

Children's Mercy Kansas City

SHARE @ Children's Mercy

Research Month 2021

Research at Children's Mercy Month

5-2021

Enhanced Recovery After Surgery (ERAS) Vs Traditional Care In Pediatric Cerebral Palsy Patients Undergoing Bilateral Multilevel Lower Extremity Orthopedic Surgery: A Pilot Study

Nichole M. Doyle

Kathryn Keeler

Todd A. Glenski

Ezra Goodrich

Marisha Madhira

Follow this and additional works at: https://scholarlyexchange.childrensmercy.org/research_month2021

Enhanced Recovery After Surgery vs Traditional Care in Pediatric Cerebral Palsy Patients Undergoing Bilateral Multilevel Lower Extremity Orthopedic Surgery: A Pilot Study

Nichole Doyle, MD¹; Kathryn Keeler, MD²; Todd Glenski MD MSHA¹; Ezra Goodrich, BA³; Marisha Madhira, BSE³

¹Department of Anesthesiology; ²Department of Orthopedic Surgery, ³University of Kansas Medical School Children's Mercy Hospital, Kansas City, Missouri; University of Missouri – Kansas City School of Medicine

Children's Mercy Kansas City

Introduction

- Children with cerebral palsy (CP) often undergo musculoskeletal surgeries throughout their developmental years.
- Narcotics are not ideal in this patient population due to underlying pulmonary pathology and constipation.
- Standard of treatment for these patients utilizes an epidural catheter for 1-2 days post-operatively.
- Epidural catheter placement in this patient population may not always be possible or safe. They also decrease mobility and prevent the initiation of physical therapy.
- We developed an enhanced recovery after surgery (ERAS) protocol utilizing peripheral nerve blocks instead of epidural catheters as well as instituting a standardized care protocol throughout their care in the hospital system

- Purpose:**
- We hypothesize that by instituting an ERAS protocol in this patient population they will be able to be mobilized earlier, pass physical therapy sooner and as a result have a decreased length of hospital stay
 - The secondary outcomes are narcotic consumption and incidence of side effects.

Methods

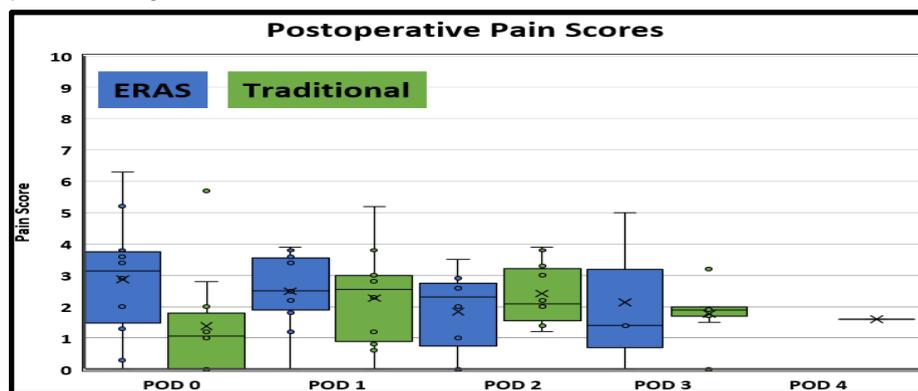
- IRB approved secondary data use cohort pilot study
- 10 consecutive CP patients undergoing bilateral multilevel lower extremity surgeries utilizing ERAS protocol from June to Sept 2021 were compared with controls who underwent traditional care from 2017 to 2020
- Patients were matched by Gross Motor Function Classification System (GMFCS) score, procedure performed and age.
- Data collected included surgery performed, type of regional/neuraxial anesthesia performed, need for patient-controlled anesthesia (PCA), narcotic use, diazepam use, pain scores, post operative day cleared by PT, and length of stay.

