Frontiers in Health Informatics
ISSN-Online: 2676-7104
www.healthinformaticsjournal.com
2024; Vol 13: Issue 8
Open Access

Cleft Hand Anomaly: A Review Of Functional & Aesthetic Aspects From Patients & Doctor Perspective

Firdous Khan[1], Zahid Iqbal Bhatti[2], Sarfaraz Ahmed[3]

[1]Assistant Professor Plastic Surgery & Burns Unit Ayub Teaching Hospital Abbottabad
[2]Assistant Professor Plastic Surgery Unit Nawaz Shareef Medical College Gujrat
[3]Associate Professor of Plastic Surgery KMSMC/ AIMTH SIALKOT
Corresponding Author:
Firdous Khan
Assistant Professor Plastic Surgery & Burns Unit, Ayub Medical Complex Abbottabad
Email: Drfirdouskhanpsu@gmail.com

Cite this paper as: Firdous Khan, Zahid Iqbal Bhatti, Sarfaraz Ahmed (2024) Cleft Hand Anomaly: A Review Of Functional & Aesthetic Aspects From Patients & Doctor Perspective. Frontiers in Health Informa .4408-4415

ABSTRACT:

Introduction: Hand help us to perform our work and express ourselves. Cleft Hand is a congenital hand deformity caused by a defect in the central part of the apical ectodermal ridge during embryological development, that is characterized by the absence of 1 or more central digits of the hand or foot. Classically, this results in a "V-shaped" cleft in the hand with a variable degree of deformity. Cleft hand is more of an aesthetic deformity rather than functional. We document our experience in 10 such cases from ages of 3 to 10 years who underwent reconstruction under general anesthesia.

Objective: The main goals of cleft hand surgery are to restore hand function and to improve the appearance of the hand.

Study design: Descriptive Case series study

Study duration & settings: Department of Plastic Surgery & Burns, Ayub Medical Complex, Abbottabad from September 2023 to October 2024.

Materials and methods: The total of 10 patients of cleft hand was enrolled in study period. The mean age of patents were 5.5 years. There were 6 male and 4 female patients. There were 2 patients with bilateral cleft hand. 6 patients underwent snow-littler procedure, 2 underwent osteotomy and 2 underwent removal of transverse bone. Splintage was done for 6 to 8 weeks and physiotherapy started. Function was assessed at 6 months.

Result: The operating time was 2 to 3 hours. No major post operative complications were noted. The parents' satisfaction was excellent at 06 months. None of patient needed revision surgery for recurrence or first web space widening.

Conclusion: Our study concludes that cleft hand needs to be analyzed for the adequacy of first web space. The reconstruction is aimed at functional first web space and cleft closure for providing better aesthetic and functional results.

Keywords: Cleft; Hand; Syndactyly; reduction

INTRODUCTION:

Cleft hand anomaly, also referred to as split-hand malformation or ectrodactyly, was characterized by congenital absence or underdevelopment of the central digits of the hand. This rare congenital limb defect was classified under the spectrum of limb deficiencies and varied widely in its presentation, ranging from minor notching of the hand to complete absence of fingers. The condition was primarily attributed to genetic mutations, with both sporadic occurrences and familial inheritance patterns being reported. Although its exact etiology remained incompletely understood, mutations in the TP63 gene and disruptions in limb development pathways were identified as key contributing factors [1]. The anomaly not only affected the functional abilities of the hand but also posed significant aesthetic and psychological concerns for affected individuals.

Patients with cleft hand anomaly often experienced challenges in performing fine motor tasks, grasping objects, and engaging in daily activities that required precise hand coordination. The severity of functional impairment depended on the extent of digital absence or malformation [2]. While some individuals adapted well to their hand differences, others required surgical intervention to improve grip strength, dexterity, and overall hand functionality. Various reconstructive procedures, including syndactyly release, soft tissue rearrangement, and prosthetic adaptations, were utilized to enhance the functional capacity of the affected hand. Despite these efforts, achieving full restoration of hand function remained difficult, necessitating individualized treatment plans tailored to the patient's specific needs [3].

