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Comparison of Clinical Outcomes of Neglected Posterior Elbow Dislocation Managed with Open Reduction With and Without K-Wire Fixation

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ABSTRACT

Neglected posterior elbow dislocation presents a significant surgical challenge due to chronic soft tissue contractures and joint stiffness. Open reduction is the standard treatment, but the benefit of additional K-wire fixation remains uncertain. This observational analytic study with a case-control design was conducted at Haji Adam Malik General Hospital, Medan. A total of 50 patients with neglected posterior elbow dislocation treated between January 2020 and December 2024 were included. Patients were divided into two groups: open reduction with K-wire fixation (n = 25) and without fixation (n = 25). Clinical outcomes were assessed using the qDASH score, range of motion (ROM), and joint instability. Data were analyzed using Chi-square and Fisher's exact tests with a significance level of $p < 0.05$. There were no significant differences between the two groups in qDASH scores ($p = 0.551$), ROM ($p = 0.529$), or joint instability ($p = 0.773$). Most patients (64%) achieved minimal disability, 72% had normal ROM, and 78% showed no signs of instability postoperatively. Open reduction of neglected posterior elbow dislocation yields comparable functional outcomes with or without K-wire fixation. The addition of K-wire does not appear to significantly influence disability scores, range of motion, or elbow stability. Surgical success may depend more on soft tissue management and rehabilitation than on internal fixation.

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INTRODUCTION

Posterior neglected elbow dislocation is a complex problem that is often encountered due to a lack of proper early management in the first few stages of an injury (1). Even though acute elbow dislocations constitute only 10–25% of elbow injuries, neglected cases are often seen in developing regions where late presentation is common due to socioeconomic factors and barriers to healthcare (2,3). Chronic dislocations, in this case, are those that have gone unreduced for more than three weeks, resulting in the formation of fibrous tissue, soft tissue contraction, and surrounding tissue scarring that greatly restricts movement and flexibility (4). Without the proper surgical treatment, these patients risk becoming permanently disabled and losing the ability to carry out daily activities independently.

Open reduction continues to be the primary treatment approach for these patients. However, it remains controversial whether internal fixation, particularly with K-wires, is necessary after reduction is achieved (5). Proponents of K-wire fixation maintain that it offers supportive stabilization that permits some level of soft tissue repair and joint alignment, particularly in markedly unstable cases (6). Conversely, some clinical observations argue that not all cases may require rigid fixation and that it may in fact slow down early movement, resulting in stiffened joints. The best approach remains undetermined owing to insufficient rigorous comparative evidence due to numerous studies (7).

Given the functional importance of the elbow joint and the increasing recognition of neglected dislocations in clinical practice, it is imperative to clarify the role of K-wire fixation in surgical outcomes (8).

This study aims to assess and compare the clinical outcomes of patients with neglected posterior elbow dislocation treated with open reduction with and without K-wire fixation at Haji Adam Malik General Hospital, Medan.

METHOD

Study Design

The research utilized an observational analytic technique combined with a case-control approach. With this design, the investigators were able to evaluate and compare the outcomes of different surgical techniques. This evaluation was done out of the two intervening groups' functional and stability outcomes. This study was approved by the Ethics Committee of the Faculty of Medicine, Universitas Sumatera Utara.

Study Setting and Period

The study was performed at Haji Adam Malik General Hospital, Medan, a tertiary referral center with comprehensive orthopedic surgical services. In April 2025, the medial record pertaining to all instances of neglected posterior elbow dislocation with open reduction within the timeframe of January 2020 to December 2024 was reviewed. This included both electronic and physical records for retrieval of information and assessment of outcomes.

Study Population and Sampling

This included all patients 18 years and above with a diagnosis of neglected simple posterior elbow dislocation and open reduction via paratricipital posterior (Alonso-Llames) approach during the stated timeframe. Inclusion was based on having complete clinical data for assessment and follow up postoperatively. Exclusion criteria included anything deemed as complex elbow dislocations, non-completed standard surgical treatment for elbow dislocations, any chronic conditions with prior elbow surgical interventions, claimed peripheral nerve damage, or absent comprehensive follow up data.

Members of the study group were recruited using the non probability consecutive sampling method, which involved enrolling all patients who were eligible and fulfilled the inclusion criteria until the required number of participants was reached. As calculating the minimum sample size with significant difference of proportions per group gave a minimum of 21 participants, rounding up for each group strengthened the inferential analysis to an increment of 25 patients per group, resulting in 50 participants in total.

