Original Article

Correction of palatine fistulas with a musculo-mucosal buccinator flap: results of 6 cases after 27 years

Correção de fissura palatina com retalho musculo-mucoso de bucinador: resultados de 6 casos após 27 anos

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■ **ABSTRACT**

Introduction: The buccal musculo-mucosal patch, described in 1989, can be used to correct palatine fistulas and fissures with stretching of the soft palate, or to cover bloody areas after tumor resection. **Methods:** This is an analysis of the 27-year postoperative results for 6 patients who underwent operation at Base Hospital and Santa Casa de São José do Rio Preto between 1984 and 1989, and reassessed in 2016, when a myo-buccinator mucosa was used for cleft palate correction. **Results:** Of the 36 operated cases, 6 were reevaluated after 27 years, of which 5 had primary correction and 1 had a secondary correction (fistula after cleft palate closure). All the cases had satisfactory results in terms of maxillary growth, correction of the palatine fistula, and speech function. **Conclusion:** Although not statistically significant, the present study demonstrated that the buccal musculo-mucosal flap is an adequate procedure for correction and stretching of the palate, with normal or near-normal maxillary growth and practically normal speech even without adequate phono-audiological treatment.

Keywords: Cleft palate; Cleft lip; Velopharyngeal insufficiency; Surgical flap; Fistula.

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■ **RESUMO**

Introdução: O retalho miomucoso de músculo bucinador, descrito em 1989, pode ser utilizado para corrigir fístulas palatinas, fissuras com alongamento do palato mole ou cobrir áreas cruentas após ressecções de tumores. **Métodos:** Trata-se da análise do resultado após 27 anos de 6 casos de pacientes operados no Hospital de Base e na Santa Casa de São José do Rio Preto, no período de 1984 a 1989, e reavaliados em 2016, nos quais foram realizados retalhos miomucosos de bucinador para correção de fissura palatina. **Resultados:** Dos 36 casos operados, 6 foram reavaliados após 27 anos, dos quais 5 trataram-se de correção primária e 1 de correção secundária (fístula após fechamento de fissura palatina). Todos os casos obtiveram resultados satisfatórios no crescimento maxilar, na correção da fistula palatina e na função da fala. **Conclusão:** Apesar de estatisticamente não significativo, o presente estudo demonstrou que o retalho miomucoso de músculo bucinador para correção e alongamento do palato é um procedimento adequado, com resultados de crescimento maxilar normal ou próximo disso e fala praticamente normal, mesmo sem adequado tratamento fonoaudiológico.

Descritores: Fissura palatina; Fenda labial; Insuficiência velofaríngea; Retalhos cirúrgicos; Fístula.

INTRODUCTION

In 1989, the author described[1] his experience with the use of the musculo-mucosal buccinator[2] flap to correct palatine fistulas and fissures with soft palate elongation when the fissured slopes are short or in cases of fissure correction that resulted in primary treatment of the short palate with its phonological consequences. It also covers areas of bloody post-resection site of tumors within its rotation arc and treatment of mandibular osteomyelitis[1].

The anatomy is described again according to the initial studies and the technique for obtaining the flap. Six cases of palatine fissures treated with palatoplasty with a follow-up period of 27 years were found in the original publication series and were included in this study.

OBJECTIVE

This study aimed to review the statements and observations mentioned initially (1989) regarding the use of the musculo-mucosal buccinator flap. In addition, it compared a case treated with the classic techniques that also had a 27-year postoperative follow-up and had a similar treatment solution and evolution.

METHODS

The results after 27 years of follow-up of 6 patients treated with a mucosal buccinator for cleft palate correction at Base Hospital and Santa Casa de São José do Rio Preto from 1984 to 1989 were analyzed and reassessed in 2016. The present study follows the ethical principles of the Declaration of Helsinki and obtained signed Informed Surgical Consent forms from the patients included in the study.

