

Correction of labial tubercle defect in repaired bilateral cleft lips using bilateral vermilion musculomucosal sliding flaps

Case series

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Abstract

Rationale: Insignificant, asymmetrical or lack of labial tubercle often occurs after cleft lip surgery due to improper treatment of vermilion tissue. Especially in the cases of bilateral cleft lip, because of short front lip and insufficient vermilion tissue, the median vermilion depression often occurs after surgery, forming a “whistling” deformity. The object of this study is to verify the outcomes of patients with median labial tubercle defects after treatment with bilateral vermilion musculomucosal sliding flaps (VMSF).

Patient concerns: Six patients with median labial tubercle defect after bilateral cleft lip repair from March 2015 to May 2017 were enrolled in our department and subjected to bilateral lip deformity correction under general anesthesia.

Diagnoses: Secondary deformity of bilateral cleft lip forming a “whistling” deformity were diagnosed in all the patients.

Interventions: Bilateral VMSF were designed and used to reconstruct the median labial tubercles by sliding downward so as to eliminate the whistling deformity.

Outcomes: During the 10 to 37 months of follow-up, the reconstructed vermilion tubercles had stable morphology showing no whistling deformity and the overall lip shapes were satisfactory.

Lessons: Reconstructing MVTD and eliminating whistling deformity using the scar tissues that need to be removed previously on the vermilion musculomucosa has achieved stable and satisfactory results and is worthy of clinical application.

Abbreviation: VMSF = vermilion musculomucosal sliding flaps.

Keywords: bilateral vermilion musculomucosal sliding flaps, median vermilion tubercle defect, whistling deformity

1. Introduction

Insignificant, asymmetrical or lack of labial tubercle often occurs after cleft lip surgery due to improper treatment of vermilion tissue. Especially in the cases of bilateral cleft lip, because of short front lip and insufficient vermilion tissue, the median vermilion depression often occurs after surgery, forming a “whistling”

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deformity. Absence of labial tubercle, Cupid's bow and Cupid's bow peak in the upper lip, as well as Cupid's concave are often accompanied with the exposure of the upper anterior crown or even the anterior crown and gums. The second-stage labiaplasty of vermilion of the lip after bilateral cleft lip surgery is more complicated than that of the unilateral cleft lip surgery.^[1–5] Due to the special position of the labial tubercle, its shape and fullness are essential for the overall repair effect. In recent years, we have explored a suitable, simple and practical method for commonly seen labial tubercle defect or “whistling” deformity of vermilion of the lip after bilateral cleft lip surgery, and achieved satisfactory results. In this study, we want to verify the aesthetics effects of outcomes of median labial tubercle by bilateral vermilion musculomucosal sliding flaps (VMSF).

2. Patients and methods

2.1. Clinical data

The retrospective study was approved by the Ethics Committee of Shanghai Jiaotong University School of Medicine. All patients signed the informed consent form. Patient's medical records were anonymous. Informed written consent was obtained from the patients for publication of their case details and accompanying images. We collected data of 6 patients with grade II labial tubercle defect^[10] after bilateral cleft lip surgery from March 2015 to May 2017 in our department. Among them, 3 were males and 3 were females at ages of 7 to 28 years old with median of 13 and average of 15.

2.2. Surgical methods

Under general anesthesia, bilateral lip deformity correction plus labial tubercle reconstruction was performed. During the operation, bilateral lip mucosa sliding flap was designed under pedicle and slid down to reconstruct the labial tubercle. The bilateral orbicularis was repositioned and sutured together with overlap so as to achieve the purpose of re-engineering the labial tubercle and eliminating the “whistling” deformity (Fig. 1).

2.2.1. Incision and separation. All surgeries were performed by Dr Yang, who has more than 20 years experiences in cleft lip repair. This was a single center study. The incision was made as shown in Figure 1 (A, B). In detail,

- 1) cut the skin at the front lip,
- 2) turn the anterior lip skin flap under the skin upwards,
- 3) dissect and retain the anterior lip muscle,
- 4) retain the anterior lip mucosa tissue for reconstructing labial tubercle,
- 5) remove scar tissue from the upper lip skin,
- 6) cut the skin of the lateral lip, and
- 7) design a rectangular mucosal flap with bilateral orbicularis muscle fibers inside under the pedicle at the vermilion of the lateral lip, forming a complete lip mucosal muscle flap in the lateral lip for reconstructing lip tubercle.

