



Reconstruction of the oral commissure in patients with unilateral transverse facial cleft

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Abstract

The normal commissure is not a simple joint of the upper and lower lip, but a triangular mucosal area. To reconstruct a symmetrical oral commissure in patients with a unilateral transverse facial cleft, we designed composite vermilion flaps, including triangular flaps. We retrospectively studied 17 patients with unilateral transverse facial clefts from 2013–2016. Three-dimensional images were obtained with a 3-dimensional photogrammetry system at the 1-year follow-up, and we used an anthropometric method to evaluate the postoperative symmetry of the commissure. No obvious deformity was found during the follow-up examination, and comparison of the cleft and non-cleft sides by the paired samples *t* test showed that in all cases both horizontally and vertically symmetrical commissures had been achieved.

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Introduction

A transverse facial cleft, also referred to as a Tessier 7 cleft, is a relatively rare congenital malformation.¹ It has a frequency of 1:80 000 live births and is seen in every 100–300 facial clefts.^{1,2} It results from the failure of mesodermal migration or merging to obliterate the embryonic grooves between the maxillary and mandibular prominences during the fourth and fifth weeks of the embryonic phase of gestation.³ The extent of the cleft is variable, and ranges from slight elongation of the commissure to a stomal opening that approaches the auditory canal, but from the side to the oral corner is more common.^{4,5}

Many people have had good results in repairing the transverse facial cleft and gone on to study them in more detail. Such papers have focused mainly on localising the new commissure, and reconstructing the orbicular oris muscles. However, papers about correction of the shape of the commissure are less common, because it is difficult to reconstruct as a result of its unique and delicate anatomical structure.

We have noted that the normal commissure is not a simple connection of the upper and lower lip, but a smooth triangular area that consists of segments in line. The patients who we have operated on had the operation at about the age of six months, and are followed up for a year. During the operation, we design composite vermilion flaps to construct an oral commissure, reconstruct the muscle by overlapping and joining it, and put in a skin suture with a small S-plasty along the nasolabial fold. The anthropometric measurement of 3-dimensional images was used to evaluate the symmetry of the commissure after repair, and showed that we had obtained anatomically reasonable results with this technique. Here we

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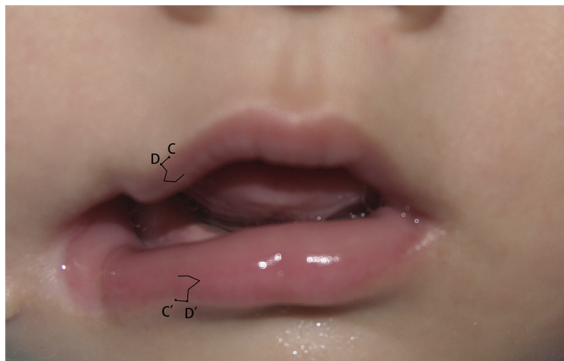


Fig. 1. Design of the new commissure and the composite vermilion flaps.

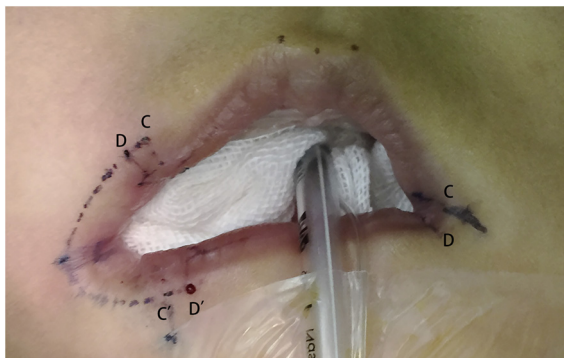


Fig. 2. Markings for repair of a unilateral transverse facial cleft.

describe the anatomy of the trigone of the commissure, and its reconstruction.

Patients and methods

Between 2013 and 2016 we studied 17 patients with unilateral transverse facial clefts, who had been operated on by the corresponding author (JL). There were eight boys and nine girls, mean (range) age 6 (4–12) months. Seven had a cleft of the right lip and 10 of the left lip, and the extent of the clefts varied from 5–20 mm long. No patient had a family history of congenital facial deformities, or a history of prenatal exposure to radiation or teratogenic drugs.

Surgical technique

The unilateral transverse facial cleft is repaired using composite vermilion flaps to construct the commissure. Under general anaesthesia, the points of the new commissure, C and C', are established by reference to the distance from the commissure on the normal side to the midpoint of the Cupid's bow (Figs. 1 and 2). The reconstructed commissure is positioned 3–4 mm medially to provide balance for postoperative retraction of the scar and the reconstructed position of the commissure. The composite vermilion flaps, which involve the triangular flaps, are designed to avoid a suture scar at the

point of the commissure. The horizontal incision lines along the vermilion-cutaneous junction are drawn from the points C and C' to meet at points D and D'. The lines from D and D' are drawn to meet the base of the triangular flaps.

After injection of epinephrine-saline solution (1:200,000), we make the horizontal and perpendicular incisions. They allow the postoperative suture to be separated from the new commissure, and contribute to closure of the skin without tension. The vermilion flap is then dissected from the surface of the orbicularis oris muscle, which is fully exposed and cut off transversely at 4–5 mm. The zygomatic major and risorius muscles, respectively, are separated and released. After dissection, the muscle bundles are overlapped, with the superior muscle bundle placed over the inferior bundle, to restore the ring structure of the orbicularis oris muscle and imitate the normal modiolus of the oral commissure. In the area of the commissure, the zygomatic major and risorius muscle are sutured to the orbicularis oris muscle ring at a certain tension to restore the normal attachment. The vermilion flap on the upper lip is rotated to the lower lip, and then C and C', D and D' are sutured to each other in the same layer to reconstruct the trigone of the commissure. After the new commissure has been sutured, a small S-plasty is made lateral to the nasolabial fold to close the cutaneous sutures.

Anthropometry and statistical analysis

Three-dimensional images were taken by the 3dMD photogrammetric system (3DMD LLC), and anthropometric measurements made from the 3-dimensional images. The line segment that connects the commissure and other facial landmarks, the length of the commissure, and the corner of the commissure, were measured on the 3dMD facial photographs (Fig. 3). The significance of differences between the means was calculated using the paired samples *t* test with the aid of IBM SPSS Statistics for Windows (version 21, IBM Corp). Oral symmetry was assessed by comparing the morphological data of the cleft side with that of the non-cleft side.

Results

Seventeen patients with unilateral transverse facial clefts were followed up for 1–3 years, after a symmetrical oral commissure had been reconstructed in all cases. There were no contraction deformities or downward and lateral migration of the commissure at rest (Figs. 4 and 5), and no limitation of mouth opening during smiling or whistling. Anthropometric data were measured one year postoperatively. Six measurements were made to reflect the symmetry of the commissure on the 3-dimensional image: labiale superius to the commissure; the tip of the Cupid's bow to the commissure; subalare to the commissure; endocanthi to the commissure; length of the commissure; and corner of the commissure. The results of the *t* test showed that there were no significant differences in

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