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Surgical Management of Cleft Lip and Palate: A Multi-Center Survey of Causes, Complications, and Variations in Kerbala

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Abstract

Background: Cleft lip and palate are common congenital anomalies which present with great regional variability of presentation, surgical management and outcomes. **Specific Background:** Limited information is available over the complete cleft phenotype distribution, surgical support and postoperative complications in Kerbala/Iraq (prevalence ~1/1000 live births). **Existing Knowledge**: There is currently no detailed regional profiling reported on phenotype patterns, perioperative procedures and complication rates in relation to this population-group. **Objective**: This retrospective chart review was conducted to profile cleft phenotype, laterality, and surgical management along with postoperative outcomes among 55 patients treated in three Kerbala hospitals. **Results**: Cleft lip and palate was the most common phenotype (69.1%) males were more affected (54.55%), and unilateral were more common (67.3%). In recent practice, a rapid recovery was noted with primary repairs and absorbable sutures (1-2 days average discharge-81.81%). In 34.7% of cases, alveolar bone graft was performed. Complications following the surgery were observed in 12.7% of patients: fistula (12.7%), scar (27.2%) and dehiscence85(18%), resulting in a requirement for another operation, with similar occurrence rate of 12.7%. **Novelty**: This is the first detailed regional descriptive profile of cleft care that has been established in Kerbala, and sets a platform for comparison against future phenotype distribution patterns and surgical outcomes. **Implications**: The results underscore the importance of standard approaches to follow-up, improved multidisciplinary care pathways, and interventions focused on sequelae resolution in order to maximize functional and aesthetic outcome in this patient group..

Highlight :

- Cleft lip and palate was the predominant (69.1%) type, with higher contribution of unilateral clefts and with male-preponderance.
- Primary repair was performed with absorbable suture material and a 1-2 day hospitalization and bone grafting was applicable in 34.7% of cases performed at the ages of 7-12 years.
- The most common complications were Fistula formation (12.7%) and Scarring (27.2%) requiring multidisciplinary follow up for best outcomes..

Keywords : left Lip and Palate, Surgical Management, Postoperative Complications, Phenotype Distribution, Alveolar Bone Grafting

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Introduction

According to one article, doctors should assess cleft lip/cleft palate in light of dysfunctional appearance; and the most common malposition in this kind of congenital cleft is incomplete cleft appearance. Nevertheless its manifestations are many, including unilateral or bilateral cleft lips, necessary palate and combinations that further Lom out onto the list of theoretical post-partum deviations (Vyas et al. 2020). The developing face of the fetus is an intricately coordinated series of events. Several facial prominences soon combine to form the upper lip while the palate is then created: failures in either of these joining events cause a gap that ends up forming a cleft (McCarthy, 2020). This issue has multiple causes, including genetic predisposition and environmental factors. It is not the fault of one parent. Having a child born with cleft lip and/or palate communicates significant genetic input (Smolyar 1996), but on the other hand maternal teratogen status in the mother's body, social habits which includes whether cigarettes or alcohol are used will add various population hazards(Farwa et al. 2024; Kotonam-Fujiwata et al.2005). Racial and geographic differences in the incidence of clefting suggest that it is both an environmental and genetic disorder. The prenatal frequency of cleft/craniofacial abnormalities can be determined indirectly by international variation in rates; such deviation from expected values could indicate a combination of genes with environments(Franklin et al., 2021). Ultrasound probes can be used to differentially identify frequency of prenatal cleft/craniofacial abnormalities as early as the beginning of the first trimester and, in some cases provide imagery that enhances early diagnosis by three-dimensional imaging; once more, before birth isolated cleft palate often harder (Kennedy et al., 2025). Early detection means that you can plan for a complete postnatal care system and advise the parents, whereas through this kind of cooperation between obstetricians and surgeons success rates are increased(Farwa et al.2024). Factual circumstances: Because many cleft lip/palates are associated with other congenital anomalies, the ratio of these cases to all clefts might be high. However, most cleft palates uterus follow a complex gene pattern, and it seems heritability levels are relatively high (Graf et al. 2010). The risk of recurrence in future pregnancies depends on parental and family history, and the figures appear in many nations to differ considerably by county and indeed from one region within a country or across great cultural bounds(Valari et al.2021). When dealing with cleft lip and palate children lifelong treatment demands excellent all-round care from various specialists, taking care of many aspects. In general, there are several series of plastic reconstructions. The goal of each series is to restore normal appearance, make proper speech and feeding possible, support healthy teeth, and bring about the best possible cosmetic result(Burlamachi, 2005). The metrics used for healthcare planning in Kerbala are to possess an understanding of disease load and the resource needs informed by regional epidemiological data. As for orofacial clefting, numbers say there are some 1 mouth per 1000 live births-and these break up unevenly between unilateral and bilateral clefts (and males preferentially favor all left clefting) (Kadhim, 2008). Regional statistics of this type suggest that distribution and provision of resources must not only be at the national level, but also smaller scale demands, such as surgical services, prenatal counselling and postoperative therapy for example should also be considered. There are also particular management implications for clinical care and quality insights(Agranat et al. 2008). In this reference, we have performed the following study with an effort to register the status quo of current state in treating patients with cleft lip and palate at three major hospitals in nearby provincial town bore tis vicinity. We will provide time frames for implemented treatments periods of butchery attacks observed aetiology and risk factors including outcome-related sequelae. That's for transparent reporting, and thus for patient care but also macro level management implications of findings (Stock et al. 23; Sander et al. 2004).

