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Research Article

Profile and Clinical Outcome Lateral Condyle Humerus Fracture in Children's Patients in National Orthopedic Hospital (2022-2024)

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ABSTRACT

The lateral condyle fracture is the second most prevalent elbow fracture in pediatric populations. Fractures of the distal humerus present challenges regarding diagnosis, treatment, and associated complications. This study aimed to describe the demographic characteristics, treatment modalities, and radiologic outcomes of pediatric lateral condyle humerus fractures managed at Prof. Soeharso Hospital between January 2022 to July 2024. This was a descriptive, retrospective study of pediatric patients diagnosed with lateral condylar humerus fractures during the study period. Patients were classified according to sex, age, treatment method, and outcomes. Data were obtained from hospital medical records and analyzed using Microsoft Excel. Between January 2022 and July 2024, 23 pediatric patients were identified, consisting of 15 boys and 8 girls. The majority of patients (n = 12, 52.2%) were aged 6–10 years. Most patients (n = 21) underwent surgical treatment, while two were treated conservatively. All surgical cases were managed with open reduction and internal fixation (ORIF): 20 patients with 2–3 Kirschner wires and one with a screw. Follow-up radiographs at 6–12 months postoperatively showed bone union in 15 patients, malunion in five, and nonunion in one. Among the conservatively treated patients, one developed a malunion and one a nonunion. In conclusion, pediatric patients treated at Prof. Dr. R. Soeharso Orthopaedic Hospital with open reduction and internal fixation achieved satisfactory union rates and remain the preferred technique for managing displaced lateral condyle fractures in children.

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INTRODUCTION

The lateral condyle fracture ranks as the second most prevalent elbow fracture in pediatric populations and is the most frequent elbow fracture associated with the growth plate (Weinstein & Flynn, 2014; Xie et al., 2020). Fractures of the distal humerus pose challenges in diagnosis, treatment, and the management of complications, as highlighted by Li et al. (2023). The majority of elbow fractures occur in males, with lateral condyle fractures accounting for 9.6–22.3% of all reported cases. These injuries are commonly the result of recreational activities (53.7%) and/or sports (49.6%) (Saris et al., 2023).

The primary objective of surgical management is to achieve anatomical reduction of the articular surface (Schroeder et al., 2020; Abzug et al., 2019). Open reduction and internal fixation (ORIF) is frequently favored for obtaining accurate reduction of physeal and intra-articular fractures. In recent years, there has been increasing interest in less invasive approaches, including closed reduction and percutaneous pinning (CRPP) (Martins & Ganeshan, 2024).

While the management principles are well established, clinical outcomes may vary depending on demographic and healthcare system factors. In the Indonesian pediatric population, delays in presentation, limited access to specialized orthopedic care, and challenges in rehabilitation services may contribute to suboptimal functional outcomes. These contextual challenges highlight the importance of understanding how access to healthcare and treatment timing influence recovery. This study aimed to describe the demographic characteristics, treatment modalities, and clinical outcomes of pediatric lateral condyle humerus fractures managed at Prof. Soeharso Hospital between January 2022 to July 2024.

METHODS

This research is a descriptive, retrospective study of pediatric patients with lateral condylar humerus fractures treated at Prof. Dr. R. Soeharso Orthopaedic Hospital from January 2022 to July 2024. The inclusion criteria were (1) patients aged 0–18 years and (2) those diagnosed with a lateral condyle fracture within the study period. Patients who did not meet these criteria were excluded.

Data were obtained from hospital medical records and collected following approval from the institutional ethics committee of Soeharso Orthopaedic Hospital (Ethical Approval No. PP.01.03/D.XXV.2.3/448/2025). The collected variables included patient demographics, treatment methods, and outcomes. Radiological evaluation was performed to assess union status, malunion, or nonunion based on alignment, disappearance of the fracture line, and the presence or absence of callus formation. All patients were followed up for 6 to 12 months post-treatment to evaluate both clinical and radiological outcomes. The data were organized and analyzed using Microsoft Excel software.

RESULTS

Between January 2022 and July 2024, 23 pediatric patients with lateral condyle fractures were treated at Prof. Soeharso Hospital. Of these 23 patients, 15 were boys, and 8 were girls. The majority were aged 6–10 years (12 patients). In terms of treatment, most patients were managed surgically (21 patients), while only 2 patients were treated conservatively with a circular cast.

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Table 1. Demographic distribution

Category	Sub-category	N	%
Sex	Boy	15	65%
	Girl	8	35%
	Total	23	100%
Age Group	< 5 years	3	13.0%
	6–10 years	12	52.2%
	11–15 years	4	17.4%
	16–18 years	4	17.4%
	Total	23	100%
Healing Outcome	Union	15	71.4%
	Malunion	5	23.8%
	Non-union	1	4.8%
	Total	21	100%
Complications	Malunion	1	50%
	Non-union	1	50%
	Total	2	100%

Figure 1. X Ray post ORIF Lateral Condyle Humerus using Divergen Kirschner Wire

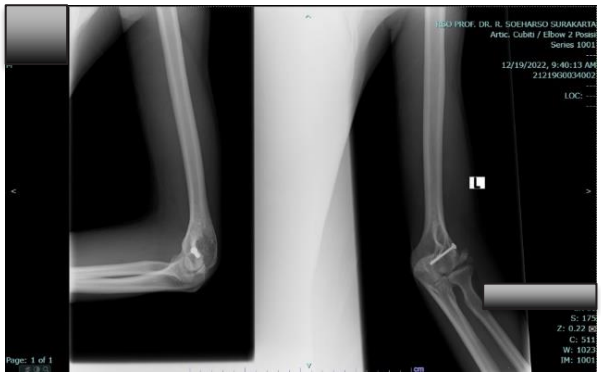

Figure 2. X Ray post ORIF Lateral Condyle Humerus using Screwing

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All surgically treated patients underwent open reduction with internal fixation via a lateral approach to the elbow. Of the 21 patients, 20 underwent internal fixation with 2–3 Kirschner wires (Figure 1), while 1 patient underwent internal fixation with a screw (Figure 2). At the 6–12-month follow-up, all patients reported no pain.

