

Mulliken's Bilateral Cleft Lip Repair: Early Outcome Analysis

Mansoor Khan¹, Hidayat Ullah¹, Alamzeb Khan² and Waqas Hayat¹

¹Department of Plastic Surgery, Hayatabad Medical Complex, Peshawar, Pakistan

²Department of Plastic and Reconstructive Surgery, Saidu Teaching Hospital, Swat, Pakistan

ABSTRACT

Objective: To determine the early surgical outcome of Mulliken's repair technique for bilateral cleft lip.

Study Design: Descriptive cross-sectional study.

Place and Duration of the study: Burns and Plastic Surgery Centre, Hayatabad Medical Complex, Peshawar, Pakistan, from January 2020 to December 2021.

Methodology: This study included 51 patients with bilateral cleft lip deformity. Patients were evaluated preoperatively to exclude any associated congenital anomalies or comorbidities. Then the patients were classified into mild, moderate, severe, and asymmetrical cases. Outcomes were determined immediately and one week postoperatively, as good (score 16-20), fair (score 11-15), and bad (0-10) on the basis of anthropometric measurements on outcome evaluation criteria (OEC).

Results: Preoperatively mild, moderate, and severe bilateral cleft lips were observed in 18 (35.3%), 6 (11.85%), and 15 (29.4%), respectively, while 10 (19.6%) were bilateral asymmetrical cleft lips. The postoperative outcome score ranged from 16 to 20 (mean 19.2±1.03) which falls in the good outcome range. Nasal symmetry was good in 64.7% (n=33) cases while 31.4% (n=16) patients had satisfactory scores.

Conclusion: Although Mulliken's repair is by far the most prevalent type of repair for bilateral cleft lip patients, the results can vary markedly. The early outcome evaluation criteria is an objective tool to measure the outcomes.

Key Words: Cleft lip, Bilateral cleft lip, Mulliken, Mulliken's repair, Day care surgery, Outcome.

How to cite this article: Khan M, Ullah H, Khan A, Hayat W. Mulliken's Bilateral Cleft Lip Repair: Early Outcome Analysis. *J Coll Physicians Surg Pak* 2023; **33**(08):906-909.

INTRODUCTION

There is a paradigm shift to single-stage nasolabial repair and preoperative nasoalveolar moulding. This has made it possible to change the historical dissatisfactory impression about the postoperative surgical outcome of bilateral cleft lip and nasal deformity.¹ The intrinsic and iatrogenic stigmata of bilateral cleft nasolabial deformity can be avoided by preoperative nasolabial moulding and adherence to the surgical principles of achieving symmetry, primary muscular continuity, appropriate size and shape of the philtrum, formation of median tubercle from lateral lip elements and repositioning of lower lateral cartilages to recreate the nasal tip and columella.²⁻⁴ It requires dedication and craftsmanship on the part of the operator to meet the standards.

Many iterations of surgical procedures and pre-operative therapies are discussed in the literature in order to improve the post-operative results in patients with bilateral cleft lips.⁵⁻⁷ But there is a lack of consensus guidelines on the optimal treatment options for patients. There are a few studies in which the outcomes of bilateral cleft lip repair were studied. These studies were done mostly during the evolution of the Mulliken's repair technique. Bermudez *et al.* used an Outcome Evaluation Criteria (OEC) which is an objective scoring system, for the assessment of post-operative outcomes that can be used for patients undergoing repair of bilateral cleft lip.⁸ No studies were conducted on the Outcome evaluation criteria as a metric to help surgeons evaluate the effectiveness of their postoperative procedures. Studying this criteria can help standardise the outcome parameters for treatment of these patients. This will improve the outcomes and will also serve as a metric tool for surgeons to objectively assess their postoperative results. The aim of this study was to evaluate the early postoperative outcome of Mulliken's bilateral cleft nasolabial repair.

METHODOLOGY

This descriptive cross-sectional study was conducted at the Burns and Plastic Surgery Centre, Hayatabad Medical Complex, Peshawar, Pakistan, from January 2020 to December 2021 after obtaining ethical approval from the Institutional

Correspondence to: Dr. Waqas Hayat, Department of Plastic Surgery, Hayatabad Medical Complex, Peshawar, Pakistan
E-mail: waqashayat218@yahoo.com

Received: October 01, 2022; Revised: June 21, 2023;

Accepted: July 17, 2023

DOI: <https://doi.org/10.29271/jcpsp.2023.08.906>

Ethical Board (14/REB/B&PSC/19) before the initiation of the study. Patient consent was obtained before including in the study.

