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Clinical Paper
Cleft Lip and Palate

Cleft relapse and oronasal fistula after Furlow palatoplasty in infants with cleft palate: incidence and risk factors

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Abstract. This study was performed to investigate the incidence of and risk factors for postoperative cleft relapse and oronasal fistula after Furlow palatoplasty in infants. Sixty-two infants with cleft palate, aged 6–12 months (mean 8.25 months), who underwent cleft repair by Furlow double opposing Z-plasty between March 2012 and August 2014, were enrolled in the study. Risk factors for postoperative cleft relapse and oronasal fistula after Furlow palatoplasty were identified by logistic regression analysis. The incidence rates of cleft relapse at 1 week and oronasal fistula at 3 months after surgery were 24.2% (15/62) and 9.7% (6/62), respectively. Among all of the variables screened, only the width of the cleft was significantly associated with the incidence of postoperative cleft relapse ($P = 0.001$) and oronasal fistula ($P = 0.011$); the incidence rates were positively correlated with the width of the cleft when it exceeded 6.8 mm and 7.5 mm, respectively. Based on these findings, in order to reduce the incidence of postoperative cleft relapse and oronasal fistula, Furlow repair is not recommended for patients with wide clefts. An appropriate angle between the Z-flap incision and the central axis, use of a bilateral relaxation incision, and postoperative nursing care can help reduce the incidence of postoperative cleft relapse.

Key words: cleft palate; cleft relapse; fistula; infant; furlow palatoplasty.

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Cleft palate is the second most common human birth defect, and it poses a great physiological and social challenge to affected patients. A wide range of surgical procedures have been described for the repair of cleft palate.[1] However, none has proved to be superior to the others or is suitable for all patients, and a standard protocol is still lacking.[2] Among the many palatoplasties, the Furlow double opposing Z-plasty (also known as the Furlow palatoplasty), which is based on the geometric principle of 'Z' operation, can both fully extend the length of the soft palate and reconstruct the palatal muscles to narrow the pharyngeal cavity, which is beneficial for the recovery of palatopharyngeal closure function.[3,4] It has been reported that

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patients treated with the Furlow palatoplasty can achieve 90% of palatopharyngeal closure function, which is higher than that achieved with other procedures, like the von Langenbeck procedure, one-flap push-back palatoplasty, and the Sommerlad procedure.[2,3,5,6] Since 2002, the Furlow palatoplasty has become one of the most commonly used procedures for palate repair.[7]

Oronasal fistula is the most common complication after palatoplasty.[8] Most commonly, sutures within the oral mucosa fall off at 1 week after surgery, leaving a local fissure at the surgical site in the oral cavity. The present authors term the resultant fissure 'cleft relapse'. The local fissure either eventually heals well after proper treatment or develops into a channel between the oral and nasal cavity, which is called an oronasal fistula.[9] An oronasal fistula can result in nasal leak, dysarthria, hearing impairment, food reflux, and maxillary hypoplasia, greatly harming and inconveniencing the patient.[9,10] Oronasal fistula continues to be a challenge for cleft surgeons, and thus research-based guidelines for selecting the optimal techniques or procedures to decrease the rate of fistula are important.

The Furlow palatoplasty is associated with a lower incidence of oronasal fistula (5.6–10%) compared with other palatoplasty procedures such as the von Langenbeck procedure (22%) and one-flap push-back palatoplasty (43%);[11,12] however, the incidence is still high in cases of wide clefts.[13] Given that the occurrence of palatal fistula might be related to multiple factors, such as high tension in the local sutures, infection, injury, haematoma, and tissue necrosis,[10] identifying the risk factors for the development of an oronasal fistula after Furlow palatoplasty is of great significance in terms of optimizing the indications for this widely accepted procedure.

Several studies have reported the incidence rates of cleft relapse and oronasal fistula after other palatoplasty procedures,[13–15] but there are relatively few reports on the incidence of postoperative cleft relapse and oronasal fistula after Furlow palatoplasty in infants.

Considering that palatoplasties performed at the infant stage are conducive to the normal development of phonetic function,[16] the present study aimed to investigate the incidence of and risk factors for cleft relapse and oronasal fistula after Furlow double opposing Z-plasty in infants with cleft palate.