Variables and Operational Definitions

The independent variable was the surgical approach which was dichotomized as open reduction with or without K-wire fixation. Postoperative clinical outcomes and K-wire fixation. Functional disability was measured with qDASH and elbow joint instability was assessed through physical testing. A neglected dislocation was described as an unreduced elbow dislocation for 3 weeks or more after the injury. The qDASH were scored as minimal (<15), mild to moderate (15–50), or severe (>50) disability. Elbow joint ROM was classified as within normal limits or restricted, and joint instability was described as the elbow joint's inability to maintain proper alignment with minimal stress.

Data Collection Procedure

The independent variable in the study was the surgical technique, defined as open reduction with or without K-wire fixation. The dependent variables were the postoperative clinical outcomes, including functional disability assessed using the qDASH score, range of motion (ROM) evaluated through clinical examination, and elbow joint instability assessed via physical testing. A neglected dislocation was defined as an unreduced elbow dislocation persisting for 3 weeks or more following injury. The qDASH scores were categorized into minimal (<15), mild-to-moderate (15–50), or severe (>50) disability. ROM was classified as either within normal limits or restricted, while instability was defined as the inability of the elbow joint to maintain proper alignment under minimal stress.

Data Analysis

All obtained information was coded and processed using appropriate software for analysis. As for the outcome variables and baseline characteristics, the mean, median, frequency, and percentage were all described accordingly. The inter-relator reliability between patient and caregiver qDASH scores was examined with the Kappa test. To check for normality, the Kolmogorov–Smirnov test was used. The intervention groups were compared for clinical outcomes using Chi-square and relevant non-parametric tests for the inferential analysis. A significance level of 0.05 was used.

RESULTS

The study included 50 patients, equally split into two groups: patients who had open reduction with K-wire fixation and patients who had reduction without fixation. The demographic details are included in Table 1.

The average age in the study population was 33.82 years with a standard deviation of 10.73 years. Males constituted a higher proportion of the population at 56%. A majority of patients, 76%, had a dislocation duration of more than 6 months. The leading cause of injury was falls in 66%, with the remaining 34% being post traumatic in nature. The right elbow was affected more frequently (84%) than the left elbow (16%).

Table 1. Demographic Characteristics of Study Subjects (n = 50)

Characteristic	Result
Age (mean ± SD, years)	33.82 ± 10.73
Sex	
Male	28 (56%)
Female	22 (44%)
Duration of dislocation	
≤6 months	12 (24%)
>6 months	38 (76%)
Cause	
Fall	33 (66%)
Traffic accident	17 (34%)
Affected side	
Right	42 (84%)
Left	8 (16%)

Of the 50 patients, 32 (or 64%) had a qDASH ≤ 15, and there was nearly equal K-wire to non-K-wire group distribution (46.9% and 53.1%). Seventeen patients had scores of 15 to 50 with a greater proportion in the K-wire group (58.8%). Only one patient had a severely disabling qDASH score greater than 50 and none was K-wire fixed. Fisher's exact test for statistical analysis gave a p-value of 0.551 suggesting no significant difference in functional results between the two groups and this is presented in table 2.

Table 2. qDASH Differences Between Subjects With and Without K-wire Fixation

		K-wire		Total	*p*-value
		Yes	No		
qDASH	<15	15 (46.9%)	17 (53.1%)	32 (64%)	0.551
	15–50	10 (58.8%)	7 (41.2%)	17 (34%)	
	>50	0 (0%)	1 (100%)	1 (2%)	

As shown in table 3, 36 patients (72%) achieved normal ROM after surgery. There is an almost equal distribution across the groups. Of the 14 patients with insufficient ROM, slightly more had K-wire fixation (57.1%). The Chi-square test did not identify significant differences between the groups (p = 0.529).

Table 3. ROM Differences Between Subjects With and Without K-wire Fixation

		K-wire		Total	*p*-value
		Yes	No		
ROM	Normal	17 (47.2%)	19 (52.8%)	36 (72%)	0.529
	Limited	8 (57.1%)	6 (42.9%)	14 (28%)	

As shown in table 4, elbow instability was noted in 11 patients (22%), with a slight predominance in the K-wire group (54.5%). Most patients (78%) remained free of joint instability regardless of the type of fixation used. Instability rates between the groups did not differ (p = 0.773).

