Journal of Plastic, Reconstructive & Aesthetic Surgery 115 (2026) 123–129

Two-staged tubercle plasty using a banked prolabial vermilion island flap for bilateral cleft lip

Kazuhiro Tsunekawa *, **Fumio Nagai**, **Kiichiro Yaguchi**, **Shunsuke Yuzuriha**

Department of Plastic and Reconstructive Surgery, Shinshu University School of Medicine, 3-1-1 Asahi, Matsumoto, Nagano 390-8621, Japan

Received 30 October 2025; Accepted 11 February 2026

KEYWORDS
Cleft lip;
Esthetics;
Lip deformities;
Reconstructive surgical procedures;
Surgical flaps;
Two-staged tubercle reconstruction

Summary *Background:* We evaluated the effectiveness of a novel two-staged tubercle plasty method utilizing banked vermilion tissue of the prolabium to reconstruct a natural and esthetically pleasing median tubercle in patients with bilateral cleft lip.
Methods: A retrospective observational study was conducted on 20 patients (13 boys and 7 girls) with bilateral cleft lip who underwent primary cheiloplasty with oral-side banking of the prolabial vermilion at our institution between 2009 and 2024. At preschool age (5–6 years), a second-stage tubercle plasty was performed in conjunction with secondary alveolar bone grafting. Anthropometric measurements (philtral height, vermilion height of the upper lip, and total labial height) were assessed pre- and postoperatively and compared with age-matched normal controls. The morphology of the upper lip and degree of wet vermilion exposure were evaluated on a four-point scale (excellent, good, fair, and poor) before and after the revision surgery.
Results: All patients underwent successful procedures without complications. The vermilion and total labial heights were significantly increased (both p=0.031), while philtral height remained unchanged. At 6–131 months of follow-up, lip morphology was significantly improved (p=0.021) and wet vermilion exposure was reduced (p=0.008).
Conclusion: Two-staged tubercle plasty using banked vermilion tissue of the prolabium is an effective technique for correcting an upward convex deformity of the upper lip in patients with bilateral cleft lip. This method preserves native lip tissue during the primary repair and allows for natural median tubercle construction at a later stage. Additional studies with larger cohorts and long-term follow-up are warranted to validate these findings.
© 2026 The Authors. Published by Elsevier Ltd on behalf of British Association of Plastic, Reconstructive and Aesthetic Surgeons. This is an open access article under the CC BY license (http://creativecommons.org/licenses/by/4.0/).

* Correspondence to: 3-1-1 Asahi, Matsumoto, Nagano 390-8621, Japan.
E-mail address: tsune@shinshu-u.ac.jp (K. Tsunekawa).

https://doi.org/10.1016/j.bjps.2026.02.022
1748-6815/© 2026 The Authors. Published by Elsevier Ltd on behalf of British Association of Plastic, Reconstructive and Aesthetic Surgeons. This is an open access article under the CC BY license (http://creativecommons.org/licenses/by/4.0/).

Patients with bilateral cleft lip often exhibit an upward convex appearance of the upper lip due to a tiny or no median tubercle after primary repair. Insufficient elongation, volume, anatomical repositioning, or combinations of these insufficiencies in primary cheiloplasty are thought to reduce the volume of the central lip, including the median tubercle, leading to the whistling deformity in patients with severe bilateral cleft lip.[1-3]

Various surgical procedures have been presented for revising the whistling deformity,[1-16] with most studies reporting satisfactory to excellent results. However, the choice of procedure is subjective and largely depends on the degree of the deformity and usable tissue available for repair in afflicted patients.[5,17]

At the primary repair for bilateral cleft lip, the prolabium is divided into the philtrum flap, which is composed of the skin, and the central vermilion mucosa flap containing dry vermilion and wet mucous tissue. The central vermilion mucosa flap is used to reconstruct the gingivobuccal sulcus, and the distal end of this flap is interposed between the bilateral lip elements on the oral cavity side. Although the viability of a prolabial vermilion mucosa flap remains unknown, it may be of use for subsequent construction of the median tubercle. We evaluated the effectiveness of a novel two-staged vermilion plasty method that could not only improve the whistling deformity, but also create a median tubercle containing the dry vermilion using the vermilion tissue of the prolabium banked on the oral side.

