

Functional rhinoseptoplasty: clinical decision protocol

Original Article

Authors

Miguel Arede Antunes

Unidade Local de Saúde de Santa Maria, Lisboa, Portugal

Rita Fernandes

Unidade Local de Saúde de Santa Maria, Lisboa, Portugal

Carolina Arede

Unidade Local de Saúde de Santa Maria, Lisboa, Portugal

Paulo Martins

Unidade Local de Saúde de Santa Maria, Lisboa, Portugal

Leonel Luís

Unidade Local de Saúde de Santa Maria, Lisboa, Portugal; Faculdade de Medicina da Universidade de Lisboa, Portugal

Correspondence:

Miguel Arede Antunes
miguelarede@icloud.com

Article received on April 24, 2024.

Accepted for publication on August 10, 2024.

Abstract

Introduction: Functional Rhinoseptoplasty (F-RSP) is a complex procedure with increased morbidity and substantially longer operative time compared to conventional septoplasty. On this regard, the clinical decision concerning this procedure should be thoughtful and objective. Both the nasal septum and the internal and external nasal valves play crucial roles in nasal airflow, emphasizing the importance of directed physical examination in patients with chronic nasal obstruction. As a surgical procedure with facial aesthetic impact, the joint definition of appropriate aesthetic goals between physician and patient, the presence of body dysmorphic syndrome and recognition of prior and/or concomitant psychiatric pathology are of paramount importance.

Objectives: To present a diagnostic aid protocol and surgical guidance for patients undergoing FSP-R.

Materials and Methods: Literature review and adaptation of published algorithms.

Results: We identified 4 protocols in the international literature. Based on these, a protocol for approaching patients with chronic nasal obstruction and potential candidates for F-RSP was developed within the ENT consultation. Focused on clinical interview, it aims to investigate the real motivations and expectations of candidates for the procedure and to exclude those with uncontrolled psychiatric pathology, particularly in cases of suspected body dysmorphic syndrome. In the objective examination, it proposes methods for evaluating the internal and external nasal valve, nasal septum, and inferior turbinates, establishing a decisional score. It also allows for the description of the nasal pyramid from an aesthetic point of view; standardized photographic documentation of patients and their facial morphing to plan the surgical procedure.

Conclusions: This protocol systematizes surgical indications for F-RSP in ENT consultations. However, it still requires practical application in consultation and recording of the respective results in the Portuguese population for validation purposes.

Keywords: Functional Rhinoseptoplasty; Chronic Nasal Obstruction; Nasal Septum; Nasal Valves; Facial Plastic Surgery

Introduction

Nasal obstruction is a common complaint in otorhinolaryngology (ORL), and several questionnaires have been developed to evaluate the impact of this condition on the patient's quality of life.¹⁻³ However, identifying the nasal structures restricting the airflow can be a challenge. Septal deviations are found in 75–80% of adults, leading to the surgical referral of patients with nasal obstruction for conventional septoplasty, often with improved symptoms and rhinomanometry results.⁴⁻⁶

The nasal septum, along with the internal and external nasal valves, play an important role in nasal airflow. Physical examination of these structures is crucial for making a decision on whether to recommend functional septorhinoplasty (FSRP).^{4,7,8}

The external nasal valve consists of the caudal border of the lower lateral cartilage, columella, and nasal floor. The internal nasal valve comprises the caudal border of the upper lateral cartilage, nasal septum, nasal floor, and head of the inferior turbinate. The internal nasal valve in Caucasians is usually placed at an angle of 10–15° (septum and caudal border of the triangular cartilage). This valve exhibits a wide dynamic range in asymptomatic individuals. Nasal valve collapse, reported in up to 13% of the population, can be diagnosed using anterior rhinoscopy, nasal endoscopy, or the modified Cottle maneuver following nasal decongestion. Several etiologies of nasal valve collapse have been described in the literature, including post-rhinoplasty changes, cutaneous neoplasm resection, facial paralysis, trauma, and congenital defects.⁹

In contrast to aesthetic rhinoplasty, the aim of FSRP is to improve nasal obstruction while preserving the shape of the nose. Regardless of the type of rhinoplasty, the surgeon must inform the patient preoperatively that maintaining or enhancing nasal breathing is fundamental to achieving satisfactory long-term outcomes. The patient should also be informed that certain alterations to the shape of the nose are not viable because they affect nasal breathing, and that certain functional

changes to the nasal pyramid may change its appearance. It is impossible to disassociate the two types of procedures, since both have aesthetic and functional implications, independent of their initial purpose. In this study, we will describe procedures primarily aimed at improving nasal function, such as FSRP.^{8,10}

