

## Surgical outcome of two-flap palatoplasty at King Fahad Medical City: A tertiary care center experience

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### Abstract

The purpose of this study was to assess surgical outcomes of two-flap palatoplasty for management of cleft palate. Between January 2009 and January 2017, we recruited 29 non-syndromic patients who underwent two-flap palatoplasty for cleft palate repair at the oral and maxillofacial department. Their medical records were procured, and surgical outcomes were assessed. Velopharyngeal insufficiency (VPI) was evaluated on the basis of speech assessment by a speech therapist. Speech abnormality (nasality, nasal emission, and articulation error) was assessed by a speech therapist using the GOSS-Pass test. Swallowing and regurgitation were assessed by a swallowing team. Fistula and wound dehiscence were clinically assessed by the primary investigator. Documented data were evaluated using statistical analysis. Among the study patients; 75.8 % had normal speech, 20.7 % developed VPI; 17.3% had hypernasality; 4.3% had hypernasality as well as nasal emission; 4.3% had hypernasality, nasal emission, and articulation errors; and 4.3% had articulation errors. Approximately 20% of the patients had fistulas (83.3% had oronasal fistulas and 16.7% had nasovestibular fistulas). Normal swallowing findings were noted in 93% of the patients. There were statistically significant relationships between age-repair and VPI ( $r=0.450$ ,  $t=0.014$ ), age-speech ( $r=0.525$ ,  $t=0.003$ ), and age-fistula development ( $r=0.414$ ,  $t=0.026$ ). Conversely, there were no significant relationships between age and dehiscence ( $r=0.127$ ,  $t=0.512$ ), age and swallowing ( $r=0.360$ ,  $t=0.055$ ), and age and regurgitation ( $r=0.306$ ,  $t=0.106$ ). Two-flap palatoplasty is a reliable technique with excellent surgical and speech outcomes. Early repair is associated with better speech outcome and less incidence of VPI.

### Introduction

Cleft lip and palate is one of the most common congenital craniofacial deformities of multifactorial etiology. They are highly

variable with regard to anatomical and functional abnormalities among patients. Their management requires a multi-team approach, including oral and maxillofacial surgery, plastic surgery, otolaryngology, pediatrics, genetics, speech and language pathology, dietetics, psychiatry, and other allied health specialties.<sup>1,2</sup> The main goals of cleft palate repair are achievement of normal speech and adequate velopharyngeal function with minimal effect on facial growth.<sup>3</sup> Surgical techniques and timing depend on the deformity and surgeon experience as well as preference.<sup>4</sup> Multiple surgical techniques have been described to achieve optimal results with a low complication rate.<sup>5</sup> Two-flap palatoplasty is one of the most commonly used techniques for cleft palate repair, which was described by Bardach in Poland in 1967. This technique is a modification and extension of existing techniques that use nasal and oral mucoperiosteal flaps, as described by Veau, to achieve closure of the palatal cleft.<sup>6,7</sup> Minimization of the area of exposed bone of the hard palate to reduce any adverse effects on maxillary growth<sup>8</sup> and complete closure of the entire palatal cleft in a single operation are prerequisites for a good surgical outcome.<sup>9</sup> There are many controversies regarding the surgical technique and timing, but most surgeons recommend repair at 12 months of age. Salyer *et al.* found that 8.92% of patients developed speech abnormalities attributable to velopharyngeal insufficiency (VPI) in a retrospective study on 382 two-flap palatoplasties over 20 years. In addition, they found that 91.14% of the patients demonstrated normal resonance.<sup>10</sup> A fistula is a known complication of cleft palate repair, and its incidence has been reported to range between 12% and 45%.<sup>11</sup> Previous studies analyzing surgeon experience with two-flap palatoplasty have noted a low fistula rate of 3.4%.<sup>12-14</sup> Few studies have described incidences of wound dehiscence, swallowing abnormality, and regurgitation.<sup>15</sup>

### Materials and Methods

This retrospective study performed in the oral and maxillofacial department was approved by the institutional review board of King Fahad Medical City (IRB00010471). Between January 2009 and January 2017, we identified 44 patients who underwent palatoplasty for cleft palate repair (performed by one of the author, Abdulsalam Aljabab). Their medical records were obtained, and postoperative complications were assessed. Fifteen patients were excluded (six were syndromic and nine underwent a different technique of the palatoplasty procedure). Postoperative complications, including VPI, speech abnormality, fistula formation rate, wound dehiscence, swallowing abnormality, and regurgitation,

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ence, swallowing abnormality, and regurgitation, were assessed. VPI was evaluated according to speech assessment by a speech therapist. Speech abnormality was assessed by GOSS-Pass, which is a formal test for Arabic speaking individuals. The test was originally a British test for articulation and resonance and for subjective assessment of VPI. Fistula and wound dehiscence were clinically assessed by the primary investigator. A swallowing team assessed swallowing and regurgitation.