Patients and Procedures

Study design

This study was conducted as a retrospective chart review of patients treated for cleft lip and palate at three hospitals in Kerbala, namely, Kerbala City Hospital, Al-Hussein Teaching Hospital, and Al-Kafeel Hospital. Records were retrieved and analysed to describe the prevalence, characteristics, and distribution of cleft-related conditions, as well as postoperative challenges encountered in this regional cohort. Ethical approval was obtained from the relevant institutional review board.

Inclusion and exclusion criteria

Inclusion criteria included patients aged 3 months to 24 years at the time of data collection, with diagnoses of cleft lip, cleft palate, or cleft lip and palate, as well as treatment records from Al-Husseini Teaching Hospital or Al-Kafeel Hospital (and, for a complete regional picture, Kerbala City Hospital when available). Exclusion criteria included patients outside the specified age range as well as those with incomplete medical records or unclassified cleft conditions.

Participants

A total of 55 patients meeting the inclusion criteria were analysed. The age range was from 3 months to 24 years. The cohort included both genders and encompassed all major cleft phenotypes encountered in the setting: cleft lip, cleft palate, and cleft lip with palate. The distribution by cleft type and sex was captured to characterize the demographic profile of the population served by these institutions. Cleft types fell into one of four categories:

1. Cleft lip: Clefting in facial structures that affects the lip (partial or complete split of the upper lip).
2. Harelip: a harelip, large jaw, and central cleft of the palate.
3. Both Lip and Palate Cleft: cleft in lip and palate.
4. CleftTypesubcategories:unilateral(leftorright),bilateral,complete,andincomplete.

Data collection

Demographic characteristics, including age at presentation and sex, were noted. Phenotype of cleft and side specific and was noted if the patient had a CL (CLeft Lip), CP (Cleft palate) or UCLP(C Left lip with two sides on palate, unilateral or bilateral) as well isolated /Not also, UCL/ BCL complete/Incomplete. Details of the surgical strategy and time-relative procedures (initial repair, staged procedure, deviation from institutional protocol) were recorded. Postoperative variables were also gathered, including early complications during the postoperative period and any other new problems or readmissions in relation to index surgery.

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Statistical analysis

All information was collected and entered into a secured database as well as by verification for the accuracy. Descriptive statistics were used to summarize how often and where cleft types occurred by sex and anatomic grouping. Percentages were generated for each outcome and across subpopulations.

Result

Patient details and presentation

This study examined 55 patients treated for cleft lip, cleft palate, as well as cleft lip and palate in Kerbala, providing a detailed portrait of phenotype distribution, laterality, age, hospital stay, surgical practices, and postoperative outcomes. Cleft lip and palate emerged as a predominant presentation, with a clear male predominance within the cleft lip and palate category. Unilateral clefts were more common than bilateral clefts, and complete clefts vastly outnumbered incomplete clefts. In terms of phenotype, bilateral clefts accounted for a smaller fraction of the cohort compared with unilateral clefts, as presented in Table 1. Cleft lip accounted for 11 cases, representing 20.0% of the total sample, with 5 cases (9.09%) in males and 6 cases (10.90%) in females. Cleft palate comprised 6 cases, corresponding to 10.90% of the cohort, including 4 male cases (7.27%) and 2 female cases (3.64%). Cleft lip and palate were the most prevalent category, with 38 cases (69.10% of all patients), of which 30 were male (54.55%) and 8 were female (14.55%).

