

PERCUTANEOUS PINNING VERSUS OPEN REDUCTION K WIRE FIXATION IN GARTLAND TYPE III SUPRACONDYLAR HUMERUS FRACTURE IN CHILDREN

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Abstract: This study was carried out to explore the percutaneous pinning versus open reduction K wire fixation in Gartland Type III supracondylar humerus fractures in children. This randomised control trial was conducted at the Department of Orthopaedic and Trauma DHQ Hospital Timergara Lower Dir Kpk Pakistan hospital from September 2022 to November 2023. Eighty-four patients participated in this study, which was distributed into two groups. The open reduction and percutaneous pinning groups contained 42 patients each. Both groups were assessed for enhancement in function and radio-logically for fracture union. Children of both genders with Gartland type III supracondylar fractures between the ages of 2 and 12 years were included. In contrast, all children with open fractures, multiple fractures, and systemic diseases like infections such as pneumonia and individuals with cancer were excluded. In the group receiving percutaneous pinning, 33 (78.5%) children had excellent functional outcomes, 7 (16.6%) showed good functional outcomes, and 2 (4.7%) showed fair functional outcomes. In the open reduction group, there were 27 (64.3%) children with excellent functional results, 10 (23.8%) with good functional outcomes, 3 (7.1%) with fair outcomes, and 2 (4.7%) with poor functional consequences ($p > 0.05$). When treating children with Gartland type III supracondylar fractures of the humerus, percutaneous pinning is the safest and most successful method than open reduction with K wire fixation. Its apparent operative scars and other consequences are modest.

Keywords: Percutaneous Pinning; Open Reduction K Wire Fixation; Gartland Type III Supracondylar Humerus Fracture; Children

Introduction

Supracondylar humeral fracture in children is considered as second most frequent fracture⁷(Kazimoglu et al., 2009). This kind of fracture accounts for 55 to seventy-five per cent % of all elbow fractures. (Egol et al., 2012) The primary reason for most of them is falling onto an extended hand. (Bajwa, 2009) The extension type has a higher frequency (97.7%) than the flexion type. According to the rate of distal fragment displacement, Gartland further categorises the different types of extensions. (ullah Khan and Askar, 1970) Gartland type 3 supracondylar humerus traumas occur 16.7% of the time. (Houshian et al., 2001) and 85% of kids between the ages of 4 and 11 experience these fractures. It affects men more frequently. These fractures have the potential to result in significant morbidity and several negative effects. (Aslan et al., 2014) Since Hippocrates, treating elbow fractures in children has proven challenging for surgeons. (Anwar et al., 2011) Supracondylar fractures might be among the hardest fractures to repair in certain situations. (Pretell-Mazzini et al., 2010). Options for therapy for this fracture vary depending on the kind of fracture, related medical conditions, oedema, and displacement. Some surgeons advocated closed treatment, but research eventually showed it to be ineffectual. (Ababneh et al., 1998; Hadlow et al., 1996). The best method for treating pediatric supracondylar fractures is debated: open reduction or closed reduction. Therefore, this study aimed to compare the efficacy of open reduction K wire fixation against percutaneous pinning in treating children with Gartland type III supracondylar humerus fractures.

Methodology

This randomised control trial was conducted at the Department of Orthopaedic and Trauma DHQ Hospital Timergara Lower Dir Kpk Pakistan hospital from September 2022 to November 2023. The hospital's ethical committee approved the study, and informed consent was obtained from the parents/guardians of all children. Children of both genders with Gartland type III supracondylar fractures between the ages of 2 and 12 years were included. In contrast, all children with open fractures, multiple fractures, and systemic diseases like infections such as pneumonia and individuals with cancer were excluded. Eighty-four patients were included, with 42 placed in the two groups—percutaneous pinning and open reduction.

Patients in the percutaneous pinning group underwent percutaneous pinning treatment using an image intensifier. The open reduction and internal fixation approach was used to treat the patients in the open reduction group. The posterior triceps splitting approach was employed to stabilise the ulna nerve in all open reduction instances. This was done with the forearm hanging and the arm lying on an armrest. Both groups were assessed radioically for fracture union and clinically for improvement in function at 2, 4, 8, and 12 weeks. The Flynn grading system was applied to assess the effectiveness of both procedures.