Methods

This retrospective observational study to evaluate the effectiveness of two-staged vermilion plasty to revise the whistling deformity and produce a median tubercle in patients with bilateral cleft lip was performed at a single center between 2009 and 2024. All surgeries were performed by a single surgeon. The inclusion criteria comprised symmetrical bilateral cleft lip with complete, incomplete, or asymmetrical bilateral cleft lip in preschool patients (5-6 years) with banked vermilion of the prolabium. The exclusion criteria included the presence of mini/minor/mini-micro form type, primary cheiloplasty performed at a non-affiliated hospital, incomplete data, discontinuation of follow-up owing to relocation, associated syndromes, and cases in which revision of the upper lip tubercle was deemed unnecessary at 5 years of age. A total of 49 consecutive Japanese patients with bilateral cleft lip who underwent primary cheiloplasty at Shinshu University hospital or its affiliated hospitals were initially screened, with 20 patients meeting the inclusion criteria for final analysis.

Surgical techniques

In our two-staged tubercle plasty method, the patient undergoes the primary repair at 3-5 months of age without presurgical orthopedic manipulation of the premaxilla. Following the method reported by Mulliken,[18] the repair is performed on the nose and both sides of the lip simultaneously. With regard to the prolabial region, the biconcave prolabial flap between the Cupid's bow peaks is elevated, and the central vermilion mucosa flap including the central dry vermilion is dissected after excising the white lip (Figure 1a, b). The widespread and flat nose is repaired with advancement of the lateral crus and orbicularis oris to both lateral labialis segments, which are then sutured together. The lateral lip elements are sutured together to make the upper vermilion without trimming, and the mucosal portions of the lateral lip elements are sutured to the central vermilion flap in a Y-shaped configuration to reconstruct the lip mucosa and gingivobuccal sulcus. The distal end of the central vermilion flap originates from the dry vermilion and serves as the banked prolabium vermilion (Figure 1c, d). Notably, this segment corresponds to the portion that is excised in the Mulliken's technique.

The second operation is planned to combine secondary alveolar bone grafting for cleft alveolus at a preschool age. The positions of the banked prolabium vermilion and mucosal vermilion are each moved to the opposite side (Figure 1e, f). The island flap size depends on the banked dry vermilion area, which originates from the vermilion tissue of the prolabium. The island flap with the banked prolabial vermilion is elevated and moved outward to make a full median tubercle. On the other side, the bipedicle flap with the arch-shaped mucosal vermilion flap is elevated and simultaneously moved toward the oral side (Figure 1g).

Anthropometric analysis

First, the demographic data, flap size, and postoperative complications were recorded. Next, we analyzed the results of facial measurements and compared them between pre- and post-operative time points, in addition to those of 6-year-old Japanese children without lip deformities. We obtained the following 3 anthropometric measurements: philtral height (i.e., distance between subnasale [sn] and labrale superius [ls]), vermilion height of the upper-lip (i.e., distance between ls and stomion [sto]), and total labial height (i.e., distance between sn and sto)[19] via direct surface measurements using an electronic digital ruler.

Four-point Likert scale analysis

The morphology of the upper lip and extent of wet vermilion exposure were then assessed using a four-point scale (4: excellent, 3: good, 2: fair, or 1: poor) using photographs obtained immediately prior to revision surgery and at the outpatient follow-up at least 6 months later. In patients who were followed for at least 5 years after the revision surgery using our method, the morphology of the upper lip and degree of wet vermilion exposure were evaluated at 3 time points (before revision surgery, short-term after revision surgery [$\leq$24 months], and long-term after revision surgery [$\geq$60 months]) using the same Likert scale. Measurements were independently performed by 7 evaluators who were not involved in the treatments. To minimize assessment bias, the evaluators assessed standardized photographs of patients without any knowledge on whether the images were taken before or after the revision surgery.