Table 1: Cleft Lip, Palate, and Lip-Palate Distribution by Gender

Category *(n, %)*	**All Patients** *(n = 55)*	**Male** *(n = 39)*	**Female** *(n = 16)*
Cleft Lip	11 *(20.00)*	5 *(9.09)*	6 *(10.90)*
Cleft Palate	6 *(10.90)*	**4** *(7.27)*	2 *(3.64)*
Cleft Lip and Palate	38 *(69.10)*	30 *(54.55)*	8 *(14.55)*

Cleft laterality and cleft type were distributed as summarized in Table 2. Among unilateral clefts, right-sided cases accounted for 11 patients (20.00%), while left-sided clefts comprised 26 patients (47.27%). Bilateral clefts represented 18 cases (32.73%). For cleft type, complete clefts were predominant, with 49 cases (89.10%), whereas incomplete clefts accounted for 6 cases (10.90%).

Table 2: Distribution of Cleft Laterality and Cleft Type

Cleft Laterality	**All Patients** *(n = 55)*
Unilateral Clefts	
Right-sided	11 *(20.00)*
Left-sided	26 *(47.27)*
Bilateral Clefts	18 *(32.73)*
Cleft Type	
Complete Clefts	49 *(89.10)*
Incomplete Clefts	6 *(10.90)*

Surgical management and perioperative report

The study noted that approximately 81.81% of patients with cleft lips stayed in the hospital for one to two days postoperatively, reflecting typical short-stay postoperative care in the participating centres. The most commonly used sutures for cleft lip repair were absorbable materials, with Monocryl 5-0 employed in mucosa, Monocryl 4-0 in musculature, Monocryl 4-0 at points for nasal suspension (McComb type), and Vicryl 6-0 in skin. The reported mean time to onset of suture absorption for skin closure using Vicryl Rapide 6-0 was seven days.

The cleft lip and palate cases comprised 38 patients meeting the inclusion criteria. The ages in this group ranged from 6 months to 24 years, with 21.1% of the participants being female and 78.9% male. Unilateral clefts accounted for 67.3% of these cases, while bilateral clefts represented 32.7%. About 90.32% of patients in this subgroup remained in the hospital for one to three days. The suturing pattern mirrored that used for cleft lip repairs, with Monocryl 5-0 in mucosa, Monocryl 4-0 in musculature, and Monocryl 4-0 in oral mucosa, while the absorption timeline for palatal mucosa repair averaged nine days. When present, alveolar cleft repair with bone grafting, using autologous bone harvested from the iliac crest or ribs, was documented as a common intermediate intervention to support the eruption and alignment of permanent teeth, typically between the ages of 7 and 12 years, and was reported in approximately 34.7% of cases within the study period. Sample pre- and post-surgery images for different categories are presented in Figures 1 and 2.

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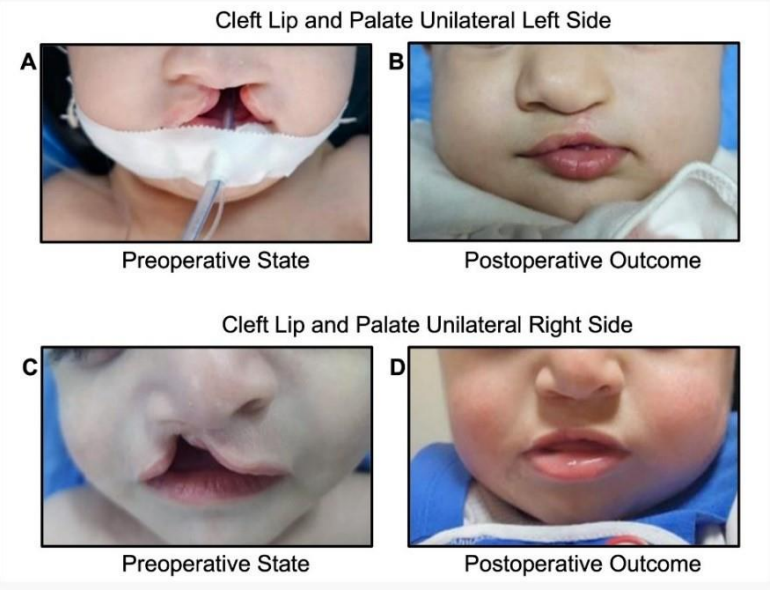

Figure 1: Cleft Lip Repair in Unilateral Left and Right Sides
A and B show unilateral left cleft lip and palate before and after surgical repair, respectively. Image A demonstrates preoperative status with lip/nasal tissue gap and feeding support, while image B shows postoperative closure with improved lip contour. C and D show unilateral right cleft lip and palate before and after surgical repair, respectively. Image C demonstrates preoperative deformity with lip asymmetry, while image D shows postoperative lip normalization and restoration of contour.

