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Comparison of nasal symmetry in closed, semi-open and open tip rhinoplasty following primary cleft lip repair: Systematic review and meta analysis

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Abstract---Aim: The purpose of the present research was to assess the amount of nasal symmetry achieved through closed, semi-open, open tip rhinoplasty after primary cleft lip repair. Methodology: Protocol was registered on the PROSPERO register of systematic reviews. PRISMA-P guidelines for the conduct of systematic review were followed. Literature search was done in various databases. The inclusion criteria were patients with non-syndromic unilateral cleft lip undergoing rhinoplasty with primary cleft lip repair and preference given to studies comparing the 3 procedures. Results: Sixteen articles were selected based on inclusion criteria after screening 522 articles— 1 randomized controlled trial, 2 retrospective cohorts, and 13 case series. Both closed and open techniques have achieved good symmetry

of nostrils with no impairment of growth. No advantage of one technique over the other was noted. Conclusion: There is a paucity of randomized controlled trials and prospective studies on the subject to arrive at an evidence-based recommendation as to whether open or closed rhinoplasty during primary cleft lip repair gives better long-term outcomes.

Keywords---rhinoplasty, surgical technique, nose, non-syndromic clefting.

Introduction

Correction of cleft lip nasal deformity is a major challenge in cleft surgery. For many years, the nose was left untouched at the time of primary lip repair. This was because of concern about interfering with nasal growth, damage to nasal cartilage and the introduction of the scar that could make secondary correction more difficult.^{1,2} However, evidence demonstrates no interference in growth or subsequent surgeries.^{3,4} Often a repaired cleft is revealed more by associated nasal deformity than by the lip repair line. The multiplicity of methods described for realignment of the deformed cartilages testifies to the difficulty of first achieving and then sustaining correction of the nasal deformity. The alar cartilages provide the key to the cleft lip nasal problems. Failing to address the alar cartilage at the time of lip repair leaves it locked and tethered in its displaced position by scar and transverse shortage of nostril lining. Moreover, the growth of nasal tip is altered and secondary correction is difficult to achieve. Correction of nasal deformity can be with or without direct exposure of the alar cartilages. The open and closed rhinoplasty approaches remain a subject for debate. Advances in surgical techniques and improved understanding of rhinoplasty dynamics ensure that this topic remains contemporary. Traditional techniques have undoubtedly some advantages and some disadvantages.⁵ The advantages of the "open" rhinoplasty are, for example, a greater intraoperative visibility, high precision in performing corrective action, symmetrical on both sides of the nose; in fact, by using the approach of "open" rhinoplasty, we can make any change under direct vision. In addition, this technique creates a large surgical access that makes it possible to model the shape of the nose by inserting and fixing cartilage grafts; the "open" rhinoplasty makes it more easy and accurate not only the removal of cartilage from the septum, but also more accurate and stable the placement of the grafts in the different sites.⁶ Despite the numerous advantages, there are also some disadvantages in the open rhinoplasty, such as, for example, a post-operative course longer and a greater presence of edema on the region of the columella, frequently accompanied with paranasal hematomas; another poorly aesthetic result is the presence of a transverse scar in correspondence of the columella.⁷ The literature of the last 15 years has highlighted that many surgeons prefer the approach of "open" rhinoplasty for the greater facility in performing complex interventions on the osteo-cartilaginous tissues of the nose and for ever greater predictability of results, although the closed technique allows to achieve a minor trauma for the soft tissues with good aesthetic conditions in the post-operative course: the "semi-open" technique has the several advantages of the open technique, and it does not involve the presence of post-surgical scars. The

"semi-open" technique allows operating times comparable to the traditional techniques, in addition, it allows to have an intra-operative visual field very wide, equivalent to that which can be achieved using the open technique, but without leaving any external scar. Both open and closed techniques have evolved extensively, many preferring semi-open technique. Proponents of either technique stand by their personal conviction. There is no evidence-based consensus so far as to which technique is superior in terms of outcome so as to be recommended.

Aim of the present study

The purpose of the present research was to assess the amount of nasal symmetry achieved through closed, semi-open, open tip rhinoplasty after primary cleft lip repair.

