Primary palatoplasty using the von Langenbeck technique: surgical experience and aesthetic results of 278 cases

Palatoplastia primária pela técnica de Von Langenbeck: experiência e resultados morfológicos obtidos em 278 casos operados

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ABSTRACT

Introduction: Palatoplasty with elevated bilateral mucoperiosteal flaps using the von Langenbeck technique associated with intravelar veloplasty is a common procedure with low rates of oronasal fistula (ONF) and velopharyngeal insufficiency. The objective is to present the author’s surgical experience and the incidence of ONF among 278 patients who underwent primary palatoplasty using the von Langenbeck technique associated with intravelar veloplasty. Methods: This retrospective study analyzed the medical records of 278 patients who underwent primary palatoplasty at the Mário Covas Treatment Center for Craniofacial Malformations of the Guilherme Álvaro Hospital located in the municipality of Santos, São Paulo, Brazil, between May 2010 and May 2018. Results: A total of 278 primary palatoplasty procedures were performed; of them, 225 (80.9%) were performed in two surgical stages and 53 (19.1%) in one surgical stage. The study population included 182 men (65.5%) and 96 women (34.5%). The prevalence of left and bilateral cleft lip and palate was 26.3% and 27%, respectively, and the prevalence of bilateral cleft palate, and right cleft lip and palate was 37.4% and 7.6%, respectively. Sixty-one patients had ONF (21.94%), the incidence of which decreased progressively throughout the study period. Conclusion: Primary palatoplasty, using the von Langenbeck technique associated with intravelar veloplasty, is reproducible when performed in one or two surgical stages, and considered safe when the learning curve is reached with a complication rate similar to those in the literature.

Keywords: Cleft palate; Oral fistula; Surgery, Plastic; Velopharyngeal insufficiency; Palate, Soft; Palate, Hard; Palatal muscles.

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INTRODUCTION

Among the congenital craniofacial malformations, cleft lip and palate (CLP) is the most common and occurs in 1 of every 650 births in Brazil. CLP may cause functional limitations in speech, difficulty eating and breathing, and negative social and psychological consequences during adulthood.

The palate acts as an anatomical barrier that separates the oral cavity from the nasal cavity. Together with other structures of the pharynx, it contributes to the function of the velopharyngeal sphincter by assisting in speech and feeding. Without the normal function of these structures, patients with cleft palate may develop changes such as nasal air leak and food reflux through the nose. Moreover, patients with CLP have social adaptation problems because of their physical appearance.

CLP is classified according to the affected region into pre-foramen (lips and primary palate), transforamen (primary and secondary palate), and post-foramen. Therefore, the submucosal cleft should be identified in cases of bifid uvula, and cleft palate size can be classified as narrow, normal, or wide.
Regardless of the technique used, the objectives of palatoplasty are to: 1) Stretch the palate to minimize the incidence of VFI and promote adequate speech development; 2) Minimize the restriction of maxillary and alveolar growth; and 3) Prevent complications, including oronasal fistulas (ONFs).

**OBJECTIVE**

To present the author’s experience and the incidence of ONF in 278 cases of primary palatoplasty using the von Langenbeck technique associated with intravelar veloplasty.

**METHODS**

This retrospective study reviewed the medical records of all patients treated surgically at the Mário Covas Treatment Center for Craniofacial Malformations, Guilherme Álvaro Hospital, Santos, São Paulo, Brazil, between May 2010 and May 2018.

The inclusion criteria were diagnosis of cleft palate (CP) or CLP associated or not with syndromes (excluding cases of cleft soft palate) and treated with primary palatoplasty using the described technique performed by the same surgeon (the author).

A total of 278 records were selected, and the following data were obtained:

- **Diagnosis:** right, left, or bilateral CLP corresponding to trans-foramen clefts; and bilateral CP corresponding to post-foramen clefts;
- **Sex (male/female);**
- **Race (Caucasian, mixed, or Black);**
- **Patient age (in months) at the time of primary palatoplasty;**
- **Surgical stage of primary palatoplasty (one or two);**
- **Clinical course with ONF (yes/no) during the 6-month follow-up period after the last procedure.**

The data collected over the 8-year study period (May 2010 to May 2018) were organized and recorded in an Excel spreadsheet, and the data on the appearance of ONF were analyzed in eight 1-year periods based on the date of the last surgery.

Phonation results were not included in the analysis because the objective of this study was to evaluate the aesthetic results and the incidence of ONF.

**RESULTS**

A total of 278 primary palatoplasty procedures using the von Langenbeck technique associated with intravelar veloplasty were evaluated, including 225 (80.9%) performed in two surgical stages (soft palate first, followed by hard palate) and 53 (19.1%) performed in one surgical stage.

The study population included 182 (65.5%) men and 96 (34.5%) women.

In preoperative diagnoses, the incidence of left and bilateral CLP was 26.3% and 27%, respectively, while that of complete CP and right CLP was 37.4% and 7.6%, respectively. A total of 157 patients (56.4%) were Caucasian, 107 (38.4%) were mixed, and 14 (5.04%) were Black. The average age at the time of primary palatoplasty was 17.2 months.

Postoperative complications included total suture dehiscence (2 cases [0.7%]), postoperative bleeding (4 cases [1.44%]), and infection (2 cases [0.72%]). There were no cases of flap necrosis.

ONF occurred in 61 patients (21.94%) during the study period, and the incidence decreased progressively. The incidence of ONF in the first 1-year period (May 2010 to May 2011) and the last 1-year period (May 2017 to May 2018) was 25.00% and 18.75%, respectively (Table 1).