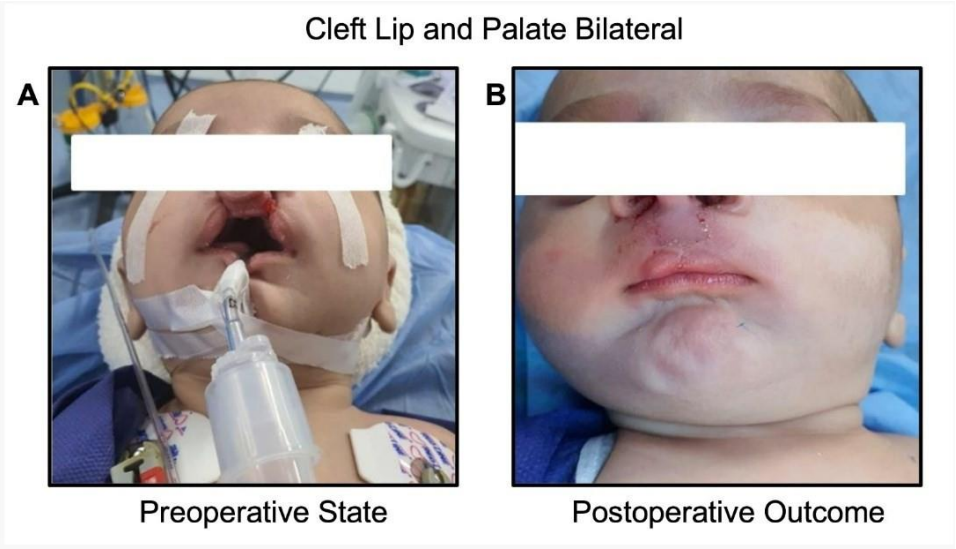

Figure 1: Cleft Lip Repair in Unilateral Left and Right Sides
A and B show unilateral left cleft lip and palate before and after surgical repair, respectively. Image A demonstrates preoperative status with lip/nasal tissue gap and feeding support, while image B shows postoperative closure with improved lip contour. C and D show unilateral right cleft lip and palate before and after surgical repair, respectively. Image C demonstrates preoperative deformity with lip asymmetry, while image D shows postoperative lip normalization and restoration of contour.

Postoperative complications

Postoperative complications for cleft lip repair included scarring in 27.2% of cases and dehiscence in 18%, with other complications observed in 7.13% of cases. Complications across the entire cohort (Table 3) included Scar formation in 4 cases, representing 7.27% of patients. Dehiscence was documented in 3 cases (5.45%). Fistula formation was the most common complication, seen in 7 cases (12.73%). Anatomical variations were noted in 2 cases (3.64%). Other bleeding or complications occurred in 1 case (1.82%). Recurrent cases requiring revision or additional intervention were recorded in 7 cases (12.73%).

Discussion

This report on patients undergoing cleft lip and/or palate repair in Kerbala provides a detailed overview of phenotype distribution, laterality, age at intervention, hospital stay, surgical techniques, and postoperative outcomes in a regional context. The data show that cleft lip and palate are the

most common phenotypes, with a significant male dominance, and unilateral clefts are more frequent than bilateral clefts. Among the phenotypes, cleft lip with palate is the most prevalent (69.1%), followed by cleft lip (20.0%) and cleft palate (10.9%). Bilateral clefts account for a smaller percentage of cases compared to unilateral ones (32.7% bilateral vs 67.3% unilateral among the cleft lip/palate group). Complete clefts are more common (89.1%) than incomplete clefts (10.9%). These findings are consistent with global epidemiologic patterns in many populations, where cleft lip and palate are typically the dominant phenotypes and unilateral clefts are more common than bilateral ones (Muzammil et al., 2021; Rullo et al., 2015). The marked male predominance in cleft lip and palate reflects widely reported sex dimorphism in clefting disorders, although the extent observed here suggests that local genetic, environmental, and healthcare-seeking factors may influence diagnosis and referral patterns (Papaefthymiou et al., 2024).

