

Intramedullary Rodding in Pediatric Patients: Effects of Anesthesia Type on Narcotic Consumption and Length of Stay

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INTRODUCTION

Several etiologies can predispose one to limb deformity. Regardless of the cause, untreated limb length discrepancy leads to long-term hip, knee, and low back pathology.¹

Different methods of limb lengthening include circular and unilateral external fixation devices, lengthening over nails, and lengthening with intramedullary telescoping rods.²

As orthopedic technology has evolved, so too has anesthesia developed to ensure adequate pain control while mitigating negative side effects.

While literature investigating the various methods of limb-lengthening has grown in recent years, very few studies have explored the role of anesthesia on patient outcomes undergoing these procedures.

This study compared patient demographics and outcomes in pediatric patients undergoing limb lengthening receiving either general, regional block, or epidural anesthesia.

METHOD

A retrospective chart review was performed for 44 pediatric patients undergoing gradual limb lengthening via the NuVasive PRECICE nail from January 2014 to December 2018.

Patients were stratified into cohorts based on the anesthesia type utilized, resulting in 13 general, 15 block, and 16 epidural patients.

Patient demographics and outcomes were investigated.

Patient demographics included mean age, sex, race, ASA class, and mean BMI.

Patient outcomes included mean length of surgery, mean length of stay (LOS), mean visual analog scores, pain intensity, total opioid consumption, discharge destination, complications, and additional surgeries.

RESULTS & DISCUSSION

General anesthesia, regional blocks, and epidurals were similar in all aspects except patient BMI, LOS, and pain scores at the 40-hour postoperative mark.

LOS was significantly shorter for block patients compared to general patients. LOS was shorter for epidural patients than general patients, however this did not achieve significance.

Total opioid consumption was decreased in the block group compared to both the epidural and general groups. Patients in the general group consumed 4 to 10 times the amount of opioids than the block group.

LOS was significantly shorter for block patients compared to general patients, with the LOS of epidural patients between the two.

Parameter (N) (SD)	General	Block	Epidural	p-value
Mean Length of Surgery (min)	286.00 (57.43)	300.27 (74.51)	334.67 (62.69)	0.307
Mean Length of Stay (days)	3.54 (1.94)	2.27 (0.46)*	3.13 (0.72)	0.019
Mean VAS Score				
Preoperative	0.00 (0.00)	0.64 (1.45)	0.33 (1.15)	0.339
8-Hour	1.73 (3.07)	1.20 (1.66)	1.19 (2.71)	0.831
16-Hour	2.00 (3.13)	4.00 (3.57)	2.38 (4.16)	0.358
24-Hour	1.92 (2.87)	1.79 (2.15)	2.36 (2.71)	0.831
32-Hour	2.36 (2.50)	2.86 (2.32)	2.33 (3.22)	0.854
40-Hour	2.10 (2.08)	4.31 (2.18)	1.50 (3.01)*	0.018
48-Hour	1.56 (2.19)	2.71 (2.14)	2.20 (3.19)	0.697
Pain Intensity (AUC)				
24-Hour	38.15 (44.32)	52.80 (40.21)	45.00 (63.72)	0.751
48-Hour	37.54 (34.16)	61.33 (30.64)	44.50 (50.17)	0.270
Total Opioid Consumption (MME)				
Postoperative Day 0	675.61 (596.18)	165.20 (221.58)	690.27 (1,126.42)	0.116
Postoperative Day 1	494.37 (851.60)	57.84 (118.09)	1,430.54 (3,810.33)	0.263
Postoperative Day 2	256.35 (404.97)	24.88 (18.58)	181.63 (231.55)	0.064
Discharge Destination (%)				0.458
Home	11 (84.6)	15 (100.0)	15 (93.8)	
Subacute Rehab	1 (7.7)	0 (0.0)	1 (6.3)	
Other Hospital Facility	1 (7.7)	0 (0.0)	0 (0.0)	

* Demonstrates significantly different values from only the General cohort

* Demonstrates significantly different values from only the Block cohort

SD: standard deviation

VAS: Visual Analog Scale

AUC: area-under-curve

MME: morphine millequivalents

CONCLUSION

No previous study has compared general, regional, and epidural anesthesia in pediatric patients undergoing limb lengthening procedures.

In this study, pediatric patients undergoing PRECICE nailing who received a regional block consumed less opioids and had a shorter hospital stay than those who received general and epidural anesthesia.

General anesthesia plus a regional block may provide the ideal anesthetic combination for pediatric limb lengthening patients to mitigate pain and negative side effects associated with opioids.

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