Section: Orthopaedics

Original Research Article

REDEFINING PAIN MANAGEMENT: HEMATOMA BLOCK AS AN ALTERNATIVE TO SEDATION IN THE ELDERLY

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Received : *17/10/2024*
Received in revised form : *02/12/2024*
Accepted : *17/12/2024*

Keywords:
Hematoma block, procedural sedation and analgesia, distal radius fracture, elderly patients, emergency department, pain management.

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DOI: 10.47009/jamp.2024.6.6.125

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2024; 6 (6); 661-664

Abstract

Background: Distal radius fractures are common among elderly patients, often requiring closed manipulative reduction. While procedural sedation and analgesia (PSA) is effective for pain management, it carries risks such as respiratory distress and necessitates intensive monitoring, which may strain emergency department (ED) workflows. Hematoma block (HB) offers a localized and potentially safer alternative, but evidence comparing HB to PSA in elderly populations remains limited. The objective is to compare the effectiveness and safety of HB versus PSA for closed manipulative reduction of distal radius fractures in elderly patients. **Materials and Methods:** This retrospective study was conducted at the Emergency Department of Malabar Medical College Hospital from November 2023 to May 2024. Fifty patients aged ≥65 years with isolated displaced distal radius fractures were equally divided into two groups (HB and PSA). Pain scores were assessed before, during, and after the procedure at 2, 4, and 12 hours. Length of ED stay and adverse events (e.g., respiratory distress, nausea, vomiting) were recorded. Statistical analysis included chi-square and independent t-tests, with significance set at $p<0.05$. **Result:** Pain relief was comparable between the two groups during and after the procedure, though PSA provided slightly lower intra-procedure pain scores (HB: 4.2 ± 0.8; PSA: 3.9 ± 0.7, $p=0.03$). The HB group had a significantly shorter ED stay (HB: 2.1 ± 0.5 hours; PSA: 3.4 ± 0.6 hours, $p<0.001$). Adverse events were significantly lower in the HB group (4%) compared to the PSA group (44%, $p<0.01$), with PSA associated with respiratory distress (16%), nausea (20%), and vomiting (12%). **Conclusion:** Hematoma block is a safe, effective, and resource-efficient alternative to PSA for elderly patients with distal radius fractures. It provides comparable pain relief, significantly reduces ED stay, and lowers the incidence of adverse events, making it a preferred choice in emergency care settings.

INTRODUCTION

Distal radius fractures are a common occurrence, particularly in elderly patients, often necessitating closed manipulative reduction for proper alignment. Traditionally, procedural sedation and analgesia (PSA) have been the mainstay for pain relief and to facilitate such reductions. However, PSA is associated with notable risks, such as respiratory distress, especially in elderly patients who may already have comorbidities. Additionally, PSA requires intensive monitoring and resources, which can further strain emergency department (ED) workflows.[1-3]

Hematoma block (HB) presents a simpler and potentially safer alternative, providing localized pain relief directly at the fracture site.[4,5] This method minimizes systemic complications and expedites the recovery process. Despite its apparent advantages, robust evidence comparing the effectiveness of HB to PSA in elderly populations is limited. This gap in knowledge is particularly pertinent in the context of the COVID-19 pandemic, where reducing ED stay duration is crucial for both patient safety and healthcare efficiency.[6]

This study seeks to address this critical gap by evaluating the effectiveness and safety of HB compared to PSA for elderly patients undergoing closed manipulative reduction of distal radius

ISSN (O): 2687-5365; ISSN (P): 2753-6556

fractures. Through this investigation, we aim to provide evidence-based recommendations to optimize pain management strategies and improve patient outcomes in this vulnerable population.

MATERIALS AND METHODS

Study Design: This study is a retroscpective study comparing the effectiveness and safety of hematoma block (HB) versus procedural sedation and analgesia (PSA) in the closed manipulative reduction of distal radius fractures in elderly patients.

Study Setting: The study was conducted at the Emergency Department of Malabar Medical College Hospital and Research Centre, Modakalloor, Kerala from novemeber 2023 to may 2024.

Study Duration: The study was carried out over a period of six months.

Study Population: Patients aged 65 years or older presenting with isolated, displaced distal radius fractures requiring closed manipulative reduction.

Sample Size: 50 patients (25 in the HB group and 25 in the PSA group).