2.2.2. Suturing and reconstruction.

- 1) Reconstruct the orbicularis muscle based on the muscle function rectification,
- 2) slide the lip mucosal muscle fibers of both sides of the lip downward and suture them together with overlap, and
- 3) suture the corresponding muscle layers in the anterior lip mucosa to rebuild the labial tubercle with full morphology.

All patients were given antibiotics for 3 to 5 days after operation. At day 7 of post-operation, the sutures were removed. The parameters used to assess the “success” or “satisfactory” level was subjective satisfaction of the patients and their families.

3. Results

All 6 patients were healed by first intention. The morphology was significantly improved after surgery. The shape of labial tubercles was full and realistic. At follow-up of 10 to 37 months with average of 24 months, the postoperative recovery was good and the patients and their families were satisfied with the results (Figs. 2 and 3) based on preoperative and postoperative photos.

4. Discussion

Due to its excessive tissue defects, especially mid anterior lip defect, patients with congenital bilateral cleft lip often have

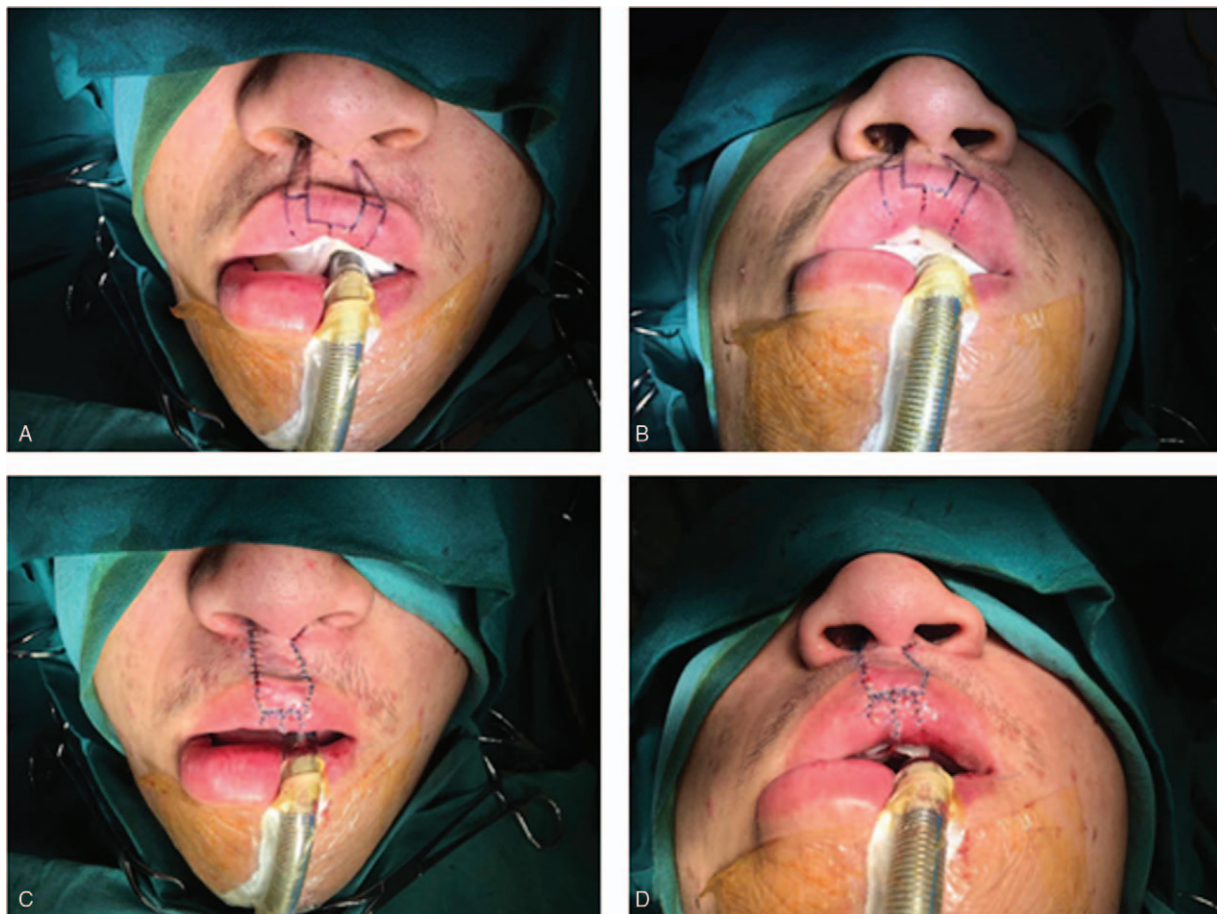


Figure 1. Incision design and postoperation picture. A. Incision design on frontal view; B. Incision design on submental view; C. Postoperation picture on frontal view; D. Postoperation picture on submental view.



