Evaluation of a Surgical Tactic in the Prevention of Oronasal Fistula during Palatoplasty in Patients with Cleft Palate

Avaliação de uma tática cirúrgica na prevenção de fístula oronasal durante a palatoplastia em pacientes fissurados

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Abstract

Oronasal fistula is a common complication in surgeries for the repair of cleft palate. It represents a challenge due to the scarcity of tissue in the affected area. The incidence of this complication ranges from 3% to 46%, and it is more prevalent in zone III of the Pittsburgh classification, which corresponds to the junction between the hard and soft palates. The present study aimed to evaluate a surgical tactic to reduce the incidence of oronasal fistulas. We conducted a retrospective study with 142 consecutive patients who underwent palatoplasty from January 2018 to June 2024 at Hospital Santa Izabel using the two-flap technique with a strategy to reduce suture tension. We analyzed factors such as cleft type (per the Veau classification), age at surgery, sex, cleft size, and fistula incidence (according to the Pittsburgh classification). The incidence of oronasal fistulas was of 1.4%, which is significantly lower than the rates reported in the literature, with no fistulas occurring in zone III, where they are more frequent. The tactic reduced fistula formation, even in patients with wide clefts and comorbidities, demonstrating its viability and benefits for the clinical practice.

Keywords

- cleft palate
- fistula
- oral fistula
- palate
- hard
- palate
- soft

Resumo

A fístula oronasal é uma complicação comum em cirurgias de reparo da fissura palatina, e representa um desafio devido à escassez de tecido na região afetada. A incidência dessa complicação varia de 3% a 46%, sendo mais prevalente na região III da classificação de Pittsburgh, que corresponde à junção entre os palatos duro e mole. Este estudo tem como objetivo avaliar uma tática cirúrgica para reduzir a incidência de fístulas oronasais. Realizou-se um estudo retrospectivo com 142 pacientes consecutivos submetidos à palatoplastia entre janeiro de 2018 e junho de 2024 no Hospital Santa Izabel, utilizando a técnica de 2 retalhos associada a uma tática para reduzir a tensão da sutura. Foram analisados fatores como tipo de fissura (pela classificação de Veau), idade à cirurgia, sexo, tamanho da fissura e incidência de fístulas (conforme a

Palavras-chave

- fissura palatina
- fístula
- fístula bucal
- palato duro
- palato mole

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classificação de Pittsburgh). A incidência de fistulas oronasais foi de 1,4%, significativamente menor do que a relatada na literatura, sem ocorrência de fístulas na zona III, onde são mais frequentes. A tática mostrou-se eficaz na redução da formação de fístulas, mesmo em pacientes com fissuras amplas e comorbidades associadas, o que evidencia a sua viabilidade e os benefícios para a prática clínica.

Introduction

Oronasal fistula (ONF) is a complication that all surgeons seek to avoid due to its complexity and the need for palatal reoperation. In addition, it has implications for facial development and speech. It results from a healing failure after the first palate repair surgery, creating a patent opening between the oral and nasal cavities.

The incidence of ONF varies widely in the literature, from 3 to 46%.[1–28] A recent review[29] reported an incidence ranging from 6.4 to 8.6%. The Pittsburgh classification[30] categorizes the ONF location into seven types: I) uvula; II) soft palate; III) soft and hard palate junction; IV) hard palate; V) primary and secondary palate junction; VI) lingual alveolar; and VII) labial alveolar. A meta-analysis[6] showed an ONF incidence of 6.9% and demonstrated the occurrence of fistulas according to the Pittsburgh classification as follows: type I – 0%; type II – 15.7%; type III – 50%; and type IV – 32.6%.

Despite the several surgical techniques available for palatoplasty, the literature still lacks a consensus on the ideal approach to prevent ONF formation. A meta-analysis[31] indicated the absence of a statistically significant difference between palatoplasty techniques and ONF incidence. The most common techniques present the following fistula rates: Furlow – 6.6%; double-flap – 5.1%; Wardill Kilner – 12.5%; von Langenbeck – 11.5%; Sommerland – 14.3%; and others – 6.7%.