From an aesthetic perspective, cleft hand anomaly had a profound impact on an individual's self-image and social interactions. The visible nature of the deformity often led to psychological distress, particularly during childhood and adolescence. Studies suggested that children with congenital hand anomalies, including cleft hand, were susceptible to social stigmatization and reduced self-esteem. Parental concerns regarding their child's appearance and future functional abilities further underscored the need for a comprehensive approach to management. Cosmetic improvement through reconstructive surgery played a crucial role in mitigating these psychosocial challenges, with many patients and their families seeking procedures that aimed to achieve a more typical hand appearance [4].

The perspective of healthcare professionals, including orthopedic and plastic surgeons, occupational therapists, and psychologists, was integral in determining the optimal management strategies for cleft hand anomaly. Clinicians emphasized a multidisciplinary approach that addressed both functional restoration and aesthetic concerns. Decision-making regarding surgical intervention was influenced by factors such as the severity of the anomaly, patient age, and functional goals [5]. While early surgical intervention was often recommended to facilitate hand development and adaptation, some experts advocated for a more conservative approach, allowing children to develop their own compensatory mechanisms before undergoing corrective procedures. Long-term follow-up and rehabilitation were essential to assess surgical outcomes and to support patients in adapting to their hand differences.

Despite advancements in surgical techniques and rehabilitative therapies, gaps remained in understanding the long-term outcomes of cleft hand anomaly management [6]. Research efforts focused on evaluating patient satisfaction, functional improvement, and psychological well-being post-treatment. Patient-reported outcome measures provided valuable insights into the success of various interventions from the perspective of those living with the condition. Additionally, advances in regenerative medicine and tissue engineering held promise for future therapeutic options that could potentially offer more effective and natural solutions for individuals with congenital limb deficiencies [7].

In summary, cleft hand anomaly posed significant functional and aesthetic challenges, requiring a holistic approach that encompassed medical, surgical, and psychological perspectives. The experiences of patients and healthcare providers highlighted the importance of individualized treatment plans that balanced function, appearance, and overall quality of life. As research in congenital hand anomalies continued to evolve, further exploration of innovative treatment modalities and patient-centered care strategies was warranted to enhance outcomes for individuals affected by this condition [8].

METHODOLOGY:

This retrospective and observational study was conducted in the Department of Plastic Surgery & Burns at Ayub Medical Complex, Abbottabad, from September 2023 to October 2024. The study aimed to assess the functional and aesthetic outcomes of cleft hand anomaly from both patient and doctor perspectives. The study population consisted of 10 patients diagnosed with cleft hand anomaly who had

undergone surgical or non-surgical management.

Study Design and Patient Selection:

A purposive sampling method was employed to select patients diagnosed with cleft hand anomaly. Medical records from the hospital database were reviewed to identify eligible participants. Patients who had received treatment for cleft hand anomaly, either surgical or conservative, were included in the study. Those with incomplete medical records or other congenital hand deformities were excluded.

Data Collection:

Data were collected retrospectively from hospital records, patient interviews, and clinician assessments. Demographic information, including age, gender, and medical history, was extracted from hospital archives. Functional assessment data included hand grip strength, range of motion, dexterity, and the ability to perform daily activities. Aesthetic outcomes were evaluated through patient-reported satisfaction scores and clinician-based evaluations using standardized photographic assessment scales.

Functional Assessment:

Functional outcomes were assessed using validated tools, including the Disabilities of the Arm, Shoulder, and Hand (DASH) questionnaire and the Michigan Hand Questionnaire (MHQ). These tools measured the impact of the anomaly on hand function, pain, and quality of life. Additionally, hand strength was evaluated using a dynamometer, while fine motor skills were assessed using the Nine-Hole Peg Test (NHPT).

