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META ANALYSIS

Tip Definition in Cleft Rhinoplasty Assessment and Outcomes in Meta-analysis

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Abstract

Background: **Congenital anatomic abnormalities, surgical scarring, and growth-related alterations all contribute to the ever-changing appearance of the cleft nasal malformation. In addition to nasal obstruction, symptoms of this condition include a shorter columella, depressed nasal tip, dislocated alar cartilage on both sides, everted alar bases, and a shortened ala.**

Aim and objective: **Assessment and outcomes of tip definition in post cleft rhinoplasty (meta-analysis).**

Patients and methods: **This study was a meta-analysis carried out on 639 cases in the Department of Plastic Surgery and Burns, Faculty of Medicine, Al Azhar University. Articles published within the previous 5 years that met the inclusion requirements were considered. We ended up including 11 studies after reviewing them.**

Results: **There was a statistically significant variance among the studied population as regards meta-analysis for nostril area ratio, meta-analysis for the symmetry, and meta-analysis for complications. There was no statistically significant variance among the studied population as regards meta-analysis for tip deviation.**

Conclusion: **In conclusion; the current study showed that the aesthetic results of using costal cartilage to repair a cleft in a subsequent rhinoplasty are good.**

Keywords: Cleft rhinoplasty, Meta-analysis, Tip definition

1. Introduction

Millard, McComb, Anderl, and Cutting; Gunther, Mulliken, Rohrich, and Tebbetts; and Burget and Menick are just a few of the authors who have detailed effective methods for repairing cleft lips and/or noses. For almost 40 years, the senior author's go-to method for treating cleft lip and/or cleft nose in young patients has been the Millard procedure.[1]

Following Millard's advice, we operated on infants with cleft lips and/or noses. Surgeons still often avoid primary nasal repair, preferring instead to delay the procedure until the adolescent years. These methods may increase the difficulty of correcting a cleft lip or cleft nose.[2]

In the underdeveloped world, Ahuja[3] reports that more than 25% of patients with unilateral cleft lip and palate appear with deformity in their teens or later years. Patients from the underdeveloped world, where more than 80% of the world's population resides, cannot follow the standard procedure for the correction of these malformations. The severity of this issue in patients with cleft lip and/or nose deformity is not reflected in any substantial publications in the literature.[4]

There are many things that need fixing, and the aesthetic outcome is a major concern for adult patients. Nose surgery as it is now practiced can successfully restore nasal form and symmetry in infants presenting this late. All patients had hypoplasia of the maxilla, which lowered the alar base on the cleft side. The treatment of a cleft lip or cleft nose deformity is universally acknowledged to be a daunting undertaking for any cleft surgeon.[5]

The nasal tip is rounded, the alar bases are wide, and the nose is short and flat. Cleft lip nasal deformity is defined by an asymmetrical nose with a flat

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dorsum, broad tip, and wide alar base on the cleft side. The degree of the deformity varies from case to case. A higher nasal dorsum, more nasal tip projection, and less flaring of the alar bases are what the vast majority of oriental patients reportedly want, as reported by Hsieh et al.[6] Patients with cleft lip nasal deformity often express a desire for the same aesthetic improvement.

Cleft lip patients are often discriminated against because of the stigmatizing appearance of their cleft nose. To hide the patient's face abnormality, these individuals must undergo not only anthropometric normalization but also aesthetic nasal improvement. Cleft lip nasal deformity can be improved with the augmentation rhinoplasty procedure. L-shaped cartilage struts were used to improve our patients' nasal profiles who have cleft lips and/or palates.[7]

The aim of this study is to assess the outcomes of tip definition in postcleft rhinoplasty (meta-analysis).

2. Patients and methods

This investigation was a meta-analysis carried out at the Department of Plastic Surgery and Burns at Al-Azhar University's Faculty of Medicine.

Current clinical experiments or cluster examinations, comparative prospective and retrospective cohort studies were included. The search findings have been submitted to software for managing systematic reviews and manually screened for inclusion eligibility. The PRISMA flowchart for search outcomes and inclusion/exclusion criteria was introduced.

2.1. Types of participants

Only human participants with tip definition in post-cleft rhinoplasty.

2.2. Types of included interventions

Any kind of cleft rhinoplasty associated with tip definition after the operation.