Although many studies highlight surgeon experience as a factor associated with a lower ONF incidence, others do not find statistical significance.[3,32] The cleft palate type is associated with the incidence of ONF.[19] According to the Veau classification, the higher the degree, the greater the risk of developing ONF,[9] with a 2.64-fold increase in the ONF index corresponding to the increase in the Veau classification. The literature is consensual[25,31,33–39] on three central aspects: suture tension as the main factor for ONF formation, the relationship between the cleft width and the amount of palatal tissue available for reconstruction, and that more aggressive palatal dissections and lateral relaxing incisions can reduce suture tension, decreasing the incidence of ONF.

Objective

The current study aimed to evaluate a surgical tactic to reduce the incidence of ONF with a special focus on Pittsburgh's zone III, which presents the highest incidence.

Materials and Methods

The Ethics Committee of Hospital Santa Izabel, in the city of Salvador, state of Bahia, Brazil, approved the present study, which was conducted at said facility. This retrospective study involved 142 consecutive patients who underwent primary palatoplasty from January 2018 to June 2024, when the new surgical tactic was introduced. We included all patients with cleft palate and lip without previous palate surgery, regardless of comorbidities or associated syndromes.

The patients were stratified according to the cleft type per the Veau classification, sex, age at surgery, and cleft width. To measure the cleft width, we used preoperative photographs and calculated the width a/b ratio, in which "a" is the cleft width and "b" is the width of the foramen of the greater palatine artery. We assessed the fistula incidence per the Pittsburgh classification. All patients were operated on by the same surgeon, using the two-flap palatoplasty technique,[40] and underwent an evaluation 30 days after surgery.

The new surgical tactic was designed to reduce suture tension in Pittsburgh's zone III, where 50% of fistulas occur. This zone is a transitional area between the hard and soft palates, with thin tissues usually sutured in two planes, one in the nasal mucosa and the other in the oral mucosa. The proposed method introduces a third suture plane in the periosteum, a tissue more resistant to traction, with one or two U-shaped Vicryl-4.0 sutures (►**Figs. 1**–**3**).

The palatoplasty was performed under general anesthesia using the two-flap mucoperiosteal technique with intravelar veloplasty, following the principles of Sommerland[41] and using lateral relaxing incisions. We applied sutures to the nasal mucosa and muscles, introducing a third suture plane in the transition zone, that is, using one to two U-shaped sutures in the periosteal plane in the distal portion of the mucoperiosteal flap. Then, we closed the oral mucosa and placed hemostatic material in the bloody areas. The patients received a liquid diet for 7 days and had no hand or arm movement restrictions.

Results

The 142 patients included 59 female and 83 male subjects. According to the Veau classification, 7.04% of them were type I, 8.42% were type II, 61.26% were type III, and 23.23% were type IV. Most patients (73.23%) were younger than 24 months old at surgery, 15.49% were operated on between 24 and 47 months of age, and 11.26% were older than 48 months at