### Statistical analysis

Statistical analysis was performed using Pearson correlation analysis involving  $r$  square and P-value for each parameter. All analyses were performed using SPSS (Version 22.0) software (IBM Corp., Armonk, NY, USA).

### Results

The study included 29 patients (58.6% girls and 41.4% boys). The mean patient age at palatoplasty was 16 (range 9-27) months.

The study included the entire spectrum of cleft types, bilateral cleft lip and palate, right unilateral cleft lip and palate, left unilateral cleft lip and palate, and cleft palate only (37.9%, 3.4%, 6.9%, and 51.7%, respectively) (Table 1). 22 patients had normal speech, 6 patients developed VPI; 4 patients had only hypernasality; one patient had hypernasality as well as nasal emission; one patient had hypernasality, nasal emission, and articulation errors; and one patient had only articulation errors (Table 2). Fistulas were noted in 20% of the patients (83.3% had oronasal fistulas and 16.7% had nasovestibular fistulas). All fistulas were conservatively managed, and complete healing was noted in later follow-ups. Swallowing assessments showed that 93% of the patients had a normal pattern. Two patients had swallowing abnormality, one patient had nasal regurgitation, and one patient had nasal regurgitation as well as silent aspiration. There were statistically significant relationships between age at repair and VPI ( $r=0.450$ ,  $t=0.014$ ), age and speech ( $r=0.525$ ,  $t=0.003$ ), and age and fistula development ( $r=0.414$ ,  $t=0.026$ ). Conversely, there were no statistically significant relationships between age and dehiscence ( $r=0.127$ ,  $t=0.512$ ), age and swallowing ( $r=0.360$ ,  $t=0.055$ ), and age and regurgitation ( $r=0.306$ ,  $t=0.106$ ).

## Discussion

Many authors have reported on early palatal repair and its beneficial effects on speech.<sup>16,17</sup> Haapanen and Rantala found that speech was significantly better in children who underwent palatoplasty between 12 and 18 months of age than in those who underwent the procedure later.<sup>17</sup> Dorf and Curtin used 12 months of age as a dividing point between early and late palatal repair.<sup>16</sup> They found that speech was better, with fewer compensatory articulations, in those who underwent early palatal repair. Conversely, it was noted that if repair is performed too

early, there is no additional benefit. Salyer *et al.* reported that patients achieved consistently high standards of articulation with a very low incidence of compensatory articulation when palatoplasty was performed before 12 months of age.<sup>9</sup> These authors also found a significant increase in the rate of secondary surgery for VPI when patients underwent palatoplasty at  $>18$  or  $<12$  months of age.<sup>9</sup> In our study, we found that patients who underwent early palatoplasty had better speech outcomes and a reduced incidence of VPI. All patients who developed speech abnormality showed improvement with speech therapy. In addition, 6 (20.6%) of our patients missed their follow-up for speech therapy. Therefore, patient education is very important to achieve better outcomes. The complication of fistula may present anywhere along the palate. It is usually a result of inadequate dissection of the flaps, closure under tension, postoperative bleeding, hematoma formation between the oral and nasal layers, or infection. Some studies consider the presence of a palatal fistula as failure of the surgical technique.<sup>4</sup> In our study, we found that approximately 20% of our patients had fistulas. In addition, all patients who had fistulas did not have postoperative complications that could contribute to fistula formation, such as hematoma or infection. Indeed, we found a statistically significant relationship between age and fistula formation ( $r=0.414$ ,  $t=0.026$ ); thus, age at repair had a large impact on the incidence of complications. In our study, 93% of the patients had normal swallowing findings, whereas the remaining patients had swallowing abnormality, nasal regurgitation, and one patient had nasal regurgitation as well as silent aspiration.

## Conclusions

Two-flap palatoplasty is a reliable technique with excellent surgical and speech outcomes. Early and regular speech assessments, patient education, and appropriate treatment when indicated are integral aspects of a multidisciplinary approach to achieve good speech outcomes.

**Table 1. Cleft type.**

Bilateral cleft lip and palate	11	37.9%
Cleft palate	15	51.7%
Unilateral cleft lip and palate - Left	1	3.4%
Unilateral cleft lip and palate - Right	2	6.9%

**Table 2. Speech assessment.**

Normal speech	22	75.8%
Articulation errors	2	8.6%
Hypernasality	6	20.6%
Nasal emission	2	8.6%

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