



General endotracheal vs. non-endotracheal regional anesthesia for elective inguinal hernia surgery in very preterm neonates: A single institution experience



Juan Gurria¹, Phillip Kuo², Angie Kao², Luisa Christensen², AiXuan Holterman^{*,3}

Children's Hospital of Illinois, University of Illinois College of Medicine at Peoria

ARTICLE INFO

Article history:

Received 7 October 2016

Accepted 20 October 2016

Key words:

Preterm
Neonatal
Inguinal
Hernia
Repair
Bronchopulmonary dysplasia

ABSTRACT

Background: Very pre-term infants (VP) at <32 weeks post menstrual age PMA have a high incidence of bronchopulmonary dysplasia BPD. BPD places them at risk for pulmonary-related perioperative complications from general endotracheal anesthesia GE during elective inguinal hernia repair.

Methods: A retrospective cohort study was done to compare pulmonary-related perioperative risks between VP patients undergoing non-emergent inguinal hernia repair prior to NICU discharge under GE (n = 58) vs regional anesthesia RA (n = 37).

Results: Median PMA (RA 26 vs GE 27 weeks), operative weight (RA 2.2 vs GE 2.27 kg), % with BPD, medical and surgical comorbidities, number of concurrent procedures are similar between groups, except for sac laparoscopy (0% RA vs 36% GE). Procedural anesthesia time was 40 minutes for RA vs 69 minutes for GE, (p < 0.001). GE (17%) vs RA (0%) remained intubated post op (p < 0.001). Oral feeding was fully tolerated in RA (97%) vs GE (72%, p = 0.002) by 48 h after surgery. The statistical differences hold after regression analysis controlling for sac laparoscopy and procedure time. No difference in intraoperative or postoperative hernia complications is found.

Conclusion: RA is safe. RA is associated with early resumption of full feed, avoidance of prolonged mechanical intubation. We recommend a randomized controlled trial comparing the safety and efficacy of GE vs RA in VP infants undergoing elective NICU inguinal hernia repair.

Level of Evidence: II Retrospective study.

© 2017 Published by Elsevier Inc.

1. Background

Inguinal hernia IH is one of the most commonly encountered surgical problems in preterm infants [1]. Its frequency is inversely related to birth weight [2]. Since the risk of hernia incarceration is 3-fold greater in very low birth weight VLBW infants (<1500 g), several studies have recommended elective repair prior to discharge from the NICU [1,3,4]. The majority of IH repair have been performed under general endotracheal intubation anesthesia GE.

Preterm infants have multiple prohibitive comorbidities, including patent ductus arteriosus, intraventricular hemorrhage, necrotizing enterocolitis, and particularly, bronchopulmonary dysplasia BPD [5]. Up to 30% of very pre-term infants born at <32 weeks PMA post menstrual age (VP) have BPD [6]. BPD is associated with decreased pulmonary functional residual capacity, impaired oxygen diffusion capacity, higher

metabolic demands to support increased oxygen consumption needs [7,8], and limited cardiorespiratory reserve. Therefore, VP infants may be more vulnerable to pulmonary-related perioperative complications from endotracheal intubation during GE [9]. Mechanical ventilation may also exacerbate pulmonary hypertension, bronchospasm and pulmonary vasoconstriction following reversal of neuromuscular blockade [10]. General anesthesia additionally adversely affects neurologic function [11], thus increasing the risk for GE-related respiratory depression. The overall incidence of postoperative respiratory complications such as apnea, atelectasis, and aspiration pneumonia has been reported in up to 33% in preterm infants [12,13]. This provides the rationale for advocating overnight post-operative monitoring in preterm patients undergoing hernia repair [14]. However, premature patients may not need post-operative hospital admissions if IH repair were performed under regional anesthesia (RA) [15]. The rate of postoperative apnea in high risk infants undergoing elective inguinal hernia repair under RA has been reported to be lower than to the published 10%–30% rate for general anesthesia [16] RA is also associated with reduced requirement for postoperative mechanical ventilation [17]. We therefore propose to examine the benefits of RA over endotracheal GE as an anesthetic approach in elective IH repair in premature infants. Based on our assumption that BPD is a major risk factor for endotracheal intubation-related

* Corresponding author at: 624 NE Glen Oak Ave, Suite 2679, Peoria, IL 61603. Tel.: +1 3096556454.

E-mail address: [AiXuan.L.Holterman@osfhealthcare.org](mailto: AiXuan.L.Holterman@osfhealthcare.org) (A. Holterman).

¹ Study conception and design, acquisition of data, analysis and interpretation of data, drafting of manuscript.

² Acquisition of data.

³ Study conception and design, data analysis, critical revision of manuscript.

respiratory complications with GE, and that the incidence of BPD is high in <32 weeks PMA VP NICU infants, our research question is: Which anesthetic technique (RA vs GE) is associated with lower perioperative-related pulmonary risks in NICU VP patients? Our hypothesis is that Regional Anesthesia is associated with a lower risk of perioperative ventilation-related complications in very preterm neonates undergoing in-hospital elective inguinal hernia repair. The primary outcome is the need for postoperative mechanical ventilation, and the secondary outcome is achieving full oral feeding within 48 h of surgery as proxies of GE endotracheal intubation-related complications.

2. Methods

This retrospective cohort study involves IRB-approved EPIC chart reviews from January 2011 to May 2015 of all consecutive 191 NICU infants undergoing inguinal hernia repair under general endotracheal GE vs non-endotracheal regional anesthesia RA (caudal or spinal) prior to NICU discharge at the Children’s Hospital of Illinois (CHOI). The patients were treated by 6 pediatric surgeons and 12 pediatric anesthesiologists.

