The Furlow Z-plasty in two-staged palatal repair modifications and complications

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Abstract

Objectives: To report the modifications and complications of the Furlow palatoplasty for two-stage closure of the palate.

Patients and methods: Prospective study of a consecutive series of 45 primary closures of the soft palate portion of clefts extending into the hard palate; mean (S.D.) age at repair 12 (2) months; median follow-up 4 years 4 months (range 2 months to 9 years). The hard palatal part of the cleft was closed in 18 patients at the mean age of 3 years 11 months.

Results: The main modifications that we made were the use of quilting sutures, lateral V–Y closures, and fibrin glue application, and the omission of lateral releasing incisions. Patients stayed in hospital for a median of 4 days (range 3–8 days). Two patients had postoperative partial obstruction of the airway and were given steroids. In six patients, a smaller portion of the oral layer of the wound broke down; it healed by secondary intention in five, but resulted in partial dehiscence in one. There were no oronasal fistulas in the 18 patients who had delayed closure of the hard palate part of the cleft. Secondary pharyngoplasty was not necessary in any patient.

Conclusion: Furlow’s technique has been modified for use in the two-stage closure of complete cleft palates (with or without cleft lip or alveolus) with an acceptable rate of complications.

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Introduction

The Gothenburg centre has demonstrated better long-term midfacial growth in patients with complete unilateral clefts after delayed closure of the hard palate than after early one-stage closure.1–4 The Philadelphia centre has demonstrated better speech after the Furlow double opposing Z-palatoplasty.5,6 We started to use Furlow’s technique for two-stage palatal repairs in 1995 and reported favourable early maxillary growth.7 In that year, we set up a prospective study to record modifications and complications of the technique. We now report our experience in patients with complete cleft lip, alveolus, and palate, and those with complete cleft of the secondary palate (two-staged palatal repairs).

Patients and methods

Between 1995 and 2003, we did a total of 80 consecutive primary closures of the soft palate, using Furlow’s technique (Fig. 1).8,9 Two groups of patients were identified: those in whom the palatal cleft extended so far anteriorly into the hard palate that a two-stage closure was thought necessary (n=45), and those in whom the cleft of the secondary palate was closed in one stage, because it was confined to the soft...
Fig. 1. Design of Furlow’s double opposing Z-plasty. (a) Markings on the oral layer; (b) raising the flaps in the oral layer. The left-sided flap contains the vela palatini muscle bundles; and (c) suturing of the Z-plasty in the nasal layer. The right-sided flap contains the vela palatini muscle bundles.

In 39 patients, V-Y closure of the oral layer was used instead, with the aim of avoiding surface scarring and secondary epithelialisation (Fig. 2a). In 39 children, it proved necessary to insert mass sutures between the nasal and oral layers at the edge of the residual cleft in the hard palate to prevent leakage (Fig. 2b). Quilting sutures (one in the middle, or two in the lateral parts of the repaired soft palate, $n=9$) were introduced in 1999, to further obliterate dead spaces and to support the wound sutures (Fig. 2c). In six bilateral clefts, the nasal layer...
Fig. 2. Modifications made. (a) Closure of the oral layer with lateral V-Y plasties; (b) mass suture of oral and nasal layer to prevent contamination; (c) quilting sutures to obliterate dead space in the lateral regions; and (d) lengthening of a short hemiuvula.

Delayed closure of the hard palate was in two layers, pairing the edges in cases with narrow unilateral complete clefts. A single transpositional palatal flap, epiperiosteal at its lateral half, was raised for wider unilateral complete clefts and clefts of the secondary palate. Double transpositional palatal flaps were used for bilateral complete clefts. When these flaps were used, a triangular hinged flap of the oral layer from the soft palate was sutured in the nasal layer to seal off this area, which is prone to fistulation (Fig. 3a–d).