<table>
<thead>
<tr>
<th>Period</th>
<th>Patients</th>
<th>Fistula</th>
<th>%</th>
</tr>
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<tbody>
<tr>
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</tr>
<tr>
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<td>May 2014 - May 2015</td>
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<td>10.23</td>
</tr>
<tr>
<td>May 2017 - May 2018</td>
<td>48</td>
<td>9</td>
<td>18.75</td>
</tr>
<tr>
<td>Total</td>
<td>278</td>
<td>61</td>
<td>21.94</td>
</tr>
</tbody>
</table>

Data on ONF for the primary and secondary palates were included in the study, although their site of occurrence was not determined.

**Surgical technique**

Patients undergoing primary palatoplasty are treated surgically at 6–18 months of age depending on the ease of follow-up. In cases of trans-foramen clefts, primary cheiloplasty is performed in patients older than 3 months and primary palatoplasty can be performed 6 months later using the von Langenbeck technique with or without a vomer flap. Cheiloplasty was not performed together with primary palatoplasty in this population.

CP type was classified as narrow, normal, or wide; in narrow clefts, the procedure was performed...
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in one surgical stage, while in normal or wide clefts, it was performed in two stages (soft palate first, hard palate 6 months later).

All patients underwent surgery while under general anesthesia and orotracheal intubation under direct vision. A Dingman mouth gag was positioned after adequate visual inspection (Figure 1).

The edges of the cleft were demarcated on the soft palate, which was infiltrated with 2% lidocaine combined with a vasoconstrictor (1:200,000) for topical anesthesia. An incision was made on the edges, and the plane of the oral and nasal mucosa was dissected to release the anterior insertion of the levator veli palatini muscle bilaterally and, if necessary, the insertion of the tensor veli palatini muscle. The nasal mucosa was closed and the cleft uvula was repaired. The levator veli palatini muscle was closed and sutured with U-shaped Vicryl® 4-0 sutures, while the oral mucosa was sutured with U-shaped Vicryl® 5-0 sutures.

Relaxing incisions and vomer flaps were demarcated in the second surgical stage (Figure 2), and the incision sites and hard palate were infiltrated with 2% lidocaine combined with a vasoconstrictor (1:200,000) for topical anesthesia.

Bilateral relaxing incisions were made on the medial hard palate at the alveolar crest according to the von Langenbeck procedure.

The bilateral mucoperiosteal flaps were elevated, the pedicle of the greater palatal artery was identified, and the nasal mucosa of the hard palate was dissected (Figure 3).

In wide and normal clefts, unilateral or bilateral mucoperiosteal flaps of the vomer were elevated to close the nasal lining (Figures 4 and 5).

The mucoperiosteal flaps were closed, and the oral mucosa was sutured with U-shaped Vicryl® 5-0 sutures (Figures 6 and 7).
Hemostatic dressings remained at the site of the relaxing incisions only in cases in which the open area was large because they did not impair healing, although they had no demonstrable benefit (Figures 8 and 9).

The steps mentioned above were performed simultaneously in cases of primary palatoplasty in a single surgical step.

**DISCUSSION**

The controversial aspects of palatoplasty include the ideal age at the time of primary surgery to interfere as little as possible with facial growth and allow adequate speech development.

CLP affects facial bone growth, allowing the development of trends and different protocols for its repair as well as surgical repair in one or two surgical stages\(^{15,16}\) without affecting mandibular growth\(^{17}\).

There is no consensus on the ideal age for primary palatoplasty. In our protocol, this surgery was performed at the age of 6–18 months in one stage or alternatively one stage for narrow clefts and two stages for normal and wide clefts.
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Despite being the oldest technique, von Langenbeck’s palatoplasty is still used and a good option for wide and incomplete clefts because it is simple and facilitates dissection. Palatoplasty combined with repair of the nasal lining and muscle sheath is safe and has a low rate of ONF. The occurrence of ONF depends on patient age, cleft type and extent, association with syndromes, surgeon experience, and factors that affect the surgical outcome including suture tension, bleeding, and infection.

The incidence of ONF depends on surgical timing, and the primary surgery can be delayed because of the limited access to health services as demonstrated in our sample by the significant difference in patient age at the time of the first surgery. Surgeon experience also plays a fundamental role given that the author’s learning curve improved over time (Figure 10). The sample was evaluated in eight 1-year periods from May 2010 to May 2018. The incidence of ONF in the first and last periods was 25% and 18.75%, respectively, and the average incidence throughout the study period was 21.94%, which agrees with data in the literature. It should be noted that all ONFs present at 6 months postoperative were identified, including those located anterior to the incisive foramen given that some studies disregarded them.

CONCLUSIONS

Primary palatoplasty using the von Langenbeck technique associated with intravelar veloplasty was reproducible in our service when performed in one or two surgical stages. Although the incidence of ONF was higher than that reported in the literature, this surgical procedure is considered safe when the learning curve is reached and improves the aesthetics of CP.

COLLABORATIONS

MRM  Analysis and/or data interpretation, Conception and design study, Data Curation, Final manuscript approval, Formal Analysis, Funding Acquisition, Methodology, Project Administration, Realization of operations and/or trials, Resources, Supervision, Writing - Review & Editing

CGM  Analysis and/or data interpretation, Conception and design study, Data Curation, Formal Analysis, Investigation, Methodology, Project Administration, Realization of operations and/or trials, Writing - Original Draft Preparation
REFERENCES