Both primary and secondary bilateral cleft lip patients were included irrespective of their gender. Patients with age less than 3 months, syndromic associations and comorbidities were excluded. The sample size was 51.⁹ Patients were thoroughly assessed by history and clinical examination by the primary surgeons (two) and anaesthesiologists (two). Clinical photographs were acquired preoperatively, on table and one week postoperatively to evaluate the early surgical outcome. Using photographs, the preoperative status of patients was categorised on the basis of the severity of the cleft as mild, moderate, and severe deformity. Incomplete cleft lip is classified as mild. Moderate deformity is a complete but not wide cleft with some tissue contact between the lateral and medial lip segments at rest. Severe deformity is a complete and wide cleft (Figure 1A and 1B) while asymmetrical is a combination of different severities on either side (Figure 1C and 1D). Lip repair with primary rhinoplasty was performed under general anaesthesia.⁸

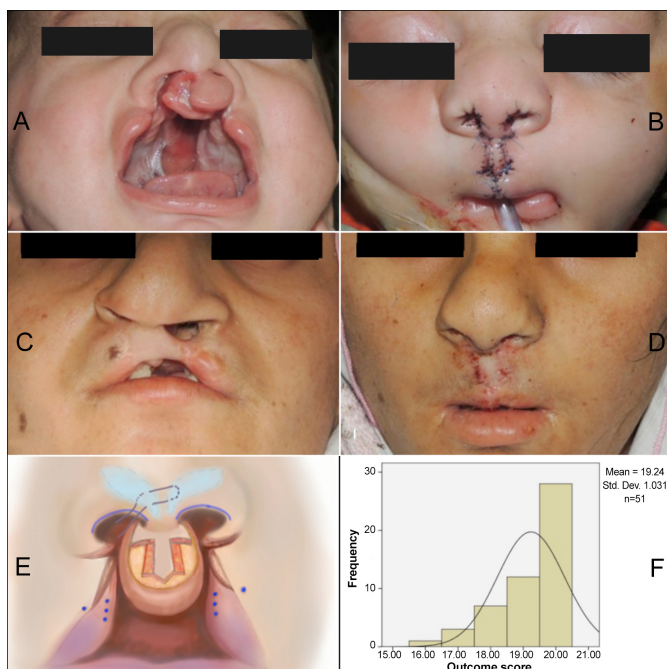


Figure 1: (A) Mulliken's repair of severe bilateral cleft lip deformity, (B) Frontal view of immediate post-operative view. (C) Mulliken's repair for severe secondary bilateral cleft lip and nasal deformity with scarred, deficient prolabial tissue (D) Frontal view, one week post-operatively with mild deviated neo-philtrum due to the oblique design to exploit the scar. (E) Mulliken's nasolabial repair technique. Philtrum is designed from the prolabium. 1mm of skin is deepithelialized to recreate the philtrum columns. A stitch is taken in the lower lateral cartilages after resecting excess fat. (F) Histogram showing Bermudez's Outcome Evaluation Criteria (OEC) scores in this study.

Postoperative results were subjectively graded using Bermudez's OEC which stratified outcomes into two broad categories of symmetry and avoidance of stigmata. A scoring system is used as is given in Table I. The scores are then classified into 3 categories *i.e.* good (16-20), fair (11-15), and poor (0-10, Table I).⁸ The data were evaluated and stratified for severity of the cleft

lip and type of repair (primary and secondary cases).⁸ This is an objective evaluation that is evident in the clinical photograph and on the physical examination of the patient.

Data were organised and analysed using IBM Statistical Package for Social Sciences. Univariate analysis was done to calculate the frequencies and percentages for gender, and preoperative severity grade of the patient. Mean and standard deviation were calculated for patient age. Bermudez's OEC scores were used for postoperative objective analysis. Frequencies of OEC scores were calculated for the 3 categories (good, fair, and poor). Multivariate analysis was done for postoperative OEC scores. Chi-square test was done to calculate the statistical significance, keeping the alpha value <0.05 .

RESULTS

A total of 51 bilateral cleft lip patients, including 39 (76.5%) primary and 12 (23.5%) secondary cases were operated on with Mulliken's technique as shown in Figure 1E. The study population comprised of 31 (60.8%) male and 20 (39.2%) female patients with age ranged from three to 300 months (mean = 41.4 ± 6.4 months). Preoperatively mild, moderate, and severe bilateral cleft lips were observed in 18 (35.3%), 6 (11.85%), and 15 (29.4%), respectively, while 10 (19.6%) were bilateral asymmetrical cleft lips and 2 (3.9%) had associated craniofacial clefts. The postoperative outcome score ranged from 16 to 20 (mean = 19.2 ± 1.03) which all fall in the good outcome range for both primary and secondary cases (Figure 1C and 1D).

