CAS 2023 Annual Meeting

Pediatric Abstracts

Contents

Anesthesia Challenges During Single Lung Ventilation in an Infant with Glenn Physiology

AUTHORS

Schifino Wolmeister, Anelise[1]; Garbin, Marta[2]; Bertolizio, Gianluca[1,3]

[1] Department of Pediatric Anesthesia, Montreal Children's Hospital/ McGill University, Montreal, Canada
[2] Department of Clinical Sciences, Université de Montréal, St-Hyacinthe, Canada
[3] Research Institute, McGill University Health Centre, Montreal, Canada

INTRODUCTION

The bidirectional Glenn (BDG) procedure is often part of the staged surgical repair pathway for children with single ventricle physiology. It directs the upper body blood flow into the pulmonary circulation, whereas the lower body continues to drain blood into the single systemic ventricle[1]. Consequently, the child's saturation improves but does not normalize (typical range 75-85%). Given the absence of a pulmonary ventricle, pulmonary blood flow (PBF) and blood oxygenation are highly dependent on low pulmonary vascular resistance (PVR)[2]. In children, thoracotomy is challenging since conditions such as positive pressure ventilation, collapsed lung, lateral position, hypercapnia, and catecholamine release secondary to nociception, increase intrathoracic pressure and PVR, leading to a decreased PBF. Ventilation-perfusion mismatch also occurs and further worsens patient's oxygenation[3]. Finally, lung isolation is difficult in infants[3]. We present the anesthesia management of an infant with BDG undergoing esophageal atresia (EA) repair via lateral thoracotomy. Parental consent was obtained.

CASE PRESENTATION

An 8-month-old, 5.1 kg, full-term infant scheduled for rigid bronchoscopy and definitive surgical EA repair. Past medical history included: dextro-transposition of the great arteries with atrial and ventricular septal defects, hypoplastic left ventricle, CHARGE syndrome, tracheoesophageal fistula surgically ligated at birth, modified Blalock-Taussig shunt (mBTS) with pulmonary artery band placement at 3 weeks of age, and BDG surgery with mBTS removal at 5 months. Patient was known for difficult intubation, sedation, venous and arterial accesses. Preoperative echocardiography showed unobstructed Glenn anastomosis, presence of pulmonary artery band, and decreased right (systemic) ventricle function. Baseline saturation was 82%.
Patient presented in the operating room with high-flow nasal cannula and infusions of fentanyl, midazolam and milrinone, which were maintained throughout the procedure. Rigid bronchoscopy was performed in spontaneous ventilation under remifentanil, dexmedetomidine, ketamine and propofol infusions, and vocal cords topicalization. Monitoring included ECG, two oximeters, invasive (left pedal artery) and non-invasive blood pressure, and near infrared spectroscopy. After checking for the presence of extra fistulas, the patient was deepened, paralyzed with rocuronium, and nasally intubated. A 5-french bronchial blocker was nasally inserted and advanced with the parallel technique[4]. Low dose of epinephrine, dobutamine, vasopressin, and iNO were employed. An ultrasound-guided

erector spinae plane block was performed. Surgery lasted 6 hours and was characterized by difficult stumps isolation, accidental fistula reopening, sudden bleed (500 ml) causing hypotension (45/20 mmHg), and transient hypercapnia (85 mmHg). Lactate remained within normal limits (0.6). Patient was successfully transferred in the intensive care and extubated 12 days later.

CONCLUSION

Open thoracotomy in presence of Glenn physiology poses significant challenges to the anesthesiologist. The anesthetic management should be focused on 1) providing hemodynamic support with medications that have minimal impact on PVR, 2) the use of selective pulmonary vasodilators, 3) the implementation of anesthetic and ventilatory strategies that minimize the ventilation-perfusion mismatch, 4) an optimal analgesia, 5) the anticipation of surgical complications, 6) a continuous communication with the surgical team. Despite the detrimental effects of lateral thoracotomy on PVR and PBF, surgical EA repair and single lung ventilation can be relatively well tolerated in patients with Glenn physiology.