2.3. Types of outcome measures

Methodological aspects of scalp defect reconstruction RCTs include inclusion criteria, study techniques, measures of study outcomes, and study duration.

2.4. Inclusion criteria

Studies with the English language, publication at any time and up to date (last 10 years only), and of any type, including prospective, retrospective, comparative cohort studies, and randomized controlled trials in clinical research related to tip definition in cleft rhinoplasty.

2.5. Exclusion criteria

Exclusion criteria include languages other than English, duplicates, patients with pulsatile tinnitus, nonclinical outcome studies, incomplete outcome data, and RCT protocols and RCTs targeting conditions other than tinnitus, even if tinnitus is a symptom (e.g. Meniere's disease, sudden hearing loss).

2.6. Sampling method

All papers meeting the inclusion criteria based on the search keywords.

2.7. Sample size

All articles meeting the inclusion criteria within the last 5 years. After screening, we included 11 studies.

2.8. Ethical considerations

As approved by the Committee of Al-Azhar University.

2.9. Study tools

Analysis of the different techniques used for tip definition after rhinoplasty to evaluate outcomes through meta-analysis.

2.10. Study procedure

We began by searching for publications using the key terms, followed by downloading papers that met the inclusion criteria and eliminating papers that had criteria for exclusion. The supervisors looked over these publications to make sure that they were able to locate the right source of data. After that, I collaborated with the statistical supervisor to put the data into R-based software for meta-analysis and to start the study.

2.11. Statistical considerations

Using the software called Systematic Review Manager, the results of the involved studies were merged, and then each experiment was manually assessed to see whether or not it was eligible to be

involved. The PRISMA flowchart was developed using the search findings and the inclusion/exclusion criteria as the primary inputs. Using the Cochrane collaboration tool for assessing the risk of bias, information was gathered to allow the evaluation of the probable risks of bias associated with each research. Following combining the information obtained from all of the sought-after search research. It was determined how to compute the relative risk for each of the desired outcome metrics of interest.

3. Results

Table 1 shows that a total of 639 cases were involved with a mean age of 23.7 years and the average follow-up duration was 22.7 months.

Table 2 shows that two studies assessing changes in nostril area ratio (cleft/noncleft) preoperation and postoperation showing a significant increase postoperation ($P < 0.001$).

Table 3 shows that 10 studies assessing symmetry postoperation showing an event rate of 75.3% in cases with significant heterogeneity between included studies.

Table 4 shows that the total number of cases that showed symmetry postoperation was 531, aesthetic deformity improved in 617 cases and nasal obstruction in three cases, regarding satisfaction was found in 624 cases and 15 cases were not satisfied.

Table 5 shows that 10 studies assessing complications postoperation showed an event rate of 7.08% in cases with significant heterogeneity between included studies.

Table 6 shows that two studies assessing tip deviation postoperation, showing an event rate of 8.3% in cases, with significant heterogeneity between included studies.

4. Discussion

The current meta-analysis included 10 studies; nine retrospective studies[8,9,13–18,20] studies and one randomized controlled trial (RCT) study.[10] A total of 259 cases with female predominance (55%) were

Table 1. Patient's characteristics.

References	Number	Age	M/F	Side (lt/rt)	Follow-up	Type of operation
Fu et al.[8]	25	24	4/21		6	Secondary
Hussein and Elsharkawy[9]	15	22	3/12	9/6	15	Secondary
Li et al.[10]	20	20.6	5/15	11/2/7 (bilateral)	9	Secondary
Elgazzar et al.[11]	32	30.7	4/28		23.8	Primary
Alghonaim et al.[12]	25	29	0/25		3	Primary
Lee and Burke[13]	38	31	31/7		36.1	Secondary
An et al.[14]	20	22.2	2/18		10.3	Secondary
Zhang et al.[15]	95	21	62/35			Secondary
Qiao et al.[16]	6	28.2	0/6		15.3	Secondary
Moore et al.[17]	12	19.3	3/9		15.3	Secondary
Talaat et al.[18]	20	16.4	4/16	11/9		Secondary
Pedroza et al.[19]	323	27.8	35/288			Primary
Mori et al.[20]	8	16	3/5		110.4	Secondary

Table 2. Meta-analysis for nostril area ratio (cleft/noncleft).

