al. The International Frontal Sinus Anatomy Classification (IFAC) and Classification of the Extent of Endoscopic Frontal Sinus Surgery (EFSS). International Forum of Allergy and Rhinology, [s. l.], v. 6, n. 7, p. 677–696, 2016.

3. MOHAMED, M. et al. Study of Nasofrontal Beak Identification as a Useful Landmark in Endoscopic Frontal Sinus Surgery. [s. l.], v. 86, n. January, p. 781–787, 2022.

4. MCLAUGHLIN, R. B.; REHL, R. M.; LANZA, D. C. Clinically relevant frontal sinus anatomy and physiology. Otolaryngologic Clinics of North America, [s. l.], v. 34, n. 1, p. 1–22, 2001.

5. GHERIANI, H. et al. Frontal Ostium Grade (FOG): A New Computer Tomography Grading System for Endoscopic Frontal Sinus Surgery. Otolaryngology - Head and Neck Surgery (United States), [s. l.], v. 163, n. 3, p. 611–617, 2020.

6. HONG, S. D. et al. The effect of anatomically directed topical steroid drops on frontal recess patency after endoscopic sinus surgery: A prospective randomized single blind study. American Journal of Rhinology and Allergy, [s. l.], v. 26, n. 3, p. 209–212, 2012.

7. JIANG, W. et al. Endoscopic frontal recess anatomy directed by the drainage pathways using the connecting plates as landmarks. European Archives of Oto-Rhino-Laryngology, [s. l.], v. 278, n. 9, p. 3315–3323, 2021. Disponível em: https://doi.org/10.1007/s00405-020-06577-5.

8. KEW, J. et al. Multiplanar reconstructed computed tomography images improves depiction and understanding of the anatomy of the frontal sinus and recess. American Journal of Rhinology, [s. l.], v. 16, n. 2, p. 119–123, 2002.

9. CHOBY, G., et al. Computed tomography analysis of frontal cell prevalence according to the international frontal sinus anatomy classification. Int Forum Allergy Rhinol, v.8, n.7, p.825–830, 2018.

10. OFAL, A.A.B.; EL-ANWAR, M.W. Frontal Recess Cells in International Frontal Sinus Anatomy Classification (IFAC); Prevalence, Infection Incidence, and Relation to Frontal Sinus Infection in Chronic Sinusitis Patients. Indian J Otolaryngol Head Neck Surg, 2022.

11. SOMMER, F., et al. Incidence of anatomical variations according to the international frontal sinus anatomy classification (IFAC) and their coincidence with radiological sings of opacification. Eur Arch Otorhinolaryngol, v.276, n.11, p. 3139–3146, 2019.

12. TRAN, L.V.; NGO, N.H.; PSALTIS, A.J. A radiological study assessing the prevalence of frontal recess cells and the most common frontal sinus drainage pathways. Am J Rhinol Allergy, v.33, n. 3, p. 323–330, 2019.

13. PARK, S. S. et al. Pneumatization pattern of the frontal recess: Relationship of the anterior-to-posterior length of frontal isthmus and/or frontal recess with the volume of agger nasi cell. Clinical and Experimental Otorhinolaryngology, [s. l.], v. 3, n. 2, p. 76–83, 2010.

14. DELGAUDIO, J. M. et al. Multiplanar Computed Tomographic Analysis of Frontal Recess Cells. Archives of Otolaryngology–Head & Neck Surgery, [s. l.], v. 131, n. 3, p. 230, 2005.

15. HOSEMANN, W. et al. Clinical anatomy of the nasal process of the frontal bone (spina nasalis interna). [s. l.],2001.

16. AKHLAGHI, M. et al. Frontal sinus parameters in computed tomography and sex determination. Legal Medicine, [s. l.], v. 19, p. 22–27, 2016. Disponível em: http://dx.doi.org/10.1016/j.legalmed.2016.01.008.

17. ELOY, J. A. et al. High-resolution computed tomography analysis of the frontal sinus ostium: A pilot study. American Journal of Otolaryngology - Head and Neck Medicine and Surgery, [s. l.], v. 34, n. 2, p. 99–102, 2013. Disponível em: http://dx.doi.org/10.1016/j.amjoto.2012.08.009.