Anatomy

The buccinator muscle is located deep in the cheek and has a slightly quadrangular shape (Figure 1A). Its inner surface is covered by the oral mucosa. The other surface is in contact with the masseter muscle, mandible branch, medial pterygoid muscle, buccopharyngeal fascia, and adipose body of the cheek (Bichat's adipose ball). Between it and the oropharyngeal fascia is a loose areolar plane that facilitates dissection-divulsion and obtaining of the flap.

Previously, its fibers intersect with those of the orbicularis muscle and later are inserted in the mandibular raphe, superiorly in the maxilla and inferiorly in the branch of the mandible (Figure 1B). It is transposed by the parotid duct at the height of the second upper molar tooth, slightly above the center of the muscle[3,4].

Arterial irrigation is done through 3 main origins, the buccal artery, and the branch of the internal jaw that irrigates the posterior half of the muscle, horizontally from front to back. The anterior portion receives branches of the facial artery 1 cm lateral to the corner of the mouth, giving off horizontal branches to the muscle[5-9]. The third branch is the posterosuperior alveolar[6] branch of the internal maxillary artery that irrigates the muscle in its superior posterior portion.

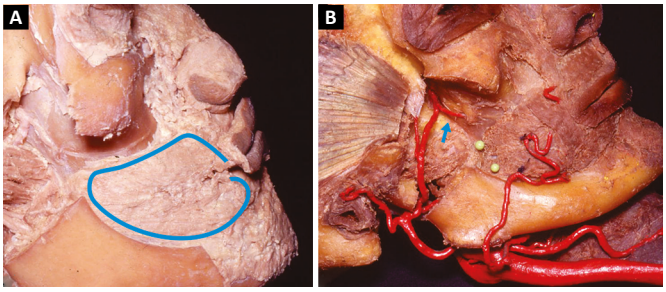

Figure 1. A and **B:** Shape, origin, and insertion of the buccinator muscle occupying the lateral region of the mouth[3,4].

There are consistent anastomoses between all these arteries, which can be found on the lateral surface[3,10] of the muscle or within its fibers. This network also has anastomoses with branches of the infraorbital artery (Figure 2A)[3,10,11].

Venous drainage is rich with some of the arteries that drain into the pterygoid plexus and then into the internal maxillary vein. Another previous collector is the facial vein. A venous plexus also surrounds the parotid duct (Figure 2B)[4].

The motor innervation of the buccinator muscle passes through the facial nerve that emerges near the adipose body of the cheek[12,13] from posterior to anterior in the oral plexus (Figure 2C)[14,15]. This set gives the possibility of obtaining part of the muscle without undermining the remaining portion. Sensory innervation of the buccal mucosa that is adhered to the buccinator muscle is made by branches of the maxillary nerve.

The buccinator muscle is part of a sphincteric muscular system that includes the upper constricting muscle of the pharynx and orbicularis muscle, which facilitates suctioning, whistling, and propulsion of food during chewing. It also has an influence on the toning of the lips and symmetry of the labial commissures[16].

Obtaining retail

Under general anesthesia, the patient underwent orotracheal intubation fixed at the median line, in the horizontal dorsal decubitus and Trendelenburg positions, hyperextended head, the surgeon sitting at her head, and mouth opened with a static mouth retractor (Rose position). The spindle was obtained at a maximum of 1.5 cm in width in infancy and 2 cm in adulthood, from the labial commissure to the mandibular raphe, ending there with the same width of the center of the flap, and just below the osteo (Figure 3A and B).