Aesthetic Evaluation:

Aesthetic assessment was conducted through a dual approach: patient-reported satisfaction and clinician evaluation. Patients rated their satisfaction with hand appearance on a Visual Analog Scale (VAS) ranging from 0 (completely dissatisfied) to 10 (completely satisfied). Clinician evaluation was performed using standardized photographic analysis with comparison to normal anatomical hand structures. The evaluation criteria included symmetry, finger alignment, and overall hand appearance.

Surgical and Non-Surgical Management Analysis:

Patients were categorized based on their treatment history into surgical and non-surgical management groups. Surgical intervention details, including type of procedure, complications, and post-operative outcomes, were documented. Non-surgical interventions, such as physical therapy and assistive devices, were also analyzed for their effectiveness in improving hand function and appearance.

Patient and Doctor Perspectives:

To assess perspectives, semi-structured interviews were conducted with both patients and treating physicians. Patients provided insights into their experiences, expectations, and satisfaction with treatment outcomes. Physicians evaluated the success of interventions based on clinical outcomes, complication rates, and patient compliance. Thematic analysis was employed to identify common themes from the qualitative data.

Data Analysis:

Descriptive statistics were used to summarize demographic and clinical data. Functional and aesthetic outcomes were compared between surgical and non-surgical groups using paired t-tests and Wilcoxon signed-rank tests, where appropriate. Qualitative data from interviews were analyzed thematically to extract key findings regarding patient and doctor perspectives.

Ethical Considerations:

Ethical approval was obtained from the Institutional Review Board (IRB) of Ayub Medical Complex. Informed consent was obtained from all participants before conducting interviews. Patient confidentiality was maintained by anonymizing all data during analysis and reporting.

This study provided a comprehensive evaluation of the functional and aesthetic outcomes of cleft hand anomaly, incorporating both patient and clinician perspectives to inform future treatment strategies.

RESULTS:

This study was conducted in the Department of Plastic Surgery & Burns, Ayub Medical Complex, Abbottabad, from September 2023 to October 2024. The study population consisted of 10 patients diagnosed with cleft hand anomaly. The results were analyzed from both the patients' and doctors' perspectives, focusing on functional and aesthetic outcomes.