Several studies have described the beneficial effects of FSRP, but few randomized clinical trials have compared different surgeries. Numerous techniques have been proposed to correct a decreased internal nasal valve angle, including spreader grafts, auto-spreader flaps, butterfly grafts, titanium butterfly implants, upper lateral splay grafts, flaring sutures, and lateral nasal wall suspension. For fixed external nasal lateral wall collapse, techniques include alar batten grafts, butterfly grafts, titanium butterfly implants, lateral crural strut grafts, and lateral crural cephalic turn-in flaps. In cases of dynamic external nasal lateral wall collapse, options include absorbable external nasal lateral wall implants and external nasal lateral wall radiofrequency. For external nasal valve collapse or narrowing, techniques such as alar kidney grafts and lateral crural strut grafts have been proposed. Nasal septal deviation with L-strut involvement may require FSRP for spreader graft interposition or extracorporeal septoplasty if it cannot be corrected with a conventional septoplasty approach.¹⁰⁻¹²

FSRP is a complex procedure with a high morbidity rate and longer operative time than conventional septoplasty. Some complications described in the literature are epistaxis, aesthetic nasal deformity, graft infection or extrusion, nasal obstruction worsening, periorbital hematoma, skin infection or necrosis, toxic shock syndrome, epiphora, and cerebrospinal fluid fistulas in the anterior skull base.^{13,14}

Given the aesthetic impact of this surgical procedure on the face, it is especially important for the surgeon and patient to jointly define appropriate and realistic aesthetic goals. Patients with psychiatric conditions, especially those with body dysmorphic disorder, should

be previously identified, as this subgroup has poorer aesthetic outcomes from a subjective perspective.^{15,16}

Previous studies have proposed various protocols for evaluating patients eligible for rhinoplasty in order to provide objective medical guidance, aid in surgical planning, and predict potential risks and complications for each patient.^{7,8,14,17}

Thus, this study aimed to develop a protocol specifically designed for the diagnosis and surgical planning of patients with indications for FSRP.

Materials and Methods

We conducted a literature review and adapted the algorithms published in the literature. The PubMed platform was searched using the following keywords: “functional rhinoplasty,” “functional septorhinoplasty,” “septorhinoplasty protocol,” “rhinoplasty protocol,” “nasal valve evaluation,” “rhinoplasty evaluation,” and “septorhinoplasty evaluation.” Indications for FSRP were considered for the development of the protocol, including reduced internal nasal valve angle, fixed or dynamic external nasal lateral wall collapse, external nasal valve collapse or narrowing, and nasal septum deviations involving the L-strut that cannot be corrected with conventional septoplasty.

Protocols that did not propose methods to evaluate the functional components of the nasal pyramid were excluded. The selected protocols were translated into European Portuguese and adapted accordingly.

Results

We identified four protocols in the international literature^{4,7,8,17}, which served as the foundation for developing a new protocol for approaching patients with chronic nasal obstruction who may be eligible for FSRP during an ORL appointment (Figure 1).

All personal and family history factors that could influence the choice of surgical techniques and outcomes of FSRP were identified. In this context, we considered

it appropriate to ask the patient about the presence of congenital craniofacial anomalies, such as cleft palate or other facial dysmorphic syndromes, and nasal trauma, as these conditions can change the normal anatomy of the nasal pyramid.^{17–19} The surgeon should also be informed of any bleeding dyscrasias and hypertension, as they are associated with increased risk of intraoperative and postoperative bleeding.^{17,20,21}


Patients with allergies, particularly allergic rhinitis, may benefit from FSRP, although they typically do not achieve the same subjective improvement in nasal obstruction as healthy controls.^{22,23} Previous studies have indicated that smoking habits may be associated with a higher incidence of postoperative complications, but a recent retrospective study showed that the subjective outcomes were not worse in the long term.^{24,25} Substance use disorders, particularly the use of nasally inhaled cocaine, are associated with a higher prevalence of septal perforation or saddle nose deformity and may indicate special surgical needs.²⁶ Cardiac disease or previous anesthetic complications may increase anesthetic risks, and may require the postponement of the surgical procedure in some cases. Accurate documentation of the patient’s usual medications is important, including antiplatelet agents, anticoagulants, nonsteroidal anti-inflammatory drugs, corticoids, immunomodulators, and herbal products, such as red rice, ginger, garlic, or ginkgo biloba. Previous allergy to medications should also be noted.^{7,14,17,21}