Inclusion Criteria

1. Patients aged ≥65 years.
2. Isolated displaced distal radius fractures.
3. No additional trauma or deformities in other regions.
4. No history of previous fractures or deformities in the distal radius.

Exclusion Criteria

1. Patients <65 years of age.
2. History of addiction or alcoholism.
3. Diagnosed coagulopathy, respiratory diseases, or lung conditions.

Intervention Procedures

1. Hematoma Block

- After obtaining informed consent, 2% lignocaine was administered at the fracture site5.
- Sterile precautions was maintained, and 4 ml of 2% lignocaine was injected into the hematoma at the fracture site.

2. Procedural Sedation and Analgesia

- A pre-sedation evaluation was done to assess ASA status, vital signs, airway, and cardiopulmonary function.
- Sedation was administered using Ketamine (1 mg/kg) or a combination of Fentanyl (1 mcg/kg) and Midazolam (0.05 mg/kg)7.
- Continuous monitoring was performed, with equipment available for emergency airway management. Recovery was supervised until baseline cognitive and motor functions are restored8.

Data Collection

Data was collected using a structured proforma, including:

- **Demographics:** Age and sex.
- **Pain Scores:** Measured before, during, and after the procedure at 2, 4, and 12 hours using a standardized pain scale.
- **Length of ED Stay:** Measured from the time of admission to discharge.
- **Adverse Effects:** Respiratory distress, nausea, or other complications.

Outcome Measures

1. Pain relief during and after the procedure.
2. Duration of ED stay.
3. Frequency and severity of adverse events.

Statistical Analysis

- Descriptive Statistics: Frequency, percentage, and mean ± standard deviation and outcome variables was summarized.
- Inferential Statistics:
  - ❖ Chi-square test for categorical variables.
  - ❖ Independent t-tests for normally distributed continuous variables.
  - ❖ Statistical significance: p-value < 0.05.
- Software: IBM SPSS Statistics was used for data analysis.

Ethical Considerations

Ethical approval was obtained from the institutional ethics committee. Informed consent was secured from all participants. Data confidentiality was maintained, and participants had the right to withdraw at any time without consequences9.

RESULTS

Demographics: The study included 50 elderly patients with isolated displaced distal radius fractures, divided equally into two groups: Hematoma Block (HB) and Procedural Sedation and Analgesia (PSA). The mean age of participants was 70.4 ± 4.2 years in the HB group and 71.1 ± 3.8 years in the PSA group, with a nearly equal distribution of males and females in both groups (48% male, 52% female in HB; 52% male, 48% female in PSA). [Table 1]

Pain Scores: Pain scores were assessed before, during, and after the procedure at multiple intervals (2, 4, and 12 hours post-procedure).

- **Pre-procedure:** Both groups reported high pain scores, with no significant difference (HB: 8.5 ± 0.6; PSA: 8.7 ± 0.5, $p > 0.05$).
- **During procedure:** Pain scores were slightly lower in the PSA group (HB: 4.2 ± 0.8; PSA: 3.9 ± 0.7, $p = 0.03$), though the clinical difference was minimal.
- **Post-procedure:** Pain scores decreased significantly in both groups, with no significant differences at 2, 4, or 12 hours post-procedure ($p > 0.05$). [Table 2]

Length of ED Stay: The HB group had a significantly shorter ED stay compared to the PSA group (HB: 2.1 ± 0.5 hours; PSA: 3.4 ± 0.6 hours, $p < 0.001$).

Adverse Events: Adverse events were more common in the PSA group:

- **Respiratory distress:** 0% in HB vs. 16% in PSA.
- **Nausea:** 4% in HB vs. 20% in PSA.
- **Vomiting:** 0% in HB vs. 12% in PSA.

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- Other complications (e.g., hypotension): 0% in HB vs. 8% in PSA.

Overall, total adverse events were significantly lower in the HB group (4%) compared to the PSA group (44%, $p < 0.01$). [Table 3]

Table 1: Demographic Characteristics of the Study Population.