The outcomes of the nasal symmetry was good in 64.7% (n=33) cases while 31.4% (n=16) patients had satisfactory scores. In 3.9% (n=2) cases, nasal symmetry outcome was found poor (Table II). The distribution of OEC score is shown in Figure 1F. The stigmata of the oblique nostril for bilateral cleft lip was present in 6 (11.8%) cases while 2 (3.9%) cases had long lip. The relationship of Nasal symmetry with preoperative severity and type of presentation (*i.e.* primary, secondary) was not found statistically significant with p-values of 0.237 and 0.184, respectively calculated with chi-square test.

Symmetry of free vermillion (Table II) was good in 84.3% (n=43). The free vermillion symmetry was found good in 73.1% (n=19 out of total 26) and 96% (n=24 out of total 25) during 2020 and 2021, respectively with a statistically significant association (p=0.024, calculated by chi-square test with a confidence interval of 95%).

DISCUSSION

Cleft surgery is constantly evolving and there are numerous studies describing new techniques or modifications to the old ones.¹⁰⁻¹⁴ In this series, the authors reported the early postoperative outcome of Mulliken's bilateral nasolabial repair for both primary and secondary cleft deformities. The OEC score can later on also be used to compare newer iterations to the established techniques.

Table I: Outcome evaluation criteria for bilateral cleft lip repair.¹⁶

Symmetry			Avoidance of stigmata			
Score	Unsatisfactory	Satisfactory	Good	Score	Present	Absent
Symmetry of the cupid's bow	0	1	2	Wide philtrum	0	1
Symmetry of the nose	0	1	2	Undimpled philtrum	0	1
Symmetry of the free vermillion	0	1	2	Long lip	0	1
Vertical symmetry of the lateral lip	0	1	2	Malpositioned premaxilla	0	1
Horizontal symmetry of the lateral lip	0	1	2	Lack of muscle integrity	0	1
				Vermillion colour mismatch	0	1
				Absence of the white roll	0	1
				Nose/oblique nostrils	0	1
				Whistle deformity	0	1
				Absence of an upper labial sulcus	0	1

Outcome Score: Good 16-20; Fair 11-15; Bad 0-10.

Table II: Postoperative outcome of symmetry parameters.

Parameter	Unsatisfied	Satisfied	Good	Total
Symmetry of Cupid's Bow	0 (0%)	0 (0%)	51 (100 %)	51 (100 %)
Symmetry of Nose	2 (3.9%)	16 (31.4%)	33 (64.7%)	51 (100 %)
Symmetry of free Vermilion	0 (0%)	8 (15.7%)	43 (84.3%)	51 (100 %)
Symmetry of Vertical Lateral Lip	0 (0%)	2 (3.9%)	49 (96.1%)	51 (100 %)
Symmetry of Horizontal Lateral Lip	0 (0%)	3 (5.9%)	48 (94.1%)	51 (100 %)

The study population is a modest one similar to those reported by Mulliken as 50 patients in their series.¹⁵ This study population is larger as compared to the 30 reported by Kim *et al.*¹⁰ Compared to this study population age, Akintububo *et al.* reported a presentation age of 3 months to 60 years for cleft surgeries in his series of African population.¹⁶ This study population had a similar composition to that reported by Kim *et al.* on the basis of preoperative severity.¹⁰ Yuzuriha *et al.* reported the frequency of asymmetrical bilateral cleft lip deformity as 23%,¹⁷ which is similar to 19.6% for this study population. In this series, the postoperative outcome scores were consistent with the postoperative outcomes reported in the literature.^{18,19} Pinto *et al.* reported favourable results in terms of bilateral cleft lip nasal deformity stigmata removal when simultaneous nasal correction was performed with cleft lip repair.²⁰ Chang *et al.* also shared their experience of simultaneous primary rhinoplasty with over correction in bilateral cleft lip patients preceded by preoperative nasolabial moulding as equal to non-cleft patients.²¹ Adeyemo *et al.* reported satisfactory postoperative outcome in 95% cases of bilateral cleft lip, repaired with modified Millard's technique but their assessment criteria is very brief and ignored the bilateral cleft lip stigmata.²² Another series by Fakih-Gomez *et al.* described their results as good bilateral cleft lip repair with excellent symmetry for their technique but without proper qualitative and quantitative assessment criteria.²³ Reddy *et al.* reported a better cosmetic outcome for Afroze repair in comparison to Millard's repair.²⁴ A study by Hammoudeh *et al.* also showed good results with early nasal repair.²⁵ In all these studies, the postoperative outcome criteria were different from each other which shows the difficulty of establishing a standardised outcome assessment protocol.