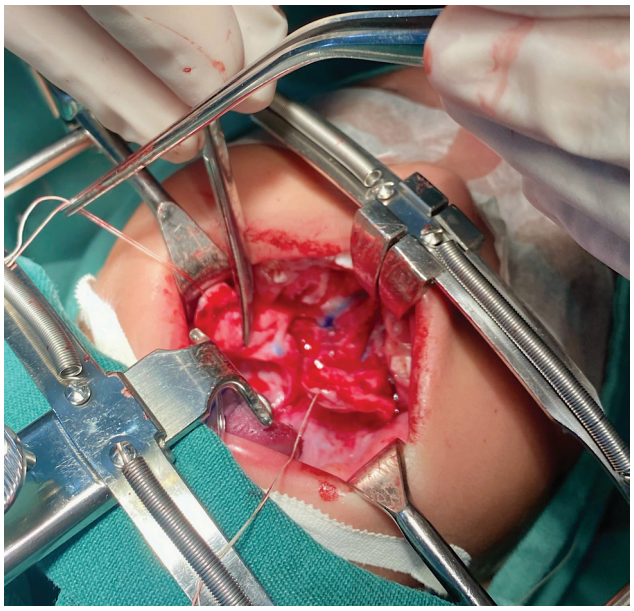

Fig. 1 The distal portion of the palate (marked with methylene blue) after detachment of the mucoperiosteal flap. When repositioning the flap, we marked the distal portion of the periosteum, indicating the point for the third suture layer.

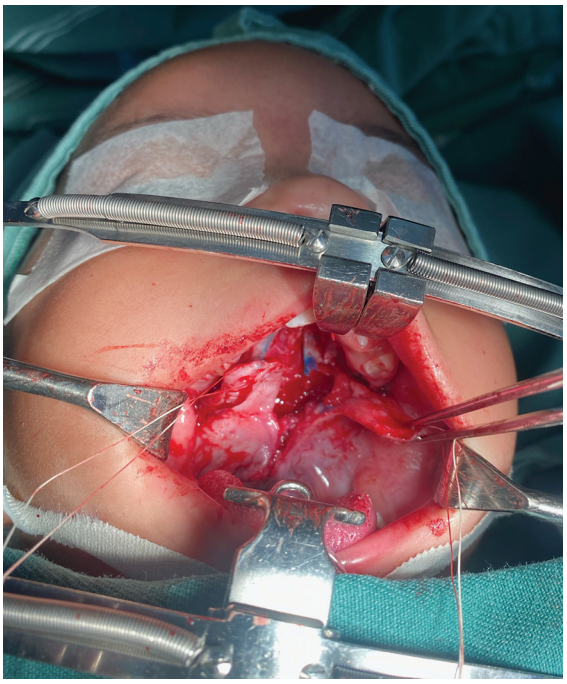

Fig. 2 The distal portion of the contralateral palate (marked with methylene blue) after detachment of the mucoperiosteal flap. When repositioning the flap, we marked the distal portion of the periosteum, indicating the point for the third suture layer.

surgery. The cleft width ratio was < 0.40 in 83.09% of the patients and > 0.40 in 16.09%.

Table 1 Characteristics of the study sample

Veau classification		Sex		Age at surgery (months)			Cleft width ratio	
		Male	Female	< 24	24–48	> 40	< 40	≥ 40
Type I (n)	10	6	4	10	0	0	10	0
Type II (n)	12	7	5	6	5	1	9	3
Type III (n)	87	55	32	67	11	9	80	7
Type IV (n)	33	20	13	21	6	6	19	14

The overall incidence of ONF was of 1.4%, affecting 2 patients classified as Veau type IV, who were younger than 24 months, had a cleft width ratio > 0.40, and the fistulas were located in zone II.

Further analysis revealed that one of these patients had a behavioral disorder with repetitive hand-to-mouth movements, as reported by the mother. In the second case, preoperative photographs revealed a velopalatine fossa and inadequate dissection by the surgeon, which contributed to fistula formation (►**Figs. 4**–**11**).

Discussion

Effective ONF prevention remains a crucial goal in palatoplasty. Closure of the ONF often results in more scarring in the palate and adjacent areas, requiring additional surgical procedures. Regardless of the surgical technique for cleft palate closure, the incidence of ONF persists. Some studies suggest that surgeon experience is associated with lower ONF rates, while others find no statistical difference.

The sex and age distribution of patients undergoing surgery remains consistent with those reported in other published studies. Regarding the causes of ONF formation, the cleft type is a significant factor, with an increased risk according to the Veau classification. The cleft size and the amount of tissue available for closure are directly linked to suture tension, making them valuable predictors of ONF. Lateral relaxing incisions are essential for tension reduction. Although 16.09% of the patients in the current study presented high cleft width, introducing the third suture plane lowered ONF rates, demonstrating its effectiveness.

