

Pain Management in Postoperative Pediatric Craniotomy Patients: A Scoping Review

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Purpose

- Develop a standardized, evidence-based practice recommendation that safely and adequately manages pain for the postoperative pediatric craniotomy patient.
- To collect, simplify, and review the current data to fuel future studies to establish more evidence, protocols, and evidence-based recommendations.

Background

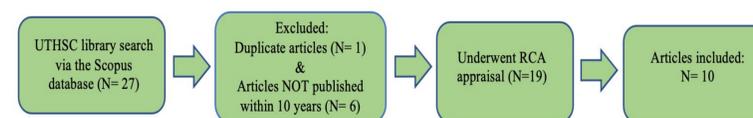
- Post-craniotomy pediatric patients experience moderate to severe pain.
- No current standardized protocol to help guide adequate pain control in the post operative setting.
 - Most pain management is institutional-based or provider preference.
- Fear that use of NSAIDs after neurosurgery increases the risk of bleeding.
 - Current evidence shows otherwise
- Untreated pain not only causes unnecessary suffering, but also increases risk of complications and chronic pain.
- Pediatric patients are prone to inadequate pain control due to communication barriers such as age, cognitive development, and culture.
- Due to the lack of FDA approval of pain medication in the pediatric population, drug limitations contributes to inadequate pain control.
- Opioid administration can alter neurological assessments, which are crucial postoperative craniotomies.

Methods

- **Eligibility criteria:**
 - Addresses pediatric pain management
 - Peer reviewed
 - Scientifically researched
 - Approved by IRB
 - Published in medical or nursing journals
 - Printed in English
 - Systematic reviews, retrospective studies, qualitative reviews, RCT
 - Published within the last 10 year

Methods- continued

- Each author searched UTHSC databases using keywords “(pediatric) (craniotomy) (pain)”, “(pediatric) (opioid pain management) (post-operative)”, “(pediatric) (craniotomy pain management)”, and “(pediatric pain management) (non-opioid)”
- Ten articles were divided between each group member and data was collected and placed into the Excel table created. The following data was searched and extracted from the 10 articles:
- Year of publication, type of study performed, age and sex of participants, diagnosis, surgical procedure performed, medications with respective routes, dosages and frequency, pain scores with opioid and non-opioid administration, and side effects or adverse events related to medication administration.
- Studies were grouped by design type and summarized by study population, interventions, and key findings.



Results

Most Common Topics:

↑, ↓, —, NE, NR, ✓	1	2	3	4	5	6	7	8	9	10
APS	✓	NR	✓	✓	NR	NR	NR	✓	NE	✓
AE	↓ ^b	NE	↓ ^b	NE	↑ ^a	↑ ^g ND ^{d, e, f}	↑ ^a	↑ ^a	ND ^b	NR
PL	NE	↓ ^{a, b} , ^h	↓	↓ ^{a, i} j	↓ ^{a, c} ↑ ^b	↑ ^{f, g} ND ^{e, d, c}	↓ ^{a, b} , ^c	↓ ^{a, b} c	↓ ^b	↓ ^{a, b} , ^c

SYMBOL KEY

↑ = Increased, ↓ = Decreased, — = No Change, NE = Not Examined, NR = Not Reported, ND = No Difference, ✓ = applicable or present, a = opioids, b = non-opioids, c = combined, d = fentanyl, e = morphine, f = control, g = tramadol, h = sucrose, i = non-pharmacological, j = parental presence

LEGEND

APS = appropriate pain scale, AE = adverse events, PL = pain level
 1 = Amirovin, R., et al. (2018); 2 = Gagnon, M., et al. (2016); 3 = Lukosiene, L., et al. (2014); 4 = Smeland, A., et al. (2019); 5 = Tsaousi, G., et al. (2017); 6 = Xing, F., et al. (2019); 7 = Kulikov, A., et al. (2021); 8 = Maxwell, L.G., et al. (2014); 9 = Nesvick, C. L., et al. (2020), 10 = Teo, J.H., et al. (2011).

- **Most adverse events occur with opioid administration**
- **Optimization of post-op pain management includes scheduled non-opioid administration regimen with as needed opioid administration for rescue breakthrough pain**
- **Eight articles demonstrated decreased pain levels with either frequent or scheduled non-opioid administration, as needed opioid administration, and multimodal pain medication administration**

Implications for Practice

- **This scoping review highlights the need for more rigorous research for general pediatrics, and for pediatric post-op craniotomy patients.**
 - **Minimal** pediatric pain management research and less data for post-op craniotomy pain management prevents us from forming a solid recommendation for practice.
 - **Scheduled non-opioid medication administration with as needed opioid medication administration may be the safest and most effective regimen for post-op craniotomy patients.**
 - New data supports the use of NSAIDs in this patient population.
 - Scheduled opioids are associated with increased adverse effects.
 - Frequent opioids can mask potential complications of the craniotomy procedure.
 - Pain scores were generally lower with non-opioid analgesia administration.
- **Further research is needed to improve and optimize pediatric pain management.**

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