Materials and methods

Patients

This study consisted of an evaluation of all cleft palate patients treated at the authors' centre from March 2012 to August 2014. The inclusion criteria were (1) age between 6 and 12 months; (2) complete or incomplete cleft palate, including cleft soft and hard palate (CSHP), cleft soft palate (CSP), and unilateral cleft lip and palate (UCLP); (3) no upper respiratory or gastrointestinal infection; and (4) ability to attend for regular follow-up. Exclusion criteria were patients with syndromic cleft palate, such as those with Pierre Robin syndrome, congenital velopharyngeal insufficiency, and submucous cleft palate. Informed consent was obtained from the guardian of each infant, and the study protocol was approved by the ethics committee of the study centre.

Surgical procedure

The Furlow double opposing Z-plasty was performed as described previously.[3] The key point of the Furlow palatoplasty is to design two opposing Z flaps beside the cleft, forming a musculomucosal flap with a posterior pedicle and a mucosal flap with an anterior pedicle both in the oral and nasal cavities in the soft palate area (Fig. 1). First, the two arms of the Z-flap in the oral cavity are dissected within the mucosa. Then the edges of the cleft are cut open and the palatine muscle is cut off at the location of its attachment, forming a triangular flap with the posterior pedicle. Next, on the other side of the cleft, the mucosa is stripped at the superficial layer of the palatine muscle, forming a mucosal flap with an anterior pedicle. Thus, the Z-flap in the oral cavity is created. The Z-flap in the nasal cavity is created following the same steps. In the suture step, the flaps in the nasal cavity are mutually diverted and sutured first, followed by the flaps in the oral cavity.

For the patients in this study, the nasal mucosa was sutured with non-absorbable 5–0 Vicryl sutures; interrupted suturing with absorbable 5–0 sutures was applied to the oral mucosa. For the hard palate portion, where a fistula can easily develop, mattress sutures were adopted to avoid excessive involution of the front part of the mucosa . All of the procedures were performed by one surgeon (FL), who was skilled in this technique before the study was performed.

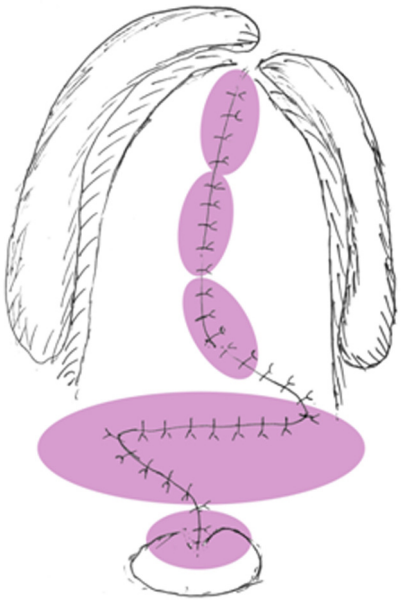

Fig. 1. Schematic diagram of the incision design. The pink areas indicate fistulae of types I–V (from bottom to top), respectively: type I, bifid uvula; type II, soft palate; type III, junction of the soft and hard palates; type IV, hard palate; type V, junction of the primary and secondary palates. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of the article.)

Postoperative follow-up

After surgery, treatments including local debridement, regular flushing, and wet dressing were given, as well as a prescription for mouthwash. All of the children were observed until day 3 after surgery. The children were discharged once it was confirmed that they had no abnormal routine blood test results and no signs of surgical wound infection. Epidermal growth factor for local application was administered to promote wound healing.

All patients underwent physical examinations at 1 week and 3 months after surgery, in which the healing status of the incision and the presence and location of cleft relapse or fistula were recorded. On the basis of the Pittsburgh Fistula Classification System,[17] palatal fistulae can be classified into seven types: I, bifid uvula; II, soft palate; III, junction of the soft and hard palate; IV, hard palate; V, junction of the primary and secondary palates (for Veau IV clefts); VI, lingual alveolar; and VII, labial alveolar. The fistulae seen in the present study were of types I–V (Fig. 1).

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