Abstract

Methods: Retrospective case series review of all children who underwent 2-flap palatoplasty (2FP) by the attending surgeon (J.J.M.). Fifty-five consecutive patients were analyzed over a 5.5 year period. Study variables were obtained from multidisciplinary craniofacial/cleft records. All patients underwent 2FP with intravelar veloplasty utilizing the suture technique described herein. No patients were excluded from primary review.

Results: Eighty-nine percent of patients were Veau class 2 or 3. Twenty-four (44%) patients had an associated syndrome. Patients with a lower Veau class were 3.6 times more likely to have an associated syndrome (p=0.0001). Two (4%) patients developed a fistula. There was no association between Veau class, presence of an associated syndrome, or use of dermal allograft with the development of a fistula (p=1.0, 1.0, 0.25). Postoperative velopharyngeal insufficiency (VPI) was noted in 11 (20%) patients, without association between Veau class, syndrome, or dermal allografting (p=1.0, 0.74, and 0.35, respectively). Repairs in the first half of the patient sample had a 14-fold increased risk of postoperative VPI (p=0.0024).

Conclusion: Our use of an inverted horizontal mattress suture for nasal mucoperiosteal closure during 2FP appears safe, and is comparable to the lowest published rates of postoperative fistula and VPI. Further standardized studies are needed in this area.

Methods and Surgical Technique

Fifty-five consecutive patients who underwent a standard 2-flap palatoplasty (2FP) with intravelar veloplasty by the attending surgeon (J.J.M.) over five years were reviewed. Suture technique is demonstrated in Figure 2. Patients were examined one week postoperatively, again at three months, and with yearly follow up for asymptomatic patients.

Study variables included: age at time of surgery, sex, Veau classification, and presence of comorbid syndrome. Outcomes included: use of dermal allograft, length to last follow up, postoperative and location of postoperative fistula. Speech and language pathology records were also accessed for presence of postoperative VPI. To analyze the effects of surgeon experience, first vs. second half study sample were compared.

Statistical Analysis Software® (SAS Institute, Inc., Cary, NC, USA) was used to analyze collected study variables. The Mantel-Haenszel Exact Chi-Square test examined trends and outcomes by Veau class, where the Fisher’s Exact Test was utilized for instances of dichotomous variables and Veau class groupings (1&2 v. 3&4.) A t-test assessed differences in mean age of first vs. second half patients, fistula, and VPI.

Figure 2. 4-0 vicryl® horizontal mattress suture approximates the nasal mucosal layer with knots tied on nasal mucosal surface (rather than buried) to elevate wound edges. After veloplasty the oral mucosa is closed similarly (knots tied introrally.) Dermal allografting between the nasal and oral mucosal layers with Alloderm® is used where tissue deficiency precludes tension-free closure. Dissection of the neurovascular pedicle and tensor veli palatini tendon sectioning are routinely performed for flap medialization. The entire palate is bolstered with Xerof orm® gauze and removed on postoperative day 2.

Results

Mean age at time of repair was 399 days (median: 350; range: 174-973; SD: 151). Thirty-six (65%) of patients were female. The majority of patients (89%) were Veau classes 2 and 3. Patients with a lower (grouped 1&2) Veau class were more likely to have an associated syndrome compared to higher (grouped 3&4) Veau class (p=0.0001). Twenty-four (44%) patients had an associated syndrome.

Postoperative Fistula: Neither mean age (p=0.45) nor sex (p=0.46) were associated with fistula. Figure 3(A) demonstrates no significant associations between study variables and development of fistula. Two (4%) of our patients developed a fistula. The first was a female, Veau class 3 with no associated syndrome, repaired at 248 days. The second was a male, Veau class 2 with a partial (21g22.3) chromosome 21 deletion repaired at 392 days with use of dermal allograft.

VPI: Neither mean age (p=0.30) nor sex (p=0.19) were associated with development of fistula. First half patient sample was associated with a 14-fold increased risk of VPI (p=0.0024). Other study variables demonstrated no effect on VPI. Figure 3(B).

Dermal Allograft: Dermal allografting was utilized in 8 (15%) patients and was not associated with Veau Class (p=0.58) or syndrome (p=0.28).

Discussion

The primary goal of cleft palate repair is velopharyngeal competence without fistula formation, which can create challenging and often refractory management issues. Surgical outcome data in these patients are confounded by a lack of uniform study design, exclusion criteria, and classification schemes in the literature. Our study addressed several of these short-comings by including well-matched samples sizes of patients with lower (45%) and higher (55%) Veau classes, as well as syndromic (44%) and non-syndromic (56%) patients. No patient’s were excluded from the study and we analyzed a single surgeon’s experience on a single operative procedure while making a use of a strict definition of fistula.

In contrast to other studies, our results did not identify Veau class or associated syndrome as a risk for development of fistula or VPI. The positive correlation between our first half of patients and postoperative VPI may be attributable to older mean age at repair (which approached statistical significance; 437 days v. 361, p=0.06) rather than surgeon inexperience. We identified no association between dermal allograft use (15%) of patients and adverse outcomes.

Conclusions

Our use of a novel exposed inverted horizontal mattress suture technique for nasal mucoperiosteal closure described a safe and easily incorporated modification to the classic two-flap palatoplasty while circumventing the theoretical complications of later maxillofacial repair by virtue of its primary closure. Furthermore, our outcomes are comparable to the lowest reported postoperative fistula and VPI rates after primary repair of the cleft palate. Additional prospective studies in this area are needed to determine the optimal surgical management of cleft patients.