Of the 45 children, 30 were boys and 15 girls (2:1 ratio), and their mean (S.D.) age at the time of repair of the soft palate was 12 (2) months. The median follow-up was 4 years 4 months (range 2 months to 9 years 2 months). There were 20 patients with unilateral complete cleft lip, alveolus,
Fig. 3. (a–d) The cleft in the hard palate is closed at the age of 4 years. The residual cleft has become smaller and can be closed by paring of the edges and unilateral or bilateral transposition flaps. The lateral part of the flap is split-thickness, the medial part full-thickness, and including the periosteum. In bilateral clefts, a triangular oral hinge flap is routinely inserted in the nasal layer to prevent oronasal fistula. This technique is sometimes applied in unilateral clefts or median clefts in which there is considerable width posteriorly.

and palate (Veuve Class III) (in 11 the cleft was on the left side and in 9 on the right), 11 with bilateral complete cleft lip, alveolus, and palate (Veuve Class IV), 13 with variable extension of the cleft into the hard palate (Veuve Class II), and 1 with a cleft secondary palate and a cleft lip. Several children also had other conditions, including 4 with Pierre Robin sequence \((n = 4)\), holoprosencephaly \((n = 1)\), amnion band syndrome/unicoronal suture synostosis \((n = 1)\), partial agenesis of the corpus callosum \((n = 1)\) and progeria \((n = 1)\).

Furlow’s original technique \(^8,9\) was used with the modifications reported above. The operation was limited to the soft palate, the repair of the hard palate being delayed until
Results

We encountered several complications. Two patients had partial obstructions to the airway, which required treatment with steroids during the first 2 or 3 days. The wounds of the oral layer broke down partially in six children; five of these healed by secondary epithelialisation and contraction of the scar. In the sixth, there was full-thickness dehiscence in the anterior part of the wound up to the muscle sling, which was corrected at the time of closure of the hard palate.

Twenty-two patients were given antibiotics for prophylaxis (21 cephalosporin, and one penicillin). Twenty-six patients were discharged, 18 patients were prescribed a course of cephalosporins, and seven of penicillin. The decision to prescribe antibiotics was taken after judging the appearance of the wound and the child’s clinical condition.

Discussion

There are two important ways of assessing the success of palatal repair: the quality of speech and the incidence of oronasal fistula.

A crude measure of the quality of speech is the incidence of operations to correct velopharyngeal insufficiency. Such operations are necessary in 5–45% of patients. The Philadelphia centre has probably the largest series of Furlow Z-plasty operations and has reported a 7.2% incidence of secondary pharyngoplasty, speech being poorer in Vau Class I and II clefts. They also found no difference in the quality of speech between 40 children in whom the palatal cleft was repaired between 3 and 7 months, and 50 children in whom the palate was repaired later than 7 months. This supports our postponing of the repair of the soft palate to the age of 1 year, or earlier if the child starts babbling.

The incidence of oronasal fistulas after palatal repair varies from 3.4 to 23% of patients. Two-stage repair is thought to reduce the incidence because the secondary cleft is smaller, which allows repair with a minimum of dissection and disruption of mucosal vascularity. Primary one-stage Furlow palatoplasty is reported to result in 0–1.9% of fistulas. We found no fistulas after delayed closure of the hard palate in our small group of 18 patients, including patients with Veau III and IV clefts. This can be attributed to the use of the triangular hinge flap, which closes the cleft on the nasal side at the transition between hard and soft palate, and seals off the median suture line in the oral layer.

The Philadelphia surgeons mentioned early in their experience that in wide clefts, lateral incisions could be closed in a Y-V configuration, after backing the flaps away from their intended position. We are currently using this Y-V flap in nearly every case. This is at the expense of initial palatal length but avoids secondary shortening of the soft palate by superficial contraction of the scar.

It is said that Furlow’s technique is demanding, because it creates length at the expense of width, and spanning the width of a cleft without tension on the oral suture lines is almost impossible. Extending the lateral incisions up to the torus tubarius facilitates tension-free closure of the nasal layer, at the expense of increasing lateral voids. Obliteration of the space with fibrin glue and quilting sutures has solved this problem. Placing a mass suture at the anterior wound edge has minimised contamination of these spaces by saliva and food.

Quilting sutures, and lateral Y-V closure helps minimise complications and reduces the need for secondary pharyngoplasty.

Addendum

In April 2005 we did a sphincter pharyngoplasty for a 5-year old boy who was born with right-sided complete cleft lip and palate. The soft palate had been closed by Furlow’s technique in February 2000 and the hard palate in March 2003. Both procedures were uneventful. Nasometer evaluation indicated the need for a pharyngoplasty and nasendoscopy showed a coronal closure pattern.

By April 2005, the cleft in the hard palate had been closed in 25 patients, bringing the incidence of pharyngoplasty up to 4%.

References