Statistical analysis

Data presented as the mean or median were compared using the paired or unpaired *t*-tests, Friedman's test, and

Wilcoxon's test with Bonferroni correction, as appropriate. Statistical significance was set at a p-value < 0.05. All statistical analyses were performed using IBM SPSS version 29.0 software (IBM Corp., NY).

This study was reviewed and approved by the committee for medical ethics of Shinshu University School of Medicine institutional review board (no. 6570). The manuscript was checked against the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist (Supplemental Appendix).

Results

Among the 49 patients with bilateral cleft lip initially screened during the study period, 11 had incomplete data, 8 discontinued follow-up owing to relocation, 7 were deemed not to require revision, and 3 had associated syndromes. After applying these exclusion criteria, 20 patients (13 boys and 7 girls) satisfied the inclusion criteria and were analyzed in this study. The background characteristics of the cohort are shown in Table 1. Bilateral cleft lip type was 7 complete, 8 incomplete, and 5 asymmetric with incomplete. The cohort included 19 cleft alveolus and 16 cleft palate cases. At the time of the secondary repair, mean age was 65.0 ± 4.8 months (range: 52–72 months). The longest follow-up period after the revision surgery was 131 months. All cases underwent reversal of the position between the bipedicle and island flap. The mean size of the island flap was $11.1 \times 5.0\ mm^2$. No major complications such as flap necrosis, wound infection, or wound dehiscence were observed in any case. As minor complications, 2 cases showed insufficient volume of the reconstructed median tubercle. A trap door deformity after the revision surgery was observed in 5 cases in the early postoperative period, among them 4 cases had sufficient long-term follow-up $\geq$60 months. Among these, 3 cases improved spontaneously and