If the extremity is in Y, the anterior portions advance slightly in the upper and lower labial mucosa (Figure 3C and 3D). The flap is started from the angle of the mouth. The scaly mucosa is incised only at the end. Scissors are then attached, and the muscle attached to the mucosa is removed using the scissors

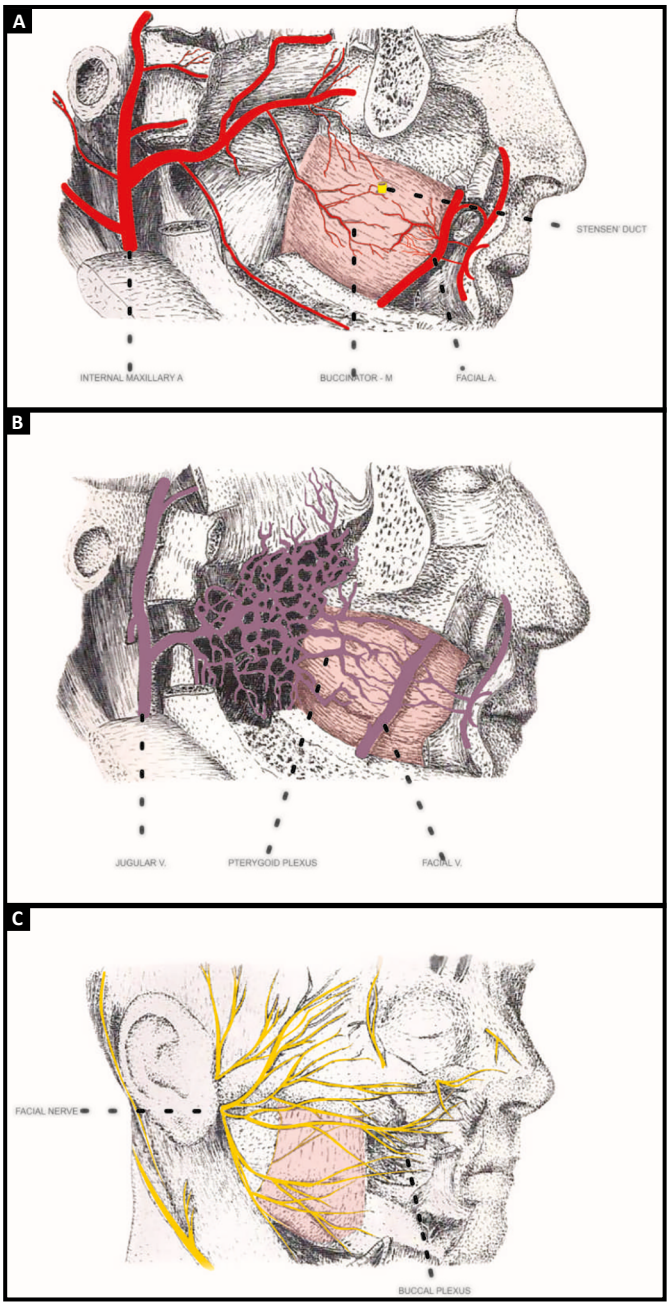

Figure 2. A: Arterial supply of the buccinator muscle; **B:** Venous supply; **C:** Motor innervation[1].

on the demarcated line, centimeter by centimeter to the mandibular ramus. Release of the oropharyngeal fascia muscle is easy[1,2].

In this procedure, pterygoid plexus veins must be ligated and sectioned. The adipose body of the cheek will always be exposed and should be compressed with gauze soaked in adrenaline solution at a concentration of 1:200,000 by using a retractor. When the flap is in Y, the orbicular artery of the lips is found early in the divulsion and can be ligated and sectioned. The posterior vascular pedicle enters the flap in front of raphe in which the muscle and mucosa remain fixed.