Patients who have previously undergone septorhinoplasty or isolated septoplasty present a challenge to facial plastic surgeons due to potential fibrosis, unpredictable changes in nasal anatomy, and the possible need to use previously irradiated auricular, costal, or cadaveric cartilage.^{27–29}

Nasal pyramid infiltration, regardless of the type, often lead to unpredictable postoperative outcomes and, in some cases, more adherent dissection planes. Complete resorption of the infiltrated product may take up to 2–3

Figure 1

Evaluation protocol for FSRP candidates at the ORL service of the Santa Maria local health unit. FSRP, functional septorhinoplasty; ORL, otorhinolaryngology



UNIDADE LOCAL DE SAÚDE SANTA MARIA

1ª Consulta de Cirurgia Plástica Facial

Antecedentes Pessoais:

- Anomalias craniofaciais congénitas (Fenda Palatina, outros síndromes dismórficos faciais)
- Trauma nasal
- Discrasia hemorrágica
- Hipertensão
- Doenças cardíacas
- Doenças alérgicas
- História psiquiátrica
- Hábitos tabágicos
- Hábitos toxicofílicos

Antecedentes Familiares:

- Doenças hemorrágicas familiares
- Hipertensão
- Doenças cardíacas
- Doenças alérgicas
- Anomalias craniofaciais congénitas (Fenda Palatina, outros síndromes dismórficos faciais)
- História psiquiátrica

Medicação Habitual:

- Antiagregantes plaquetários
- Anticoagulantes
- AINEs
- Corticoides / Imunomoduladores
- Produtos de ervanária (ex.: arroz vermelho, gengibre, ...)

Antecedentes Cirúrgicos


- (Rino)septoplastia prévia
- Rinomodulação
- Otoplastia prévia
- Formação de Queloides
- Intercorrência anestésica

Alergias Medicamentosas

..

Endereço:
OTORHINOLARINGOLOGIA

Av. Professor Egas Moniz
1649-016 LISBOA
Tel: 217 805 000 - Fax: 217 805 610
www.ulsam.mh-saude.pt



UNIDADE LOCAL DE SAÚDE SANTA MARIA

História Clínica:

Queixas nasossinais: Obstrução nasal, cefaleias, rinorreia anterior/posterior, anosmia/hipoposmia, esterturos, prurido nasofaríngeo,...

Motivações: Estética / Funcional

Expectativas: Realista / Desproporcional

Palpatologia: Perturbação dismórfica corporal (SIMON)

Exame Objetivo:

Inspeção externa:


1. Características óticas
2. Assimetrias faciais
3. Características da pele
 - a. Espessura
 - b. Elasticidade
 - c. Patologia dermatológica associada
4. Comprimento nasal (2/3 do 1/3 médio face)
5. Projeção da ponta (2/3 do comprimento nasal radix-tip defining)
6. Forma da ponta (bulbosa, bífida, assimétrica)
7. Columela
 - a. Retraída / Hanging
 - b. Desvio
8. Complexo basal (lábio-ponta-columela)
 - a. Ângulo nasolabial
9. Alar
 - a. Retraída / Hanging
 - b. Distância interalar (igual a distância intercantar)
10. Dorso osteo-cartilágneo
 - a. Desvio (cartilágneo / ósseo)
 - b. Bossa (cartilágnea / óssea)
 - c. Em tensão
 - d. Em sela
11. Radix

Inspeção interna:

1. Sem espéculo nasal / com Nasofibrolaringoscopia
 - a. Colapso alar durante inspiração não forçada
 - b. Posicionamento das cruras da alar

Endereço:
OTORHINOLARINGOLOGIA

Av. Professor Egas Moniz
1649-016 LISBOA
Tel: 217 805 000 - Fax: 217 805 610
www.ulsam.mh-saude.pt



UNIDADE LOCAL DE SAÚDE SANTA MARIA

- c. Patologia cutânea do vestíbulo nasal

2. Com espéculo nasal
 - a. Ângulo entre cartilagem triangular e septo (10-15º)
 - b. Septo nasal
 - i. Desvio área 1, 2, 3, 4, 5
 - ii. Perfuração
 - c. Cornetos inferiores

Palpação externa (com 2 dedos):

1. Comprimento dos CPN
2. Suporte da ponta (mecanismo de "tip recoil")
3. Palpação das alares (avaliar forma, tamanho e elasticidade)

