Ketamine: Review of perioperative infusion for paediatric scoliosis surgery

Bang, J., Thirukkamu, M.
School of Medical Sciences, University of Manchester

Background/Aims

- Paediatric scoliosis patients with severe malformation of the spine will require a surgical intervention.
- Due to its invasiveness of the surgical process, effective intra- and post-operative pain management is crucial.
- Remifentanil is a form of opiate with rapid onset, short duration of action and minimal interference with the spinal cord monitoring and is therefore used widely in scoliosis surgery.
- However, **remifentanil** has also shown its **tendency to induce hyperalgesia** as well as **acute opioid tolerance** which may lead **to increased morphine requirement** in patients perioperatively.
- **Ketamine**, an NMDA receptor antagonist, **is thought to prevent remifentanil induced hyperalgesia and its development of acute opioid tolerance.**
- 5 Randomised Controlled Trials were selected and critically analysed in order to identify, if any, benefits of perioperative low dose ketamine infusion during paediatric scoliosis surgery.

Methods

PRISMA 2009 Flow diagram
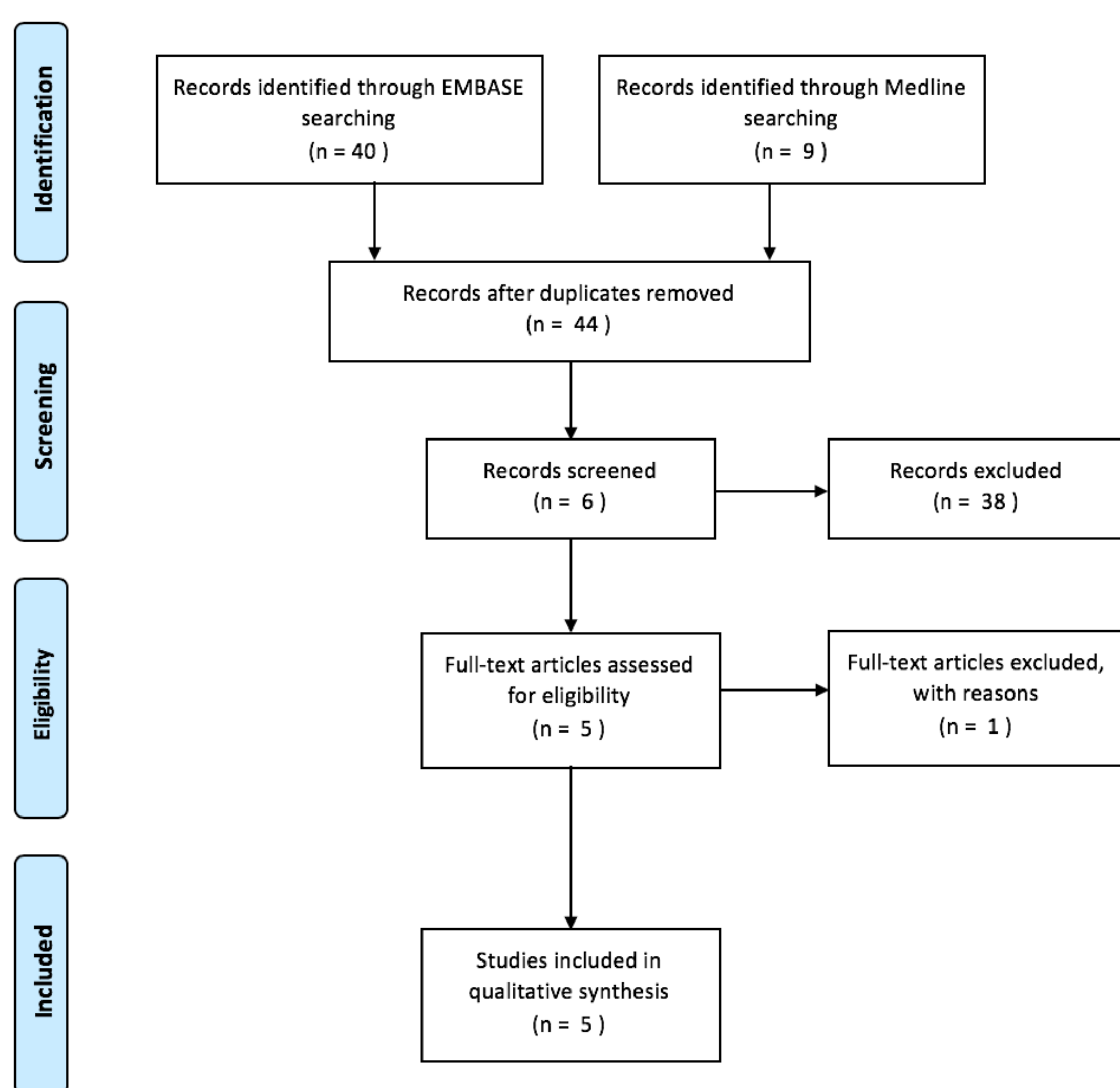
Total of 44 abstracts and subsequently 10 full papers were reviewed.