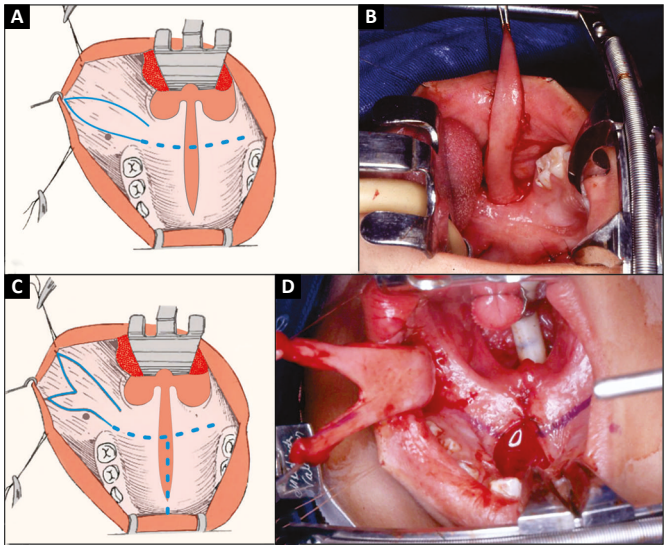

Figure 3. A: Schematic of the spindle flap marking and its position when rotated (dotted line); **B:** The obtained flap and its extensibility; **C:** Marking of the Y-shaped flap and its future position with rotation; **D:** Y-shaped flap and its extensibility[2].

The donor area is closed with absorbable wires with some separate stitches and then anchored using continuous stitches. To facilitate this procedure, the opening of the static retractor is reduced. The greasy body of the face remains in its place of origin.

The point of rotation of the flap obtained is in the raphe, and the arch is made behind the tuberosity of the maxilla, with the end of the flap reaching to the anterior region of the hard palate. The flap is extensible, reaching areas more distant than its original measurement before being obtained (Figure 3B and 3D).

Palatal stretching

After obtaining the fusiform flap, a transverse incision is made between the hard and soft palates, releasing the mucosa and musculature between them until reaching the pedicle base of the raised flap. On the nasal side, the mucosa is partially detached from the hard palate. The loose musculature is drawn back toward the posterior pharynx and sutured in the midline point to point (non-absorbable) until it reaches maximum tension transversely (muscular V-Y)[1,2]. In this way the tendency of the soft palate, besides lengthening, turns backward. The buccinator flap is then rotated 180° along its axis and sutured over the blown area (Figure 4A-B-C).

Correction of palatine fistulas

In fistulas of the junction between the hard and soft palates, which are the most common, the procedure is similar to that for cases of stretching. If necessary, a mucosal flap in the "book sheet" of the palate is used to cover the nasal lining. Stretching is always obtained as a consequence of fistula closure[1,2].

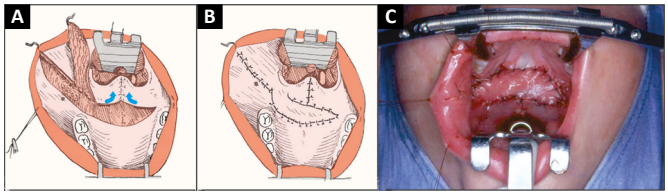

Figure 4. A and **B:** Schematic of the obtained spindle flap and its rotation by 180°. **C:** The flap is rotated and sutured over the bloody area[2].

The same occurs with previous fistulas. Retractions of the fistula border make the lining, and the flap in this case in Y closes the fistula and lengthens the palate (Figure 5A-B-C).