Figure 2. One month after operation.



Figure 3. Nine months after operation.

depression in the mid-upper lip and missing labial tubercle. The labial tubercle is important for the aesthetic form of the lip vermilion. Missing labial tubercle results in loss of the beauty of the lip.^[6,7] In some severe cases, it can also lead to lip incompetence or “whistling” deformity, affecting lip beauty, pronouncing and other functions.^[8] The characteristics of secondary malformation after bilateral cleft lip surgery are related to the severity of cleft lip and the first surgical method.^[9]

According to Yan et al,^[10] “whistling” deformity can be divided into 4 grades. Grade I is defined as the exposure of half-crown of No.11 and No.21 teeth; Grade II is defined as exposure of the entire crown of the No.11 and No.21 teeth with or without exposure of $\frac{1}{2}$ to $\frac{2}{3}$ of near-middle longitudinal crown of No.12 and No.22 teeth; Grade III is defined as exposure of the entire crown of No.11 and No.21 teeth and $\frac{1}{2}$ of their attached gum or exposure of $>\frac{2}{3}$ crown of No.12 and No.22 teeth; Grade IV is defined as exposure of the entire crown of No.11 and No.21 teeth and their attached gum, or exposure of near-middle longitudinal crown of No.12 and No.22 teeth. Deformities of each grade were repaired with corresponding suitable methods including double muscular complex flap repair, V–Y advanced flap repair,

Table 1

Comparison of the characteristics of flap designs.

	Tissue	Blood supply	Scar	Relapse
Double muscular complex flap	Little	Good	Little	Not easy
V–Y advanced flap	Little	Good	Little	Easy
Double “Z” flap	Enough	Good	Obvious	Not easy
Abbe flap	Enough	Bad	Large	Not easy
Our method	Enough	Good	Little	Not easy

double “Z” flap repair, and the Abbe flap for lower lip reconstruction, and so on.

Double muscular complex flap repair, V–Y advanced flap repair, double “Z” flap repair and Abbe flap repair can be used in treatment for Grade 2 deformity. Double muscular complex flap repair has characteristics of little tissue, good blood supply, little scar, and not easy to relapse. V–Y advanced flap repair has characteristics of little tissue (mucosal repair only), good blood supply, little scar, and easy to relapse. Double “Z” flap repair has characteristics of enough tissue, good blood supply, large scar, and not easy to relapse. The Abbe flap for lower lip reconstruction has characteristics of enough tissue, bad blood supply, little scar and not easy to relapse, and requires 2 weeks of lip bracing (Table 1).

We have reconstructed the 3-dimensional structure of the labial tubercle by re-using the lip vermilion mucosal tissue that needs to be resected and by reducing the orbicularis oris muscle function method and sliding down vermilion musculomucosal flap. The method is more capable than the double-sided sacral iliac muscle flap and able to reconstruct the 3-dimension and fullness of the labial tubercle and solve the mild to moderate “whistling” deformity (Grades I–III). In addition, the method has a wide range of applications. As illustrated in Figure 1, the method is easy to understand and there is no need to worry about blood supply. The “cat ear” deformity can be formed in the flap pedicle division if surgical technician was inexperienced.

Vermilion is rich in blood supply. Thus, designed muscle mucosa flap can be free from the limitation of length and width, which provides a good guarantee for the surgical effect. The incision we designed is mostly located in the non-keratinized mucosa area of the lip. The postoperative scar is concealed and the repair effect is satisfactory.

Author contributions

Yun Liang, MS, wrote the paper. Yusheng Yang, PhD, is the corresponding author and performed the surgeries. Yilai Wu, PhD, collected the data. All authors have read and approved the final manuscript.

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