Among patients who underwent surgical treatment, 15 of 15 patients with fractures showed lateral condylar union; however, 5 patients demonstrated malunion, and 1 patient had nonunion of the lateral condyle of the humerus (Figure 3).

Patients with malunion of the lateral condyle presented with an inability to flex the elbow fully, increased varus deformity compared to the contralateral elbow, and a prominent lateral condyle. Four patients with malunion underwent corrective reconstructive surgery, while one patient did not undergo corrective surgery. The patient with nonunion of the lateral condyle of the humerus underwent corrective reconstructive surgery combined with allograft bone grafting (Figure 4).

X-ray examination of two patients who received conservative treatment with a circular cast revealed that one patient had malunion and the other had nonunion of the lateral condyle of the humerus (Figures 5 and 6). These patients were planned for reconstructive surgery of the lateral condyle of the humerus.

Figure 3. Nonunion after ORIF using Kirschner Wire

Figure 4. X Ray post-ORIF reconstruction to Correct Malunion and Non-Union in the Lateral Condyle of the Humerus Fracture

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Figure 5. Malunion after circular casting

Figure 6. Non-Union after Circular Casting

DISCUSSION

Between January 2022 and July 2024, 23 pediatric patients with lateral condyle fractures were treated at Prof. Dr. R. Soeharso Orthopaedic Hospital. Most patients were boys (65%), consistent with previously reported epidemiological patterns, and the majority were between 6 and 10 years of age (52.2%), with the peak incidence occurring at six years (Zhu et al., 2023; Sahu, 2017).

The majority of patients in this study underwent surgical treatment using open reduction and internal fixation (ORIF). This approach aligns with previous studies that recommend ORIF as an effective procedure for unstable or displaced fractures to prevent complications such as non-union or malunion (Sahu, 2017; Stevenson & Perry, 2018). The consensus supports surgical fixation for fractures displaced by more than 2 mm (Mahar et al., 2018). Even in cases of delayed presentation, surgical intervention can still provide satisfactory functional recovery (Shrestha & Hutchison, 2019).

There remains ongoing debate regarding the optimal reduction technique—open versus closed. Previous studies have reported comparable outcomes between closed

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reduction percutaneous pinning (CRPP) and open reduction percutaneous pinning (ORPP) for totally displaced or rotational fractures, with acceptable complication rates. Nevertheless, open reduction and fixation remain the gold standard, particularly for displaced and rotational fractures, due to superior visualization and more reliable anatomical reduction (Mahar et al., 2018).

Kirschner wires were the most frequently used fixation method in this study, consistent with findings from earlier literature (Shrestha & Hutchison, 2019). Screw fixation may be beneficial when a larger metaphyseal fragment is present. Among the 21 surgically treated patients, 20 underwent fixation with 2–3 Kirschner wires, while one underwent screw fixation. Most surgically treated patients achieved bone union (71.4%). However, five cases of malunion and one case of nonunion were identified. The malunion rate (23.8%) in this cohort is higher than that reported in several previous studies. Potential contributing factors include delayed presentation, technical variability during surgery, and limited access to postoperative rehabilitation (Saris et al., 2023; Martins & Ganeshan, 2024). These findings highlight the challenges of managing complex or delayed cases in a national orthopedic referral center, where patients are often referred from peripheral hospitals after prolonged injury intervals.

Among the two conservatively treated patients, neither achieved bone union—one developed a malunion and the other a nonunion—supporting prior evidence that conservative management is associated with a higher risk of these complications (Saris et al., 2023). Non-union or malunion of the lateral condyle frequently requires revision surgery, including open reduction, internal fixation, and, when indicated, bone grafting. In this study, four patients with malunion and one with non-union underwent corrective reconstructive surgery, all of whom achieved satisfactory outcomes (Abzug et al., 2019). Although radiological union was the primary focus of the analysis, qualitative assessment indicated that most patients regained satisfactory joint motion and functional capacity for daily activities following surgery.

The principal limitation of this study is the small sample size, particularly within the conservatively treated subgroup, which reduces statistical power and limits generalizability. Additional limitations include its retrospective design, the lack of standardized functional outcome assessment, and potential bias due to incomplete follow-up documentation.

Future studies should adopt prospective cohort designs with larger sample sizes, standardized classification systems, and validated functional outcome measures. Long-term follow-up is also necessary to assess potential growth disturbances and late functional sequelae in pediatric patients with lateral condyle fractures.

CONCLUSION

In pediatric patients at Prof. Soeharso Hospital, open reduction and internal fixation achieved satisfactory union rates and remains the preferred technique for displaced lateral condyle fractures in children. However, the incidence of malunion highlights the need for early detection, precise surgical technique, and consistent follow-up to prevent deformity.

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