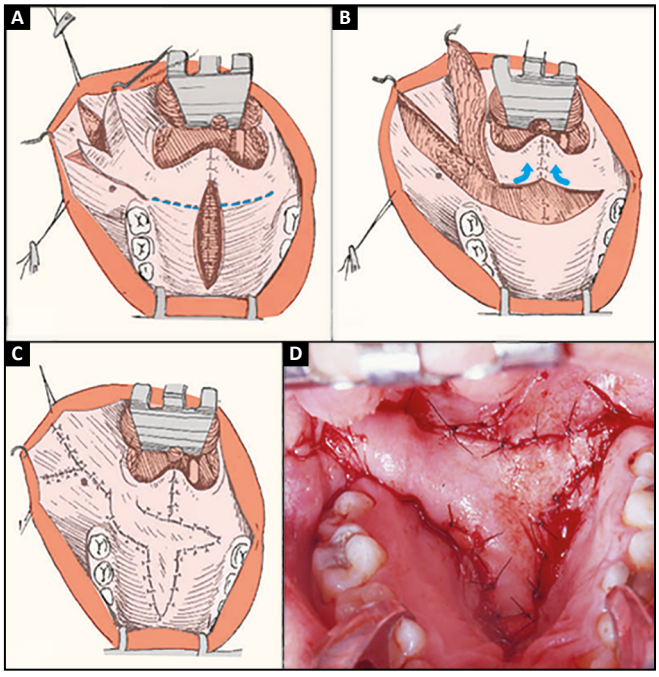

Figure 5. A, **B** and **C:** Schematic of the obtained and rotated Y-shaped flap. D: The flap is sutured over the raw area of the nasal lining of the hard palate and between the hard and soft palates, lengthening it[2].

Closure of the primary palature with stretching

When the soft palate slopes are narrow, closure using the classical techniques[17-19] may result in a short palate, causing future difficulties in phonation. Under these conditions, it is desirable to lengthen the palate primarily.

The free edges of the cleft are detached, the nasal mucosa is approached throughout its length, the hard and soft palate are separated by transverse incision, and the muscles are sutured in V-Y. A Y-flap is obtained and rotated 180° on the pedicle. One of the legs covers the hard longitudinal area of the hard palate and the other suture transversely over the blistering area between the two palates (Figure 5A-B-C-D)[1,2].

RESULTS

Results after 27 years

After 27 years of the initial publication, the author was able to contact only 6 of the 36 patients with cleft palate treated using a buccinator muscle flap[1]. Five had primary corrections, with the use of a fusiform flap at the beginning of the experiment in one and a Y flap in four. One of them had a secondary correction, and one did not have preoperative photographs.

The patient in figure 6A-B-C-D-E, a receptionist, underwent palate correction with fusiform flap stretching and closure of the soft and hard palates with the classic technique using palatal flaps. He did not undergo any orthodontic or phoniatric treatment, despite the mild speech difficulty and hypoplastic jaw, with collapse to the right already visible in the preoperative period in childhood.

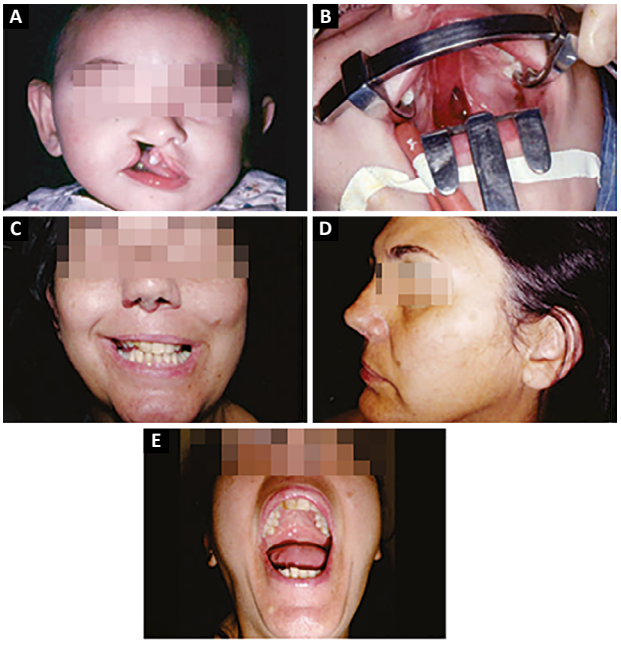

Figure 6. A, **B**, **C**, **D** and **E:** Transforamen fissure corrected with a spindle flap from the buccinator muscle.