REFERENCES

1. Choi RS, DiNardo JA, Brown ML. Superior cavopulmonary connection: Its physiology, limitations, and anesthetic implications. *Semin Cardiothorac Vasc Anesth.* 2020;24(4):337-348.
2. Al-Eyadhy A. Mechanical ventilation strategy following Glenn and Fontan surgeries: On going challenge! *J Saudi Heart Assoc.* 2009;21(3):153-157.
3. Templeton TW, Piccioni F, Chatterjee D. An update on one-lung ventilation in children. *Anesth Analg.* 2021;132(5):1389-1399.
4. Letal M, Theam M. Paediatric lung isolation. *BJA Education.* 2016;17(2):57-62.

An Exploratory Analysis of Pediatric Anesthesia Activity on Twitter Using the #pedsanes Hashtag

Submission ID

58

AUTHORS

Downing, Lynsey[1,2]; Mariano, Edward R.[3,4]; Kou, Alex[3,4]; Matava, Clyde[1,2]

[1] *Department of Anesthesia and Pain Medicine, The Hospital for Sick Children, Toronto, ON, Canada*
[2] *Department of Anesthesiology and Pain Medicine, Temerty Faculty of Medicine, University of Toronto, ON, Canada*
[3] *Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University School of Medicine; Stanford, CA, USA*
[4] *Anesthesiology and Perioperative Care Service, Veterans Affairs Palo Alto Health Care System; Palo Alto, CA, USA*

INTRODUCTION

The use of social media within the medical field has rapidly evolved over the past two decades, with Twitter being one of the most common platforms of engagement. The use of hashtags such as #pedsanes has been reported as a community builder around the subject of pediatric anesthesia. Understanding the use of #pedsanes can inform dissemination of pediatric anesthesia content and discourse. We aimed to describe the distribution and patterns of tweets and contributors using #pedsanes across the globe.

METHODS

Using Tweetbinder (https://www.tweetbinder.com) and the R package “academictwitteR” we extracted tweets that included the hashtag ‘#pedsanes’ from March 14th, 2016 to March 10th, 2022. Tweets were analysed for frequency, type, unique users, impact and reach, language, content and the most common themes.

RESULTS

A total of 58,724 tweets were retrieved; 22,071 (38.8%) were original tweets including 3247 replies, while 35,971 (61.2%) were retweets all generated by over 5946 contributors located in at least 122 countries. The frequency distribution of tweets gradually increased over time with peaks in activity corresponding to major pediatric anesthesia societal meetings and during the early phases of the COVID-19 pandemic. The most retweeted and most liked posts included images.

DISCUSSION

We report the widespread and increasing use of social media and the '#pedsanes' hashtag within the pediatric anesthesia and medical community over time. It remains unknown the extent to which Twitter hashtag activity translates to changes in clinical practice. However, the #pedsanes hashtag appears to play a key role in disseminating pediatric anesthesia information globally.

REFERENCES

1. Elhajjar S, Ouaida F. Use of social media in healthcare. *Health Mark Q.* 2021:1-18.
2. Gai N, So D, Siddiqui A, Steinberg BE. Dissemination of Anesthesia Information During the Coronavirus Disease 2019 Pandemic Through Twitter: An Infodemiology Study. *Anesth Analg.* 2021;133(2):515-525.
3. Schwenk ES, Jaremko KM, Gupta RK, et al. How Twitter conversations using hashtags #regionalanesthesia and #regionalanaesthesia have changed in the COVID-19 era. *Reg Anesth Pain Med.* 2020;45(10):765-766.
4. Klaassen Z, Vertosick E, Vickers AJ, et al. Optimal Dissemination of Scientific Manuscripts via Social Media: A Prospective Trial Comparing Visual Abstracts Versus Key Figures in Consecutive Original Manuscripts Published in European Urology. *Eur Urol.* 2022.
5. Suarez-Lledo V, Alvarez-Galvez J. Prevalence of Health Misinformation on Social Media: Systematic Review. *Journal of medical Internet research.* 2021;23(1):e17187-e17187.

