

Comparison of Hematoma Block Versus Intravenous Sedation in Reduction of Distal Radius Extra Articular Fractures in Adults

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ABSTRACT

Objective: To compare hematoma block versus intravenous sedation in reduction of distal radius extra articular fractures in adults.

Study Design: Randomized controlled trial.

Place and Duration of the Study: The emergency department of Orthopedic Unit, Services Hospital, Lahore, Pakistan from 1st August 2021 to 31st January 2022.

Material and Methods: A total of 330 patients who presented in the emergency department of Orthopedic Unit were included. Patients were divided into two groups (165 patients in each group). Patients in Group-A underwent hematoma block method (10ml of 2% lidocaine into the fracture site) while in Group-B, sedation method (using Inj. Propofol, 1-2.5mg induction and 50-200mcg/kg/min intravenous maintenance dose) was adopted. Pre reduction and post reduction pain scores were calculated using VAS from 0 (no pain) to 10 (severe pain). Details were recorded regarding age, gender of the patient, pain score and reduction time.

Results: In a total of 330 cases, 91 (27.6%) were male and 239 (72.4%) were female. Overall, mean age was calculated to 35.22±8.81 years while 224 (67.9%) patients were aged between 20 to 40 years. Mean pain score was calculated to be 4.96±0.74 before the treatment. Post-treatment, patients in hematoma block method group had statistically significant less pain score ($p=0.0001$), total reduction in pain ($p=0.0002$) and time to reduction of pain ($p=0.0001$).

Conclusion: We concluded that hematoma block is superior in terms of mean reduction in pain score and mean time to reduction in patients presenting with distal radial fractures when compared with intra-venous sedation.

Keywords: Extra-articular distal radius fractures, pain reduction, hematoma block, intravenous sedation

INTRODUCTION

Fractures involving the distal radius are generally more frequent among adult population. Data from the developed countries has shown females above 50 years of age to have 15% life time risk of distal radius fractures while this risk is just over 2% among male population above 50 years of age.^{1,2} Outpatient based management is usually done among cases of distal radius fractures while early reduction is considered to be the best approach aiming pain relief.^{3,4}

For facilitation of the reduction of distal radius fractures, general anesthesia is the most frequently adopted modality.⁵ For cases who present at night are usually advised to come back on the next as starved for a minimum duration of 4-hours. The said approach seems to be time consuming for the patients and the staff involved in the management.⁶ Hematoma blocks have emerged to be a popular choice adopted in the emergency room with or without an IV sedative agent.⁷ Mode of anesthesia is generally dependent upon the surgeon's own preferences.⁸ Not much literature exists regarding the best and most effective anesthesia approach among patients undergoing reduction of distal radius extra articular fractures. Researchers in the past have shown systemic absorption of lidocaine from the site of the fracture to be well below the toxic threshold for the standard dose of 2.2 to 2.4 mg/kg.^{9,10}

In a study the mean pain score before reduction was 5.95±1.94 in hematoma block group and 6.01±1.4 in IV sedation group while after fracture reduction it was 2.25±0.2 in hematoma block group and 2.72±0.7 in the IV sedation group, mean time to reduction was 0.90±0.47 in hematoma block and 2.63±0.96 in sedation group.⁹ Only limited international research is available while both of these methods are still commonly employed in tertiary care units in Pakistan. This study was thought to produce baseline data for surgeons to decide which method is best suited in terms of various outcomes. Our hypothesis was that hematoma block is superior to intra-venous sedation in terms of mean reduction in pain score and mean time to reduction in patients

presenting with distal radial fractures. Objective of this study was to compare hematoma block versus intravenous sedation in reduction of distal radius extra articular fractures in adults

MATERIAL AND METHODS

This randomized controlled trial was done at Orthopedic Department, Services Hospital, Lahore from 1st August 2021 to 31st January 2022. Approval from institutional ethical committee was taken. Written consents were acquired from all study participants at the time of enrollment. Sample size of 330 cases (165 in each group) was calculated with 95% confidence level, 80% power of study and taking expected mean \pm S.D of mean decrease in pain score in both group i.e 3.29±0.7⁹ in IV sedation group Vs 3.70±1.74⁹ in hematoma block group in reduction of extra articular fracture distal radius.

Inclusion criteria were patients of both genders with ages between 20-60 years having distal radius fractures presenting in emergency department within 24 hours of acquiring the fracture. Exclusion criteria were patients with failed trial of reduction somewhere else or those patients who had neurovascular injury (assessed by absent distal pulses and motor examination). All patients who had open fracture of distal radius (overlying skin involvement) or those with polytrauma were also not included. Extra-articular distal radius fractures were labeled as those which were within 2.5cm of radiocarpal joint and diagnosed on standard PA and lateral radiographs of wrist joint (as a breach in continuity of bone).

Patients were divided into two groups (165 patients in each group).

- Group A: Hematoma Block method(10ml of 2% lidocaine into the fracture site)
- Group B: Sedation method(using Inj.Propofol ,1-2.5mg induction and 50-200mcg/kg/min intravenous maintenance dose)

All the cases were managed under supervision of senior registrar of the unit to eliminate bias. All the details of the procedure and possible complications were explained to the

patients and secrecy of data was maintained. Pre reduction pain score was calculated using VAS from 0 (no pain) to 10 (severe pain). Intravenous sedation was given and monitored by the anesthetist in the accident and emergency department. Hematoma block was given under full aseptic measures using 7.5% Povidone iodine. After five to ten minutes, the reduction and immobilization of fracture was done with plaster of paris. After complete recovery (i.e within 3 minutes) from anesthesia (i/v sedation) patients were evaluated for post reduction pain score from 0 (no pain) to 10 (severe pain). Details were recorded regarding age, gender of the patient, educational status, BMI, pain score and reduction time. All the data was entered into the attached proforma. Outcomes were measured in terms of mean decrease in pain score and mean to reduction. Mean decrease in pain score was measured by calculating the difference in mean pain score before and after the reduction i.e (within 3 minutes) using visual analogue scale where '0' means no pain up to '10' means severe pain. Mean time to reduction was calculated in hours, from the time getting x-ray from radiology department to the completion of reduction maneuver.