18. YOO, S. W. et al. A Measurement of the Frontal Sinus Ostium Using the Sagittal Images of Computed Tomography. Korean Journal of Otorhinolaryngology-Head and Neck Surgery, [s. l.], v. 57, n. 11, p. 766,

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BODY DYSMORPHIC DISORDER IN RINOPLASTLY CANDIDATES: COMPARATIVE ANALYSIS OF SCORES WITH PRE-OPERATORY SIMULATION

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ABSTRACT

In patients who wish to modify the nasal appearance through rhinoplasty, the state of mental health is important, as patients with psychopathologies related to body image distortion have high rates of dissatisfaction with the surgical result. This research becomes relevant, as it aims to assess the prevalence of Body Dysmorphic Disorder (BDD) in candidates for rhinoplasty through the application of questionnaires, the Yale-Brown Obsessive Compulsive Scale modified for Body Dysmorphic Disorder (BDD- YBOCS) and Body Dysmorphic Symptoms Scale (BDSS), in its validated version for Portuguese, that is, Corporal Dysmorphism Symptoms Scale, and through preoperative 2D simulation guided by the patient's desire, analyzes whether there is a correlation between the scores obtained in the questionnaires with the intensity of the nasal change desired by the patient, that is, whether patients who are candidates for rhinoplasty with positive screening or higher scores in the BDD questionnaires present greater self-image distortion during the 2D simulation when compared to patients with negative screening for BDD. The survey was applied to 28 volunteer participants at Hospital Paranaense de Otorrinolaringologia IPO in Curitiba. It was found that the female public was the one that most presented complaints related to nasal aesthetics, there were 19 female participants (67.9%) and 9 male participants (32.1%). The average age was 29 years. It was found that 3 participants (10.7%) were screened positive for BDD. There was a direct correlation between higher scores on the BDSS questionnaire and greater changes in the nasolabial angle (p 0.043) and nasofrontal angle (p 0.048) variables, while the BDD-YBOCS questionnaire showed a direct correlation between higher scores on the questionnaire and greater changes only in the nasolabial angle variable (p 0.026). It was concluded that the prevalence of BDD in rhinoplasty candidates was 10.7% and that patients with positive screening or higher scores in the questionnaires presented greater self-image distortion during the 2D simulation, as they wanted more intense changes in nasal aesthetics as when compared with patients who screened negative for BDD.

KEYWORDS

Dysmorphism. Rhinoplasty. Questionnaire. Simulation.

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INTRODUCTION

Social media, especially those focused on personal image, have been associated with dissatisfaction and symptoms of body image disorders, as they globalize an aesthetic ideal to be achieved. Excessive concern with appearance can hide psychopathologies that are not always easy to recognize.[1]

In this scenario, it is important to remember Body Dysmorphic Disorder (BDD), which is a negative emotional response to the visual perception of body parts, which the individual perceives as deformed.[2] Brito et al.,[3] reports that patients with severe symptoms of BDD have high rates of suicidal ideation (80%) and suicide attempt (24%). For Kuck et al.,[4] low self-esteem and depressive symptoms are important hallmarks in patients with BDD.

According to the American Psychiatric Association.,[5] in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), BDD is diagnosable by four criteria that are necessarily present: (1) the individual is concerned about a defect in physical appearance (which are not observable or appear to be minimal for others) and if a minor anomaly is present, is markedly excessively preoccupied with it; (2) during the course of the illness, the individual engages in repetitive behaviors (e.g., mirror checking, neurotic excoriation, and asking friends and family for their opinion about the defect) or mental acts (e.g., comparing their appearance to others) in response to appearance problems; (3) the worry must cause significant stress or impairment in social, occupational, or other areas of functioning; (4) these complaints cannot be characterized as another mental disorder, such as anorexia nervosa.

