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# Comparison of the Efficacy of Dexmedetomidine versus Ketamine as an Adjunct to Ropivacaine for Scalp Block during Awake Craniotomy Surgery – A Clinical Comparative Study

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## Background

- Awake craniotomy is a complex neurosurgical procedure necessitating patient cooperation for functional mapping while ensuring optimal analgesia and haemodynamic stability.
- Scalp block with local anaesthetics significantly enhances perioperative comfort, and adjuncts are frequently employed to improve block quality and duration.
- **Dexmedetomidine**, an $\alpha_2$ agonist, and **ketamine**, an NMDA receptor antagonist, are both used for their analgesic-sparing effects and minimal respiratory depression.
- We hypothesise that ketamine, administered at a dose of 0.5 mg/kg, will demonstrate non-inferiority to dexmedetomidine in prolonging the duration of analgesia and enhancing postoperative pain management.

## Patients & Methods

- This prospective, randomised, double-blinded study was conducted from September 2023 to June 2024 after obtaining institutional ethics committee approval (IEC/INT/2023/MD-1323) and CTRI registration (CTRI/2024/01/061259).
- Forty-six patients aged 18–65 years, ASA I–II, scheduled for elective awake craniotomy, were enrolled. Exclusion criteria included allergy, psychiatric illness, BMI > 35 and severe systemic disease.
- Patients were randomised into two groups:

| **Group RD** (n = 23) | **Group RK** (n = 23) |
|---|---|
| Ropivacaine 0.5% + Dexmed 1 µg/kg | Ropivacaine 0.5% + ketamine 0.5 mg/kg |

## Study procedure

- Scalp blocks were administered prior to skin incision.
- Haemodynamic parameters, $SpO_2$, RASS scores and respiratory rates were recorded intra-operatively.
- The time of onset of sensory block was assessed using pinprick sensation every 1 minute until loss of sensation.
- Postoperative monitoring included haemodynamic parameters, $SpO_2$, pain scores (NRS) and PACU stay duration; observation lasted 24 hours.
- Statistical analysis was conducted using SPSS v22: parametric tests (t-test), non-parametric tests (Mann–Whitney U), Fisher's exact test and generalised estimating equations. P < 0.05 was considered significant.

## Results

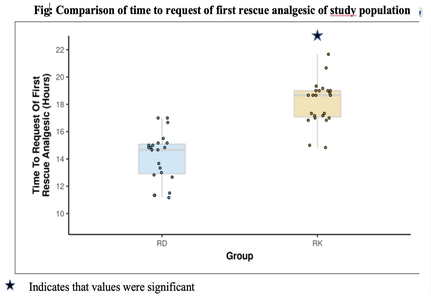
Time to first rescue analgesia (mean ± SD)

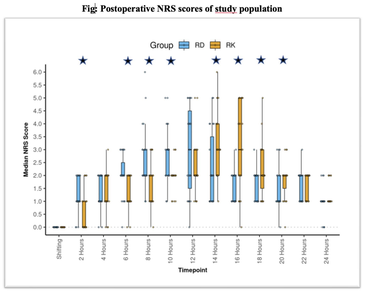
**18.67 h** vs **14.67 h**

RK 18.67 ± 2.63 vs RD 14.67 ± 3.36 h · (P < 0.001)

- Demographic variables were comparable.
- **Group RK** showed significantly prolonged time to first rescue analgesia versus **Group RD**, demonstrating the superior analgesic efficacy of ketamine.
- Intraoperative haemodynamics were significantly higher in Group RK in terms of systolic BP, diastolic BP and mean arterial pressure at 50, 60 and 70 minutes (P < 0.05).
- Both groups had comparable onset of sensory block, sedation scores, oxygen saturation, and incidence of psychosis and PONV (P > 0.05).

## Figures




**Left:** time to request of first rescue analgesic. **Right:** postoperative NRS pain scores over 24 h. ★ indicates values that were significant (P < 0.05).

Respiratory depression
**8.7% vs 39.1%**
RK vs RD · P = 0.016

PACU discharge
**Earlier in RD**
P = 0.015

## Discussion and Conclusion

- The utilisation of ketamine as an adjunct to local anaesthesia is justified, as it offers superior analgesic effects and maintains stable haemodynamics.
- Additionally, it facilitates ventilation and reduces postoperative analgesic consumption without significantly delaying recovery.
- Therefore, **ketamine 0.5 mg/kg as an adjunct to the local anaesthetic solution is comparable and non-inferior to dexmedetomidine** in scalp block for awake craniotomy surgeries.

## References

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- Kadian S, Gupta P, Agrawal S. Comparative evaluation of analgesic efficacy of ketamine and magnesium sulfate as adjuvants to bupivacaine for scalp block in supra-tentorial craniotomy: a randomized, double-blind clinical study. *J Clin Neurosci.* 2025;137:111347.