Chronic Post-Surgical Pain in Children Following Cardiac Surgery: Prevalence, Survey Tools and Implications

AUTHORS

Correia, Michelle[1]; Sun, Naiyi[2]; Taylor, Katherine[3]

[1] Department of Anesthesia and Pain Medicine, BC Children's Hospital, Vancouver, Canada
[2] Department of Anesthesia and Pain Medicine, The Hospital for Sick Children, University of Toronto, Toronto, Canada
[3] Staff Cardiac Anesthesiologist, Hospital for Sick Children, Associate Professor, University of Toronto, Toronto, Canada

Acknowledgements: Ms Carolyne Pehora, Clinical Research Nurse Co-ordinator and Ms Bryna Fernandes, Data Analyst, Chronic & Transitional Pain Service, The Hospital for Sick Children, Toronto, Canada.

INTRODUCTION

Chronic post-surgical pain (CPSP) in pediatric patients is a significant problem affecting ~20% of children post major surgery.[1] CPSP has devastating effects on quality of life and is an expensive public health issue.[2] For children undergoing cardiac surgery, the prevalence of CPSP has received limited attention. Quality of life (QOL) variables are becomingly increasingly important in cardiac surgery as more patients are surviving longer with congenital heart disease. We investigated prevalence of scar-related persistent pain and its impacts on QOL in children after cardiac surgery. This benchmark data is important to evaluate our pediatric cardiac surgery program and to inform new program innovations at our centre, such as minimally invasive cardiac surgery and fascial plane blocks in pediatric cardiac surgery.

METHODS

With Research Ethics Board approval, we searched our cardiac surgery database for patients ≥6 years of age who underwent cardiac surgery between June 2018-2021 via sternotomy or thoracotomy with an email address. Eligible participants were emailed a letter of introduction and invitation to complete three online surveys measuring wound pain, disability associated with pain and neuropathic pain via a secure REDCaps link between December 21, 2021 and January 20, 2022. Non-respondents received an email reminder on days 1, 6, 11 and 16. Consent was implied by survey completion.

The three surveys were an English translation of the same protocol used by a Danish group investigating CPSP post cardiac surgery[3];the Patient Reported Outcomes Measurement Information System (PROMIS) Pediatric Pain Interference instrument[4]and the Self-reported Leeds Assessment of Neuropathic Symptoms and Signs (S-LANNS) pain scale.[5] The PROMIS scale assesses self-reported consequences of pain and the extent pain hinders engagement with social, cognitive, emotional, physical, and recreational activities. The S-LANSS is a 7-question screening tool for neuropathic pain without the need for a physical examination. We estimated 15 minutes was required to complete all surveys.

RESULTS

There were 590 surgical patients ≥6 years in the study period, 233 of whom had email address in their health record. One consolidated email with the three pain surveys was sent to 233 patient/families a total of five times. We received 72 responses (30.9%), deleting two for no responses. Patients completed 65% of surveys, parents completed the remainder. From the 70 respondents, 15 (21.4%) reported current pain or pain in the past week. Five patients (33%) had pain that lasted ≥2 months and 20% (n=3) described the worst pain as 10/10. Moderate to severe pain scores (≥ 4 on the Visual Analogue Scale) were reported by 47%. PROMIS T scores ≥ 55 were reported by 36% (n=25/69) indicating moderate pain-related moderate disability. More than half, (57%) reported at least one affirmative response to S-LANSS survey symptoms. Ten patients (15.4%) scored >12 indicating a significant neuropathic component to their pain.