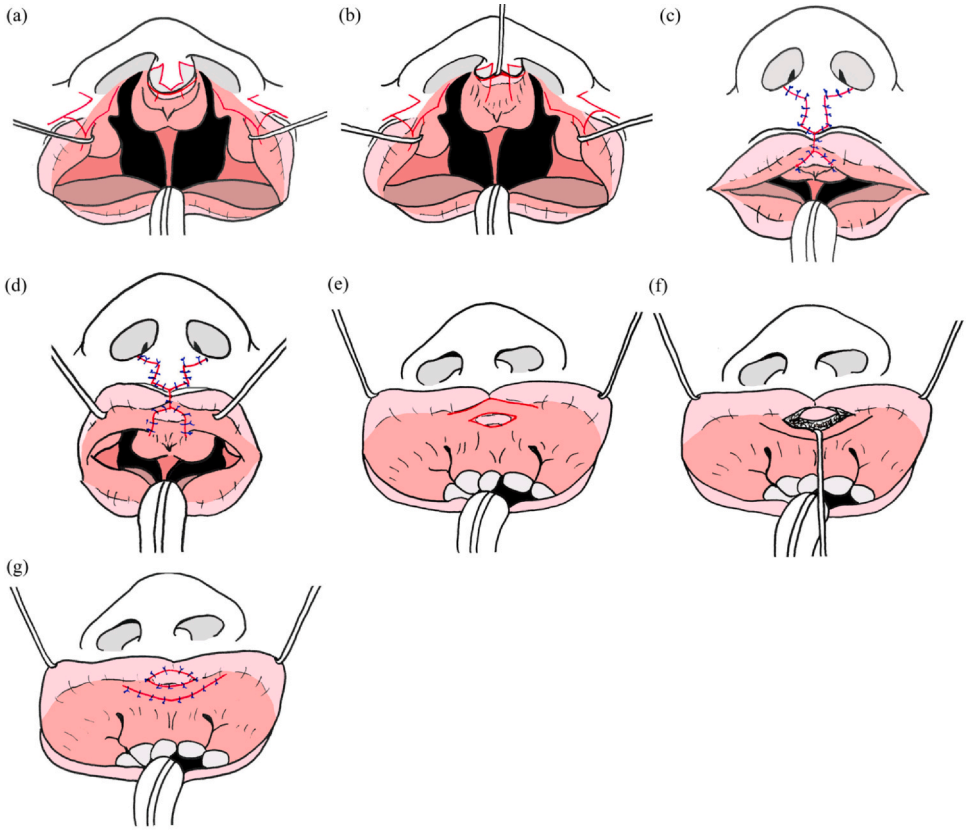

Figure 1 Strategy of two-staged tubercle plasty for bilateral cleft lip from primary repair to secondary repair. The light pink area represents the dry vermilion, whereas the dark pink area represents the wet vermilion, oral mucosa, and gingiva. (a). Surgical design of the primary repair of bilateral cleft lip in the worm's-eye view during surgery. The red line indicates the planned incision line. Following Mulliken's method, a prolabium flap is designed to make a philtrum. The central vermilion flap is advanced intraorally to reconstruct the gingivobuccal sulcus. Both lateral lip elements are advanced to construct the upper lip. (b). A skin hook is placed on the philtrum, and the tip of the central vermilion flap includes the dry vermilion (light pink). (c). At the end of the primary repair, the dry vermilion tissue of the prolabium is set on the inside of the upper lip (arrowhead). (d). A skin hook is placed on the upper lip to indicate the oral mucosa. The central vermilion flap is used to reconstruct the gingivobuccal sulcus, and the dry vermilion portion at its tip is banked inside the oral cavity. (e). Surgical design of the secondary repair. The bipedicle flap (arrow) is set on the wet vermilion area, which is located on the outside. The island flap (arrowhead) is set on the banked vermilion tissue, which is located on the inside. (f). The island flap (arrowhead) is moved forward, and the bipedicle flap (arrow) is moved backward. (g). The island flap covered with dry vermilion is located on the outside, and the bipedicle flap covered with wet vermilion is located on the inside.

Table 1 Patient information, follow-up duration, and flap size.

	Total cohort	Long-term cohort
Patient enrollment (n)	20	8
Male	13	6
Female	7	2
Type of bilateral cleft lip (n)		
Complete	7	2
Incomplete	8	5
Complete with contralateral incomplete	5	1
Cleft alveolus	19	8
Cleft palate	16	5
Age at time of surgery (months)		
Primary repair (mean ± SD)	3.7 ± 1.8	3.0 ± 0.8
Secondary repair (mean ± SD)	65.0 ± 4.8	64 ± 6.2
Time of postoperative evaluation after secondary repair (months)		
Mean ± SD	25.5 ± 36.8	81.9 ± 8.7
Minimum - maximum	6-131	69-97
Size of island flap (mm)		
Width (mean ± SD)	11.1 ± 2.3	11.6 ± 2.4
Height (mean ± SD)	5.0 ± 0.9	5.8 ± 0.7

SD, standard deviation.

1 deformity persisted, with possible future revision surgery. The remaining trap door deformity case lacked sufficient long-term follow-up and has remained under observation.

The results of the anthropometric measurements are shown in Table 2. Post-surgery philtrum height (sn-ls) was identical to the preoperative value (12.5 ± 1.6 mm). In contrast, the vermilion height of the upper-lip (ls-sto) and total labial height (sn-sto) post-surgery were significantly longer than preoperative height (both p=0.031). No significant difference in philtrum height (sn-ls) was noted between patients with cleft lip and normal controls (p=0.053). However, the vermilion height of the upper lip and total labial height were significantly greater in the cleft lip group before and post-surgery (both $p < 0.001$).

The morphological evaluation findings are summarized in Table 3. Upper lip morphology was assessed to evaluate the degree of natural appearance. After revision surgery, median naturality scores in the total cohort were significantly higher than those beforehand (3 vs. 2.5, p=0.021). Median post-revision surgery scores for the degree of wet vermilion exposure were also significantly higher (3 vs. 2, p=0.008). Ten individuals were followed-up for at least 5 years after revision surgery. Among these, 8 had evaluable photographs at 3 points: before the revision surgery, at ≤24 months (mean: 10.0 months [range: 5-21 months]) after the revision surgery, and ≥60 months (mean: 81.9 months [range: 69-97 months]) after the revision surgery. In this long-term cohort, the naturality of upper lip morphology improved from 3 pre-revision to 3.5 in the short-term post-revision period, but returned to 3 in the long-term post-revision period. In contrast, wet vermilion exposure improved from 2 pre-revision to 3 in the short- and long-term post-revision periods. Although the Friedman test indicated a significant difference among time points for both parameters (both $p < 0.05$), the Wilcoxon signed-rank test with Bonferroni correction revealed no significant differences for any pairwise comparison for either parameter.

