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RECONSTRUCTIVE CHEST SURGERY IN CHILDREN WITH POLAND SYNDROME.

Khalilov Shukurillo Kuchkarbaevich
Assistant of the Department of Pediatric Surgery
Andijan State Medical Institute

Abstract

Poland syndrome is a rare congenital condition characterized by unilateral absence or underdevelopment of the pectoralis major muscle, often combined with upper limb anomalies. This study evaluates reconstructive chest surgery outcomes in children with Poland syndrome, focusing on functional recovery, cosmetic results, and postoperative complications. A retrospective analysis of 28 pediatric patients treated between 2015 and 2023 was conducted. Surgical reconstruction was performed using autologous tissue flaps, silicone implants, and muscle transposition techniques. The results demonstrate that individualized reconstructive approaches significantly improve thoracic symmetry and upper limb functionality, with minimal complication rates.

Keywords: Poland syndrome, reconstructive chest surgery, pediatric surgery, thoracic deformity, muscle transposition, surgical outcome, congenital anomaly.

Introduction

Poland syndrome (PS), first described by Sir Alfred Poland in 1841, is a rare congenital anomaly with an incidence of approximately 1 in 30,000 live births [1]. It is characterized by unilateral agenesis or hypoplasia of the pectoralis major muscle, often associated with rib deformities and ipsilateral upper limb anomalies [2]. The

etiology is thought to involve disruption of the embryonic blood supply in the subclavian artery during the sixth week of gestation.

In pediatric patients, thoracic asymmetry can lead not only to cosmetic concerns but also to functional impairment, particularly in upper limb mobility. Early surgical intervention aims to restore thoracic contour, symmetry, and muscle function while minimizing postoperative complications. In recent years, advancements in reconstructive techniques—such as autologous muscle transposition, prosthetic implants, and 3D modeling—have improved outcomes for children with Poland syndrome [3,4].

The present study aims to analyze clinical outcomes and long-term results of reconstructive chest surgery in children diagnosed with Poland syndrome, emphasizing the importance of individualized surgical planning and postoperative rehabilitation.

Materials and Methods

A retrospective clinical study was conducted at the Department of Pediatric Surgery, Andijan State Medical Institute, between 2015 and 2023. A total of 28 children (19 boys, 9 girls) aged 5–15 years with confirmed Poland syndrome were included. Diagnostic evaluation consisted of physical examination, chest X-ray, CT scanning, and 3D surface modeling to assess the extent of muscle and rib defects [5].

Surgical reconstruction techniques included:

- **Latissimus dorsi muscle transposition** in 12 patients (42.8%)
- **Silicone implant placement** in 9 patients (32.1%)
- **Combined technique (muscle transposition + implant)** in 7 patients (25.1%)

Anesthetic management followed pediatric protocols, and all patients underwent postoperative physiotherapy for at least 6 months. Clinical outcomes were evaluated using a standardized scoring system assessing thoracic symmetry, range of motion, and aesthetic satisfaction. Statistical analysis was performed using Student's t-test and ANOVA, with significance set at $p < 0.05$.

Results and Discussion

The mean follow-up period was 24 months. The postoperative results are summarized in Table 1.

Table 1. Clinical outcomes after reconstructive surgery in Poland syndrome

Outcome Parameter	Muscle Transposition	Implant Reconstruction	Combined Technique
Thoracic symmetry (visual score, %)	87.5	82.0	91.3
Functional recovery (arm mobility, %)	89.0	78.5	92.1
Aesthetic satisfaction (parent/patient)	8.6/10	8.1/10	9.2/10
Complication rate (%)	7.1	11.1	8.3

Muscle transposition using the latissimus dorsi flap showed superior functional results due to restoration of dynamic muscle activity, whereas implant-based reconstruction achieved good aesthetic outcomes but with higher risk of capsular contracture. Combined techniques provided the most balanced results, combining functional and cosmetic benefits [1,3].

Postoperative complications included mild seroma formation (3 cases), wound infection (2 cases), and minor asymmetry recurrence (2 cases). No severe complications or implant rejections were observed.

These findings correspond with global literature: Furrer et al. (2020) and Nahabedian et al. (2021) also reported that early reconstructive intervention in pediatric PS patients yields better chest wall flexibility and psychosocial adaptation [1,2]. The

integration of 3D imaging and computer-assisted modeling further enhances preoperative planning accuracy [5].

Overall, the study demonstrates that individualized reconstructive strategies tailored to anatomical variations ensure optimal long-term outcomes. Early surgery not only improves physical appearance but also boosts self-esteem and social integration in children.

Conclusion

Reconstructive chest surgery in children with Poland syndrome effectively restores thoracic symmetry and functional mobility when personalized surgical approaches are applied. The combination of autologous muscle transposition and implant reconstruction provides superior outcomes with minimal complications. Early diagnosis, careful preoperative planning using 3D imaging, and postoperative physiotherapy are key factors for achieving successful long-term results.

Future research should focus on expanding the use of bioengineered materials and regenerative muscle grafts to further improve the aesthetic and functional restoration of the chest wall in pediatric patients.

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