The patient in figure 7A-B-C-D-E-F-G-H, an economist, underwent initial correction of the lip with healplasty at 4 months old[20], correction of the palate with a buccinator flap in Y at 1.5 years old, and rhinoplasty at 16 years old. He attained a normal bite with orthodontics and partial dentures. He did not undergo phonological treatment, had normal voice, and slight inversion of the lip projection (Figure 7G).

The patient in figure 8 A-B-C-D-E-F-G-H, an accountant, did not undergo orthopedic treatment of the jaw or orthodontics. He lost some teeth due to bad

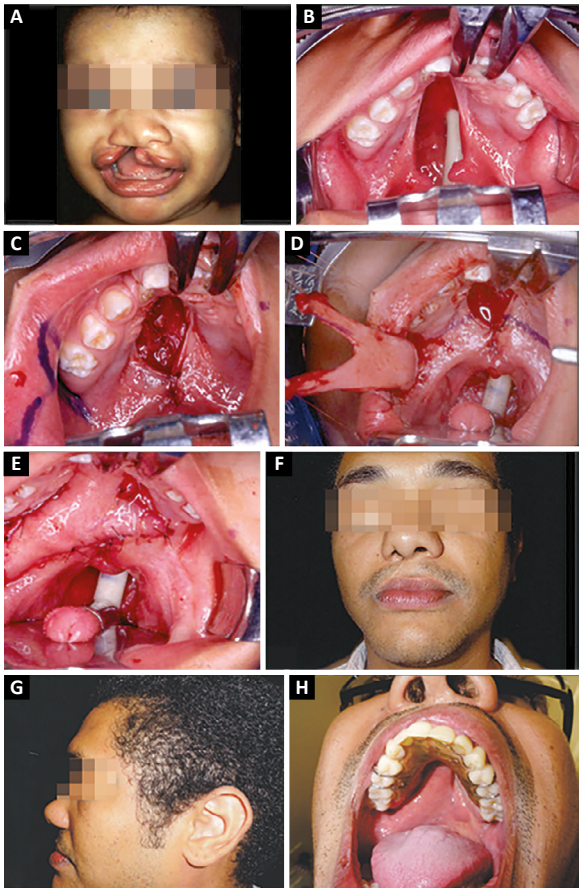

Figure 7. A, **B**, **C**, **D**, **E**, **F**, **G** and **H:** Transforamen fissure corrected with a Y-shaped flap.

conservation that were replaced, speech and bite normal. In the distension of the facial region of the buccinator, he could not project to the right (Figure 8F), but he did not mention any functional disturbance for this reason.

The patient in figure 9 A-B-C-D-E, a plastic surgeon, underwent lip surgery at 4 months (Millard's technique) with 1.5 years of the palate with a Y buccinator flap, and rhinoplasty after puberty. He underwent only orthodontic treatment, had a normal bite and voice.

The patient in figure 10 A-B-C-D-E, a tourism businesswoman, underwent a secondary stretching after correction of the soft palate (incomplete post-foramen fissure) with the simple approach technique, resulting in fistula, which was corrected, and palate elongation. He underwent orthopedic, and speech and hearing treatments to attain normal voice and bite.

DISCUSSION

The buccinator muscle flap, besides its uses in fissures and fistulas, can be used in any situation in bloody intrabuccal areas, such as tumor resections, osteomyelitis, or traumatic losses. Two flaps can be used simultaneously, one for the nasal lining and the other