Methodology

Search Strategy- Protocol was registered on the PROSPERO register of systematic reviews. PRISMA-P guidelines for the conduct of systematic review and meta-analysis protocol were followed. The following electronic databases were searched: Cochrane, PubMed, Embase, and LILACS BIREME. There were no restrictions in the search with regard to language, study setting, or date of publication. (Table 1)

Study Selection- Studies were selected based on the following inclusion criteria: human study of rhinoplasty with primary repair of unilateral cleft lip. Open versus closed rhinoplasty technique comparisons as randomized controlled trials (RCTs) preferably, if not available prospective or retrospective cohorts, are to be included. Assessment of outcome should be ideally long term (5-14 years). As there are several techniques and modifications described for both open and closed primary cleft rhinoplasty varying from closed, semiopen, and open, no concrete definition is being given as such for either. Due to this ambiguity, all incisions resulting in exposure of alar cartilages have been taken as open and nonexposure with dissection of cartilage from dorsal skin as closed. Maneuvers of the alar base and sill are not included as part of the technique. Studies that did not meet the inclusion criteria, review articles, case reports, editorials, and letters were excluded. The population of interest is patients with nonsyndromic unilateral cleft lip undergoing rhinoplasty along with primary cleft lip repair. The intervention is use of open rhinoplasty and the control is use of closed rhinoplasty technique. Outcome assessment method is definitive anatomical measurements of the nose parameters during follow-up, which are reliable and reproducible. A 3-stage review process was followed. During the initial stage, the titles were reviewed by 2 reviewers, and the articles not relevant to the reviews were excluded. In the second stage, the abstracts of the selected articles were reviewed against the inclusion criteria. The final stage consisted of detailed review of the full texts selected by both reviewers. The assessment of the risks of bias was done using Cochrane's tool for assessing risk of bias as described in section 8.5 of the Cochrane Handbook for Systematic Reviews of Interventions (Higgins and Green et al.).⁸ Randomization has been carried out using the sealed envelope technique. This has been evaluated as low risk of bias. The study reports 20 cases lost to follow-up. Hence, the study is evaluated to have a high risk of bias.

Results

Most of the publications on cleft rhinoplasty are narrative regarding new techniques, modifications, or personal protocols and experience. Some of the papers reported on combined cohorts of unilateral and bilateral and primary and secondary rhinoplasty, and it was not possible to extract data separately in these cases. Although long-term follow-up was one of the inclusion criterion, due to lack of adequate studies, we had to include studies with short-term follow-up also. Presence of multiple cointerventions in addition to the intervention of interest like presurgical orthopaedics, postoperative splinting, and variations in techniques used for rhinoplasty and assessment of outcome makes attempts at comparing the data of questionable validity. There was only 1 RCT comparing open and closed techniques. This study has concluded that both techniques give similar results after a short follow-up evaluation at 6 months. The retrospective comparative studies had done assessments subjectively and objectively using definite parameters, though there is no uniformity between the studies on these parameters. The first one has concluded that there is no difference between the 2 techniques but is in favor of the closed technique as they found more “difficult to correct complications” following their open approach. The second comparative study has demonstrated better results with the semi-open technique using Tajima incision. The closed technique series have all shown improved symmetry of nostrils with follow-up, so that secondary surgery will be less extensive. (Table 2) No interference with growth has been found. The completely open technique is being done by fewer surgeons. The studies included have shown good long-term results and have reported reduced number of secondary surgeries, and when required the intervention to be of much smaller magnitude.

Discussion

Marimuthu et al. conducted a single-center RCT comparing closed to open technique of rhinoplasty with primary cleft lip repair in unilateral cleft cases involving 36 patients.⁹ The age range of patients was 2 to 45 years and follow-up assessment could be done only in 16, with 8 in each group. A statistically significant outcome was found only in one of the 3 measurements used for quantitative analysis—the alar base width in favor of open technique. Of the 2 retrospective cohort studies, Yasonov et al. conducted a 10-year period retrospective study of 60 patients and subjective and objective assessment showed no statistically significant difference between the 2 methods.¹⁰ In their evaluation of complications, they found the number of “difficult to correct” complications to be more in the open rhinoplasty group and anticipate that this would complicate secondary rhinoplasty. In view of this, they consider closed rhinoplasty better as there is less damage to alar cartilages and no scars. Lu et al. have done a comparative study in 66 patients between closed and 2 types of open incisions—one with bilateral rim incisions and other with rim incision on noncleft and Tajima with rim incision and overcorrection on cleft side.¹¹ This 5- to 6-year retrospective study on patients with incomplete cleft lip has reported statistically better outcomes for the overcorrected group in terms of nostril height and axis compared with the closed method and also with the rim incision-only group. All the patients benefitted from primary rhinoplasty. A retrospective series of 26 cases of McComb rhinoplasty on 3- to 12-month old primary lip repair with a