Representative cases

Case 1

A 64-month-old girl with bilateral cleft lip and alveolar cleft underwent two-staged tubercle plasty (Figure 2a). Flap size was 13 mm (width)×5 mm (height). Her median tubercle esthetics improved and were maintained at 131 months after the procedure (Figure 2b).

Case 4

A 59-month-old boy with bilateral cleft lip and alveolar cleft underwent two-staged tubercle plasty (Figure 3a). Flap size

Table 2 Anthropometric measurements.

	Before second repair (mm)	After second repair (mm)	Normal group (mm)	p-value (before vs. after)	p-value (after vs. normal)
Philtral height (sn-ls)	12.5 ± 1.6	12.5 ± 1.6	11.8 ± 1.8	-	0.053
Vermilion height of the upper lip (ls-sto)	9.5 ± 1.6	10.4 ± 1.3	6.7 ± 1.3	0.031	< 0.001
Total labial height (sn-sto)	22.0 ± 2.1	22.9 ± 1.9	18.5 ± 2.0	0.031	< 0.001

Values are presented as the mean ± standard deviation.
sn, subnasale; ls, labrale superius; sto, stomion.

Table 3 Morphological evaluations.

All cohort (n=20)		Median
Naturality	**Pre-revision**	2.5
	Post-revision	3
Exposure of wet lip	**Pre-revision**	2
	Post-revision	3
Long-term cohort (n=8)		
Naturality	**Pre-revision**	3
	Post-revision (short-term)	3.5
	Post-revision (long-term)	3
Exposure of wet lip	**Pre-revision**	2
	Post-revision (short-term)	3
	Post-revision (long-term)	3

Values are presented as the median.

was 16 mm (width)×6 mm (height). His upper lip shape, including the tubercle, was markedly improved at 5 months postoperatively (Figure 3b). At 78 months postoperatively, the median tubercle had become smaller in terms of overall balance, yet the patient maintained a natural upper lip contour without wet vermilion exposure (Figure 3c).

Discussion

During the primary repair for bilateral cleft lip, we had excised a part of the prolabium and set the rest of the prolabium vermilion on the oral side following Mulliken's method.[18] However, patients with bilateral cleft lip and a soft tissue deficiency in the median tubercle and central vermilion harbor higher risk of an upward convex shape in the upper lip, requiring reconstruction with a new donor site. Therefore, we have recently started preserving all of the tissue in the central vermilion flap to construct a full tubercle later. This novel two-staged vermilion plasty

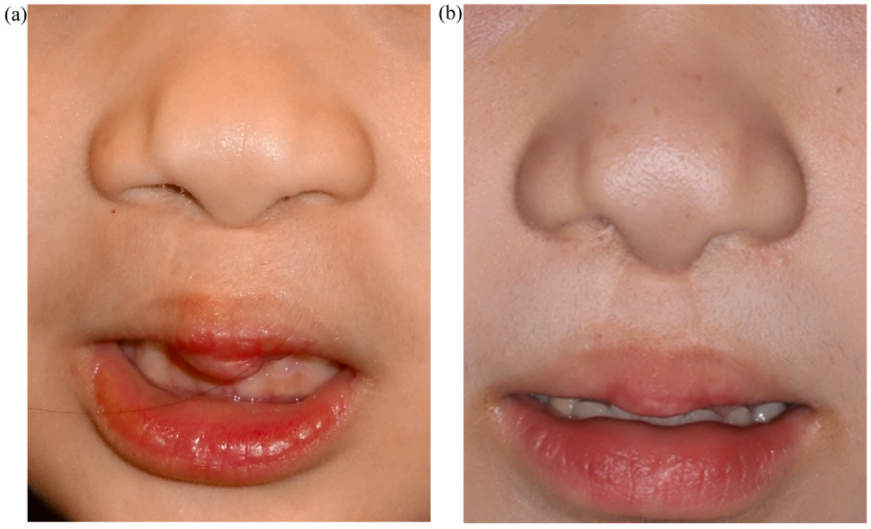

Figure 2 Case 1 presentation. (a). A 64-month-old girl exhibited a bulky tubercle before the second repair. (b). A well-balanced upper lip tubercle is maintained at 131 months after the second repair.