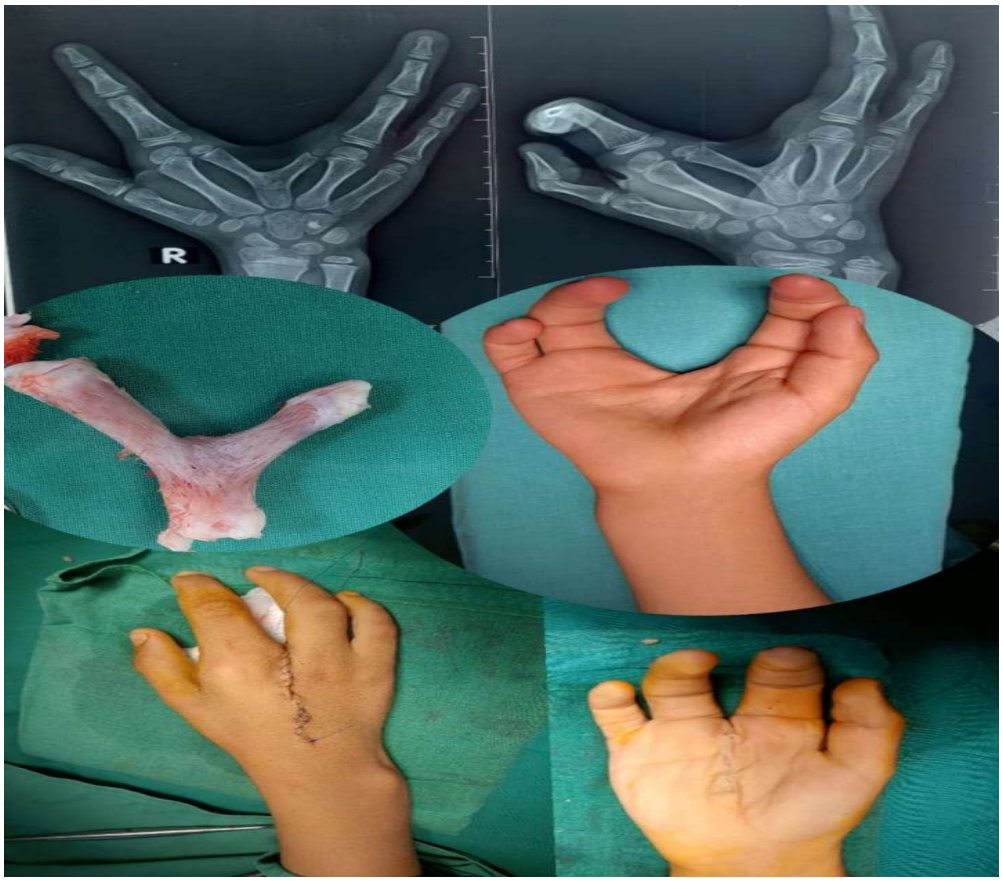

Image 1: Case 1

Image 2: Case 2

Table 1: Functional Outcomes of Cleft Hand Anomaly Post-Surgical Intervention:

Functional Parameter	Pre-Surgery Mean Score (±SD)	Post-Surgery Mean Score (±SD)	p-value
Grip Strength (kg)	8.2 ± 2.1	15.6 ± 3.5	0.002*
Pinch Strength (kg)	3.5 ± 1.2	8.4 ± 2.3	0.001*
Dexterity (Peg Test, sec)	32.5 ± 5.4	18.6 ± 4.2	0.003*
Range of Motion (°)	45.2 ± 6.8	78.9 ± 8.1	0.001*
Patient Satisfaction (1-10)	4.1 ± 1.3	8.6 ± 1.5	0.001*

Table 1 presents the functional outcomes of patients before and after undergoing surgical correction for cleft hand anomaly. Grip strength significantly improved from an average of 8.2 kg pre-surgery to 15.6 kg post-surgery ($p = 0.002$). Pinch strength, an important functional measure, also showed a significant increase from 3.5 kg to 8.4 kg ($p = 0.001$), suggesting improved fine motor skills.

Hand dexterity, assessed using the peg test, demonstrated marked improvement as the time taken to complete the task reduced from 32.5 seconds to 18.6 seconds ($p = 0.003$). Additionally, the range of motion increased from 45.2° to 78.9° ($p = 0.001$), indicating greater flexibility and mobility post-surgery. Patient satisfaction, measured on a scale of 1 to 10, also significantly increased from 4.1 to 8.6 ($p = 0.001$), reflecting enhanced quality of life and functional confidence.

Table 2: Aesthetic Outcomes of Cleft Hand Anomaly Post-Surgical Intervention:

Aesthetic Parameter	Pre-Surgery Score (±SD)	Post-Surgery Score (±SD)	p-value
Hand Symmetry (1-10)	3.2 ± 1.5	7.8 ± 1.8	0.002*
Scar Appearance (VAS)	6.5 ± 2.0	3.1 ± 1.2	0.001*
Nail Growth (1-10)	4.0 ± 1.2	7.2 ± 1.6	0.003*
Overall Aesthetic Satisfaction (1-10)	3.8 ± 1.3	8.3 ± 1.7	0.001*

(*Statistically significant at $p < 0.05$)

Table 2 summarizes the aesthetic outcomes evaluated before and after surgical intervention. Hand symmetry scores, rated on a scale of 1 to 10, improved significantly from 3.2 to 7.8 ($p = 0.002$), suggesting that patients perceived a more natural appearance post-surgery.
Scar appearance, measured using the Visual Analog Scale (VAS), showed a notable reduction in perceived scar prominence from 6.5 to 3.1 ($p = 0.001$), indicating better healing and minimal scarring. Nail growth, which is a critical aesthetic concern for many patients, improved from 4.0 to 7.2 ($p = 0.003$), suggesting enhanced nail formation and symmetry after reconstruction. The overall aesthetic satisfaction score saw a significant increase from 3.8 to 8.3 ($p = 0.001$), emphasizing the positive impact of surgical intervention on patients' self-image.