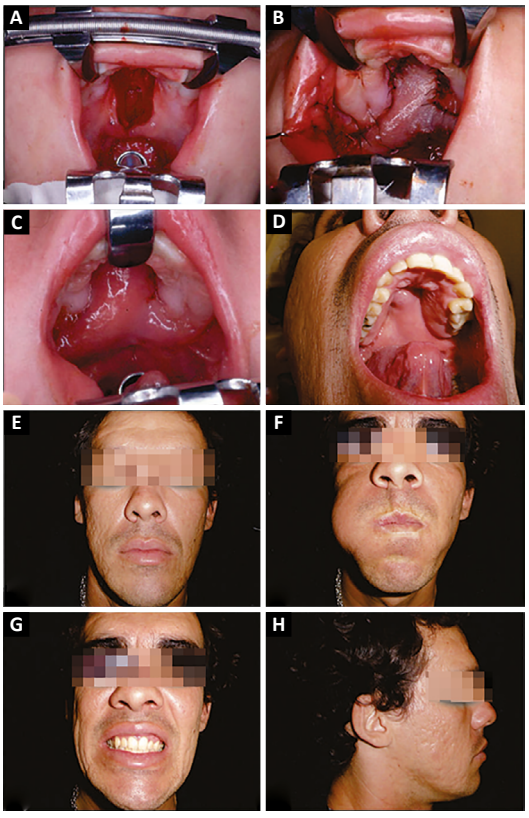

Figure 8. A, **B**, **C**, **D**, **E**, **F**, **G** and **H:** Post-foramen fissure corrected with a Y-shaped flap.

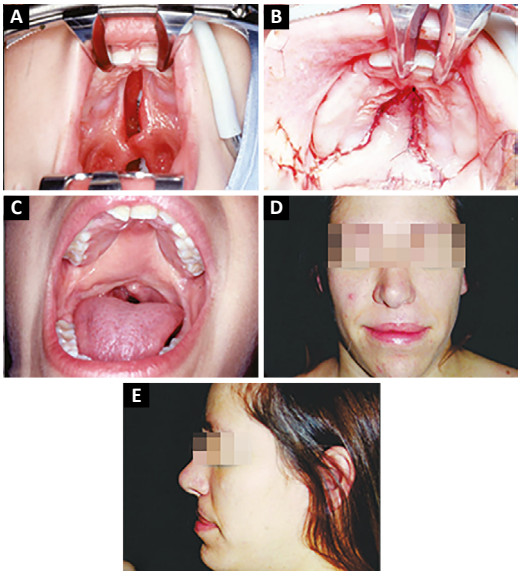

Figure 9. A, **B**, **C**, **D** and **E:** Transforamen fissure corrected with a Y-shaped flap.

for the oral mucosa. In case of failure of one, the other can still survive.

In cases of postoperative fistula, the tissues become fibrous, rigid, and retractable, making it impossible to obtain adequate, movable, and long palates with good

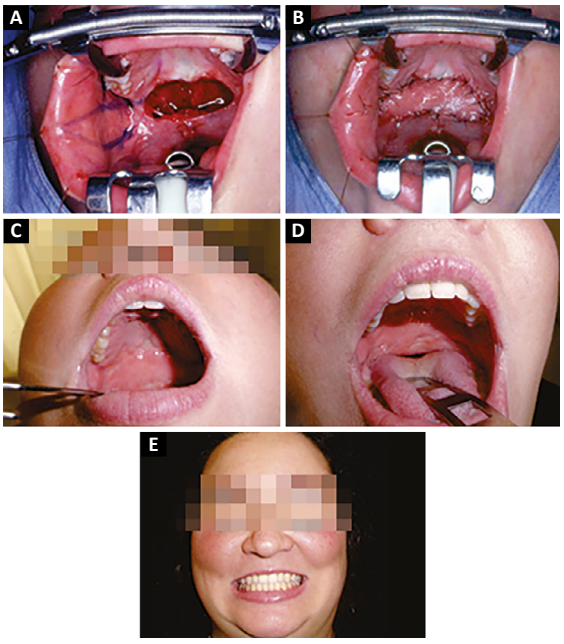

Figure 10. A, **B**, **C**, **D** and **E:** Palate elongation and correction of a fistula with a spindle flap between the soft and hard palates.

function without the use of new tissues such as the flap described.

Irrigation of the buccinator muscle with its anterior pedicle can repair labial defects of the mucosa, traumatic wounds, or tumor post-resection sites[21].