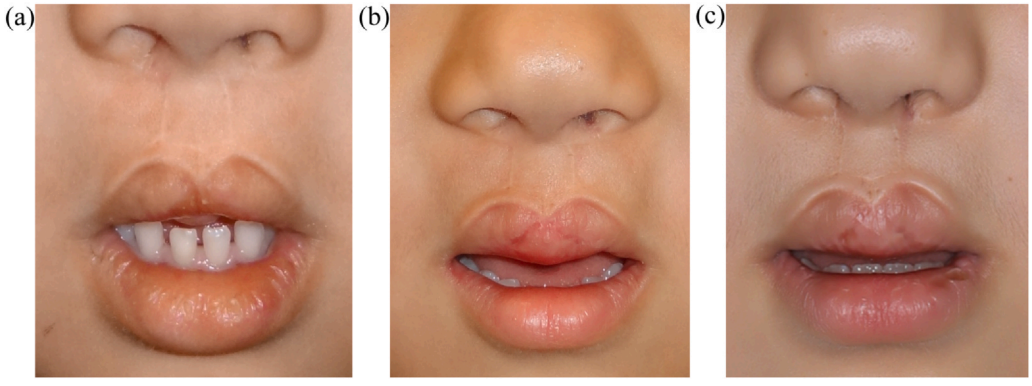

Figure 3 Case 4 presentation. (a). A 59-month-old boy exhibited no median tubercle before the second repair. (b). Sufficient volume of the median tubercle is reconstructed using a banked vermilion flap 5 months after the second repair. (c). The reconstructed tubercle has shrunk somewhat, but maintains a well-balanced volume at 78 months after the second repair.

enhances vermilion and total labial heights while improving lip esthetics.

Several studies have described techniques to repair the whistling deformity, including complete lip revision with orbicularis oris realignment,[1,4,10] Z-plasty,[13] V-Y plasty,[6] transposition flap,[14,15] Kapetansky flap,[11,12] Abbe flap,[20] and cross-lip vermilion flap.[8] When the original tissue volume is significantly deficient, revision surgery involving tissue grafting from an area other than the upper lip may be necessary. In case of flap surgery using tissue from the upper lip, tissue is added to the central area, which differs from methods that increase tissue volume more generally across the entire area. Although there is no clear definition of the whistling deformity, we consider the upward-convex lip deformity and wet vermilion exposure presented in our cases to be a mild form of this condition. In this study, the indication for secondary tubercle plasty was defined as a mild form of the whistling deformity, characterized by (1) an upward convex contour of the upper lip owing to insufficient median tubercle volume, and (2) visible wet vermilion exposure on frontal view at rest. This procedure was not indicated for cases with severe whistling deformity, for which tissue transfer from other donor sites was deemed necessary. Our method involves switching the island flap (dry vermilion) and bipedicle flap (wet vermilion), which results in a more natural lip appearance.

Preserving all of the prolabial vermilion during the primary repair facilitates later construction of a natural, full median tubercle. The original vermilion tissue on the prolabium that could sufficiently contribute to making the median tubercle should not be abandoned as red glabrous keratinized tissue is unique to the vermilion and is not found elsewhere in the body.