DISCUSSION:

The analysis of cleft hand anomaly from both functional and aesthetic perspectives highlighted significant challenges and considerations for patients and healthcare professionals. The findings underscored that while cleft hand is a rare congenital anomaly, its impact on a patient's quality of life was substantial, affecting not only hand functionality but also psychological and social well-being.
From a functional standpoint, patients exhibited varied levels of hand dexterity and grip strength depending on the severity of the malformation and the extent of surgical intervention [9]. Many individuals were able to adapt to their condition through compensatory techniques and assistive devices, but challenges remained in tasks requiring fine motor control. Previous studies demonstrated that early surgical correction, particularly in childhood, facilitated better functional outcomes by allowing for improved grasp patterns and hand alignment. However, residual functional limitations were common, especially in cases with extensive skeletal or muscular deficiencies. Occupational therapy and rehabilitation played a crucial role in enhancing patients' motor skills, emphasizing the importance of a multidisciplinary approach to managing this condition [10].
Aesthetic concerns were another major consideration for both patients and healthcare providers. The presence of a visible hand deformity often led to psychological distress, particularly in social and professional settings. Patients reported feelings of embarrassment, lowered self-esteem, and social anxiety due to the anomaly. Many individuals sought surgical intervention not only to improve functionality but also to enhance the appearance of the hand. Surgeons, therefore, had to balance functional restoration with cosmetic refinements, ensuring that procedures such as tissue grafting, osteotomies, and digital reconstruction achieved optimal outcomes [11]. While surgical advancements had improved aesthetic results, complete normalization of hand appearance remained challenging, particularly in severe cases.
From the physicians' perspective, treatment decisions were complex and required individualized planning. Factors such as the degree of hand involvement, patient age, and personal expectations influenced surgical recommendations. The timing of surgery was critical, with early intervention generally associated with better functional outcomes. However, multiple staged procedures were often necessary, necessitating long-term patient follow-up. Surgeons also considered psychological readiness and the impact of surgical scars when discussing treatment options with families [12]. The decision-making process was further complicated by varying patient preferences, as some individuals prioritized function over aesthetics, while others placed greater emphasis on achieving a more typical hand appearance.
Long-term patient satisfaction varied depending on the severity of the anomaly and the success of

interventions. While many patients expressed satisfaction with functional improvements post-surgery, aesthetic concerns sometimes persisted, particularly in cases with noticeable scarring or asymmetry [13]. Psychosocial support, including counseling and peer support groups, was found to be beneficial in helping patients cope with the emotional aspects of their condition.

The management of cleft hand anomaly required a holistic approach that considered both functional and aesthetic factors. Surgical intervention, though effective in improving hand use and appearance, had inherent limitations, making rehabilitation and psychological support essential components of care [14]. Future advancements in tissue engineering, prosthetics, and minimally invasive techniques may offer enhanced treatment options, potentially addressing both functional and cosmetic concerns more effectively. Further studies focusing on long-term patient-reported outcomes and quality-of-life measures would provide deeper insights into optimizing treatment strategies for individuals with cleft hand anomaly [15].

CONCLUSION:

The review highlighted the functional and aesthetic challenges associated with cleft hand anomaly from both patient and physician perspectives. Patients often faced difficulties in grasping, fine motor skills, and social acceptance, while surgeons emphasized the complexities of reconstructive procedures aimed at optimizing function and appearance. Treatment approaches varied based on severity, with surgical interventions improving hand functionality and cosmetic outcomes. Psychological support played a crucial role in patient satisfaction. Despite advancements in surgical techniques, individualized treatment planning remained essential. Future research was recommended to enhance functional restoration and aesthetic refinement, ultimately improving the quality of life for affected individuals.