Pittsburgh's zone III, lying at the junction between the hard and soft palates, presents the highest ONF rate due to high suture tension and thin tissues. Introducing a third periosteal suture plane in Pittsburgh's zone III was an innovative attempt to minimize the tension in the mucoperiosteal flaps, a critical factor

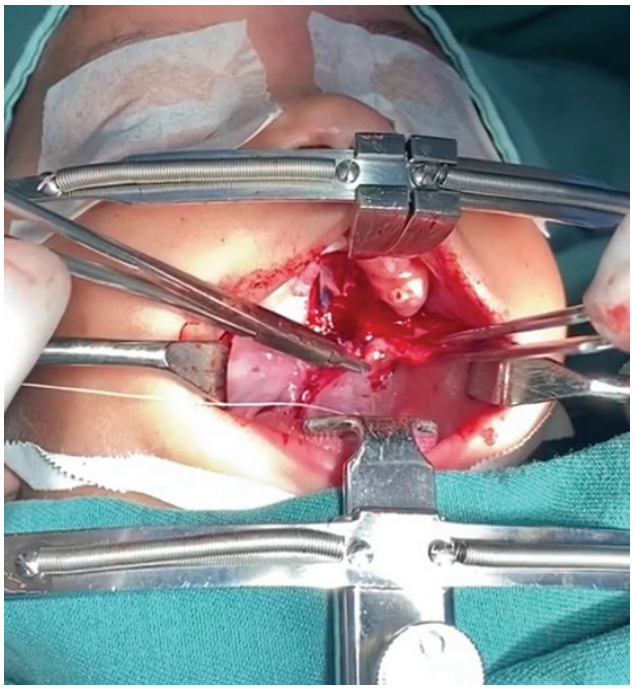

Fig. 3 Performance of the suture on the periosteum previously marked with methylene blue.

in healing failure. Distributing the suture tension force throughout a higher amount of periosteal tissue may have contributed to the significant decrease in ONF in the present study.

In the analysis of the cases of fistula in zone II, we identified a behavioral disorder in one subject, with a diagnosis of mild autism and maternal reports of repetitive hand-to-mouth movements, and, in another subject, a velopalatine fossa in preoperative photographs, indicating inadequate dissection as the cause of the condition. It is crucial to study ONF cases individually to understand the contributing factors and optimize the surgical approach to reduce its incidence.

Fig. 5 Patient with Veau grade II, ratio $\geq$ 40, postoperative period.

Conclusion

The surgical tactic introduced showed significant results in decreasing ONF incidence in patients undergoing primary palatoplasty. Although the results were encouraging, additional prospective studies are required to validate these findings. Implementing surgical strategies and determining individual factors contributing to ONF formation are essential to further improve surgical outcomes.

Authors' Contributions

GLU: data analysis and/or interpretation, final manuscript approval, and writing – review & editing; ECF: data collection and methodology; and LGU: data analysis and/or interpretation and writing – original draft.

Fig. 4 Patient with Veau grade II, ratio $\geq$ 40, preoperative period.

Fig. 6 Patient with Veau grade III, ratio $\geq$ 40, preoperative period.

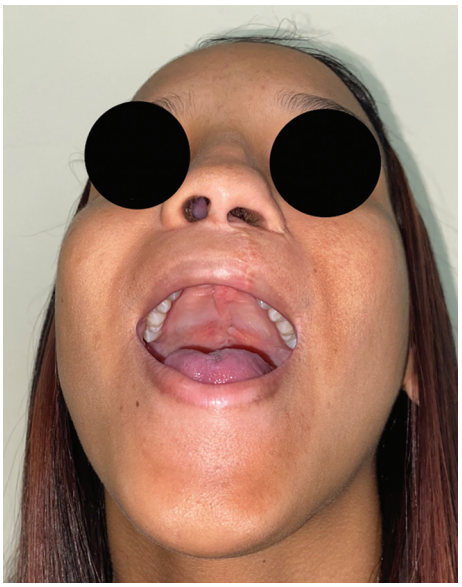

Fig. 7 Patient with Veau grade III, ratio ≥ 40, postoperative period.