In this study, the dry vermilion tissue of the prolabium was preserved, banked orally during the primary repair, and used in a second-stage island flap to recreate the median tubercle. This approach enables the prolabial vermilion to be used effectively, facilitating restoration of a natural upper lip contour with sufficient volume. Our results showed that although the overall philtrum length remained stable, this novel approach contributed to improved lip esthetics without major complications. The average island flap size in this study was $10\times5\,mm^2$, indicating the suitability of this technique for correcting mild forms of the whistling deformity. Other indications include cases in which the wet vermilion is exposed after primary cheiloplasty, and cases where the banked dry vermilion tissue of the prolabium has grown sufficiently large to construct an island flap. The significant enhancement in morphological naturality of the upper lip and degree of wet vermilion exposure also demonstrated the effectiveness of the two-staged vermilion plasty in correcting mild forms of the whistling deformity.

A known drawback of the island flap is the trapdoor deformity, which presents as a central outward bulge of tissue owing to the concentric retraction of a curved scar peripherally.[21] In this study, the trapdoor deformity was observed in 5 of 20 cases, although 3 of these improved spontaneously over the long term. When a significant deformity persists, revision surgeries such as Z-plasty should be considered.

The main limitation of this method is that the outcome varies depending on the original vermilion size. When the original vermilion is insufficient in volume, achieving an adequately sized tubercle becomes challenging. Furthermore, cleft alveolus was also present in 19 of 20 patients in this study, facilitating simultaneous lip revision at the preschool age when secondary alveolar bone grafting was performed. However, in patients without cleft alveolus, the need for an additional surgery becomes a disadvantage. For cases in which the median tubercle already has sufficient volume and/or the wet vermilion is not prominent from the frontal view, this procedure is not performed, and the banked prolabial vermilion tissue is left in place. If the median tubercle becomes excessively voluminous with growth, debulking is performed as needed at the time of alveolar bone grafting or other revision surgery. The appearance of bulky lips or a drooping tubercle before revision surgery may be considered an esthetic drawback as well.

Unlike secondary vermilion advancement procedures that redistribute existing lateral lip tissue, this technique preserves native prolabial dry vermilion during infancy for later use. Alternately, the main difference between the Mulliken technique[18] and our approach in the primary cheiloplasty lies in whether the portion of the central vermilion flap corresponding to the dry vermilion is excised (Mulliken's) or banked (ours) on the oral mucosal side. This preliminary study does not compare our technique with secondary tubercle reconstruction procedures (e.g., V-Y advancement and Abbe flap) performed after cheiloplasty in the Mulliken method, and thus a direct comparison between established methods and our novel technique cannot be made. Nevertheless, preserving the dry vermilion within the central vermilion flap instead of excising it at the time of cheiloplasty may facilitate sufficient tubercle volume and enable the entire lip surface to be reconstructed with dry vermilion, which we consider to be a useful approach.

Limitations

The limitations of this study include the small number of cases and unknown long-term outcomes, both of which require addressing in future validation studies. In addition, the small long-term follow-up cohort (n=8) represents a small exploratory subgroup, which may limit the durability findings.

Conclusion

We demonstrated the feasibility, safety, and effectiveness of a two-staged tubercle plasty method using banked prolabial vermilion tissue in patients with bilateral cleft lip. By preserving the prolabial vermilion during primary repair, a natural and esthetically pleasing upper lip including the median tubercle can be reconstructed without the need for tissue grafts from other donor sites. This technique improves upper lip contour and enhances the vermilion. Although the results are promising, further studies with comparisons to the established techniques, larger cohorts,

and long-term follow-up are necessary to fully validate the benefits and durability of this approach.

Ethics

Institutional review board approval was obtained at Shinshu University School of Medicine (no. 6570).

Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

Declaration of Competing Interest

The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Acknowledgements

The authors thank Trevor Ralph for his English editorial assistance.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.bjps.2026.02.022.

