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Introduction

Osteogenesis Imperfecta (OI):

- Genetic defect of collagen resulting in skeletal dysplasia. Majority of types caused by a mutation of the alpha chains of collagen gene (COL1A1 and COL1A2)¹
- Characterized by bone deformity and fractures, blue sclerae, dentinogenesis imperfecta, hyperlaxity of ligaments and skin, aortic root dilation, hydrocephalus, macrocephaly, and basilar invagination^{1,2,3}

Medical Implications:

- Often require frequent orthopedic surgical interventions^{2,3}
- Challenges in pain control may lead to increased opioid requirement and tolerance
- Neuraxial anesthesia is relatively contraindicated as perceived risk of complications is believed to outweigh the benefits^{2,4}

Research Objective:

- To assess whether the addition of neuraxial anesthesia (epidural and caudal) has an impact on post operative analgesia compared to systemic analgesia in children with OI undergoing lower extremity surgery. Primary outcome measured is post operative pain scores, secondary factor is whether adverse events occurred related to neuraxial use.

Methods

A retrospective chart review of pediatric patients with OI who underwent a lower extremity orthopedic operation from 2000 to 2020 was conducted at a single institution.

- Data was collected and evaluated based on total cases completed and total number of patients
- Patient demographics (gender, age, weight, OI type)
- Operative details: number of bones operated on, type of anesthesia provided
- Adverse events: bleeding, spinal cord injury, iatrogenic fracture
- Pain scores on Post Operative Day (POD) 0-3
- Cases were separated into 3 groups for analgesia approach: epidural (EPI), caudal (CAU) or solely systemic (SYS) and post operative pain scores were evaluated with Analysis of Variance (ANOVA)

Conclusion and Future Directions

- Statistically significant differences in post operative pain scores were displayed on POD 0-3 with the use of neuraxial anesthesia in children with OI undergoing LE procedures, in comparison to systemic analgesia alone
- The use of neuraxial anesthesia may decrease the use of post operative opioids to achieve adequate analgesia
- No adverse events took place with the use of neuraxial anesthesia in pediatric patients with OI

Results

- 194 OI patients evaluated; 611 LE orthopedic cases completed
- A majority of these patients were diagnosed with OI III or IV (severe OI)
- 55.3% received systemic analgesia alone, 34.9% received an epidural, and 9.8% had a caudal epidural completed

Statistically Significant Differences for Each POD

- Pain Scores POD 0: SYS>CAU; p=0.031
 - SYS: (mean=3.9, SD=2.8)
 - CAU: (mean=2.9, SD=2.6)
- Pain Scores POD 1: SYS>CAU and EPI; p=0.001
 - SYS: (mean=4.3, SD=2.6)
 - CAU: (mean=3.2, SD=2.9)
 - EPI: (mean=3.5, SD=2.9)
- Pain Scores POD 2: SYS>CAU p=0.020
 - SYS: (mean=3.5, SD=2.5)
 - CAU: (mean=2.3, SD=2.3)
- Pain Scores POD 3: SYS>EPI p=0.004
 - SYS: (mean=3.2, SD=2.5)
 - EPI: (mean=2.3, SD=2.5)
- No adverse outcomes (bleeding, spinal cord injury, or iatrogenic fracture) were identified

Table 1

	By Case (n=611) n (%)
Gender	
Male	297 (48.6)
Female	314 (51.4)
Age	
0-5 y	315 (51.6)
6-10 y	168 (27.5)
11-15 y	105 (17.2)
16-20 y	23 (3.8)
Weight (kg)	
<=10	190 (31.1)
11-15	138 (22.6)
16-20	98 (16.0)
21-25	36 (5.9)
26-30	26 (4.3)
31-40	55 (9.0)
41-49	23 (3.8)
>=50	45 (7.4)

Table 2

	By Case (n=611) n (%)
Number of Bones	
1	272 (44.7)
2	207 (34.0)
3	67 (11.0)
4	59 (9.7)
5	1 (.2)
6	2 (.3)
Not Documented	3 (.5)