Fig. 8 Patient with Veau grade II, ratio ≥ 40, preoperative period.

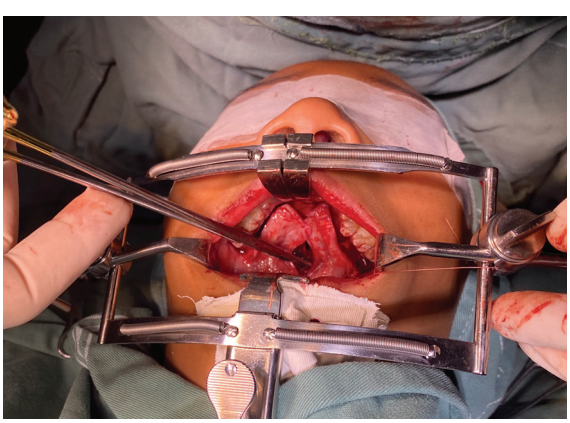

Fig. 9 Patient with Veau grade II, ratio ≥ 40, intraoperative period. Note the area of highest flap tension when performing the third-plane suture.

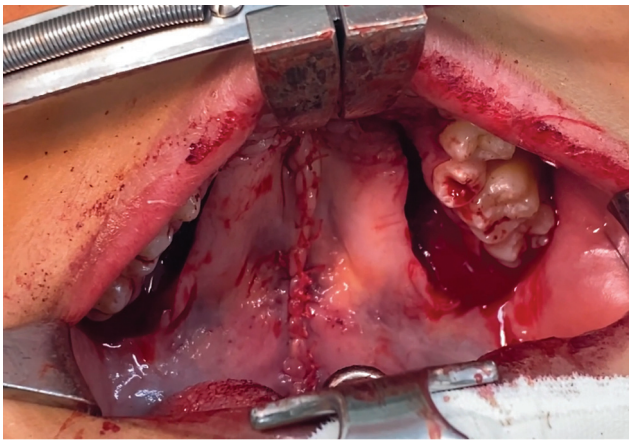

Fig. 10 Patient with Veau grade II, ratio ≥ 40, intraoperative period. Note the two U-shaped sutures at the oral mucosa in the distal portion of the periosteum.

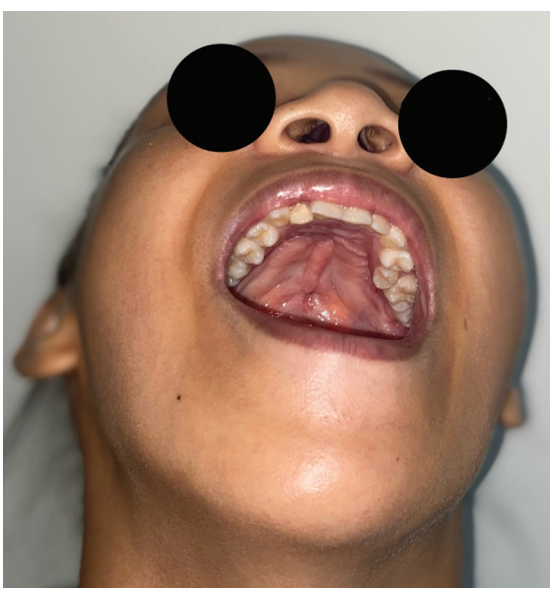

Fig. 11 Patient with Veau grade II, ratio ≥ 40, postoperative period.

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Clinical Trials
None.

Conflict of Interests
The authors have no conflict of interests to declare.

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