The study documents a clear emphasis on early, short-stay postoperative care, with roughly 82% of patients discharged within one to two days after lip repair. This length of stay is consistent with standard practice in many local hospital settings where resources are limited, and uncomplicated primary repairs are followed by brief hospital observation (Moffitt et al., 2021; Oh et al., 2015). Suture selection and technique for lip repair predominantly employed absorbable materials (Monocryl 5-0 in mucosa, 4-0 in musculature and nasal support, with Vicryl 6-0 for skin). The reported mean absorption time for skin sutures (Vicryl Rapide 6-0) at about seven days is within expected ranges for rapid-absorbing monofilament and braided materials, which can facilitate efficient wound healing while minimizing the need for postoperative suture removal (Egbunah et al., 2022).

For cleft lip and palate cases, the age range from 6 months to 24 years reflects inclusive criteria capturing both typical early repair timelines (lip repair often in the first year of life; palate repair often in the first 18 months or later depending on resources and protocols) and late presentations. The unilateral-to-bilateral distribution within cleft lip and palate emphasizes that, despite broader age ranges, surgical planning must accommodate a range of growth stages and potential secondary interventions (Fell et al., 2023).

Alveolar bone grafting, reported in approximately 34.7% of cleft lip and palate cases, serves as an important intermediate intervention to support the eruption and alignment of permanent teeth, typically during mixed dentition (ages 7–12 years). This rate provides insight into the timing and extent of secondary surgical planning in this cohort and underscores the role of autologous grafting (iliac crest or rib) as a standard adjunct in cleft care (Bartzela et al., 2025; Mundra et al., 2022). The use of autologous tissue aligns with established best practices to optimize periodontal support and alveolar bone integrity for subsequent eruption and orthodontic outcomes (Chetpakdeechit et al., 2023).

A minority of patients required rhinologic procedures during childhood, with more extensive rhinoplasty deferred until post-growth when necessary to address breathing and aesthetic concerns. This staged approach is consistent with global cleft care paradigms that reserve secondary nasal surgeries for after facial growth completion to improve stability and functional outcomes (Denadai & Lo, 2022). Orthognathic procedures were rare (<2%), reflecting either favourable skeletal relationships in the cohort or limitations in access to long-term multidisciplinary care, which is a common challenge in resource-constrained settings (Paul & Rolland, 2023).

Postoperative complications after cleft lip repair included scarring (27.2%), dehiscence (18%), fistula formation (12.7%), and other complications (7.13%), with recurrent cases requiring revision or additional intervention in 12.7% of patients. Fistula formation emerged as the most common complication, a finding that warrants attention because fistulas can significantly affect speech, feeding, and psychosocial well-being (Long et al., 2016). The spectrum and rates of complications in this cohort are broadly in line with reported ranges from diverse geographic regions, though higher dehiscence or fistula rates in some centres may reflect surgical technique nuances, tissue tension, patient age at repair, or postoperative care standards (Sutcu et al., 2021). The presence of scar formation in over a quarter of lip repairs is not unusual, given individual healing variation and the proximity to vermilion and mucosal junctions (Ramzy et al., 2023)

Conclusion

In this case series of CHDs, cleft lip and palate were the most prevalent phenotypes, male to female ratio was higher among unilateral than bilateral clefts in addition a obvious male predominance in the isolated cleft, while no significant gender difference was found in other types. For all intents and purposes, a shorter postoperative stay and the use of absorbable sutures followed by discharge represent cost-effective, resource-sensitive surgical management consistent with international best practices in numerous environments. Autologous alveolur bone grafting was still performed in a substantial proportion of patients with cleft lip and palate, indicating continuing attempts to optimize dentoskeletal results. Postoperative complications, in particular a fistula and scarring, highlight the difficulties to achieve optimal function and appearance and elements of future surgical improvement with longer multidisciplinary follow-up. In a similar vein, that longitudinal function, including speech and aesthetic satisfaction but also feeding, dental eruption and occlusion could be compared between patients with UVII versus UCF would further enhance our understanding of over-time success and improve management. Additionally, determining the optimal not only age but developmental stage for palate repair and secondary procedures in this group could be useful to tailor interventions according to regional growth patterns and resources. This investigation provides useful regional information and acts as a springboard into long-term assessment of growth, functional outcome, and quality of life as the child reaches late childhood to early teenage years.

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