Aouizerate et al.,[6] stated that among people seeking cosmetic surgery in general, we found data that can reach a percentage of 9.1%, a result like that found in the present research. The review by Veale[7] concluded that the prevalence of BDD in community-dwelling adults was estimated at 1.9%; in adolescents 2.2%; in the student population 3.3%; in adult psychiatric hospitalized patients 7.4%; in general aesthetic surgery 13.2%; in rhinoplasty surgery 20.1%; in orthognathic surgery 11.2%; in orthodontics/cosmetic dentistry 5.2% and in acne dermatology clinics 11.1%. In the meta-analysis by Ribeiro et al.,8 including 23 publications related to plastic surgery, evidenced the prevalence of BDD in 15% of patients, with a mean age of 34 years and most women (74%).

Research demonstrates the high prevalence of BDD in patients seeking rhinoplasty, this comorbidity being underdiagnosed by physicians and the identification of BDD symptoms is a challenge for plastic surgeons.9 These patients have high and unrealistic expectations with the surgical result that lead to postoperative dissatisfaction. Failure to identify these patients can pose serious health risks, aggravating the patient's psychopathology and legal problems for the surgeon.[10]

Screening questionnaires are important tools for identifying symptoms of Body Dysmorphic Disorder in patients who are candidates for rhinoplasty, determining whether these procedures are indicated or contraindicated.[3]

The main objectives of this study were to perform screening and prevalence of BDD in patients who wish to change their nasal appearance and to assess whether patients who are candidates for rhinoplasty with positive screening or higher scores on BDD

questionnaires present greater self-image distortion when compared to patients with negative screening.

MATERIAL AND METHODS

The research presents a prospective analytical and comparative study. It was applied to volunteer participants who came to a consultation with a complaint of nasal aesthetics and/or a desire for rhinoplasty, at the Hospital Paranaense de Otorrinolaringologia IPO, in the city of Curitiba, PR - Brazil. In the research, 28 participants were recruited during the months of May to September 2022. The inclusion criteria were: the participant must be a patient in the otorhinolaryngology sector of the Hospital Paranaense de Otorrinolaringologia IPO, have a complaint in regarding nasal aesthetics and/or desire for rhinoplasty, age between 18 and 60 years, being of Caucasian ethnicity, of both genders. Exclusion criteria were: participants with a previous diagnosis of mental disorder, facial deformities due to trauma, congenital malformations or tumors, ethnicities other than Caucasian.

The research was carried out through the application, by the researcher herself, of the questionnaires for Body Dysmorphic Disorder (BDD-YBOCS and BDSS), through interviews with the participants. The BDD-YBOCS questionnaire has 12 items with scores from 0 to 4 for each item. The total score is calculated by adding the scores of the 12 items. The maximum score is 48, with higher scores indicating more severe BDD symptoms. The cutoff score of the questionnaire is: equal to or greater than 19 points, considered positive screening for BDD, and less than 19 points, considered negative screening.[3]

The BDSS questionnaire has 10 questions with "yes" or "no" answers, whose total score is the sum of the positive answers. Scores of 6 or more indicate the presence of body dysmorphic symptoms.3 As a result of these questionnaires, participants were divided into two distinct groups; a group that screened positive for BDD and another group that screened negative for BDD. If there was divergence between the results of the questionnaires of the same participant, the questionnaire that presented a positive score for BDD would be considered. After applying the questionnaires, photographs were captured in the anteroposterior view and right lateral profile of the participant's face. A black fabric was used in the background of the photo. A Samsung S20 Plus cell phone camera (no conflict of interest), 12 megapixels, zoomed in 3 times was used to capture the images. The camera height has been leveled to be at nose height. The distance between the camera and the participant was 1.5 meters. Then, the rhinoplasty simulation was carried out exclusively following the participant's desire, with no interference from the researcher's opinion.

At another time, different from the medical consultation, 6 nasal measurements were obtained in the photograph resulting from the rhinoplasty simulation guided by the participant's desire, in the Adobe Photoshop 2022 software. Measurements were: intercanthal distance, interwing distance, nasal length, nasal tip projection, nasolabial angle and nasofrontal angle. Through these 6 measurements, 5 parameters were obtained: nasolabial angle; nasofrontal angle; projection of the nasal tip (Goode's method); wing-width

ratio and wing-intercanthal distance ratio. The measurement of these 5 parameters was carried out so that we could compare them with the values of the parameters considered ideal defined by the literature.