All the collected data was entered into SPSS version 26.0. Numerical variables i-e age, mean pain score before and after reduction, mean reduction in pain score and time to reduction were presented by mean±SD and range. Categorical variables i-e gender, severity of pain was presented as frequency and percentage. Data was stratified for age, gender, BMI and educational status to deal with effect modifier. Independent sample t-test was applied for comparison of continuous variables. Chi-square test was applied for comparison of categorical variables. Post stratification independent sample t-test or chi-square test was applied to check the significance with p-value <0.05 taken as significant.

RESULTS

In a total of 330 cases, 91 (27.6%) were male and 239 (72.4%) were female. Overall, mean age was calculated to 35.22±8.81 years while 224 (67.9%) patients were aged between 20 to 40 years. Mean pain score was calculated to be 4.96±0.74 before the treatment. Table-1 is showing baseline characteristics of patients of both study groups.

Table-1: Characteristics of Patients (n=330)

Characteristics	Group-A (n=165)	Group-B (n=165)	P-Value
Gender	Male	49 (29.7%)	0.3885
	Female	116 (70.3%)	
Age Groups (years)	20-40	124 (75.2%)	0.0047
	41-60	41 (24.8%)	
		65 (39.4%)	
Age in Mean±SD (years)	34.28±8.55	37.19±9.07	0.0029
Pain Score Before Treatment in Mean±SD	5.02±0.75	4.89±0.72	0.1092

Post-treatment, patients in hematoma block method group had statistically significant less pain score (p=0.0001), total reduction in pain (p=0.0002) and time to reduction of pain (p=0.0001). Table 2 is showing comparison of mean pain score, reduction in pain score and time to reduction of pain score after treatment in both study groups.

Table-2: Comparison of Mean Pain Score, Reduction in Pain Score and Time to Reduction of Pain after Treatment in both Study Groups (n=330)

Outcomes	Group-A (n=165)	Group-B (n=165)	P-Value
Pain Score After Treatment in Mean±SD	1.75±0.68	2.02±0.61	0.0001
Reduction in Pain Score in Mean±SD	3.28±1.03	2.87±0.92	0.0002
Time to Reduction of Pain	1.40±0.61	3.19±0.85	0.0001

DISCUSSION

Distal radius fractures are estimated to be the cause of 1/6th of all orthopedic emergency department visits. Young population

generally reports with trauma while older population report distal radius fractures usually because of decrease in bone density.^{11,12} Some sort of analgesia is needed among cases of distal radius fractures who undergo close reduction as it needs manipulation that increases the pain which is already present due to tissue injury because of the existing fracture. General anesthesia, IV regional anesthesia, IV sedation, regional block local anesthesia and hematoma blocks are some of the most commonly adopted approaches. In our study, mean pain score after treatment was calculated as 1.75±0.68 in Group-A and 2.02±0.61 in Group-B (p=0.0001). Mean reduction in pain score after treatment was calculated as 3.28±1.03 in Group-A and 2.87±0.92 in Group-B, p value was calculated as 0.0002. Mean time to reduction of pain was calculated as 1.40±0.61 in Group-A and 3.19±0.85 in Group-B, p value was calculated as 0.0001, showing a significant difference between the two groups. The findings of our study are comparable with what has been reported earlier by Myderrizi N et al.⁹ Afsar SS and others¹³ determined the reduction in pain adopting hematoma block for the close reduction of the distal radius fractures measuring pain as per “visual analogue pain scale” prior to and after, 5, 10 and 30 minutes following hematoma block.¹³ The researchers noted significantly lowered pain scores at all 3 points following hematoma block (p<0.001) which is consistent with the findings of the present study.¹³ The authors proposed hematoma block to be the better choice aiming manipulation of the distal radius fractures.¹³

A study comparing general anesthesia with hematoma block in reduction of fractures of the distal radius showed hematoma block patients to exhibit significantly less pain as per VAS (1.5 vs. 5.8, p<0.01).¹⁴ Singh GK and others¹⁰ comparing general anesthesia with conventional sedation approach found local anesthesia to be significantly more effective in reduction in pain scores versus sedation approach (median scores 1.8 versus 8.7, p<0.001).¹⁰ Both approaches were found to have similar safety while authors described hematoma block adopting local anesthesia approach to be a good alternative choice to conventional sedation for the reduction of “Colles fracture”.¹⁰

The findings of the previous studies mentioned above are in support of hematoma block for the reduction of extra-articular distal radius fractures in adults. However, no local study was found comparing the two techniques, while our study justifies the hypothesis that hematoma block is superior to intra-venous sedation in terms of mean reduction in pain score and mean time to reduction in patients presenting with distal radial fractures. The findings of our study are primary in our local setup which needs validation through some other trials.

CONCLUSION

Hematoma block is superior in terms of mean reduction in pain score and mean time to reduction in pain in patients presenting with distal radial fractures when compared with intra-venous sedation.

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