References

1. Kai S, Ohishi M. Secondary correction of the cleft lip and nose deformity; a new technique for revision of whistling deformity. *Cleft Palate J* 1985;**22**:290–5.
2. Reddy GS, Webb RM, Reddy RR, Reddy LV, Thomas P, Markus AF. Choice of incision for primary repair of unilateral complete cleft lip: a comparative study of outcomes in 796 patients. *Plast Reconstr Surg* 2008;**121**:932–40.
3. Assuncao AG, Ferreira LM, Mondelli RL. Bilateral cleft lip and whistling deformity: the X flap procedure for its correction. *Plast Reconstr Surg* 2006;**117**:1986–91.
4. Meijer R. Secondary repair of the bilateral cleft lip deformity. *Cleft Palate J* 1984;**21**:86–90.
5. Falguera-Uceda MI, Sanjuan-Sanjuan A, Dean-Ferrer A, Alamillos FJ, Heredero S. Modified lip revision surgery for the severe whistle lip deformity in bilateral cleft lip. *J Oral Maxillofac Surg* 2022;**80**(4):662–8. https://doi.org/10.1016/j.joms.2021.10.009.
6. Robinson DW, Ketchum LD, Masters FW. Double V-Y procedure for whistling deformity in repaired cleft lips. *Plast Reconstr Surg* 1970;**46**:241–4.
7. Kapetansky DI. Double pendulum flaps for whistling deformities in bilateral cleft lips. *Plast Reconstr Surg* 1971;**47**:321–3.
8. Wegner JD, Newman MH. Bipedicled axial cross-lip flap for correction of major vermilion deficiency after cleft lip repair. *Cleft Palate Craniofac J* 1994;**31**:148–51.
9. Grewal NS, Kawamoto HK, Kumar AR, Correa B, Desrosiers AE, Bradley JP. Correction of secondary cleft lip deformity: the whistle flap procedure. *Plast Reconstr Surg* 2009;**124**(4):1590–8.
10. Yin N, Feng G, Wang Y, Song T, Li H. Correction of secondary bilateral complete cleft lip and whistling deformities: the advance and rearrangement of the bilateral lip tissues. *Aesthet Plast Surg* 2011;**35**:750–5. (g).
11. Kiran G, Ramanojam S, Gadre PK, Shetty NK, Halli R, Singh A. Kapetansky-Juri technique to correct the whistlers lip in the multiple operated cleft patient. *Maxillofac Oral Surg* 2015;**14**(3):693–8.
12. Chung J, Lim J, Kim S, Koo Y. The reconstruction of the central tubercle in bilateral cleft lips: bilateral lateral mucosal advancement flap with reinforcement of the orbicularis oris muscle. *Ann Plast Surg* 2019;**83**(6):655–9.
13. Scheller K, Bolz J, Scheller C, Haase R. Objective evaluation of vertical Z-plasty with double transposition vermillion flaps for secondary whistling deformity correction: a method for uni- and bilateral correction. *J Craniomaxillofac Surg* 2019;**47**(10):1557–62.
14. Matsuo K, Fujiwara T, Hayashi R, Ishigaki Y, Hirose T. Bilateral lateral vermilion border transposition flaps to correct the "whistling lip" deformity. *Plast Reconstr Surg* 1993;**91**(5):930–5.
15. Yuzuriha S, Matsuo K, Fujita K. Lateral vermilion border transposition flap to correct vermilion deformities with unilateral or bilateral cleft lip. *J Plast Surg Hand Surg* 2013;**47**(2):118–22.
16. Notodihardjo SC, Kusumoto K. Reconstruction of whistling deformity using V-Y advancement flap after primary cleft lip repair. *J Surg Case Rep* 2021;**2021**(3):rjab026. https://doi.org/10.1093/jscr/rjab026.
17. Bhandari PS. An algorithmic approach to management of whistle deformity. *Ann Plast Surg* 2014;**72**(1):41–6.
18. Mulliken JB. Principles and techniques of bilateral complete cleft lip repair. *Plast Reconstr Surg* 1985;**75**(4):477–87.
19. Kanzaki H, Imai Y, Nakajyo T, et al. Midfacial changes through anterior maxillary distraction osteogenesis in patients with cleft lip and palate. *J Craniofac Surg* 2017;**28**(4):1057–62.
20. Holmström H. The Abbe island flap for the correction of whistle deformity. *Br J Plast Surg* 1987;**40**(2):176–80.
21. Koranda FC, Webster RC. Trapdoor effect in nasolabial flaps. Causes and corrections. *Arch Otolaryngol* 1985;**111**:421–4.