The Hematoma Block an Effective Alternative for Fracture Reduction in Distal Radius Fractures

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Background: An alternative to general anesthesia was tested against hematoma block by a double-blind, randomized clinical trial in reduction of Colles fracture.

Method: 96 patients more than 18 years old with displaced fractures of distal radius were selected from 2007-2009 on the basis of: 1) informed consent; 2) no contraindication to any method of analgesia; 3) no associated injury. Patients were randomized into 2 equal groups. The A group received Propofol intravenously, whereas the B group received 10 ml of 2% Lidocaine Hydrochloride into the fracture hematoma. Fractures are reduced under acceptable criteria. Pain measured by Visual Analogue Scale (VAS) was recorded before, during, and after reduction. Time to Emergency department, to manipulation and to hospital discharge is measured. In radiographic before, after reduction and a week later the radial tilt, ulnar migration and dorsal tilt are measured. Loss of these parameters were study statistically data analysis by KW statistics.

Results: 96 patients with displaced fractures of distal radius at mean age 54.3 (19-84) years old, M/F rate 37/59, left/right hand 37/58., from 2005-2008. VAS during reduction was 0 in group A and 0.97 ± 0.7 in group B and VAS after reduction was 2.72 ± 0.7 in group A and 2.25 ± 0.2 in group B. Time to reduction was 2.63 ± 0.96 hr in A and 0.90 ± 0.47 hr in B After a week, 21 fractures lose reduction in group A and 22 in group B. Conclusion: Hematoma block by local anesthetic is a safe and effective alternative to intravenous general anesthesia in reduction of Colles fracture. Key words: Distal radius fractures, Hematoma block, Intravenous general anesthesia.

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1. INTRODUCTION

Fractures of distal radius are the most common fractures among patients treated at emergency rooms comprising more than 16% of all fractures (1, 2, 3, 4, 5).

They more commonly involve children and the elderly (5, 7, 8). These fractures more frequently effect women, increase in frequency with advancing age, and result from low energy falls more often than from high energy trauma (3, 9, 10).

Adult distal radius fractures requiring manipulation and reduction are commonly encountered in the Emergency Department. Various methods of analgesia are used to decrease the patient’s pain during the procedure. These include intravenous regional anesthesia (IVRA), demand-valve nitrous oxide, haematoma block, intramuscular sedation, conscious sedation and general anesthesia (7).

Each of these methods has potential complications and may also result in inadequate anesthesia, analgesia and/or muscle relaxation, which could compromise the treatment process and results. Adverse drug reactions could also result from any of the agents used. Concerns over the toxicity of local anesthetics have been raised (14) and the serious dangers of leakage of anesthetic from a poorly contained Bier’s block, perhaps resulting from an insufficient cuff, are well known (2, 12). The aim of our study is to find out the efficacy of the hematoma block versus intravenous general anesthesia for reduction of displaced distal radius fractures.

2. MATERIALS AND METHODS

From total number of 96 patients with displaced distal radius fractures need anesthesia to reduce the fractures. Patients were randomized into two groups namely group A receiving intravenous general anesthesia and group B; receiving Hematoma Block for reducing distal forearm fracture. This was prospective randomized control trial comprising 48 patients in each group. The parameters/variables like:

- Level of pain before, during and after reducing the fractures by VAS;
- Anatomic parameters of reduction after manipulation and a week later through radiographs;
- The pain relief during reduction measured by Visual analogue scale;
- Quality of reduction and lose of reduction in unstable fractures.

are topics of our study.
2.1. Statistical Analysis
Following statistically methods were employed:
- Measurement of magnitude of difference between values of outcomes in the two groups.
- Measurement of significance of difference through Kruskal-Wallis Test.

Pre-anesthetic evaluation was done in both the groups. In all patients intravenous assess was opened by intravenous cannula and electronic monitor was connected to continuous record of pulse rate, respiratory rate, blood pressure and oxygen saturation by pulse oximeter. The group A received Propofol with induction 1-2.5 mg/kg and maintenance 50-200 mcg/kg/min intravenously on the unaffected wrist, the group B received 10 ml of 2% lidocaine hydrochloride into the fracture hematoma site from the dorsal aspect (6). Prior to injection of these drugs, the part was prepared with 7.5% povidone iodine. The calculated amount of Lidocaine was taken in 20 ml disposable syringe with 22 1/2 gauze needle. The needle was placed at the fracture hematoma site. After ten to fifteen minutes the reduction and immobilization of the fracture was done (16).