follow-up of 6 months to 2 years by Spencer and Buzzo reports results as optimal or satisfactory regarding symmetry between nostrils and columella position on being assessed by 5 plastic surgeons using photographs.¹² Tang et al. have used preoperative nasoalveolar molding (NAM) and Tajima incision for correction of nasal deformity in 29 patients.¹³ Intraoperative direct anthropometric measurements of nostril height and nostril floor and comparison with the normal side were done. They have reported significant relapse of the nasal deformity during the 9-month follow-up and recommend primary overcorrection as a solution. Open rhinoplasty is technically more demanding during primary cleft lip repair in an infant. A complete open method has been followed only in 2 of the above studies. All have achieved good results with fewer cases requiring a secondary procedure, and when required, the residual deformities being much easier to correct.

Conclusion

This systematic review was an attempt to arrive at a consensus based on the trials and studies available so far as to whether open technique or closed technique of rhinoplasty at the time of primary lip repair gives superior results consistently on follow-up. A unified research strategy in clefts is required to conduct high-quality multicenter RCTs in centers with heavy caseloads. There is no concurrence on methods of assessment of outcomes at present.

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Tables

Table 1- Study selection PRISMA-P flow diagram

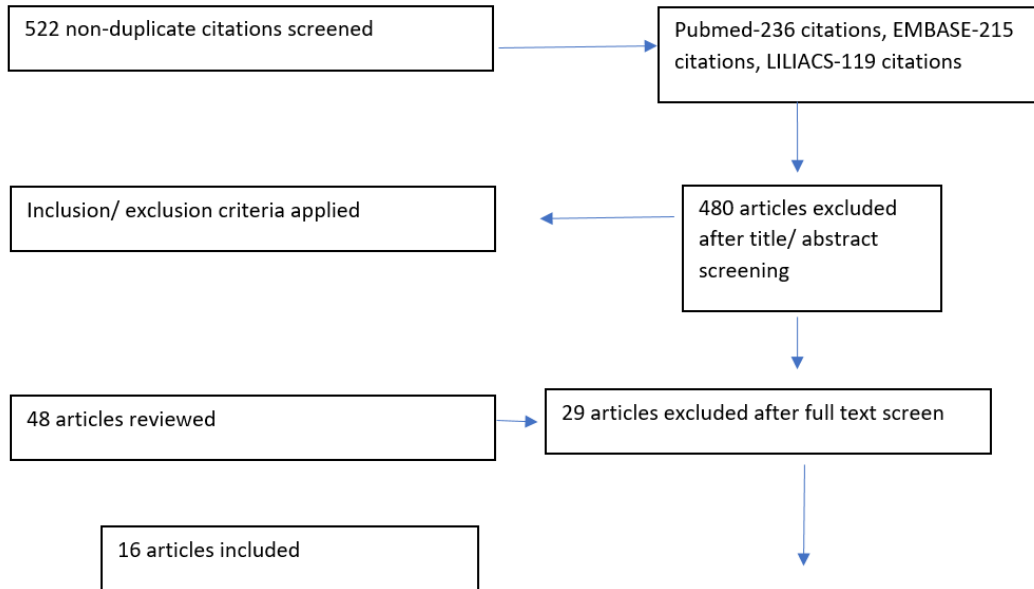


Table 2- Randomized Controlled Trial Analysis

<i>Parameters Assessed</i>	<i>Closed Rhinoplasty</i>	<i>Open Rhinoplasty</i>	<i>Semi-open Rhinoplasty</i>	<i>P value</i>
Nostril height difference between cleft and noncleft side (mm)	-2.48 ± 1.29	-2.1 ± 1.53	-1.98 ± 1.09	.593
Alar base width difference between cleft and noncleft (mm)	5.56 ± 2.47	2.7 ± 2.72	2.63 ± 2.11	.046
Columella length difference between cleft and noncleft (mm)	-2.07 ± 1.16	-1.47 ± 0.9	-1.33 ± 0.87	.271