Analyzes were performed between the group composed of subjects screened positive for BDD and the group negatively screened, comparing the mean of the parameters of each of the groups in relation to the parameters considered aesthetic ideals proclaimed by the literature in the book "Proportions of the Aesthetic Face" by Powell and Humphreys.[11] Comparative analyzes were also performed between the parameters of the group with positive screening and the negative screening group. Next, a more detailed explanation of the parameters considered aesthetic ideals taken from the work of Powell and Humphreys, described in the book entitled "Proportions of the Aesthetic Face". The parameters and their values are:

The wing distance-length ratio is calculated by dividing the wing distance by the length of the nose (from nasion to pronasion). The ideal Caucasian nose length-wing distance ratio is 0.7.

The projection of the nasal tip is the distance that the nasal tip projects from the face. Goode's method was used: a vertical line is drawn from the nasion to the alar sulcus. Then a horizontal line is drawn to the pronasion, perpendicular to this line. The connection between these two lines is called the wing point. The distance from the nasion to the pronasion was then measured. The ratio is obtained by dividing the distance from the alar point to the pronasion by the distance from the nasion to the pronasion. Goode's ratio ranges from 0.55 to 0.6.

The nasolabial angle is formed by the intersection of two lines: one tangent to the base of the nose and the other tangent to the philtrum of the upper lip: a nasolabial angle that varies between 90º and 120º is considered ideal. The average of these two values was considered ideal parameter: 105º.

The nasofrontal angle is obtained by drawing a line tangent to the glabella through the nasion that intersects with a line drawn tangent to the nasal dorsum. The ideal measure varies between 1150 and 130º. The value of 125º was considered a parameter.

The wing-to-intercanthal distance ratio is calculated by dividing the wing distance by the intercanthal distance. It is postulated that these measures are equivalent, so a ratio equal to 1 is considered ideal.

RESULTS

The analysis presented below was performed based on data from 28 patients. Tables 1 and 2 below show descriptive statistics of age, sex, and mean scores on the BDSS and BDD-YBOCS questionnaires. It is noted that the female public was the one that most presented complaints related to nasal aesthetics, corresponding to 67.9% against 32.1% of the male group. The mean age among them was 29.5 years. The average score was 2.9 on the BDSS questionnaire and 7.9 on the BDD-YBOCS questionnaire. Positive screening for BDD was found in 3 participants through both questionnaires, corresponding to 10.7% of subjects.

Table 1: Average age in the sample and average score in each questionnaire.

Variable	n	Mean ± standard deviation
Age (years)	28	29.5 ± 9.8
BDSS	28	2.9 ± 2.4
BDD-YBOCS	28	7.9 ± 6.2

Table 2: Division by gender and positive and negative screening for BDD according to questionnaire scores.

Variable	Classification	n	%
Gender	Female	19	67.9%
	Male	9	32.1%
BDSS	<6	25	89.3%
	≥6	3	10.7%
BDD-YBOCS	<19	25	89.3%
	≥19	3	10.7%

In Table 3, the results of the mean and standard deviation of each variable (nasolabial angle, projection of the nasal tip, nasofrontal angle, alar width-length ratio, ala-intercanthal distance ratio) of the 28 participants were evaluated, without yet dividing them into positive screening and negative screening groups. A comparison was made between the average of each variable with the value considered ideal, applying statistical analysis through Student's t test with statistical relevance if $p<0.05$. It was found that there was a difference in the variables nasal tip projection ($p<0.001$) and nasofrontal angle ($p<0.001$) when compared to the ideal value, showing statistical relevance. Thus, the nasofrontal angle and nasal projection variables showed greater variation in relation to the value considered ideal, showing a mean nasofrontal angle of 138.9°, that is, 13.9° greater than the ideal nasofrontal angle (125°) and the nasal projection value calculated using the Goode method was 0.64, 0.08 greater than the ideal nasal projection value (0.56). It is concluded that considering the 28 participants, without considering the results of the questionnaires, that on average the participants wanted a nose with a nasofrontal angle that was more obtuse than ideal, and even though most participants requested a reduction in nasal projection, the value obtained it was a nasal projection greater than what is considered ideal. The other variables, such as the nasolabial angle, had an average of 106°, the alar width-length ratio had an average of 0.69 and the ala-intercanthal distance ratio had an average of 0.97. These 3 variables did not show significant changes when compared with the ideal value.