OI Type and Analgesia Data

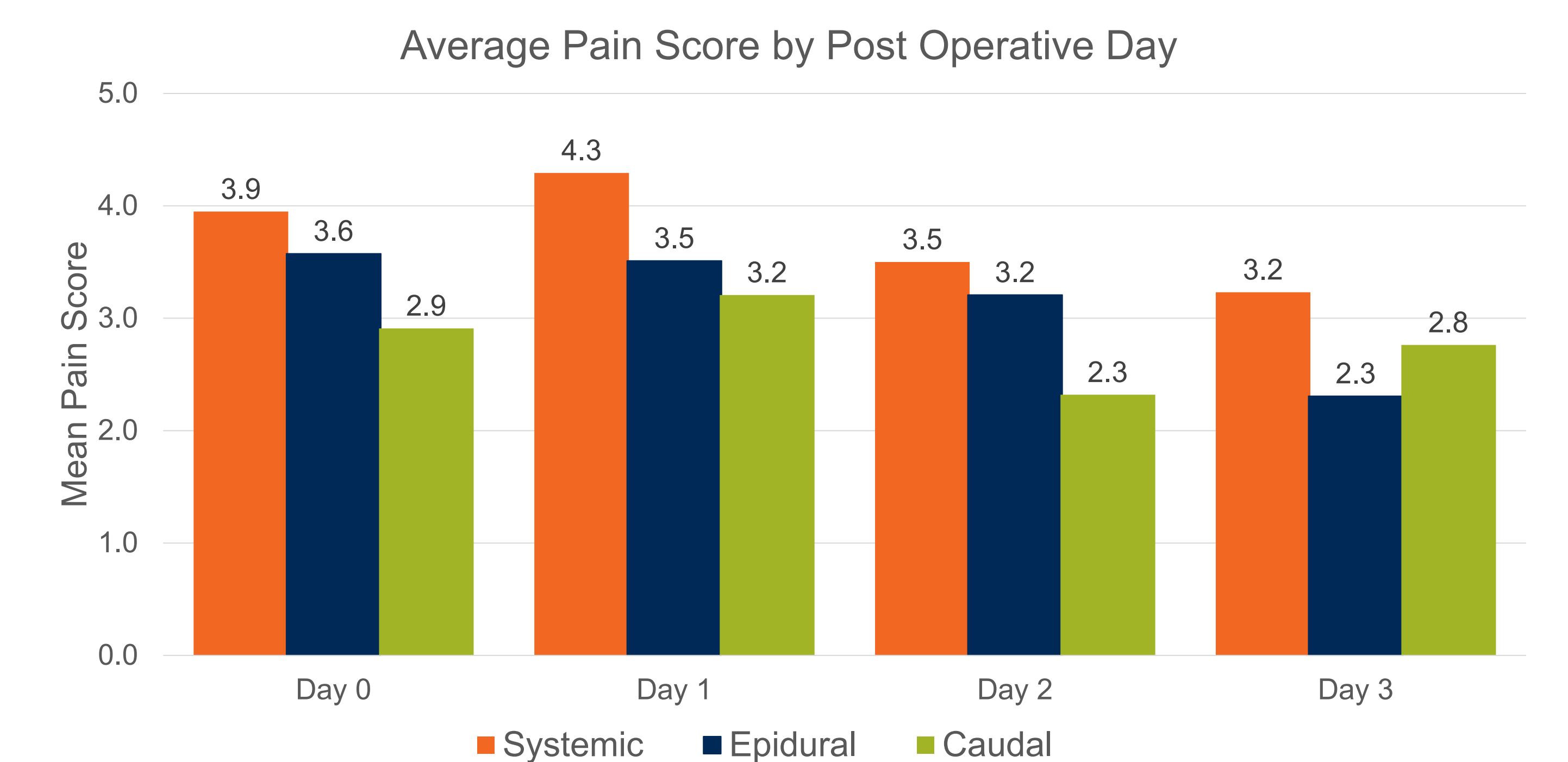
Table 3

	By Case (n=611) n (%)
OI Type	
I	73 (12.3)
I/IV	1 (.2)
III	185 (31.1)
III/IV	48 (8.1)
IV	222 (37.4)
V	8 (1.3)
VI	2 (.3)
VIII	10 (1.7)
XI	2 (.3)
XV	11 (1.9)
Mild	6 (1.0)
Moderate	3 (.5)
Severe	23 (3.9)
Not Documented	17 (2.8)

Table 4

	By Case (n=611) n (%)
Type of Analgesia	
SYS	338 (55.3)
CAU	60 (9.8)
EPI	213 (34.9)

Post Operative Pain Scores



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