VAS was recorded for evaluation of pain before, during, and after reduction Orthopedics on duty. Pulse rate, respiratory rate, blood pressure and oxygen saturation were recorded before, during and after manipulation.

Quality of reduction was assessed by X-ray immediately after reduction and a week later, measuring the angles like radial tilt, dorsal tilt and ulnar migration. The radiological criteria were based on Modified Sarmiento Criteria for the post reduction acceptability varying from Perfect, Acceptable and Unacceptable. According to which Perfect reduction consists of Excellent and Good results, Acceptable reduction consists of Fair result; and Unacceptable consists of Poor results. Criteria of radiological assessment are shown Table 1.

<table>
<thead>
<tr>
<th>Final dorsal angle</th>
<th>Loss of radial length</th>
<th>Loss of radial tilt</th>
<th>score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neutral</td>
<td>&lt; 3</td>
<td>0-4</td>
<td>0</td>
</tr>
<tr>
<td>1-10</td>
<td>3-6</td>
<td>5-9</td>
<td>1</td>
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<tr>
<td>11-14</td>
<td>7-11</td>
<td>10-14</td>
<td>2</td>
</tr>
<tr>
<td>&gt; 14</td>
<td>&gt; 11</td>
<td>&gt; 14</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 1. Criteria of Radiological Assessment. Criteria for acceptable reduction based on Sarmiento et al.; 0 excellent, 1-3 good, 4-6 fair, 7-12 poor.

3. RESULTS
All the patients in both groups have sustained fractures of distal radius from the same conditions. There is no difference in age betweens two groups. Dorsal displacement and the left hand is more frequent affected in both groups (Table 2).

The mean time to reduction is 2.63 ± 0.96 hr in the intravenous general anesthesia group and 0.90 ± 0.47 hr in the hematoma block group (Table 3). Most of the patients were not splinted or immobilized until arriving at hospital. The mean time of presentation to the Emergency department and X ray department was similar to the both groups, but the time from X ray department to the reduction was different between both groups because the group of general anesthesia had to wait until they should be ready for the application of the general anesthesia (Table 3).

Mean time to discharge was 0.74 ± 0.2 hr for hematoma block and 1.17 ± 0.24 hr for intravenous general anesthesia. The group of hematoma block had no need to stay longer in hospital in comparison with the general anesthesia group, which should stay until full remission from anesthesia.

The Table 4 shows the VAS before the reduction of the fractures in both groups. It was 6.01 ± 1.40 and 5.95 ± 1.94 in the intravenous general anesthesia group and the hematoma block group respectively. None of the patients in this study received analgesics prior to reduction.

Table 4 also depicts the VAS recorded in various stages of procedure during the reduction and after reduction.

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Group A (Mean ± SD)</th>
<th>Group B (Mean ± SD)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-anesthetic eval</td>
<td>6.01 ± 1.40</td>
<td>5.95 ± 1.94</td>
<td></td>
</tr>
<tr>
<td>Reduction</td>
<td>2.72 ± 0.77</td>
<td>2.25 ± 0.2</td>
<td>&lt; 0.0001</td>
</tr>
</tbody>
</table>

Table 4. Visual Analogue Scale before, during Manipulation and after Reduction Group A: intravenous general anesthesia group, Group B: hematoma block group VAS before, during manipulation and after reduction.
of radial angle and ulnar migration.

Table 5 shows mean radial tilt, dorsal tilt and ulnar migration after reduction and a week later. The patients with undisplaced fractures were not included in this study. There was no statistically significant difference between both groups in the number of fractures which lose reduction after a week, 21 for group A and 22 for group B.

4. DISCUSSION

Many authors have compared hematomata block with many type of anesthesia to relieve pain in the manipulation of fractures.

Funk (7) compared intravenous general anesthesia with haematoma block in 40 patients. He found that no patients receiving general anesthesia experienced pain during manipulation of their fractures, whereas patients in the haematoma block group experienced significant pain 0 versus 3.7 VAS.