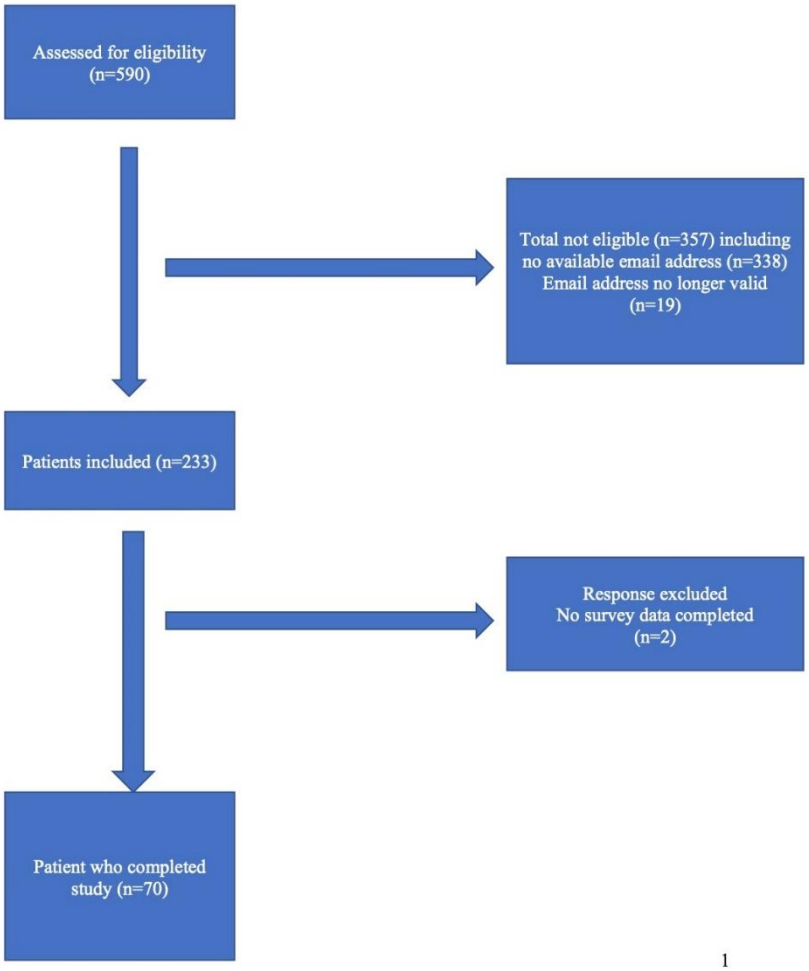
DISCUSSION

Our findings confirm a substantial (21.4%) rate of CPSP following pediatric cardiac surgery which negatively impacts daily activities and QOL, similar to rates reported in other major pediatric surgery[1] and adults post-cardiac surgery. Many patients describe neuropathic pain components. Efforts to improve early recognition, evaluation and optimization of peri-operative management to mitigate the risks for the development of CPSP in this vulnerable population are warranted. This data will inform newer surgical techniques such as minimally invasive pediatric cardiac surgery and the impact of regional anesthesia in pediatric cardiac surgery.

REFERENCES

1. Rabbitts JA, Fisher E, Rosenbloom BN, Palermo TM. Prevalence and Predictors of Chronic Postsurgical Pain in Children: A Systematic Review and Meta-Analysis. *J Pain*. Jun 2017;18(6):605-614. doi:10.1016/j.jpain.2017.03.007
2. Canadian Pain Task Force Report: March 2021 (2021).
3. Lauridsen MH, Kristensen AD, Hjortdal VE, Jensen TS, Nikolajsen L, Nikolajsen L. Chronic pain in children after cardiac surgery via sternotomy. *Cardiology in the Young*. 2014/10// 2014;24(5):893-899. doi:10.1017/s104795111300139x
4. Irwin DE, Gross HE, Stucky BD, et al. Development of six PROMIS pediatrics proxy-report item banks. *Health Qual Life Outcomes*. Feb 22 2012;10:22. doi:10.1186/1477-7525-10-22
5. Bennett MI, Smith BH, Torrance N, Potter J. The S-LANSS score for identifying pain of predominantly neuropathic origin: validation for use in clinical and postal research. *J Pain*. Mar 2005;6(3):149-58. doi:10.1016/j.jpain.2004.11.007

Figure 1: Flow Chart for Cohort study



1

Dexmedetomidine Anesthesia in Pediatric Scoliosis Spinals Surgery: A Safe Option?