Using the flap leaves the nasal lining and flap sutures in different positions, making it difficult for new fistulas to appear.

The transposition of the flap and 180° rotation behind the maxillary tuberosity always leaves a cicatricial bridle that does not lead to functional consequences. It can be corrected at any time after the integration of the flap with a mini zetaplasty.

It was described in 1989 that the donor area of the flap was not modified, but one of the patients contacted (Figure 8F) presented a reduction in the extensibility of the cheek, without causing any oral function impairment or maxillo-mandibular alterations. His medical record indicated that the flap was wide, which can be seen in figure 8C, and that it was difficult to close the donor area.

In the original description, he commented on the lymphatic edema and the muscle volume, and that the massage caused by the movements of the tongue reduced it, which was verified to be true by the other patients contacted.

Maxillary growth was practically normal in the primary patients contacted, where the none of the palatal flaps were detached and only orthodontic treatment was required. One patient (Figure 6A-E) did not undergo any treatment, and the fissured side evolved with collapse of the arch on that side, which was already visible in the preoperative photograph in childhood.

As for speech, even those who did not receive speech therapy presented minimal changes in their voices[22]. This was demonstrated in 6 cases that were surgically treated using the described technique. The patient in figure 11A-B-C-D-E-F-G underwent surgery using the traditional techniques[17,18] and had 27-year postoperative results, without maxillary orthodontic and orthodontic treatments, which were the standard treatment before the advent of the buccinator muscle flap. In addition to dental misalignment and hypodevelopment of the maxilla, he had great difficulty speaking due to nasal exhaust.

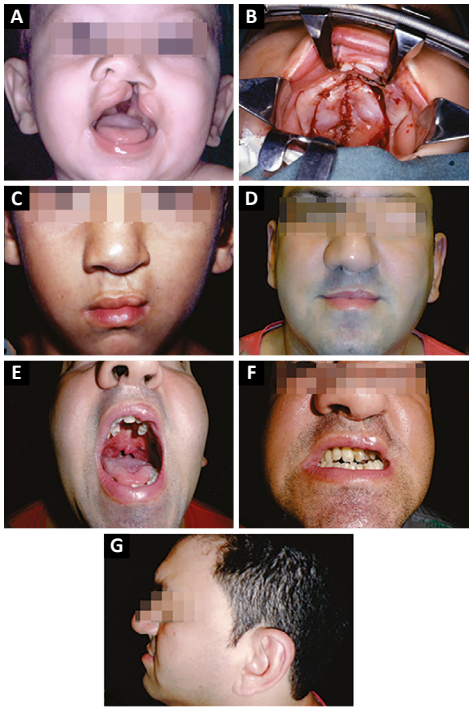

Figure 11. A, **B**, **C**, **D**, **E**, **F** and **G:** Operation with the classic Veaux-Langenbeck technique. In the 28th postoperative year, significant changes were observed in three areas in a patient who did not undergo orthopedic, orthodontic, and phoniatric treatments.

The attempt contact these patients started from the time of entry into plastic surgery residency at the Base Hospital of the State Medical School of São José do Rio Preto. The patient in figure 9A-B-C-D-E was attended to by the author from the first day of life.

Historically, the study of flaps started from a colloquial debate between friends, the author and Chem[23], when the former manifested the impossibility of correcting palatal fistulas with a microsurgical flap from the pedicle artery of the foot pedicle owing to the difficulties that the technique presented for surgeons who did not perform microsurgery, as the author himself. He expressed the need to look for other solutions, complementing previous studies that sought to obtain better function and closure of the palate with minimum sequelae[24-28].

CONCLUSION

Although statistically insignificant, the verification of cases over a mean period of 27 years shows that the 6 patients contacted had normal or near-normal maxillary growth and almost normal speech even without adequate phono-audiological treatment. One patient had poor extensibility of the cheek because the flap was too wide.

COLLABORATIONS

ARB Analysis and/or interpretation of data.

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