Table 3: Calculated measurements and deviations from the ideal.

Variable	Evaluation	n	Mean ± standard deviation	95%CI	p*
Nasolabial angle	Calculated	28	106.0 ± 8.48	102.7 to 109.3	0.262
	Ideal deviation (105)	28	1.04 ± 8.48	-2.25 to 4.32	
Nasal tip projection	Calculated	28	0.64 ± 0.09	0.60 to 0.68	<0.001
	Ideal deviation (0.56)	28	0.08 ± 0.09	0.04 to 0.12	
Nasofrontal angle	Calculated	28	138.9 ± 4.62	137.1 to 140.7	<0.001
	Ideal deviation (125)	28	13.9 ± 4.62	12.1 to 15.7	
Alar-to-length ratio	Calculated	28	0.69 ± 0.11	0.64 to 0.73	<0.001
	Ideal deviation (0.7)	28	-0.01 ± 0.11	-0.06 to 0.03	
Ala-to-intercanthal distance ratio	Calculated	28	0.97 ± 0.14	0.92 to 1.0	0.754
	Ideal deviation (1)	28	-0.03 ± 0.14	-0.08 to 0.02	

Table 4 presents the estimated Spearman correlation coefficients and the p values of the statistical tests, considering statistical significance when p<0.05. It was found that there was a direct correlation between higher scores on the BDSS questionnaire and greater changes in the nasolabial angle (p<0.043) and nasofrontal angle (p<0.048) variables. The BDD-YBOCS questionnaire showed a direct correlation between a higher score on the questionnaire and a greater change in the nasolabial angle variable, resulting in p< 0.026.

Table 5 presents descriptive statistics of measurements (calculated and deviations from the ideal) of cases with negative BDSS/BDD-YBOCS (<6 and <19) and positive cases (≥6 and ≥19). Due to the small number of positive cases, statistical tests were not applied. In the negative screening group for DCD, the mean values of the calculated parameters were nasolabial angle 105.7°, nasal tip position 0.64, nasofrontal angle 138.5°, wing width-length ratio 0.68, wing-intercanthal distance 0.98. In the positive DCD screening group, the mean values of the calculated parameters were nasolabial angle 108.7°, nasal tip position 0.65, nasofrontal angle 142.3°, wing width-length ratio 0.75, wing-intercanthal distance 0.9.

Table 4: Analysis of the association between BDSS and BDD-YBOCS with the calculated measures and deviations from the ideal.

Variables	n	Spearman correlation coefficient	p*
BDSS x Calculated-Nasolabial angle	28	0.38	0.043
BDSS x Nasolabial angle – ideal deviation (105)	28	0.38	0.043
BDSS x Calculated-Nasal tip projection	28	0.12	0.537
BDSS x Nasal tip projection - ideal deviation (0.56)	28	0.12	0.537
BDSS x Calculated-Nasofrontal angle	28	0,38	0,048
BDSS x Nasofrontal angle - ideal deviation (125)	28	0.38	0.048
BDSS x Calculated-Alar-to-length ratio	28	-0.06	0.774
BDSS x Alar-to-length ratio - ideal deviation (0.7)	28	-0.06	0.774
BDSS x Calculated-Alar-to-intercanthal distance ratio	28	-0.23	0.248
BDSS x Alar-to-intercanthal distance ratio - ideal deviation (1)	28	-0.23	0.248
BDD-YBOCS x Calculated-Nasolabial angle	28	0.42	0.026
BDD-YBOCS x Nasolabial angle - ideal deviation (105)	28	0.42	0.026
BDD-YBOCS x Calculated-Nasal tip projection	28	0.23	0.234
BDD-YBOCS x Nasal tip projection - ideal deviation (0.56)	28	0.23	0.234
BDD-YBOCS x Calculated-Nasofrontal angle	28	0.22	0.262
BDD-YBOCS x Nasofrontal angle - ideal deviation (125)	28	0.22	0.262
BDD-YBOCS x Calculated-Alar-to-length ratio	28	0.16	0.423
BDD-YBOCS x Alar-to-length ratio - ideal deviation (0.7)	28	0.16	0.423
BDD-YBOCS x Calculated-Alar-to-intercanthal distance ratio	28	-0.05	0.805
BDD-YBOCS x Alar-to-intercanthal distance ratio - ideal deviation (1)	28	-0.05	0.805