Characteristic	HB Group (n=25)	PSA Group (n=25)	p-value
Mean Age (years)	70.4 ± 4.2	71.1 ± 3.8	0.51
Gender (Male/Female)	48% / 52%	52% / 48%	0.77

Table 2: Pain Scores Before, During, and After the Procedure

Time Interval	HB Group (Mean ± SD)	PSA Group (Mean ± SD)	p-value
Pre-procedure	8.5 ± 0.6	8.7 ± 0.5	0.28
During procedure	4.2 ± 0.8	3.9 ± 0.7	0.03
2 hours post-procedure	2.6 ± 0.5	2.5 ± 0.6	0.60
4 hours post-procedure	2.3 ± 0.4	2.2 ± 0.5	0.55
12 hours post-procedure	2.0 ± 0.5	1.9 ± 0.6	0.48

Table 3: Adverse Events in HB and PSA Groups

Adverse Event	HB Group (n=25)	PSA Group (n=25)	p-value
Respiratory distress	0%	16%	0.04
Nausea	4%	20%	0.07
Vomiting	0%	12%	0.10
Hypotension	0%	8%	0.15
Total Adverse Events	4%	44%	<0.01

Table 4: Length of Emergency Department (ED) Stay

Group	Mean ED Stay (hours ± SD)	p-value
HB Group	2.1 ± 0.5	<0.001
PSA Group	3.4 ± 0.6	

DISCUSSION

This study compared the effectiveness and safety of hematoma block (HB) versus procedural sedation and analgesia (PSA) for the closed manipulative reduction of distal radius fractures in elderly patients. The findings highlight the potential of HB as a safer and more efficient alternative to PSA in this population.

Key Findings

- Pain Relief: HB provided comparable pain relief to PSA, with no significant differences in pain scores during and after the procedure. While PSA demonstrated slightly lower pain scores during the procedure, the difference was not clinically significant. These results align with previous studies, such as those by Tseng et al., which highlighted the effectiveness of HB in providing adequate pain control without the systemic risks associated with PSA.
- Length of ED Stay: Patients in the HB group had a significantly shorter ED stay (mean 2.1 ± 0.5 hours) compared to the PSA group (mean 3.4 ± 0.6 hours). This shorter duration is crucial in optimizing emergency department workflows, particularly during the COVID-19 pandemic. Bear et al. similarly reported reduced ED times with HB, further supporting its efficiency. [Table 4]
- Adverse Events: Adverse events were notably lower in the HB group (4%) compared to the PSA group (44%). PSA was associated with respiratory distress (16%), nausea (20%), vomiting (12%), and other complications like hypotension (8%), consistent with the systemic risks of sedative medications. In contrast, the localized nature of HB minimized these risks, making it a safer alternative, especially for elderly patients with comorbidities.

Clinical Implications

- The results strongly advocate for the use of HB as the first-line approach for elderly patients with distal radius fractures requiring reduction. Its minimal systemic risks and faster recovery make it a practical choice, particularly in resource-constrained or high-risk healthcare settings.
- The significantly shorter ED stay associated with HB can reduce hospital congestion and improve patient throughput.

Strengths

- This study addresses a critical gap in the literature by focusing exclusively on the elderly population, a group at higher risk for complications from systemic sedation.
- The prospective design and standardized pain assessment protocols ensure reliable and robust data.

Limitations

- The small sample size may limit the generalizability of findings. Larger multicenter trials are needed to confirm these results.
- Pain perception is inherently subjective, and additional objective measures of pain relief may enhance future studies.

ISSN (O): 2687-5365; ISSN (P): 2753-6556

- Long-term outcomes, such as functional recovery or fracture healing, were not assessed in this study.

Comparison with Previous Studies

This study builds on prior research that demonstrated the efficacy of HB in adult and pediatric populations. For example, Tabrizi et al. and Myderrizi et al. highlighted HB's safety and effectiveness compared to general anesthesia. However, this study uniquely focuses on the elderly population, addressing a significant gap in the literature.

Future Directions

- Larger, randomized controlled trials to validate the findings and explore broader populations.
- Examination of cost-effectiveness, as the shorter ED stay and reduced resource utilization with HB could translate into significant healthcare savings.
- Investigation of long-term outcomes, including patient satisfaction and functional recovery, to provide a comprehensive evaluation of HB's benefits.

CONCLUSION

This study underscores the value of hematoma block as a safe, effective, and resource-efficient alternative to procedural sedation and analgesia for elderly patients with distal radius fractures. Its comparable pain relief, significantly reduced ED stay, and lower incidence of adverse events highlight its potential as the preferred choice in emergency care settings.

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ISSN (O): 2687-5365; ISSN (P): 2753-6556