The data analysis was done with SPSS version 23. The Chi-square test was used to compare the outcomes of the two techniques. $P < 0.05$ was considered to be significant.

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Results

Eighty-four individuals with Gartland type III humerus fractures participated in this study, 42 in each group. In Table 1, the demographic features of both groups are presented. In the group receiving percutaneous pinning, 33 (78.5%) children had excellent functional outcomes, 7 (16.6%) showed good functional outcomes, and 2 (4.7%) showed fair functional outcomes. In the open reduction

group, there were 27 (64.3%) children with excellent functional results, 10 (23.8%) with good functional outcomes, 3 (7.1%) with fair outcomes, and 2 (4.7%) with poor functional consequences ($p > 0.05$).

The evaluation of the efficacy of both groups is displayed in Table 2. No variance was noticed in hospital stay, surgery problems, purposeful consequences, or mean time for radiological union between the groups ($p > 0.05$) (Table 2).

Table 1: Demographic Features of Applicants

Parameter		Percutaneous Pinning Group	Open Reduction Group
Number of patients		42	42
Mean standard deviation		7.2 ± 1.22	7.5 ± 0.33
Gender	Male	32(76.5%)	34(80.5%)
	Female	10(23.5%)	8(19.5%)
Effected side	Right	25(59.5%)	23(54.7%)
	Left	17(40.4%)	19(45.3%)
In the meantime of presentation days		1.5 ± 1.02	1.4 ± 0.76

Table 2: Evaluation of the effectiveness of two procedures in both groups

Parameter	Category	Percutaneous Pinning	Open Reduction	P value
Mean stays in hospital	Mean standard deviation	2.1 ± 0.96	4 ± 0.63	0.232
Complications of surgical technique	Injury in nerve	3(7.1%)	0	
	Infection (pin tract)	7(16.6%)	10(23.8%)	0.071
	Superficial infection	0	12(28.5%)	
	Displacement of fracture	0	0	
	Injury to the vascular system	0	0	
	Anesthesia	0	0	
Functional outcomes ((Flynn’s criteria)	Excellent	33(78.5%)	27(64.3%)	0.619
	Good	7(16.6%)	10(23.8%)	
	Fair	2(4.7%)	3(7.1%)	
	Poor	0	2(4.7%)	
Time of radiological union (weeks)	Mean standard deviation	4.11 ± 0.76	4.66 ± 1.16	0.492