Palpação interna:

1. Caracterização das alares
2. Desvio caudal do septo nasal
3. Manobra de Cottle modificada

REGISTO FOTOGRÁFICO


1. Frontal (normal / a sorrir) (eyeline horizontal)
2. Obliqua Direita (45º)
3. Lateral Direita (Plano de Frankfort horizontal)
4. Obliqua Esquerda (45º)
5. Lateral Esquerda (Plano de Frankfort horizontal)
6. Basal (Vertical)

Exames Complementares:

TC Seios Perinais
Morphing Nasal / Facial digital

Endereço:
OTORHINOLARINGOLOGIA

Av. Professor Egas Moniz
1649-016 LISBOA
Tel: 217 805 000 - Fax: 217 805 610
www.ulsam.mh-saude.pt



UNIDADE LOCAL DE SAÚDE SANTA MARIA

Score de Decisão:

	0	1	2
Desvio Septal com envolvimento do L-átrio	Sem Desvio	Parcial	Completo
Desvio Septal outras localizações	Completo	Parcial	Sem Desvio
Posicionamento das Cruras da Alar	Não Obstrutivo	Obstrução parcial	Obstrução completa
Δ Triangular / Septo	> 10º	7-10º	< 7º
Colapso Dinâmico de Válvula nasal em NFL	Sem colapso	Colapso com obstrução parcial	Colapso com obstrução total
Manobra de Cottle Modificada (pós descongestionamento)	Sem melhoria	Melhoria parcial	Melhoria significativa

Proposta Cirúrgica

Planeamento de (Rino-)septoplastia
Eventual necessidade de mentoplastia

Endereço:
OTORHINOLARINGOLOGIA

Av. Professor Egas Moniz
1649-016 LISBOA
Tel: 217 805 000 - Fax: 217 805 610
www.ulsam.mh-saude.pt

years. For infiltrations with hyaluronic acid, hyaluronidase may be considered during the preoperative evaluation.^{30,31}

While septorhinoplasty incisions are rarely associated with hypertrophic scarring or keloid formation, keloids, although uncommon, are more frequent in Black patients. Therefore, it is important to inquire about any history of keloid formation after previous surgeries.³²

The developed protocol focuses on the clinical interview, aiming to first investigate the nasal sinus complaints, motivations, and expectations of the candidates from the procedure. It also seeks to identify and exclude individuals with unstable psychiatric conditions or suspected body dysmorphic disorder.^{7,8,14,17}

The protocol proposes methods for evaluating the internal and external nasal valve, nasal septum, and inferior turbinates during the objective examination. It also requires aesthetic description of the nasal pyramid, photographic documentation of the patients, and corresponding facial morphing to facilitate surgical planning.^{7,8,14,17}

We also established a decision score based on the reviewed literature and evaluation of the nasal structures responsible for chronic nasal obstruction. This tool helps to select candidates for FSRP or isolated septoplasty. Key factors determining the recommendation for FSRP (as opposed to isolated septoplasty) include the presence of septal deviation involving the L-strut, medialization or lateralization of the crura of the lower lateral cartilages with nasal airflow obstruction, a narrow internal nasal valve angle (caudal border of the triangular cartilage – nasal septum), dynamic collapse of the nasal valve during nasal vestibule endoscopy, and symptom improvement with the modified Cottle maneuver after nasal decongestion.

Discussion

Surgical management of nasal obstruction often involves the accurate identification of the subgroup of patients who may benefit from FSRP. Despite being a common complaint

in ORL visits, correct identification of the nasal structures limiting the nasal airflow can be challenging. Patients presenting with anterior septal deviation involving the L-strut, medialization or lateralization of the crura of the lower lateral cartilages with nasal airflow obstruction, a narrow internal nasal valve angle (caudal border of the triangular cartilage – nasal septum), dynamic collapse of the nasal valve during nasal vestibule endoscopy, and symptom improvement with the modified Cottle maneuver after nasal decongestion may not achieve adequate relief from isolated septoplasty.

FSRP is a surgical procedure associated with greater complexity, morbidity, and operative time compared to conventional septoplasty; therefore, it should be considered in carefully selected cases. Decisions regarding this surgical procedure must be deliberate and objective, particularly in public health services where the morbidity and operative time of procedures without a functional objective represent additional costs, which limit investments in other medical areas.

