Pediatric Postoperative Opioid Consumption in Open Versus Thoracoscopic Congenital Diaphragmatic Hernia Repair

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Background

- Minimally invasive surgical (MIS) approaches for thoracic procedures in adults are associated with less pain and medication usage
- Data in neonates are lacking
- Primary objective of this study was an institutional interrogation and quantification of post-operative opioid consumption and pain management practices in neonates and infants who underwent MIS vs. open repair of congenital diaphragmatic hernia (CDH)
- Secondary objectives included time to extubation, oral feeds and discharge.

Methods

- IRB approved, retrospective study using patients' EMR from 2012-2016 who underwent MIS vs open thoracic surgery for CDH repair
- Demographic data included date of birth, age at time of surgery, gestational age, weight, gender, ASA status, and co-morbidities.
- Intraoperative analgesic regimen, total 7 day post-operative opioid consumption, and use of adjunctive pain medications were recorded
- Secondary measures consisted of time to extubation, oral feeds and discharge
- Continuous data were compared using rank-sum tests while categorical data used Fisher's exact tests.

Characteristics	Minimally invasive procedure (N=8)	Open thoracotomy (N=20)	P
	Median (IQR) or N (%)	Median (IQR) or N (%)	
Patient characteristics			
Female	3 (38%)	10 (50%)	0.686
Age (days)	4 (3, 5)	5 (3, 9)	0.338
Gestational age (weeks)	39 (39, 39)	39 (37, 40)	0.628
Weight (kg)	4 (3, 4)	3 (3, 4)	0.749
ASA status			
2	**1 (13%)**	**0 (0%)**	**0.036**
3	**5 (63%)**	**5 (25%)**	
4	**2 (25%)**	**15 (75%)**	
Patient Outcomes			
Opioid consumption			
Intraoperative (ME)	4.7 (3.0, 9.2)	2.7 (1.8, 6.3)	0.104
Postoperative (ME)	**0.3 (0.2, 18.3)**	**32.3 (9.9, 53.6)**	**0.006**
Hospital LOS (days)	**14 (13, 26)**	**33 (29, 54)**	**0.015**
Days to extubation	**1 (1, 2)**	**6 (3, 9)**	**0.004**
Days to oral feeding	**4 (3, 6)**	**10 (8, 13)**	**0.011**

Table. Characteristics and outcomes of patients undergoing congenital diaphragmatic hernia repair according to procedure type (N=28), IQR = interquartile range, LOS = length of stay, ME = morphine equivalents, SD = standard deviation

Results

- 28 patients were identified with 13/15 female/male, median age of 5 days, gestational age of 39 weeks, and weight of 3 kg
- MIS was performed in 8 patients
- First 7 postoperative days, median opioid consumption was 0.3 mg/kg of oral morphine equivalents (ME) (interquartile range [IQR]: 0.2, 18.3) in the MIS group versus 32.3 mg/kg (IQR: 9.9, 53.6) in the open group (95% CI of differences in medians: 8.2, 42.9 p=0.006)
- No difference was seen in intraoperative oral ME dose
- Among secondary outcomes, LOS, time to extubation, and time to oral feeding were significantly longer in the open group.

Discussion

Although several factors may impact the hospital course of neonates with CDH, we found that patients had a 10-fold difference in median opioid consumption following repair between those who underwent MIS vs open approach. Examination of pain practices of these patients revealed an absence of analgesic regimen standardization resulting in wide variation of opioid administration amongst NICU providers.

References

1. Ceelie I et al. Eur J Pain 2011;15:615-20.
2. Orzech N et al. J Laparoend Adv Surg Tech 2008;18:140-6.
3. Soto RG et al. Ann Thorac Surg 2003;75:1349-57.