AUTHORS

Yu, Jieying[1]; Norton, Jonathan[2]; Walker, Mary[1]; Perverseff, Robert[1]; Barbour-Tuck, Erin[1]; Gamble, Jonathan[1]

[1] Department of Anesthesia, University of Saskatchewan, Saskatoon, Canada
[2] Department of Neurosurgery, University of Saskatchewan, Saskatoon, Canada

INTRODUCTION

Realtime neurophysiological monitoring in the form of motor-evoked potentials (MEPs) is essential to prevent spinal cord damage in pediatric posterior spinal fusion surgery (PSFS) for scoliosis. Dexmedetomidine is a selective α2-adrenergic receptor agonist with sedative and analgesic properties and is considered a good adjunct to total intravenous anesthesia, but its effect on intraoperative neurophysiological monitoring is unclear [1,2,3,4]. Clarification of the effect of dexmedetomidine on MEPs is essential. We hypothesize that dexmedetomidine use at clinically relevant doses does not compromise MEP quality or interpretability.

METHODS

A retrospective chart review study was performed. Data collected included anesthetics used, vitals, and neurophysiological monitoring results in children and adolescents (7-19 years) presenting for idiopathic PSFS at an academic university in a catchment area of approximately 1 million from January 1 2019 to December 31 2020. Dexmedetomidine doses were 0.1 - 0.5 $\mu g.kg^{-1}.hr^{-1}$.

Data was extracted at 3 time points:
T1 – After proning
T2 – 90 minutes after T1
T3 – just before first screw insertion

The primary outcome was a reduction in MEP amplitude in muscles groups dorsal interosseous or tibialis anterior at T3 compared to T1 and T2 of greater than 50% (criteria for significant warning signal). The results were calculated as least squares means.

RESULTS

The maximal reduction observed was 6.4 % for dorsal interosseous. This result is statistically significant but not clinically significant since none of the muscle groups tested in our case series had an MEP amplitude decrease reaching alarm criteria (50% reduction).

DISCUSSION

Intraoperative neurophysiological monitoring during PSFS is essential to prevent spinal cord damage. Dexmedetomidine has many beneficial properties for the management of PSFS

including: improved postoperative analgesia, emergence agitation reduction, and minimal respiratory depression. Reported effects of dexmedetomidine on neurophysiological monitoring are mixed[1,2,3,4]. Our results indicate that dexmedetomidine is a safe option for PSFS surgeries as its use did not result in clinically significant changes in neurophysiological monitoring. Further research, ideally an appropriately powered randomized control trial measuring the impact of dexmedetomidine on neurophysiological monitoring and clinical outcomes is warranted to guide practice.

REFERENCES

1. *Holt F, Strantzas S, Zaarour C, et al.* The effect of dexmedetomidine on motor-evoked potentials during pediatric posterior spinal fusion surgery: a retrospective case-control study. Can J Anaesth. 2020; 67:1341–1348
2. *Naaz S, Ozair E*. Dexmedetomidine in current anaesthesia practice- a review. J Clin Diagn Res. 2014;8(10):GE01-GE4.
3. *Anschel DJ, Aherne A, Soto RG, et al.* Successful intraoperative spinal cord monitoring during scoliosis surgery using a total intravenous anesthetic regimen including dexmedetomidine. J Clin Neurophysiol. 2008; 25(1):56-61.
4. *Bala E, Sessler DI, Nair DR, et al*. Motor and somatosensory evoked potentials are well maintained in patients given dexmedetomidine during spine surgery. Anesthesiology. 2008; 109(3):417-25.

Fascia Iliaca Compartment Block for Pediatric Pelvic Osteotomy

AUTHORS

Nagdev, Tripti[1]; Otsuka, Yoji[2]; Everett, Tobias[3]; De Ruiter, Joost[4]; Munshey , Farrukh[5]

[1] Fellow, Department of Anesthesia and Pain Medicine, Hospital for Sick Children, Toronto & Department of Anesthesia, University of Toronto, Canada.
[2] Senior Fellow, Department of Anesthesia and Pain Medicine, Hospital for Sick Children, Toronto & Department of Anesthesia, University of Toronto, Canada.
[3] Associate Professor, Department of Anesthesia and Pain Medicine, Hospital for Sick Children, Toronto & Department of Anesthesia, University of Toronto, Canada.
[4] Assistant Professor, Department of Anesthesia and Pain Medicine, Hospital for Sick Children, Toronto & Department of Anesthesia, University of Toronto, Canada.
[5] Assistant Professor, Department of Anesthesia and Pain Medicine, Hospital for Sick Children, Toronto & Department of Anesthesia, University of Toronto, Canada.