In our study VAS scores were different between both groups because of the different waiting time before manipulation, 0 in group A vs 0.9 in group B. We recognized that waiting for about 10-15 minutes before manipulation gives a pain free procedure.

There was no difference between both groups in pain after manipulation in this study compared to Funk (7). In his study general anesthesia group experienced significantly greater pain compared to the haematoma block group (mean VAS scores: 5.8 versus 1.5 respectively, p < 0.01).

General anesthesia group waited for about two hours for manipulation compared to haematoma block group in our study (p<0.0001). We found a significant difference between two groups in time to reduction. In intravenous general anesthesia was 2.63 ± 0.96 hr in comparison with the haematoma block group 0.90 ± 0.47 hr. We also found a significant difference in discharging time from ED, which was 1.17 ± 0.24 hr in intravenous general anesthesia group in comparison with 0.74 ± 0.2 hr in haematoma block group.

Funk (7) compared among haematoma blocks alone, haematoma block with sedation and general anesthesia. He found that there was no statistically significant difference in the quality of reduction but a prolonged time to reduction in patients receiving intravenous general anesthesia.

Efficacy of haematoma block in reducing Colles’ fracture was studied by Kendall et al. (5), in which an increasing awareness of cost and time within the National Health Service contributes to a marked change in the anesthetic management of Colles’ fractures, and demonstrates the increasing popularity of the haematoma block compared with 5 years ago (7% in 1989 vs. 33% in 1994), at the expense of the general anesthetic (44% in 1989 vs. 24% in 1994).

Handoll et al. (11) in 2002 reviewed in Cochrane Database of Systemic Reviews regarding anesthesia for treating distal radial fractures in adults. The 18 included studies involved at least 1200, mainly female and older, patients with fractures of the distal radius. All studies had serious methodological limitations, notably in the frequent failure to assess clinically important and longer term outcomes. Considering the risk of intravenous general anesthesia, haematoma block is much safer and can be done easily in emergency department.

General anesthesia gives better pain relief during manipulation but involves longer waits and takes longer, with higher procedural costs compared with haematoma block. There was some indication that there was more pain post manipulation after general anesthesia.

Singh et al. (4) studied about analgesia for reduction of Colles’ fracture by double blind RCT between conventional sedation and haematoma Group.

Sixty six out of 80 consecutive cases with the fracture were studied. They concluded that pain scores during reduction in the Xylocaine group (i.e., Haematoma Group) were acceptably low, that is < 3 (median=1.8) as compared to the unacceptably high, that is >3 pain scores in the conventionally practiced sedation group (median =8.7), at a very high level of clinical and statistical significance. Therefore they concluded that hematomata block by local anesthesia is a safe and effective alternative to sedation in reduction of Colles’ fracture. This sole study favors the hematomata block for the reduction in distal radial fractures.

Bajracharya et al. (15) in his study found out the efficacy of hematomata block versus brachial plexus block.

Kendall et al. (9) included in his study 72 patients in Bier’s block group and 70 patients in the hematomata block group. There was no difference in pain score on fracture manipulation as 1.5 in the Bier’s block group and 2.8 in the hematomata group.

In our study, we did not find any statistically significant difference in reduction under hematomata block and general intravenous anesthesia. Other authors found different results comparing different anesthesia.

Kendall et al. (9) in 1997 found out that more manipulations were required in the hematoma block group (17/77 vs 4/72; P=0.003). Therefore his study favors the Bier’s block group for the perfect reduction than the hematomata block group. But his study may relate with the insufficiency of the hematoma block to manipulate pain free. Ogunlade et al. (13) showed, in his study in 35 patients, significant reduction of the pain following infiltration of 10ml of 2% Xylocaine at the fracture site and all the patients had satisfactory reduction of the fracture. This study also favors the present study.

We did not found out any significant difference in late collapse of distal radius fractures. Funk (7) also found no statistically significant differences in the numbers with radial shortening or with residual dorsal deformity. But in our study we analyzed late collapse of radius through measuring dorsal tilt, radial tilt and ulnar migration.
5. CONCLUSION
Considering the risk of intravenous general anesthesia, hematoma block by local anesthetic is a safe and effective alternative and can be done easily in emergency department compared to general intravenous anesthesia in reduction of distal radius fracture.

REFERENCES