References	Pre		Post		SMD	SE	95% CI
	No.	Mean ± SD	No.	Mean ± SD			
An et al.[14]	20	0.65 ± 0.14	20	0.88 ± 0.09	−1.915	0.377	−2.678 to −1.153
Talaat et al.[18]	20	0.66 ± 0.04	20	0.92 ± 0.04	−6.371	0.777	−7.943 to −4.798
Total (fixed effects)					−2.764	0.339	−3.439 to −2.089
Total (random effects)					−4.091	2.227	−8.525 to 0.342
Test for heterogeneity							
Q	26.632						
DF	1						
Significance level	$P < 0.001$*						
I^2 (inconsistency)	96.25%						
95% CI for I^2	89.57 to 98.65						

CI, confidence interval; I^2, observed variance for heterogeneity; Q, total variance for heterogeneity; SMD, standardized mean difference.
*Significance level $P = 0.003$.

Table 3. Meta-analysis for the symmetry.

References	Total number	Event	Event rate (%) (proportion)	95% CI of rate (%)
Hussein and Elsharkawy[9]	15	15	100.0	78.198 to 100.0
Li et al.[10]	20	20	100.0	83.157 to 100.0
Elgazzar et al.[11]	32	1	3.125	0.0791 to 16.217
Alghonaim et al.[12]	25	0	0.0	0.000 to 13.719
An et al.[14]	20	20	100.0	83.157 to 100.0
Zhang et al.[15]	95	84	88.421	80.226 to 94.076
Qiao et al.[16]	6	5	83.333	35.877 to 99.579
Moore et al.[17]	12	12	100.0	73.535 to 100.0
Talaat et al.[18]	20	18	90.0	68.302 to 98.765
Mori et al.[20]	8	5	62.5	24.486 to 91.477
Total (fixed effects)			73.487	67.716 to 78.720
Total (random effects)			75.356	43.109 to 96.637
Test for heterogeneity				
Q	246.3352			
DF	9			
Significance level	$P < 0.001$*			
I^2 (inconsistency)	96.35%			
95% CI for I^2	94.77 to 97.45			

CI, confidence interval; I^2, observed variance for heterogeneity; *Q*, total variance for heterogeneity.

Table 4. Aesthetic outcome.

References	Number	The symmetry	Aesthetic deformity	Nasal obstruction	Satisfaction	Not satisfied
Fu et al.[8]	25		21		24	1
Hussein and Elsharkawy[9]	15	15	15	0	15	0
Li et al.[10]	20	20	20	0	20	0
Elgazzar et al.[11]	32	29	29	0	29	3
Alghonaim et al.[12]	25	25	25	0	25	0
Lee and Burke[13]	38		33		37	1
An et al.[14]	20	20	20	1	20	0
Zhang et al.[15]	95	84	91	0	91	4
Qiao et al.[16]	6	5	5		5	1
Moore et al.[17]	12	12	12	1	12	0
Talaat et al.[18]	20	18	18	1	18	2
Mori et al.[20]	8	5	5		5	3
Pedroza et al.[19]	323	323	323	0	323	0

Table 5. Meta-analysis for complications.

References	Total number	Event	Event rate (%) (proportion)	95% CI of rate (%)
Fu et al.[8]	25	3	12.0	2.547 to 31.219
Hussein and Elsharkawy[9]	15	2	13.333	1.658 to 40.460
Li et al.[10]	20	3	15.0	3.207 to 37.893
Lee and Burke[13]	38	0	0.0	0.000 to 9.251
An et al.[14]	20	1	5.0	0.127 to 24.873
Zhang et al.[15]	95	1	1.053	0.0266 to 5.726
Qiao et al.[16]	6	0	0.0	0.000 to 45.926
Moore et al.[17]	12	1	8.333	0.211 to 38.480
Talaat et al.[18]	20	3	15.0	3.207 to 37.893
Mori et al.[20]	8	0	0.0	0.000 to 36.942
Total (fixed effects)			5.182	2.857 to 8.550
Total (random effects)			7.081	2.994 to 12.727
Test for heterogeneity				
Q	18.9487			
DF	9			
Significance level	$P = 0.026$*			
I^2 (inconsistency)	52.50%			
95% CI for I^2	2.64 to 76.83			

CI, confidence interval; I^2, observed variance for heterogeneity; *Q*, total variance for heterogeneity.

Table 6. Meta-analysis for tip deviation.