INTRODUCTION

Pelvic osteotomy in children is the corrective surgery for developmental dysplasia of the hip (DDH). In severe DDH, the femoral head is completely dislocated from the hip joint and the operation is associated with severe postoperative pain. We used a retrospective chart review to compare analgesic regimens for pediatric pelvic osteotomy. We sought to establish the efficacy of the Fascia Iliaca Compartment Block (FICB) as compared to non-FICB techniques, commonly lumbar epidural. We further sought to investigate the impact of the supra- to the infra inguinal approach to the FICB.
The primary objective of this study is to compare pain scores after pelvic osteotomy between two groups of patients who had FICB and without FICB.
The secondary objective of this study is 1. To compare opioid consumption and adverse event between the two groups.
2. The Supra vs InfraFICB groups were compared for pain scores, opioid consumption, and adverse event.

METHODS

The institutional ethics board approved(REB Number 1000079068) our retrospective chart review for a 3-year study period. Included were all patients undergoing pelvic osteotomy for DDH. Excluded were patients with chronic pain or taking opioids prior to the surgery. Electronic medical records (July 2018 to July 2021) were used to identify eligible patients and collect data as follows: age, sex, height, weight, diagnosis, type of surgery, use of FICB, intraoperative and postoperative opioid consumption, pain scores, analgesia/antiemetics in PACU(post-anesthesia care unit), 0-12hr and 12-24hr opioid consumption, length of stay(LOS) in the hospital, and complications related to the FICB. The patients were considered into two groups: Group F (FICB) and Group C (non-FICB techniques). The primary outcome measure was pain scores. The secondary outcome measures were opioid consumption, acetaminophen, NSAIDs, and incidence of PONV, and LOS. Main group data were compared using t-tests and subgroup analysis (supra- vs. infra inguinal FICB) using the Mann-Whitney test or Fisher's exact test according to outcome measure.

RESULTS

We included 134 patients in our analysis. All opioids were converted to morphine equivalents. Intraoperative opioid use was higher in Group F(FICB) than in Group C(4.89±6.36 vs 2.73±3.05, p=0.02). We did not observe a difference in PACU pain scores(1.8 ± 2.1 in Group Fvs.1.7 ± 2.4 in Group C, p = 0.7) or opioid use(1.85 ± 2.7 in GroupFvs.1.3 ± 2.1 in Group C,p =0.2).In post-op 0-12hrs, opioid use was higher in Group F (8.2 ± 6.6) than in Group C (4.1 ± 5.4) p < 0.001, although there was no significant difference in pain scores. In post-op 13-24hrs, opioid use was more in Group F(6.6 ± 5.3) than in Group C(3.3 ± 4.4) (p<0.001) but pain scores were lower in Group F (0.68 ±1.4 vs. 1.3 ±1.8, p=0.03). Hospital length of stay(hrs) was significantly shorter in Group F (38 ±35 vs. 145 ±106, p< 0.001). We did not demonstrate any important differences between infra and supra-inguinal FICB.

DISCUSSION

FICB is a simple and safe alternative regional anesthesia technique to epidural analgesia. We did not observe any difference in pain scores or opioid used nor did we observe a difference in pain scores in the 0-12hrs post-op, although this appears to have been achieved through higher doses of opioids. We attribute the longer length of stay in Group C to a large number of epidural catheters in that group – patients receiving a continuous infusion over days, as opposed to mobilizing rapidly following a single-shot FICB. We have adopted FICB as primary analgesia for pediatric pelvic osteotomy.

