Effectiveness of Intranasal Dexmedetomidine in Preventing Emergence Delirium in Pediatric Patients Undergoing Strabismus Surgery: A Systematic Review with Knowledge Translation

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PICOT

In pediatric patients undergoing strabismus surgery under general anesthesia, does preoperative administration of intranasal dexmedetomidine, compared with alternative premedication or no premedication, reduce the incidence of emergence delirium during the immediate postoperative period?

Background

- Most commonly performed ophthalmic procedure in children 86% experience some degree of emergence delirium (ED) (Dajani et al., 2024)
- **ED:** post-operative phenomenon characterized by agitation, confusion, and inconsolability during anesthetic emergence

Dexmedetomidine

- Centrally acting alpha-2 selective adrenergic agonist
- Provides sedation, anxiolysis and analgesia with minimal respiratory depression
- Commonly used as an agent to decrease ED
- Intranasal administration: noninvasive route with reliable absorption, prolonged duration of action, and effective sedation

Significance

Complications of ED

- Accidental self-injury
- Caregiver distress
- Long-term behavioral consequences
- ↑ healthcare cost & clinician workload
- ↓ parent satisfaction

Gap in knowledge

- Lack of standardized prevention strategy
- Other commonly used agents: inconsistent effectiveness in preventing ED

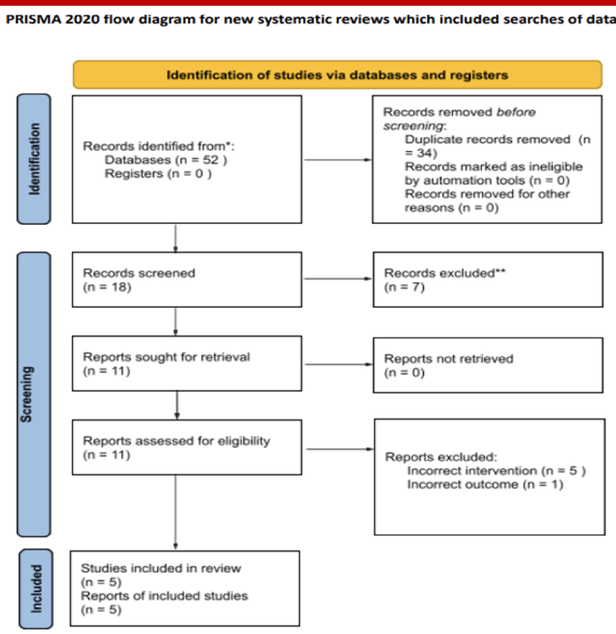
Methods

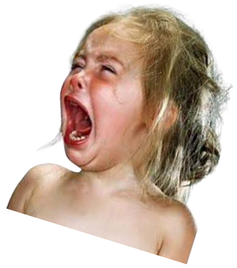
Study Design: Systematic review
Types of Studies: Randomized control trials
Inclusion: Children ages 0-18 y/o, full text, English, strabismus surgery, intranasal dexmedetomidine
Exclusion: Ages over 18 y/o, pre-existing cognitive or behavioral dysfunction
Intervention: Pre-op intranasal dexmedetomidine
Comparators: Midazolam, melatonin or placebo/no medication
Outcomes: ED quantified using PAED

Critical Appraisal

- Eligible articles were critically appraised by four independent reviewers using the JBI critical appraisal checklist
- All five studies were deemed good quality with low risk of bias

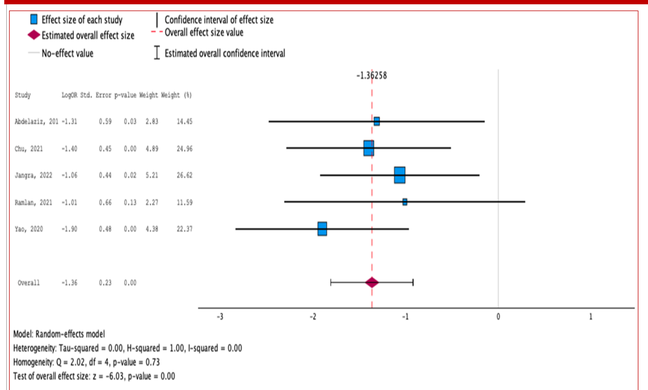
Literature Review

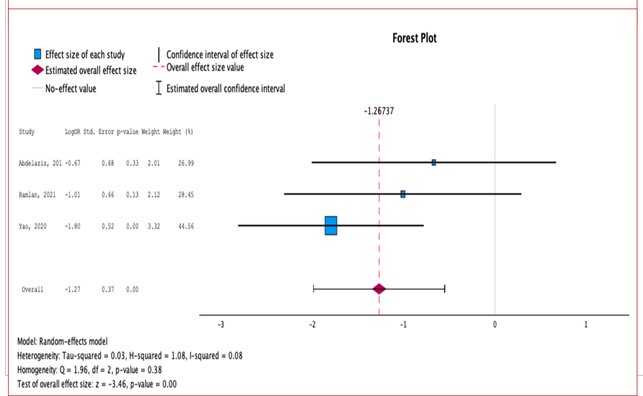




Databases searched: MEDLINE, Embase, CINAHL, Cochrane Library, and Web of Science
Keywords: *intranasal dexmedetomidine; emergence delirium; strabismus surgery; pediatric; perioperative; systematic review*

Results





Intranasal dexmedetomidine reduced ED by 74% compared with controls (OR 0.26, 95% CI 0.16–0.41, $p < 0.001$).

Compared with midazolam, dexmedetomidine reduced ED by 72% (OR 0.28, 95% CI 0.14–0.58, $p < 0.001$).

Minimal heterogeneity across studies ($I^2 = 0–8\%$) indicating consistent findings

Discussion

- 5 RCTs (n = 575) evaluated intranasal dexmedetomidine for prevention of ED in pediatric strabismus surgery
- Strabismus surgery is associated with a high risk of ED due to volatile anesthetics, developmental factors, and perioperative anxiety
- Findings support intranasal dexmedetomidine as an effective prophylactic strategy in this population
- Evidence supports translation into practice through guideline development within the Knowledge-to-Action framework

Limitations

- Methodological limitations in studies may introduce potential bias
  - Incomplete reporting of blinding
  - Treatment group management
- Limited generalizability: English-language restriction, small sample sizes, and studies conducted outside the United States

Recommendations

- Standardized methodologies for future research (optimal dosing, timing)
- Large multi-center in diverse geographic for improved generalizability
- Long term behavioral outcomes and patient/parent satisfaction needed

Conclusions

- Intranasal dexmedetomidine significantly reduces ED in pediatric patients undergoing strabismus surgery Findings support translation into standardized perioperative guidelines to reduce practice variability and improve postoperative recovery and patient experience

References

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