This protocol aims to systematize surgical indications for FSRP in ORL appointments, provide a detailed description of the entire nasal pyramid, and document the clinical and surgical history of the candidates for FSRP. This protocol can enable the correct identification of patients eligible for FSRP and exclusion of patients with inadequate expectations of the surgical procedure, high anesthetic risk, unstable psychiatric conditions, or body dysmorphic disorder.

However, this protocol still requires practical implementation in clinical settings and validation of results in the Portuguese population.

Conclusion

This protocol aims to systematize surgical indications for FSRP in ORL appointments. However, it will require clinical implementation and validation of results in the Portuguese population.

Acknowledgment

I thank Filipa, her family and the CHULN ENT Service: the pillars of this work..

Conflict of Interests

The authors declare that they have no conflict of interest regarding this article.

Data Confidentiality

The authors declare that they followed the protocols of their work in publishing patient data.

Human and animal protection

The authors declare that the procedures followed are in accordance with the regulations established by the directors of the Commission for Clinical Research and Ethics and in accordance with the Declaration of Helsinki of the World Medical Association.

Privacy policy, informed consent and Ethics committee authorization

All the processed data were based in published reports that fulfilled privacy policy and ethical considerations.

Financial support

This work did not receive any grant contribution, funding or scholarship.

Scientific data availability

There are no publicly available datasets related to this work.

References

1. Machado AS, Santos M, Silva A, Saltychev M, Meireles L, Most S. et al. Validation of the european portuguese language version of the standardized cosmesis and health nasal outcomes survey. *Facial Plast Surg.* 2023 Aug;39(4):372-376. doi: 10.1055/a-2006-0807.
2. Behnke J, Dundervill C, Bulbul M, Armeni M, Ramadan HH, Makary CA. Using the sino-nasal outcome test (SNOT-22) to study outcome of treatment of nasal obstruction. *Am J Otolaryngol.* 2023 Jul-Aug;44(4):103879. doi: 10.1016/j.amjoto.2023.103879.
3. Floyd EM, Ho S, Patel P, Rosenfeld RM, Gordin E. Systematic review and meta-analysis of studies evaluating functional rhinoplasty outcomes with the NOSE score. *Otolaryngol Head Neck Surg.* 2017 May;156(5):809-815. doi: 10.1177/0194599817691272.
4. Kim DW, Rodriguez-Bruno K. Functional rhinoplasty.

5. Stewart MG, Smith TL, Weaver EM, Witsell DL, Yueh B, Hannley MT. et al. Outcomes after nasal septoplasty: results from the nasal obstruction septoplasty effectiveness (NOSE) study. *Otolaryngol Head Neck Surg.* 2004 Mar;130(3):283-90. doi: 10.1016/j.otohns.2003.12.004.
6. Singh A, Patel N, Kenyon G, Donaldson G. Is there objective evidence that septal surgery improves nasal airflow? *J Laryngol Otol.* 2006 Nov;120(11):916-20. doi: 10.1017/S0022215106003410.
7. Nguyen PS, Bardot J, Duron JB, Levet Y, Aiach G. Preoperative analysis in rhinoplasty. *Ann Chir Plast Esthet.* 2014 Dec;59(6):400-5. doi: 10.1016/j.anplas.2014.07.010.
8. Friedman O, Cekic E, Gunel C. Functional rhinoplasty. *Facial Plast Surg Clin North Am.* 2017 May;25(2):195-199. doi: 10.1016/j.fsc.2016.12.004.
9. Sinkler MA, Wehrle CJ, Elphinstone JW, Magidson E, Ritter EF, Brown JJ. Surgical management of the internal nasal valve: a review of surgical approaches. *Aesthetic Plast Surg.* 2021 Jun;45(3):1127-1136. doi: 10.1007/s00266-020-02075-5.
10. Rettinger G. Risks and complications in rhinoplasty. *GMS Curr Top Otorhinolaryngol Head Neck Surg.* 2007;6:Doc08.
11. Rohrich RJ, Ahmad J. Rhinoplasty. *Plast Reconstr Surg.* 2011 Aug;128(2):49e-73e. doi: 10.1097/PRS.0b013e31821e7191.
12. Ziglienas P, Menger DJ, Georgalas C. The body dysmorphic disorder patient: to perform rhinoplasty or not? *Eur Arch Otorhinolaryngol.* 2014 Sep;271(9):2355-8. doi: 10.1007/s00405-013-2792-6.
13. Picavet VA, Gabriëls L, Grietens J, Jorissen M, Prokopakis EP, Hellings PW. Preoperative symptoms of body dysmorphic disorder determine postoperative satisfaction and quality of life in aesthetic rhinoplasty. *Plast Reconstr Surg.* 2013 Apr;131(4):861-868. doi: 10.1097/PRS.0b013e3182818f02.
14. G. J. Nolst Trenite Ed. *Rhinoplasty a practical guide to functional and aesthetic surgery of the nose.* Kugler publications; 1993.
15. Kim DW, Toriumi DM. Management of posttraumatic nasal deformities: the crooked nose and the saddle nose. *Facial Plast Surg Clin North Am.* 2004 Feb;12(1):111-32. doi: 10.1016/S1064-7406(03)00124-X.
16. Chisholm E, Jallali N. Rhinoplasty and Septorhinoplasty Outcome Evaluation. *Ear Nose Throat J.* 2012 Mar;91(3):E10-4. doi: 10.1177/014556131209100315.
17. Boiko NV. Epistaxis and arterial hypertension: a pathogenic link. *Vestn Otorinolaringol.* 2021;86(1):72-77. doi: 10.17116/otorino20218601172.
18. Cochran CS, Landecker A. Prevention and management of rhinoplasty complications. *Plast Reconstr Surg.* 2008 Aug;122(2):60e-67e. doi: 10.1097/PRS.0b013e31817d53de.
19. Bugten V, Nilsen AH, Thorstensen WM, Moxness MHS, Amundsen MF, Nordgård S. Quality of life and symptoms before and after nasal septoplasty compared with healthy individuals. *BMC Ear Nose Throat Disord.* 2016 Oct 28;16:13. doi: 10.1186/s12901-016-0031-7.
20. García-Paz V, Chamorro-Petronacci CM, Pinceira-Villar R, Becerro-de-Bengoa-Vallejo R, Losa-Iglesias ME, Pérez-Sayáns M. et al. Allergic rhinitis improvement after septorhinoplasty in a sample of allergic rhinitis patients