REFERENCES

1. N O'Reilly, M Desmet, R Kearns. Fascia iliaca compartment block. BJA Education 2019; 19(6): 191-197 2. RS Sinatra, J Torres, AM Bustos. Pain management after major orthopedic surgery: current strategies and new concepts. J Am Acad Orthop Surg 2002; 10(2): 117-29
2. CW Wang, TM Wang, KW Wu, SC Huang, KN Kuo. The comparative, long-term effect of the Salter osteotomy and Pemberton acetabuloplasty on pelvic height, scoliosis, and functional outcome. Bone Joint J 2016; 98-B(8):1145-50
3. SJ Lako, MA Steegers, J Egmond, J Gardeniers, LM Staals, GJ Geffen. Incisional continuous fascia iliaca block provides more effective pain relief and fewer side effects than opioids after pelvic osteotomy in children. Anesth Analg 2009; 109(6):1799-803
4. Eastburn E, Hernandez MA, Boretsky K. Technical success of the ultrasound-guided supra-inguinal fascia iliaca compartment block in older children and adolescents for hip arthroscopy. Pediatr Anesth. 2017; 27:1120–1124. https://doi.org/10.1111/pan.13227

Passive Leg Raise to Facilitate Pediatric Peripheral Intravenous Access: A Randomized Controlled Trial

AUTHORS

Macaskill, James[1]; Emadi, Roya[1]; Zhao, Mars[1]; Barbour-Tuck, Erin[2]; Walker, Mary Ellen[2]; Valcke, Patrick[3]; Munshey, Farrukh[4]; Gamble, Jonathan[2]

[1] College of Medicine, University of Saskatchewan, Saskatoon, SK, Canada
[2] Department of Anesthesiology, Perioperative Medicine and Pain Management, College of Medicine, University of Saskatchewan, Saskatoon, SK, Canada
[3] Department of Anesthesia & Perioperative Medicine, Western University, Schulich School of Medicine, Windsor, ON, Canada
[4] Department of Anesthesiology & Pain Medicine, The Hospital for Sick Children, University of Toronto, Toronto, ON, Canada

INTRODUCTION

Establishing pediatric peripheral intravenous (PIV) access is challenging even for skilled practitioners; such providers report an approximately 50 percent first-pass success rate.[1-3] Unsuccessful and repeated attempts at PIV access correlate with greater patient pain and anxiety scores in addition to decreased perceived quality of care by caregivers.[2] A passive leg raise (PLR), raising a supine patient's legs to 45 degrees, auto-transfuses lower extremity blood volume into the central circulation.[4] Similar to changes in internal jugular vein diameter a PLR may cause a transient increase in the volume and caliber of upper extremity peripheral veins. However, studies of this maneuver on pediatric peripheral venous diameter under anesthesia are limited.[5] This study aimed to determine if a PLR will 1) cause a significant increase in upper extremity venous diameter; 2) decrease the number of attempts until successful upper extremity PIV cannulation compared to a control group in pediatric patients.

METHODS

Following local Research Ethics Board approval, a parallel-group, open-label, randomized controlled trial was conducted to investigate the effect of a PLR on the facilitation of PIV access in pediatric patients. Consenting eligible participants included: ASA physical status 1-3 ages 3 months to 17 years undergoing general anesthesia for elective procedures. Excluded from the study were patients with lower limb pathology limiting range of motion and those with pre-existing central or peripheral intravenous access prior to surgery.

Participants were randomized to either a PLR or control group. Antecubital vein diameter was measured by ultrasound three times: at baseline, with a proximally placed venous tourniquet, and after intervention (with tourniquet applied); PLR was maintained until successful PIV placement. Patient demographics, number of cannulation attempts, and vein diameter measurements were recorded. The primary outcome was the number of attempts to establish PIV access. Secondary outcomes included the change in peripheral vein diameter with PLR. Mann-Whitney U tests were used to examine the effect of PLR on cannulation attempts, change and percent change of vein diameter. Backward model

building also allowed for the creation of full models with all independent variables as well as reduced models that include only independent variables with significant impact.

