

Intraoperative Methadone in Pediatric Cardiac Surgical Patients

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BACKGROUND

- Methadone, a long-acting opioid and NMDA antagonist, is increasingly used in children undergoing surgery due to its benefits including reduced postoperative pain scores, diminished opioid need, and fewer adverse effects.
- Intraoperative methadone is not well studied in children undergoing cardiac surgery.
- The aim of this study was to compare the effect of intraoperative intravenous methadone versus. non-methadone analgesia within a standardized enhanced recovery after pediatric cardiac surgery.

METHODS

- A large retrospective cohort study of 290 children undergoing cardiac surgery was conducted utilizing validated institutional electronic medical record data and Society of Thoracic Surgeons (STS) Pediatric Cardiac Surgery *Database* outcomes.
- Patients were administered either caudal morphine (<6 years) or intravenous opioids (>6 years) in non-methadone group versus intravenous methadone (0.1mg/kg), as part of an ERACS pathway.
- The *primary outcomes* for this study were postoperative opioid use in morphine milligram equivalents (MME) and postoperative pain scores.
- The secondary outcomes included opioid-related adverse outcomes including need for rescue antiemetics, need for reintubation. Use of naloxone and length of hospital stay.

RESULTS

Table 1. Clinical Outcomes					
Whole Sample					
Variable	Variable Value	Total	No Methadone	Methadone	P-Value
Any Antiemetic - n (%)	No	218 (75.7%)	183 (83%)	35 (52%)	<.001
	Yes	70 (24.3%)	38 (17%)	32 (48%)	
Reintubated - n (%)	No	260 (89.7%)	202 (91%)	58 (87%)	0.362
	Yes	30 (10.3%)	21 (9%)	9 (13%)	
Postop LOS - Median (IQR)	-	5 (3 - 8)	5 (3 - 8)	5 (4 - 9.8)	0.087
MME / Kg POD 0 - Median (IQR)	-	0.41 (0.15 - 1.03)	0.5 (0.2 - 1.1)	0.3 (0.1 - 0.7)	0.009
MME / Kg POD 1 - Median (IQR)	-	0.09 (0.05 - 0.19)	0.1 (0 - 0.2)	0.1 (0 - 0.3)	0.669
MME / Kg POD 2 - Median (IQR)	-	0.08 (0.04 - 0.19)	0.1 (0 - 0.2)	0.1 (0 - 0.5)	0.260
MME / Kg POD 3 - Median (IQR)	-	0.09 (0.05 - 0.57)	0.1 (0.1 - 0.6)	0.1 (0 - 0.4)	0.715
MME / Kg POD 4 - Median (IQR)	-	0.09 (0.05 - 0.68)	0.1 (0.1 - 0.7)	0.1 (0.1 - 0.7)	0.682
MME / Kg Post Op Total - Median (IQR)	-	0.62 (0.21 - 1.24)	0.7 (0.2 - 1.3)	0.4 (0.2 - 1.1)	0.062
MME / Kg In Hospital Total - Median (IQR)	-	1.06 (0.66 - 1.78)	1.1 (0.7 - 1.9)	0.9 (0.7 - 1.6)	0.288
Max Pain POD 0 - Mean (sd)	-	7.52 (2.7)	7.6 (2.7)	7.3 (2.7)	0.451
Max Pain POD 1 - Mean (sd)	-	4.56 (3.55)	4.6 (3.6)	4.4 (3.4)	0.692
Max Pain POD 2 - Mean (sd)	-	3.92 (3.34)	3.9 (3.3)	4.1 (3.6)	0.748
Max Pain POD 3 - Mean (sd)	-	2.72 (3.16)	2.8 (3.2)	2.6 (3.1)	0.863
Max Pain POD 4 - Mean (sd)	-	3 (3.43)	3.6 (3.5)	0.8 (1.7)	0.003
Avg Pain POD 0 - Mean (sd)	-	2.04 (1.49)	2.1 (1.5)	1.9 (1.3)	0.451
Avg Pain POD 1 - Mean (sd)	-	1 (1.01)	1 (1)	1 (1.1)	0.903
Avg Pain POD 2 - Mean (sd)	-	1.02 (1.46)	1 (1.4)	0.9 (1.5)	0.687
Avg Pain POD 3 - Mean (sd)	-	0.69 (0.98)	0.7 (1)	0.7 (0.9)	0.997
Avg Pain POD 4 - Mean (sd)	-	0.98 (1.69)	1.2 (1.8)	0.3 (0.7)	0.057
Ondansetron (mg) Total Post Op Mean (sd)	-	2.69 (14.46)	0.8 (3)	9.1 (28.7)	<.001
Naloxone (mg) Total Post Op Mean (sd)	-	0 (0.04)	0 (0)	0 (0.1)	0.408

- Out of a total of 290 children, 67 received intraoperative methadone and 113 did not.

- 197/227 children (88%) <6 years received caudal morphine (77%) or non-methadone opioids (23%).

- 37/63 (55%) of children >6 years of age received intraoperative methadone.

- Mean ages in non-methadone and methadone group were 2.8 (4.1) and 7.6 (5.9).

- Postoperative MME/kg on the day of surgery and total in-hospital stay were significantly less in the methadone group 0.3 and 0.4 versus non-methadone group 0.5 and 0.7 respectively.

- Re-intubation rates were similar.

- In children >6 years, antiemetic use was higher (68%) with methadone versus 42% with non-methadone, p=0.046.

DISCUSSION

- The study findings support that a single intraoperative methadone administration provided non-inferior analgesia after pediatric cardiac surgery.

- Intraoperative methadone group had less postoperative opioid requirements on the day of surgery and during in-hospital stay.

- Children in the methadone group were older, and had higher risk surgeries, requiring longer hospitalization.

- Large prospective studies of perioperative methadone are needed to maximize methadone’s analgesic benefits in children.

CONCLUSIONS

- **Single intraoperative methadone administration provided non-inferior analgesia after pediatric cardiac surgery with less immediate postoperative opioid requirement.**

- Postoperative additional doses of methadone may be needed for sustained analgesia during hospitalization.

- Large prospective studies are needed in children.

REFERENCES

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