2.1. Practice approach

The type of anesthesia (RA vs GE) was up to the surgeons, and less often, requested by non-surgical providers. The decision to explore the contralateral hernia was surgeon-dependent. Only 2 among the 6 surgeons are comfortable with repair under both techniques. These 2 surgeons performed 80% of their inguinal hernia repair under RA. The use of supplemental pharmacological agents during RA was individualized among the anesthesiologists. This ranged from none, to versed/propofol or light doses of inhaled anesthetics. The majority of hernia repair in RA patients were done with single shot epidural anesthesia (79%). Infants are allowed to resume oral intake following extubation.

2.2. Data collection

Demographics, post menstrual age PMA at birth and at surgery, associated medical and surgical (prior surgical procedures), preoperative comorbidities, preoperative and postoperative length of stay LOS, weight at birth and at surgery, use of caffeine and continued O2 use the morning of surgery, presence of BPD at surgery, concurrent surgical procedures, intraoperative events, post-operative course for surgical complications until discharge and with outpatient follow up were collected.

The diagnostic criteria for BPD at the time of hernia repair are: none if infants were not on O2 by 28 days of life; mild if they were on O2 for ≥28 days but were on room air at 36 weeks PMA; moderate if they remained on <30% FiO2 at ≥36 weeks PMA; and severe if they were on >30% FiO2 or positive pressure ventilation at ≥36 weeks PMA. For the purpose of the study, patients were considered to have BPD if they had moderate or severe BPD.

As proxies of pulmonary-related complications, the outcome variables were: 1) % remaining intubated >4 h after the procedure and 2) tolerating full oral feed ≤48 h since mechanical ventilation prevents resumption of oral feeding. The 4 h criterion was selected to allow time for postoperative extubation outside the operating room in the NICU, in consideration of preferences by some of the anesthesiologists not to transport a recently extubated infant from the OR to the NICU.

2.3. The inclusion criteria

The inclusion criteria were: very premature neonates (<32 weeks PMA at birth) in the NICU, elective inguinal hernia repair (unilateral and/or bilateral) prior to discharge from the NICU. We included patients undergoing procedures routinely performed concurrently with elective inguinal hernia repair (circumcision, umbilical hernia repair, orchiopexies and diagnostic laparoscopy for contralateral inguinal hernia). We made

the assumption that the patient was ready for discharge by the 2nd day after the hernia repair.

2.4. The exclusion criteria

The exclusion criteria were: incarcerated or strangulated hernia (emergency surgery), prior repair of the same side inguinal hernia, need for concurrent major procedures requiring entry into a body cavity or into an organ (intestinal, cardiac, lung, head, neck, etc.), and being on assisted mechanical ventilation the day of anticipated surgery.

2.5. Patient flow

Of the 195 NICU patients who underwent elective inguinal hernia repair prior to NICU discharge, 84 patients with ≥32 weeks PMA were excluded. Of the remaining 111 patients with <32 weeks PMA, 15 with concurrent major surgical procedures and 1 with failed regional anesthesia were eliminated from the analysis, leaving 95 patients for the study. They were segregated into two groups: 58 patients with general endotracheal anesthesia and 37 patients with regional anesthesia (Fig. 1).

2.6. Statistical analysis

We performed Wilcoxon Two-Sample, chi-square or Fisher-exact test, multivariate analysis with Bonferroni’s correction. Data were log transformed as appropriate and presented as %, mean +/–SD, median with interquartile range IQR, and odd ratio OR with 95% confidence intervals CI. The two-tailed p values were calculated for all tests, and p values <0.05 were considered statistically significant.

3. Results

3.1. Patient characteristics

Fig. 1 describes the patient study flow. Tables 1 and 2 describe the patient’s baseline preoperative and surgical characteristics. RA (n = 37) and GE (n = 58) patients have comparable median PMA at birth (RA 26 weeks vs GE 27 weeks), and at surgery (RA 37.5 weeks vs GE 37 weeks); operative weight (RA 2.3 kg vs GE 2.24 kg); frequency of BPD (nearly 50% for both), or associated medical or surgical comorbidities or bilateral inguinal hernia repair at the time of surgery. Because 70% of the patients underwent additional concurrent minor procedures

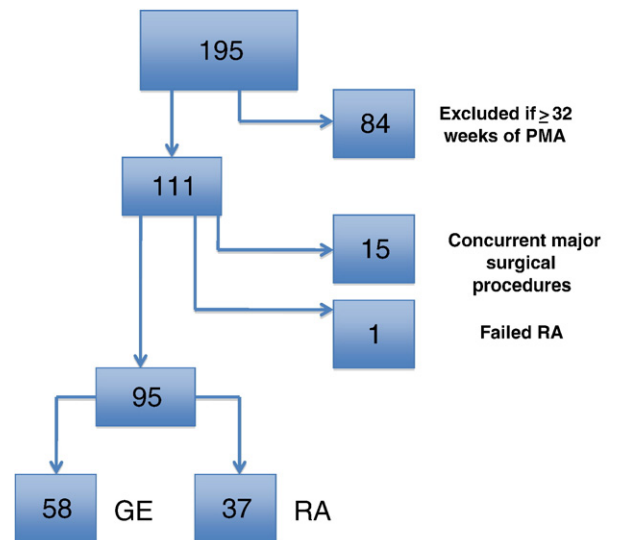


Fig. 1. Flow diagram of patients.

Download English Version:

<https://daneshyari.com/en/article/5718204>

Download Persian Version:

<https://daneshyari.com/article/5718204>

[Daneshyari.com](https://daneshyari.com)