RESULTS

Two hundred thirty-four patients were enrolled, 117 in both the intervention and control groups. We found no significant difference between the control and PLR groups in cannulation attempts, with a median [interquartile range (IQR)] of 1.0 [1.0 to 1.0] in both groups ($Z=-1.46$, $p=0.143$). However, there was a significant difference between the control and PLR groups in relative vein diameter change between the PLR and control groups (median, [IQR]) following tourniquet placement: 9% [5%-17%] vs 4% [0%-8%] ($Z=-5.84$, $p<0.001$). Our generalized linear models show a significant difference between the control and treatment groups in all models; raw and percent changes were greater in the PLR group than the control group in both full and reduced models.

DISCUSSION

A PLR did not significantly decrease the number of PIV attempts in the controlled operative room environment with cannulation performed by highly experienced providers, but it did significantly increase vein diameter. In situations of anticipated cannulation difficulty or less experienced providers, a PLR is a simple means of increasing vein diameter that may plausibly decrease the number of PIV attempts and time to cannulation, although further study is warranted.

REFERENCES

1. Larsen P, Eldridge D, Brinkley J, Newton D, Goff D, Hartzog T, Saad ND, Perkin R. Pediatric peripheral intravenous access: does nursing experience and competence really make a difference? J Infus Nurs. 2010 Jul-Aug;33(4):226-35. doi: 10.1097/NAN.0b013e3181e3a0a8.
2. Eldridge DL. Alternatives to intravenous rehydration in dehydrated pediatric patients with difficult venous access. Pediatr Emerg Care. 2010 Jul;26(7):529-35. doi: 10.1097/PEC.0b013e3181e5c00e.
3. Yamazaki S, Tomita S, Watanabe M, Kawaai H, Shimamura K. Effects of a transmitted light device for pediatric peripheral venipuncture and intravenous cannulation. Med Devices (Auckl). 2011;4:189-92. doi: 10.2147/MDER.S18497.
4. Monnet X, Teboul JL. Passive leg raising: five rules, not a drop of fluid! Crit Care. 2015 Jan 14;19(1):18. doi: 10.1186/s13054-014-0708-5.
5. Valcke PM, Munshey F, Gamble J, O'Brien J, McKay W. Passive Leg Raise to Facilitate Pediatric Peripheral Intravenous Placement [abstract]. In: Kharasch ED, editor. The Anesthesiology annual meeting; 2018 October 13-17; Moscone Center, San Francisco, United States of America. San Francisco (USA): American Society of Anesthesiologists; 2018 [cited January 17, 2023]. Available from: http://asaabstracts.com/strands/asaabstracts/abstract.htm?year=2018&index=16&absnum=4673

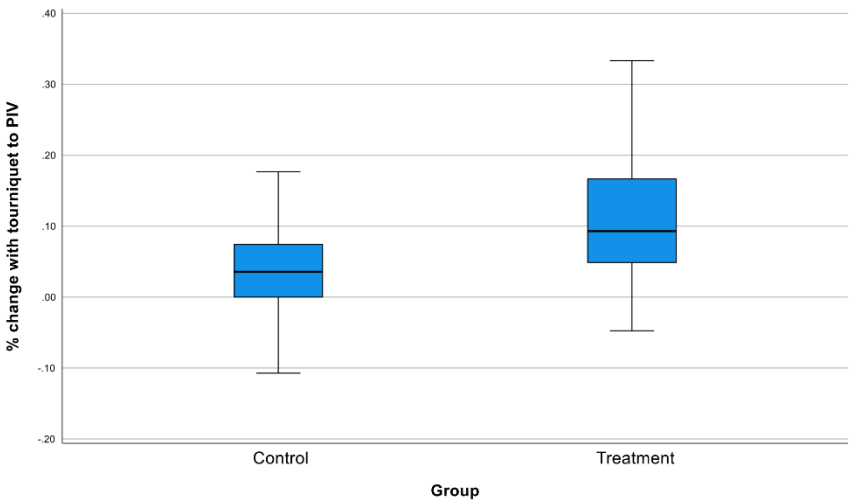


Figure 1. Box plots of percent change in vein diameter from tourniquet placement to successful cannulation