In this series, Mulliken's nasolabial repair technique was equally effective both for primary and secondary cases with

good aesthetic outcome results. The drawback of the study is that it only shows the early postoperative result. To assess the longevity and the influence of growth on the aesthetic outcome, long-term postoperative outcomes need to be assessed in further studies.

CONCLUSION

Although Mulliken repair is by far the most prevalent type of repair for bilateral cleft lip patients, the results can vary markedly from one surgeon to another. The early outcome evaluation criteria is an objective tool to measure the outcomes. Further work is needed in order to identify the common causes of low OEC scores and give specific tailored surgical strategies in order to improve the outcomes.

ETHICAL APPROVAL:

Ethical approval was obtained from the Institutional ethical board at Burns and Plastic Surgery Centre (14/REB/B&PSC/19) before the initiation of the study.

PATIENTS' CONSENT:

Informed consent was obtained from the patients for publishing the concerned data.

COMPETING INTEREST:

The authors declared no competing interest.

AUTHORS' CONTRIBUTION:

MK: Concept, data collection, write-up, data analysis, and interpretation.

HU: Data collection, technical guidance, and interpretation.

AK: Data collection, write-up, and visual design.

WH: Write-up, data interpretation, and proofreading.

All the authors have approved the final version of the manuscript to be published.