Table 4. Instability Differences Between Subjects With and Without K-wire Fixation

		K-wire		Total	*p*-value
		Yes	No		
Instability	No	19 (48.7%)	20 (51.3%)	39 (78%)	0.773
	Yes	6 (54.5%)	5 (45.5%)	11 (22%)	

DISCUSSION

This study examined the clinical outcomes of patients with neglected posterior elbow dislocation treated with open reduction with or without K-wire fixation. The results indicated that there were no important differences between the two groups in any of the parameters assessed. Both groups showed good recovery in the postoperative period with most patients attaining good functional outcomes and stable joints.9 These findings imply that K-wire fixation does not confer substantial additional advantages in clinical outcomes.10 Nonetheless, the outcomes were reasonably well distributed, suggesting that both methods could yield satisfactory results if used with appropriate surgical technique and postoperative care.

With respect to functional outcomes determined by the qDASH score, 64% of patients attained minimal disability (qDASH score of less than 15) and neither the K-wire group nor the non-K-wire group showed any noteworthy difference (p = 0.551). This supports the work of Sharma et al. (2017) on elbow dislocations, where they observed comparable qDASH scores after open reduction, regardless of softened tissue cutoff. In the same manner, Madi et al. (2022) showed that K-wire fixation did not significantly change the disability scores patients reported. It is likely that the qDASH score captures some functional capability, albeit subjectively.11 This score is not likely to reflect the degree of fixation and reduction in the case where the fixation suffices due to proper reduction.12 In neglected scenarios, the fibrosis and adaptive remodeling of the joint may assist in maintaining reduction absent internal fixation.13 Thus, perception of disability might not change due to K-wire if the soft tissue repair and rehabilitation protocols that follow are adequate.

Regarding range of motion, 72% of patients achieved normal ROM postoperative, and there was no clinically meaningful difference between groups (p = 0.529). This aligns with Pal et al.'s (2021) study, which reported acceptable elbow range of motion in neglected dislocation elbows treated with open reduction, irrespective of fixation method used.1 Also, van Ooij et al. (2011) described that long-standing dislocations tend to form fibrous pseudo-joints that, once released, exhibit acceptable postoperative motion without further fixation.14 From a biomechanics perspective, early patient mobilization is a crucial factor in preventing stiffness that can develop postoperatively. Fixation with K-wires may postpone active motion, counteracting muscle recovery, which theoretically offers benefits.15 The comparable ROM results in both groups of this study indicate that joint mobility is more a factor of release and rehabilitation than fixation method used. Therefore, it can be concluded that K-wires do not significantly affect restoration of ROM with adequate intraoperative mobilization.

In regard to joint instability, 78% of subjects had stable elbows during the follow-up visit and there was no notable difference between the groups (p = 0.773). Salihu et al. (2021) reported on the open reduction in chronic dislocation cases and “stapled” open reduction elbows which showed low residual instability, supporting these results.16 Savvidou et al. (2018) conducted a comparative study on internal fixation and delayed elbow dislocation surgeries and reached similar conclusions: there was no significant impact on rates of instability.17 It is reasonable to assume that soft tissues must be adequately released and the joint is properly reduced to heal. Additionally, in chronic dislocations, periarticular fibrosis may also enhance stability.18 Thus, there is no need for internal fixation in cases of open reduction, provided the procedure is done properly.

There are some limitations in this study. Firstly, the selection and information bias within the written outcome results are issues within the retrospective design. Secondly, the sample size, while adequate for a statistical analysis, limits the generalizability of the findings in this study and can be taken to represent a broader demography. Thirdly, although this study did not control functional outcomes for some factors like variability in rehabilitation protocols and patient adherence to rehabilitation exercises, these factors can be crucial in determining a patient’s functional outcomes. Fourth, the radiographic review was limited because some subtle forms of instability or degenerative changes were not evaluated. Finally, even though efforts to validate self-reported qDASH scores with caregiver input were made, accuracy in the self-reported scores may still suffer from recall bias.

CONCLUSION

Open reduction with or without K-wire fixation did not show significant differences in functional disability, range of motion, or joint instability in patients with neglected posterior elbow dislocation, suggesting that K-wire fixation may not be needed in the presence of a stable reduction and appropriate soft tissue management. Optimal outcomes are achieved with careful patient selection, precise surgical method, and dedicated rehabilitation. Outcome-based and surgical decision-making studies with longer follow-ups are needed to validate these findings.

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