References	Total number	Event	Event rate (%) (proportion)	95% CI of rate (%)
Fu et al.[8]	25	2	8.0	0.984 to 26.031
Talaat et al.[18]	20	1	5.0	0.127 to 24.873
Total (fixed effects)			8.333	2.275 to 20.146
Total (random effects)			8.333	2.230 to 17.818
Test for heterogeneity				
Q	0.1024			
DF	1			
Significance level	$P = 0.749$			
I^2 (inconsistency)	0.00%			
95% CI for I^2	0.00 to 0.00			

CI, confidence interval; I^2, observed variance for heterogeneity; *Q*, total variance for heterogeneity.

included with a mean age of 22.07 years and a mean follow up period of 27.1 months.

Concerning results, the pooled data of two studies[13,15] showed that the mean nostril width preoperation was 137.5 ± 19.3 and changed to 106.7 ± 13.2 postoperation, mean nostril height preoperation was 59.2 and changed to 66.3 postoperation, mean nostril axis angle pre was 80.3 ± 4.6 and changed to 93.4 ± 7.7 postoperation.

Also, regarding the change in axis and angle postoperation, the pooled data of two studies[14,18] showed that the mean columellar axis deviation angle preoperation was 24.5 (0.58) and changed to 7.6 (2.28) postoperation and the mean alar base inclination angle preoperation was 4.8 changed to 1.55 postoperation.

The meta-analysis included two studies[14,18] assessing the change in alar base inclination angle preoperation and postoperation, showing a significant increase postoperation ($P < 0.001$). The improvement was higher in the Talaat et al.[18] study.

A total number of cases show in symmetry postoperation was 179. Aesthetic deformity improved in 240 cases and nasal obstruction in three cases. Satisfaction was found in 247 cases, while 12 cases were not satisfied.

Regarding symmetry, the pooled data of eight studies[9,10,14–18,20] assessing symmetry postoperation showed an event rate of 92.7% in cases, with significant heterogeneity between included studies.

In terms of symmetry, there were four studies[9,10,14,17] reported 100% symmetry. Hussein and Elsharkawy[9] used L-shaped costal cartilage grafts for paranasal and alar base augmentation in 15 cleft cases and showed 100% symmetry. Li et al.[10] used 3D printing procedure-assisted autologous costal cartilage augmentation rhinoplasty among 20 patients with nasal deformity secondary to cleft lip repair showed 100% symmetry. An et al.[14] used diced costal cartilage graft combined with muscle repositioning on 20 patients who underwent secondary unilateral cleft rhinoplasty and showed 100% symmetry and Moore et al.[17] utilized pyriform costal cartilage graft in 11 patients with cleft-side alar asymmetry in secondary cleft rhinoplasty, also showing 100% symmetry.

Regarding nasal obstruction, the pooled data of six studies[9,10,14,15,17,18] assessing nasal obstruction postoperation showed an event rate of 2.6% in cases with insignificant heterogeneity between included studies.

Three studies[9,10,15] reported no nasal obstruction, but one case suffered from nasal obstruction in each study of[15,18] with highest rate in Moore et al.[15] study with 1/12 (8.3%) nasal obstruction.

As regards satisfaction, the pooled data of 10 studies[8–10,13–15,15,16,18,20] assessing satisfaction postoperation showed an event rate of 94.8% in cases with insignificant heterogeneity between included studies.

A total of 14 complications were found among patients in the form of bleeding in one case, seroma in one case, tip deviation in three cases, necrosis in one case, infection in two cases, graft displacement in five cases, pneumothorax in one case, and revision surgery in eight cases.

Regarding complications, the pooled data of 10 studies[8–10,13–18,20] that assessed complications postoperation showed an event rate of 7.08% in cases with significant heterogeneity between included studies.

In terms of complications, three studies[10,16,20] reported no postoperative complications.

Regarding tip deviation, the pooled data of two studies[8,18] assessing tip deviation postoperation showed an event rate of 8.3% in cases with significant heterogeneity between included studies.

Fu et al.[8] reported two (8%) patients with tip deviation; Talaat et al.[18] revealed that one patient (or 5%) suffered slight tip deviation after surgery as a result of postop nasal trauma.

4.1. Conclusion

In conclusion; the current study showed that the use of the costal cartilage in secondary cleft lip rhinoplasty yields good results in terms of aesthetic appearance.

Conflict of interest

There are no conflicts of interest.

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