Table 5: Mean of variables in the positive screening and negative screening groups for BDD.

Variable	BDSS/ BDD- YBOCS	n	Man ± standard deviation
Calculated-Nasolabial angle	Negative	25	105.7 ± 8.46
	Positive	3	108.7 ± 10.0
Nasolabial angle - ideal deviation (105)	Negative	25	0.72 ± 8.46
	Positive	3	3.67 ± 10.0
Calculated-Nasal tip projection	Negative	25	0.64 ± 0.10
	Positive	3	0.65 ± 0.09
Nasal tip projection - ideal deviation (0.56)	Negative	25	0.08 ± 0.10
	Positive	3	0.09 ± 0.09
Calculated-Nasofrontal angle	Negative	25	138.5 ± 4.45
	Positive	3	142.3 ± 5.51
Nasofrontal angle – ideal deviation (125)	Negative	25	13.5 ± 4.45
	Positive	3	17.3 ± 5.51
Calculated-Alar-to-length ratio	Negative	25	0.68 ± 0.11
	Positive	3	0.75 ± 0.03
Alar-to-length ratio - ideal deviation (0.7)	Negative	25	-0.02 ± 0.11
	Positive	3	0.05 ± 0.03
Calculated-Alar-to-intercanthal distance ratio	Negative	25	0.98 ± 0.14
	Positive	3	0.90 ± 0.09
Alar-to-intercanthal distance ratio - ideal deviation (1)	Negative	25	-0.02 ± 0.14
	Positive	3	-0.10 ± 0.09

DISCUSSION

The expansion of aesthetic surgical procedures has been taking place in large steps, making the cult of physical form evident. The pursuit of perfection, discussions about fashion, exercise, and diet, among other factors, corroborate certain standards of beauty, fueling the experience lived in TDC.[12]

In the present study, the prevalence of BDD in candidates for rhinoplasty was 10.7%, a result like the prevalence of 9.1% found in the study by Aouizerate et al.[6]

In the meta-analysis by Ribeiro et al.,[8] including 23 publications related to plastic surgery, evidenced the prevalence of BDD in 15% of patients, with a mean age of 34 years and most women (74%). In the present research, the average age was 29 years, and women accounted for 67.9% of the participants. The mean scores obtained in the questionnaires were 2.9 points in the BDSS, and 7.9 points in the BDD-YOBCS.

The research showed that among the 28 subjects, the variables nasofrontal angle and nasal projection showed greater variation in relation to the value

considered ideal. The mean nasofrontal angle was 138.9°, that is, 13.9° greater than the ideal nasofrontal angle (125°) and the nasal projection value calculated by the Goode method was 0.64, 0.08 greater than the ideal nasal projection value (0.56). It was concluded that most participants wanted a nose with a nasofrontal angle that was more obtuse than ideal, and although most participants requested a reduction in nasal projection, the value obtained was a nasal projection greater than what was considered ideal.

Comparison of variables between the two groups was not performed due to the small number of cases screening positive for BDD.

When analyzing the results of the questionnaires, it was found that there was a direct correlation between a higher score on the BDSS questionnaire and a greater change in the nasolabial angle and nasofrontal angle variables. While the BDD-YBOCS questionnaire showed a direct correlation between a higher score on the questionnaire and a greater change only in the nasolabial angle variable.

CONCLUSION

The present study allowed, through the application of the BDSS and BDD-YOBCS questionnaires, the screening and prevalence of DCD in candidates for rhinoplasty. It is concluded that there was a relationship between BDD detected by the BDD-YBOCS and BDSS questionnaires, and the 2D simulation of rhinoplasty considering the patient's desire, since patients who sought rhinoplasty with positive screening or higher scores on the questionnaires for BDD showed greater distortion of self-image and desire for more intense changes in nasal aesthetics when compared to patients with negative screening for BDD.