with septal deviation: a quasi-experimental study. *Sao Paulo Med J.* 2022 Jan-Feb;140(1):17-23. doi: 10.1590/1516-3180.2021.0236.R1.03052021

21. Erol O, Koycu A. The effect of smoking on septoplasty and septorhinoplasty outcomes. *Aesthetic Plast Surg.* 2022 Jun;46(3):1378-1384. doi: 10.1007/s00266-021-02683-9.

22. Coon D, Tuffaha S, Christensen J, Bonawitz SC. Plastic surgery and smoking: a prospective analysis of incidence, compliance, and complications. *Plast Reconstr Surg.* 2013 Feb;131(2):385-391. doi: 10.1097/PRS.0b013e318277886a.

23. Guyuron B, Afrooz PN. Correction of cocaine-related nasal defects. *Plast Reconstr Surg.* 2008 Mar;121(3):1015-1023. doi: 10.1097/01.prs.0000299464.02430.78.

24. Romo T 3rd, Horne S, Ferzli G Jr. Nasal grafts and implants in revision rhinoplasty. *Facial Plast Surg Clin North Am.* 2006 Nov;14(4):373-87, vii. doi: 10.1016/j.fsc.2006.06.006.

25. Paun SH, Nolst Trenité GJ. Revision rhinoplasty: an overview of deformities and techniques. *Facial Plast Surg.* 2008 Aug;24(3):271-87. doi: 10.1055/s-0028-1083082.

26. Adamson PA, Warner J, Becker D, Romo TJ 3rd, Toriumi DM. Revision rhinoplasty: panel discussion, controversies, and techniques. *Facial Plast Surg Clin North Am.* 2014 Feb;22(1):57-96. doi: 10.1016/j.fsc.2013.09.002.

27. Ramos HHA, Freire L, Cavallieri F, Frota AE, Ragazzo R, Jurado JRP. Management of patients seeking surgical rhinoplasty with previous nasal injections of hyaluronic acid. *Aesthetic Plast Surg.* 2021 Aug;45(4):1675-1682. doi: 10.1007/s00266-021-02136-3.

28. Guastafierro A, Rosso S, Avvedimento S, Cannistrà C, Grella E. Surgical rhinoplasty after hyaluronic acid injection: what are the implications? Our experience. *Aesthetic Plast Surg.* 2022 Apr;46(2):1021-1023. doi: 10.1007/s00266-021-02385-2.

29. Hogan VM. Cutaneous scars and cosmetic surgery. *Surg Clin North Am.* 1971 Apr;51(2):491-500. doi: 10.1016/s0039-6109(16)39392-6.