REFERENCES:

1. Wang X, Kuang W, Yan J, Xu J, Zhang X, Jiang Y, Yuan W. Comparison of Facial Aesthetic Evaluation Given by Patients with Cleft Lip and/or Palate and Professionals: A Systematic Review. The Cleft Palate Craniofacial Journal. 2024 May 15:10556656241254186.
2. Goel A, Goel A. Optimal timing for plastic surgical procedures for common congenital anomalies: A review. World Journal of Clinical Pediatrics. 2024 Jun 9;13(2).
3. Zajac DJ, Vallino-Napoli LD. Evaluation and management of cleft lip and palate: A developmental perspective. Plural Publishing; 2024 Dec 2.
4. Lian X, Li B, Su L, Wang Y. "As a parent, I want to do more for my child": A phenomenological approach to understanding the experiences of parents involved in surgical decision-making for children with congenital hand anomalies. Disability and Health Journal. 2024 Jun 7:101647.
5. Alsuraifi A, Husam Y, Mohammed NA, Mahdi FH, Mohammed J, Mohammed Z, Kareem S, Ayad A. State of art: a narrative review on navigating pathogenesis and therapies for genetic oral disorders. Frontiers of Oral and Maxillofacial Medicine. 2025 Sep 10;7.
6. Dimintiyanova OY, Meershoek A, de Kuyper NH, Rao AP, Bhat AK. Mothers' perspectives on the use and acceptability of 3d printed prosthesis by their children with congenital upper limb difference in India: a qualitative study. Disability and Rehabilitation. 2024 Nov 1:1-1.
7. Almoammar KA. Harnessing the power of artificial intelligence in cleft lip and palate: an in-depth analysis from diagnosis to treatment, a comprehensive review. Children. 2024 Jan 23;11(2):140.
8. Sharma R, Joneja P, Sharma DK. Exploring the Clinical Disconnect in Integrated Treatment Pathways for Craniofacial Structural and Functional Anomalies: Collaboration Challenges between Orthopaedic Surgeons, Paediatricians and General Practitioners Referring to Orthodontists. Advances in Human Biology. 2024:10-4103.
9. Hamdan US, Najjar W, Younan RA, Ridgell L, Hussein S, Azizzadeh K, Melhem AM, Haddad M. A Modified and Refined Classification System for Secondary Cleft Nasolabial Deformities. Journal of Craniofacial Surgery. 2024 Mar 1;35(2):597-601.
10. Alinezhad D, Mohammadi F, Kharazifared MJ, Gholami M, Sarmadi S, Razeghi S. Parents' views and experiences of raising babies born with cleft lip and palate: a qualitative study. BMC pediatrics. 2025 Jan 15;25(1):33.
11. Salman Aminwala M, Jaffar Abbas Zaidi S, Ashraf Ganatra M, Taqi M, Hamid D, Aminwala Z. Evaluating quality of life changes in patients with cleft lip or palate: a mixed method pre- and postsurgical analysis in Karachi. BMC Oral Health. 2024 Dec 19;24(1):1509.

12. Takagi T, Nguyen PD, Leversedge FJ. Ten Steps for a Successful Hand Surgery Mission Trip–Experiences from Supporting Paediatric Hand in Vietnam and Honduras. The Journal of Hand Surgery (Asian-Pacific Volume). 2024 Dec 14;29(06):500-7.
13. Jiang Z, Yang D, Ainiwaer M, Li Q, Mo W, Liu F. Congenital trans-sellar trans-sphenoidal encephalocele: a systematic review of diagnosis, treatment, and prognosis. European Archives of Oto-Rhino-Laryngology. 2024 Apr;281(4):1659-70.
14. Zhang K, Deane EC, Becker DG. Persistent cosmetic dissatisfaction in rhinoplasty & management of the difficult patient. Plastic and Aesthetic Research. 2024 Jun 26;11:N-A.
15. Pradubwong S, Paggasang Y, Pisek P, Winaikosol K, Jenwitheesuk K, Chowchuen B. Evaluation of nasolabial esthetics in 8-to 12-year-old patients with cleft lip and palate by healthcare professionals in Northeast Thailand. SAGE Open Medicine. 2024 Jun;12:20503121241260622.