REFERENCES

1. Mancini L, Avinoam S, Grayson BH, Flores RL. Three-dimensional nasolabial changes after nasoalveolar molding and primary lip/nose surgery in infants with bilateral cleft lip and palate. *Cleft Plate Crainofac J* 2022; **59(4)**:475-83 doi: 10.1177/105566562111012858.
2. Mulliken JB. Primary repair of bilateral cleft lip and nasal deformity. *Plast Reconstr Surg* 2001; **108(1)**:181-94; examination,95-6. doi: 10.1097/00006534-200107000-00028.
3. Peryer H, Slator R, Thomson J. The method of surgical lip repair affects speech outcomes in children with bilateral cleft lip and palate. *Cleft Plate Crainofac J* 2021; **58(4)**: 419-28 doi: 10.1177/1055665620956872.
4. Wei Y, Zhong T, Yin X, Shi B, Zheng Q, Li J. Dynamic nasolabial growth after primary surgery for patients with bilateral cleft lip: A five-year follow-up study. *J Oral Maxillofac Surg* 2019; **77(10)**:2125.e1-e10. doi: 10.1016/j.joms.2019. 05.013.
5. Gatti GL, Freda N, Giacomina A, Montemagni M, Sisti A. Cleft lip and palate repair. *J Craniofac Surg* 2017; **28(8)**:1918-24. doi: 10.1097/scs.0000000000003820.
6. Loh I, Chong D. Primary repair of bilateral cleft lip deformity and absent prolabium with a full-thickness skin graft. *J Craniofac Surg* 2021; **32(6)**:2217-8 doi: 10.1097/scs.0000000000007829.
7. Seo HJ, Denadai R, Lo LJ. Long-term nasal growth after primary rhinoplasty for bilateral cleft lip nose deformity: A three-dimensional photogrammetric study with comparative analysis. *J Clin Med* 2019; **8(5)**. doi: 10.3390/jcm8050602.
8. Bermudez L, Carter V, Magee W Jr, Sherman R, Ayala R. Surgical outcomes auditing systems in humanitarian organizations. *World J Surg* 2010; **34(3)**:403-10 doi: 10.1007/s00268-009-0253-6.
9. Doray B, Badila-Timbolschi D, Schaefer E, Fattori D, Monga B, Dott B, et al. Epidemiology of orofacial clefts (1995-2006) in France (congenital malformations of alsace registry). *Arch Pediatr* 2012; **19(10)**:1021-9 doi: 10.1016/j.arcped.2012.07.002.
10. Kim SK, Lee JH, Lee KC, Park JM. Mulliken method of bilateral cleft lip repair: anthropometric evaluation. *Plast Reconstr Surg* 2005; **116(5)**:1243-51; discussion 52-4 doi: 10.1097/ 01.prs.0000181518.97734.bf.
11. Kim DC, Mulliken JB. Direct anthropometry of repaired bilateral complete cleft lip: A long-term assessment. *Plast Reconstr Surg* 2017; **140(2)**:326e-32e doi: 10.1097/PRS.0000000000003535.
12. Kamel GN, Segal RM, Tsai C, Kordahi A, Gosman AA. How to get consistently good results in cleft lip repair. *Plast Reconstr Surg Glob Open* 2021; **9(7)**:e3677. doi: 10.1097/gox.0000000000003677.
13. Austen WG Jr, Gfrerer L, Lewis MB. A Personal approach to bilateral cleft lip repair. *J Craniofac Surg* 2018; **29(2)**:420-3. doi: 10.1097/scs.00000000000004121.
14. Derderian CA, Seo HJ, Denadai R, Lo LJ. Long-Term nasal growth after primary rhinoplasty for bilateral cleft lip nose deformity: A three-dimensional photogrammetric study with comparative analysis. *Cleft Palate Craniofac J* 2019; **8(5)**: 602. doi: 10.3390/jcm8050602.
15. Mulliken JB, Wu JK, Padwa BL. Repair of bilateral cleft lip: Review, revisions, and reflections. *J Craniofac Surg* 2003; **14(5)**:609-20. doi: 10.1097/00001665-200309000-00003.
16. Akintububo OB, Ojo EO, Kokong DD, Adamu SA, Nnadozie UU, Yunusa-Kaltungo Z, et al. Cleft Lip, Alveolus and Palate in African natives: An update on demographics and management outcome. *Afr J Med Med Sci* 2014; **43(Suppl 1)**:141-6.
17. Yuzuriha S, Oh AK, Mulliken JB. Asymmetrical bilateral cleft lip: Complete or incomplete and contralateral lesser defect (minor-form, microform, or mini-microform). *Plast Reconstr Surg* 2008; **122(5)**:1494-504. doi: 10.1097/PRS.0b013e31818 9169b.
18. Dadáková M, Cagánová V, Dupej J, Hoffmannová E, Borský J, Velemínská J. Three-dimensional evaluation of facial morphology in pre-school cleft patients following neonatal cheiloplasty. *J Craniomaxillofac Surg* 2016; **44(9)**:1109-16 doi: 10.1016/j.jcms.2016.07.023.
19. Oosterkamp BC, Dijkstra PU, Rimmelink HJ, van Oort RP, Goorhuis-Brouwer SM, Sandham A, et al. Satisfaction with treatment outcome in bilateral cleft lip and palate patients. *Int J Oral Maxillofac Surg* 2007; **36(10)**:890-5. doi: 10.1016/j.ijom.2007.07.008.
20. Pinto V, Piccin O, Burgio L, Summo V, Antoniazzi E, Morselli PG. Effect of early correction of nasal septal deformity in unilateral cleft lip and palate on inferior turbinate hypertrophy and nasal patency. *Int J Pediatr Otorhinolaryngol* 2018; **108**:190-5. doi: 10.1016/j.ijporl.2018.03.002.
21. Chang CS, Liao YF, Wallace CG, Chan FC, Liou EJ, Chen PK, et al. Long-term comparison of the results of four techniques used for bilateral cleft nose repair: a single surgeon's experience. *Plast Reconstr Surg* 2014; **134(6)**:926e-36e doi: 10.1097/prs.0000000000000715.
22. Adeyemo WL, James O, Adeyemi MO, Ogunlewe MO, Ladeinde AL, Butali A, et al. An evaluation of surgical outcome of bilateral cleft lip surgery using a modified Millard's (Fork Flap) technique. *Afr J Paediatr Surg* 2013; **10(4)**:307-10. doi: 10.4103/0189-6725.125419.
23. Fakh-Gomez N, Sanchez-Sanchez M, Iglesias-Martin F, Garcia-Perla-Garcia A, Belmonte-Caro R, Gonzalez-Perez LM. Repair of complete bilateral cleft lip with severely protruding premaxilla performing a premaxillary setback and vomerine osteotomy in one stage surgery. *Med Oral Patol Oral Cir Bucal* 2015; **20(4)**:e500-7 doi: 10.4317/medoral.20568.
24. Reddy SG, Reddy RR, Zinser MJ, Reddy LV, Markus AF, Bergé SJ. A comparative study of two different techniques for complete bilateral cleft lip repair using two-dimensional photographic analysis. *Plast Reconstr Surg* 2013; **132(3)**:634-42 doi: 10.1097/PRS.0b013e31829ad193.
25. Hammoudeh JA, Imahiyerobo TA, Liang F, Fahradyan A, Urbinelli L, Lau J, et al. Early cleft lip repair revisited: A safe and effective approach utilizing a multidisciplinary protocol. *Plast Reconstr Surg Glob Open* 2017; **5(6)**:e1340. doi: 10.1097/gox.0000000000001340.

• • • • •