Out of which, **5 studies were identified** to meet the eligibility criteria following the selection process.

Results

Table 1. Results in summary

	Cumulative Morphine Consumption	Pain score	Sedation score	PONV	Pruritis
Paper 1	🟩	🟩	🟦	🟦	🟦
Paper 2		🟦	🟩		
Paper 3	🟦	🟩	🟩	🟩	🟩
Paper 4	🟧	🟩	🟩	🟩	🟩
Paper 5	🟩	🟩	🟩	🟩	🟩

🟩 = No significant difference

🟦 = Reduced in Ketamine group but statistically insignificant

🟧 = Significantly reduced in Ketamine group

⬜ = Outcome not measured

Details of the Results

Paper 1
- Ketamine infusion of 4 µg/kg/min
- Subject size: 34

Paper 2
- Ketamine infusion of 1 µg/kg/min
- Subject size: 32
- Ketamine group showed more **haemodynamic stability** (statistically insignificant)
- Pain score was also lower in ketamine group in the first 2 hours
- **Recovery time** was **increased** in ketamine group

Paper 3
- Ketamine infusion of 250 ug/kg/h = 4.17 ug/kg/min intraoperative, 100 ug/kg/h =1.67 ug/kg/min 72 hours post-op.
- Subject size: 50
- Ketamine group shows reduced 1day post-op morphine consumption (statistically insignificant)

Paper 4
- Ketamine infusion of 2 ug/kg/min until 48 h post-op.
- Subject size: 36
- **Antiemetic consumption was reduced** in ketamine group

Paper 5
- Ketamine infusion of 2 ug/kg/min until 72 hours post-op.
- Subject size: 48
- Paracetamol was given to all subject group

Conclusion

There was **insufficient evidence** to support subclinical dose **of ketamine infusion during paediatric scoliosis surgery in reducing postoperative morphine consumption.**

References

1. Moustafa AM, Negmi HH, Rabie ME. The combined effect of ketamine and remifentanil infusions as total intravenous anesthesia for scoliosis surgery in children. Middle East J Anesthesiol. 2008;19(5):1151–68.
2. Minoshima R, Kosugi S, Nishimura D, Ihara N, Seki H, Yamada T, et al. Intra- and postoperative low-dose ketamine for adolescent idiopathic scoliosis surgery: A randomized controlled trial. Acta Anaesthesiol Scand. 2015;59(10):1260–8.
3. Pestieau SR, Finkel JC, Junqueira MM, Cheng Y, Lovejoy JF, Wang J, et al. Prolonged perioperative infusion of low-dose ketamine does not alter opioid use after pediatric scoliosis surgery. Paediatr Anaesth. 2014;24(6):582–90.
4. Engelhardt T, Zaarour C, Naser B, Pehora C, De Ruiter J, Howard A, et al. Intraoperative low-dose ketamine does not prevent a remifentanil-induced increase in morphine requirement after pediatric scoliosis surgery. Anesth Analg. 2008;107(4):1170–5.
5. Perelló M, Artés D, Pascuets C, Esteban E, Ey Batlle AM. Prolonged Perioperative Low-Dose Ketamine Does Not Improve Short and Long-Term Outcomes after Pediatric Idiopathic Scoliosis Surgery. Spine (Phila Pa 1976). 2017;42(5):E304–12.