The research had some limitations, as the sample size was relatively small, so it was not possible to make strong associations between the results obtained in the questionnaires and the analyzed facial variables. Investigations with fewer limitations are needed for adequate validation of current evidence.

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REFERENCES

1. GRIFFITHS, S. et al. The Contribution of Social Media to Body Dissatisfaction, Eating Disorder Symptoms, and Anabolic Steroid Use Among Sexual Minority Men. Cyberpsychol Behav Soc Netw. v. 21, n. 3, p. 149-156, 2018. doi:10.1089/cyber.2017.0375

2. SWEIS, I. L. et al. A Review of Body Dysmorphic Disorder in Aesthetic Surgery Patients and the Legal Implication. International Society of Aesthetic Plastic Surgery. v. 41, n. 5, p. 949-954, 2017. https://doi.org/10.1007/s00266-017-0819-x

3. BRITO, M.J.D. et al. Yale-Brown Obsessive Compulsive Scale modified for Body Dysmorphic Disorder (BDD-YBOCS): Brazilian Portuguese translation, cultural adaptation and validation. Revista Brasileira de Psiquiatria. v. 37, n. 4, p. 310-316, 2015. https://doi.org/10.1590/1516-4446-2015-1664

4. KUCK, N. et al. U. Body dysmorphic disorder and self-esteem: a meta-analysis. BMC Psychiatry. v. 21, n. 310, p. 1-16, 2015. doi:10.1186/s12888-021-03185-3

5. AMERICAN PSYCHIATRIC ASSOCIATION. Manual diagnóstico e estatístico de transtornos mentais: DSM-5 (5a ed.; M. I. C. Nascimento, Trad.). Porto Alegre, RS: Artmed, 2014.

6. AOUIZERATE, B. et al. Body dysmorphic disorder in a sample of cosmetic surgery applicants. Eur Psychiatry;18(7):365-368, 2003. doi:10.1016/j.eurpsy.2003.02.001

7. VEALE, D. et al. Body dysmorphic disorder in different settings: A systematic review and estimated weighted prevalence. Body Image. v. 18, p. 168-186, 2016. doi:10.1016/j.bodyim.2016.07.003.

8. RIBEIRO, R.V. E.; SILVA, G.. B.; AUGUSTO, F. V. Prevalência do transtorno dismórfico corporal em paciente candidatos e/ou submetidos a procedimentos estéticos na especialidade da cirurgia plástica: uma revisçao sistemática com meta-análise. Rev. Bras. Cir. Plást. 32(3):428-435, 2017.

9. RAMOS, T. D.; BRITO, M. J. A.; SUZUKI, V. Y. et al. High Prevalence of Body Dysmorphic Disorder and Moderate to Severe Appearance-Related Obsessive- Compulsive Symptoms Among Rhinoplasty Candidates. Aesthetic Plast Surg. v. 43, n. 4, p. 1000-1005, 2019. doi: 10.1007/s00266-018-1300-1

10. SOUZA, T.S.C.D.; PATRIAL, M.T.C.R.O.; MENEGUETTI, A. F. C. et al. Body Dysmorphic Disorder in Rhinoplasty Candidates: Prevalence and Functional Correlations. Aesth Plast Surg. v. 45, n. 3, p. 641-648, 2021. https://doi.org/10.1007/s00266-020-01930-9

11. BALLIN, A. C. et al. Anthropometric study of the caucasian nose in the city of Curitiba: relevance of population evaluation. Braz. j. otorhinolaryngol. v. 84, n. 4, p. 486-493, 2018. https://doi.org/10.1016/j.bjorl.2017.06.004

12. AIAWADH, I. et al. Prevalence of Body Dysmorphic Disorder Among Rhinoplasty Candidates: A Systematic Review. Ear, Nose & Throat Journal. v. 0, n. 0, p. 1- 7, 2021. doi:10.1177/01455613211056543