# Which is Less Painful? Intradermal vs. Subcutaneous Lidocaine Injections for Tuohy Needle Insertion: A Pilot Double-Blind Randomized Trial

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## Background and Hypothesis

- Lidocaine injection before Tuohy needle placement for epidurals is a critical component of analgesia care
- Lidocaine can be injected a number of ways:
  - Intradermally
  - Subcutaneously
  - It is unclear which route causes less pain [1]
- Pain can be measured in different ways:
  - Patient-reported numeric rating scale (NRS) scores [2]
  - Critical-Care Pain Observation Tool (CPOT)
    - Four components (facial expression, body movements, muscle tension, and vocalizations)
    - Body movements and vocalizations may have a greater impact on provider performance
- Null hypothesis: There is no difference in pain scores (NRS or CPOT) between intradermal and subcutaneous lidocaine administration

| Sub-scale | Description | Score |
|---|---|---|
| Facial expression | Relaxed, neutral | 0 |
| | Tense | 1 |
| | Grimacing | 2 |
| Body movements | Absence of movements | 0 |
| | Protection | 1 |
| | Restlessness | 2 |
| Muscle tension | Relaxed | 0 |
| | Tense, rigid | 1 |
| | Very tense or rigid | 2 |
| Compliance with ventilation | Tolerating ventilator or movement | 0 |
| | Coughing but tolerating | 1 |
| | Fighting ventilator | 2 |
| Vocalisation (extubated patients) | Talking in normal tone or no sound | 0 |
| | Sighing, moaning | 1 |
| | Crying out, sobbing | 2 |

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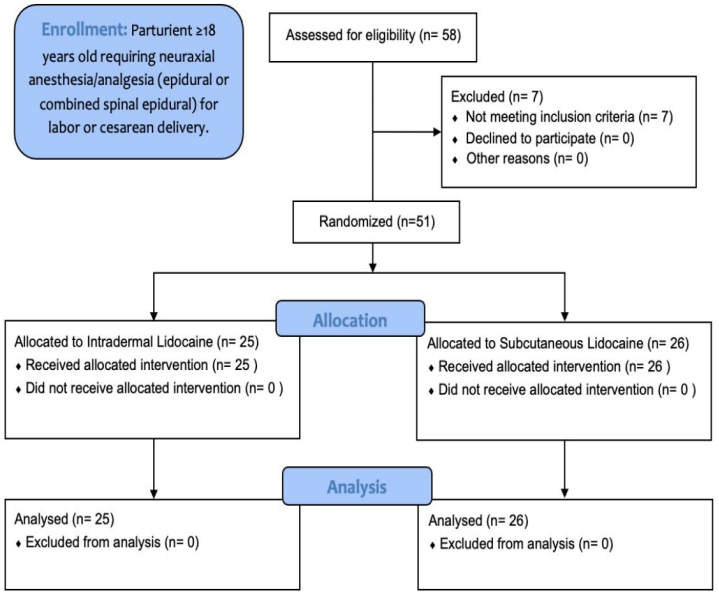
## Methods

- 51 patients randomized into two groups :
  - Subcutaneous, SC Group (n=26):
    - Needle 90-degree angle to the skin
  - Intradermal, ID Group (n=25):
    - Needle 60-degree angle to the skin
- Administration of 3 mL 1% lidocaine using a 25G with randomized techniqu
- Primary outcome:
  - Pain during lidocaine injection, assessed using CPOT and NRS scores
- Secondary outcomes:
  - The analgesic effect for Tuohy needle insertions, hemodynamic stability, and overall patient satisfaction.
- Statistical significance was defined as a P-value ≤ 0.05.
- PIlot study - main goal to power a larger trial for procedural pain for epidurals

Figure 1. CONSORT Flow Diagram of Patient Enrollment, Allocation, and Analysis



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## Results

- CPOT total scores and NRS scores did not show significant differences between the two techniques of lidocaine injection
  - Statistically significant difference for muscle tension scores of CPOT (p = 0.018)
- Secondary outcomes, including analgesia effect for Tuohy needle insertions, hemodynamic data, and patient satisfaction were similar between the groups
- The Spearman correlation coefficient showed a weak correlation between CPOT and NRS scores during lidocaine injection (Correlation = 0.32, p = 0.024)

**Table 1. Primary Outcome: Pain Evaluation of Lidocaine Injection**

| | Intradermal (N=25) | Subcutaneous (N=26) | P-Values |
|---|---|---|---|
| **The Critical-Care Pain Observation Tool (CPOT) Scores (Median (IQR))** | | | |
| Total Scores | 3 (2, 4) | 2 (1, 4) | 0.1820* |
| Vocalization & Body Movement | 1 (0, 1) | 1 (0, 1) | 0.6823* |
| **Numeric Pain Rating Scale (NRS) (Median (IQR))** | | | |
| Total Scores | 3 (2, 4) | 3 (1, 5.5) | 0.9848* |
| **Painful Injection (n, %)** | | | |
| Total CPOT (cutoff at ≥ 2/8) | 21 (84.0) | 18 (69.2) | 0.2139^ |
| NRS (cutoff at ≥ 4/10) | 10 (40.0) | 11 (42.3) | 0.8671^ |

*. Kruskal-Wallis p-value, ^. Chi-Square p-value

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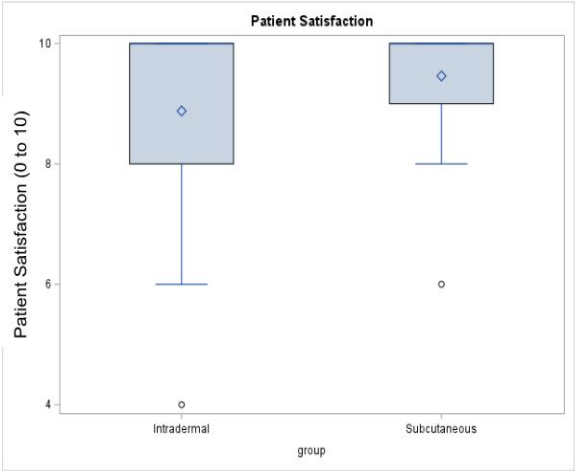
## Discussion and Conclusion

- Results are inconclusive regarding differences between the subcutaneous and intradermal lidocaine administration, likely due to the limited sample size
- Notably, subcutaneous lidocaine injections demonstrated comparable analgesic efficacy to the most commonly used intradermal lidocaine injections
- Further standardization of CPOT in diverse populations is needed
- Results warrants further investigation in a larger, more diverse population
- Goal: make epidural procedure more comfortable for the Pt
    - Some Pts say lidocaine injection worst part
    - Reducing needle pain could increase parturients seeking labor analgesia

**Fig 2. Secondary Outcome: Assessment of Overall Patient Satisfaction of Epidural Procedure After Intradermal or Subcutaneous Lidocaine**




References

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2. Hjermstad, MJ, et al.. Journal of pain and symptom management, 2011.