Table 1	Traditional	ERAS
Preoperative	-Visit with surgeon -Gabapentin at discretion of anesthesiologist	-Patient education about protocol and post-operative goals with surgeon -Minimize NPO times; Clear liquids until 2 hours before surgery -Active warming -Gabapentin 10mg/kg
Intraoperative	-Epidural placement at start of case -Ketorolac at discretion of anesthesiologist -Acetaminophen at discretion of anesthesiologist -Narcotic prn	-Peripheral nerve blocks -IV Acetaminophen & Ketorolac -Dexmedetomidine infusion and/or ketamine infusion -Narcotic prn -D/C urinary catheter before PACU
Postoperative	-Epidural infusion until POD 2 -Acetaminophen scheduled vs prn -Ketorolac scheduled vs prn -Narcotic prn, diazepam prn -D/C urinary catheter & start PT after epidural discontinued	-Dexmedetomidine infusion -Acetaminophen & Ketorolac every 6 hours -Gabapentin 5 mg/kg TID -Diazepam scheduled vs prn -Narcotic prn -Advance diet on POD 0 -PT morning of POD 1

Results

Table 2	ERAS (n=10)	Traditional (n=10)
GMFCS	4.20	4.20
Narcotic Intraop ME / kg	0.16	0.18
Narcotic Post-op ME / kg	0.26	0.54
Narcotic Post-op ME / kg / day	0.12	0.19
Diazepam Post-op /kg	0.64	0.60
Diazepam Post-op /kg/day	0.29	0.20
Post-op PCA Needed	0	4
Discharged from PT (days)	1.70	2.44
Length of Stay (days)	2.20	3.00

Comparison of Average Pain Scores



- Incidence of side effects was decreased in the ERAS group.
- In the ERAS group 1/10 patients received ondansetron and none of the patients needed diphenhydramine for pruritus, or had documented emesis or fever.
- In the Control group 2/10 received ondansetron and had documented emesis, 5/10 received diphenhydramine for pruritus and 3/10 had documented fever >38.1.

Discussion

- The results of this pilot study were very encouraging.
- This is a very small pilot study so a much larger study will need to be performed to verify these results.
- Replacing an indwelling epidural catheter with single shot peripheral nerve blocks at the beginning of the surgery allowed for earlier mobilization, discharge from physical therapy and removal of foley catheter.
- The "ideal peripheral block" is not clear when a pelvic osteotomy or acetabuloplasty is performed.
- For the 10 study patients a supra inguinal fascia iliaca block was performed when an acetabuloplasty was planned
- Larger study comparing these three blocks (supra inguinal fascia iliaca, erector spinae plane or quadratus lumborum) will need to be performed to determine if one block is superior to the others when pelvic osteotomies are planned.
- The ideal volume of local anesthetic for these blocks remains undetermined.

- We have made some changes to the current protocol since the study period which includes the removal of gabapentin.
- Next steps include evaluating intraoperative fluid management and the addition of acupuncture in the post operative period.

- There are minimal studies in the pediatric population using dexmedetomidine infusions on the floor for opioid sparing effects.
- Since completion of the pilot study we have taken care of roughly another 45 patients using this ERAS protocol.
- No side effects were seen during the pilot study related to the dexmedetomidine infusion.
- Since completion of the pilot study, one patient was too somnolent in PACU so the dexmedetomidine infusion was not started, and one patient had it stopped on the floor for somnolence.
- Further research into the safety and efficacy of dexmedetomidine infusions post operatively should be undertaken.

Conclusion

- Pilot study showed a **decrease of length of stay of almost a full day** and a **decrease in narcotic consumption**.
- ERAS pathways help **minimize the variation of care** these patients receive in the hospital system.
- Standardizing the care of these patients **enhances** the patient/family experience.

References

- Kjeldgaard Pedersen L, Nikolajsen L, Rahbek O, Uldall Duch B, Møller-Madsen B. Epidural analgesia is superior to local infiltration analgesia in children with cerebral palsy undergoing unilateral hip reconstruction. *Acta Orthop.* 2016;87:176-182.
- Brenn BR, Brislin RP, Rose JB. Epidural analgesia in children with cerebral palsy. *Can J Anaesth.* 1998;45:1156-1161.
- Trescot AM, Datta S, Lee M, Hansen H. Opioid pharmacology. *Pain Physician.* 2008;11:S133-153.
- Li J, Rai S, Ze R, Tang X, Liu R, Hong P. Enhanced recovery care versus traditional non-ERAS care following osteotomies in developmental dysplasia of the hip in children: a retrospective case-cohort study. *BMC Musculoskelet Disord.* 2020;21:234.
- Smith TW, Jr., Wang X, Singer MA, Godellas CV, Vaince FT. Enhanced recovery after surgery: A clinical review of implementation across multiple surgical subspecialties. *Am J Surg.* 2020;219:530-534.
- Shinnick JK, Short HL, Heiss KF, Santore MT, Blakely ML, Raval MV. Enhancing recovery in pediatric surgery: a review of the literature. *J Surg Res.* 2016;202:165-176.