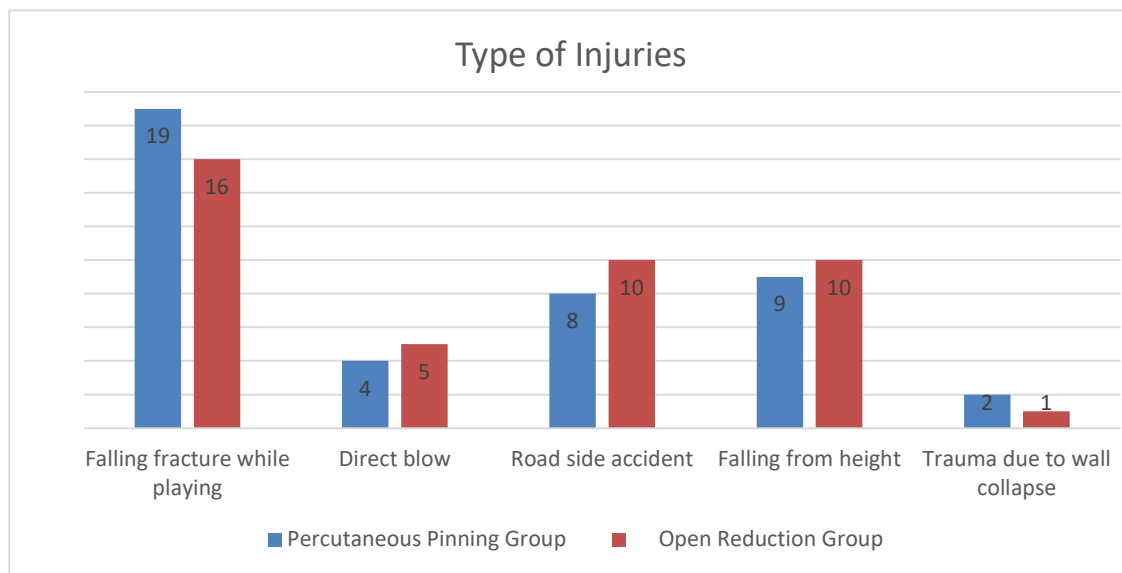


Figure 1. Type of injuries in participants in both groups

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Discussion

Each group of 42 participants in our investigation was included. In contrast to females, males predominated in our study. Similar findings were seen in earlier Turkish research that revealed a higher proportion of males (73.4%) compared to females with supracondylar Gartland type III humeral fractures. (Ozturkmen et al., 2005). Of the patients in the percutaneous pinning group, 59.5% had involvement of the right humerus. We took many photos for our investigation. Children, with the left humerus being implicated in 40% of the cases; in the open reduction group, the right humerus was responsible for 54.7% of the cases and the left humerus in 45.3%. The results did not align with a prior study conducted in Pakistan, which indicated that children's left humerus was more involved (69.1%) than their right humerus. (ud Din and Ahmad, 2003) In most patients in the percutaneous pinning group, the mechanism of injury was a falling fracture during open reduction. Children with fall fractures made up 37.5%. Despite our findings, a different study found that highway accidents were the most prevalent cause of Gartland III-type supracondylar humerus fractures. (El-Adl et al., 2008) The average presentation time for the open reduction and percutaneous pinning groups was 1.4 ± 0.76 days and 1.5 ± 1.02 days, respectively. Similar results were also observed in another investigation. (Zulfiqar et al., 2006) Patients with percutaneous pinning management were released from the hospital sooner than those who underwent open reduction K wire fixation. The limited sample size might be the cause of this. According to our research, a different study also showed that patients treated with percutaneous pinning rather than open reduction K wire fixation were discharged earlier. (Shah, 2004) Operational complications such as nerve damage and pin tract infections were noted in 2 (7.1%) and 6 (16.6%) of the percutaneous pinning group, respectively. In contrast, in the open reduction group, operative complications such as superficial infections and pin tract infections were noted in 12 (28.5%) and 10 (23.8%) of the group, respectively ($p > 0.05$). The higher incidence of bacterial infection in open cuts is the increased exposure of the surgical site to microorganisms compared to closed reduction. The findings of a prior Spanish study were similar to those of our investigation. (Heras et al., 2005) A prior Pakistani research found that 16% of patients receiving percutaneous pinning had a pin tract infection. (Iqbal, 2001) In another study, 32% of patients who received open reduction and inner fixation experienced a problem. (14) In the group receiving percutaneous pinning, 33 (78.5%) children had excellent functional outcomes, 7 (16.6%) showed acceptable functional outcomes, and 2 (4.7%) showed fair functional outcomes. In the open reduction group, 27 (66.3%) children showed excellent functional outcomes, 10 (23.8%) showed good functional outcomes, 3 (7.1%) showed fair functional outcomes, and 2 (4.7%) showed poor functional outcomes ($p > 0.05$). These outcomes resemble those of a prior investigation. (Bhatti et al., 2022) The mean time for the radiographic union was 4.11 ± 0.76 weeks in the percutaneous pinning group and 4.66 ± 1.16 weeks in the open reduction group ($p > 0.05$). These results are in line with those of an earlier investigation. (Omid et al., 2008) Our study's primary

shortcomings are its small number of participants. A long-term study with a high sample size should be conducted to obtain better findings.

Conclusion

Percutaneous pinning is a more secure and efficient procedure than open reduction with K wire fixation for treating Gartland type III supracondylar fractures of the humerus in children, even though there was no statistical difference in the effectiveness of the two treatment methods. This is because there are fewer complications, less time spent in the hospital, and less visible surgical scars.

Declarations

Data Availability statement

All data generated or analyzed during the study are included in the manuscript.

Ethics approval and consent to participate

Approved by the department Concerned.

Consent for publication

Approved

Funding

Not applicable

Conflict of interest

The authors declared absence of conflict of interest.

Author Contribution

ALAMGIR KHAN

Coordination of collaborative efforts.

Conception of Study, Development of Research Methodology Design, Study Design., Review of manuscript, final approval of manuscript

Manuscript revisions, critical input.

Data entry and Data analysis, drafting article

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