A High Baseline Psycho-Somatic Symptom Profile Predicts Persistent Pain at One Year following Spine Fusion in Children

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BACKGROUND

A high symptom profile was recently described in 30% of children with idiopathic scoliosis and was differentiated by higher depression, fatigue, pain interference, neuropathic pain and pain catastrophizing characteristics. This profile was associated with worse short-term pain outcomes after posterior spine fusion (PSF).[1] Importantly, many children who undergo PSF have persistent pain trajectories 1-5 years after surgery,[2-3] yet it is unknown whether a high symptom profile, similar to that in children with chronic or centralized pain, predicts the long-term trajectory after PSF. This longitudinal study differentiated preoperative symptom profiles in children and examined whether a high symptom profile predicts ongoing pain and analgesic use 1 year after PSF.

METHODS

With IRB approval, written parental consent and child assent, children aged 10-17 years were surveyed before surgery and at 1 year after PSF. Baseline self-reported measures included:

- pain intensity (0-10 numeric scale), location(s), and duration
- neuropathic pain (painDETECT)
- Pain catastrophizing
- PROMIS measures of fatigue, depression, anxiety, and pain interference

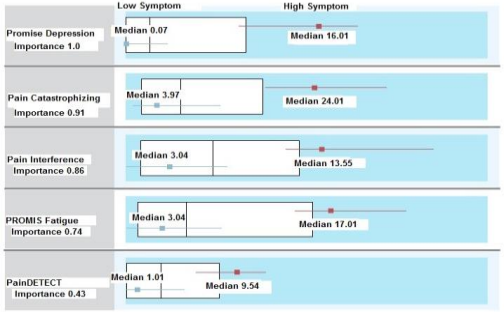
Perioperative and postoperative analgesic usage was recorded.
Children were re-surveyed at 1 year regarding pain intensity, pain interference, neuropathic pain and analgesic use.

RESULTS

- 95 healthy children (75% female, 94% ASA 1-2) completed the study.
- Cluster analyses ultimately delineated two groups with a high measure of cohesion and separation in the model. These clusters were differentiated in order of contribution as shown in Figure 1.
- There were 28 children in the high symptom cluster and 67 children in the low symptom cluster.
- Table 1 describes the demographic and perioperative characteristics of these symptom groups.

RESULTS (continued)

Figure 1. Baseline High and Low Symptom Clusters



- The High Symptom Cluster had significantly higher pain intensity, pain interference, and neuropathic pain at one year ($p \leq 0.005$).
- A multivariable linear regression model showed that the symptom cluster independently predicted pain interference at one year controlled for other characteristics (Table 2).
- A mixed effect logistic regression model showed that, controlled for the other characteristics and hospital course, children in the High Symptom Cluster had a 50% higher probability of requiring ongoing analgesia (93% [95% CI 54.8, 99.3] vs. 43% [19.6, 69.9], p=0.001).

Table 2. Multivariable Linear Regression Model Results

	Beta [95% CI]	P Value
Age	0.39 [-0.38, 1.16]	0.315
Sex	-0.53 [-3.73, 2.67]	0.741
Body mass index	-0.17 [-0.41, 0.08]	0.178
Baseline widespread pain	-0.48 [-3.37, 2.40]	0.739
Intrathecal morphine used	0.47 [-4.75, 5.69]	0.857
Hospital morphine consumption	18.87 [-21.29, 59.03]	0.351
Average Hospital Pain Score	0.29 [-0.49, 1.06]	0.458
Spine levels fused	-0.36 [-1.10, 0.38]	0.332
Symptom cluster	-9.92 [-13.2, -6.63]	p<0.001

Table 1. Baseline and Surgical Characteristics of the Cluster Groups

	Low Symptom Cluster (n=67)	High Symptom Cluster (n=28)	MD or OR [95% CI]
Age (years)	14.03 ± 1.73	14.11 ± 1.97	0.08 [-0.73, 0.88], 0.849
BMI	21.22 ± 4.93	23.80 ± 5.27	2.6 [0.33, 4.83], 0.025
Female sex (vs. male)	48 (71.6%)	24 (86%)	0.42 [0.13, 1.38], 0.192
ASA 1-2 (vs. 3)	64 (95.5%)	25 (89.3%)	0.39 [0.07, 2.07], 0.355
Preop analgesic use [opioid use]	45 (67.2%) [0]	27 (96.4%) [3]	0.08 [0.01, 0.59], 0.002
Widespread pain (vs. none to local)	15 (22%)	12 (43%)	0.39 [0.15, 0.99], 0.044
Pain control method perioperatively			
Epidural	12 (17.9%)	5 (17.9%)	0.80 [0.28, 2.31], 0.682
Intrathecal morphine (vs. other)	50 (74.6%)	22 (78.6%)	
PCA	5 (7.5%)	1 (3.6%)	
Hospital morphine consumption (mg/kg/hr)	0.08 ± 0.06	0.07 ± 0.05	-0.01 [-0.04, 0.01], 0.369
Average hospital pain score (0-10)	4.6 ± 1.65	5.71 ± 1.82	1.10 [0.34, 1.86], 0.005
Spinal segments involved			
Thoracic only	14 (20.9%)	7 (25.0%)	1.26 [0.45, 3.57], 0.660
Thoracic and Lumbar	53 (79.1%)	21 (75.0%)	
Number of spinal levels fused	Median 11	Median 10	-0.57 [-1.4, 0.26], 0.136
Anesthesia duration (hrs)	5.90 ± 1.19	5.40 ± 1.05	-0.50 [-1.01, 0.01], 0.056
Hospital length of stay (hrs)	73.72 ± 20.22	75.00 ± 13.02	1.3 [-6.9, 9.5], 0.758

MD=Mean Difference; OR=Odds Ratio; CI=Confidence Interval

CONCLUSION

Findings show that children with higher psycho-somatic symptoms preoperatively may be at risk for persistent pain and analgesic use 1 year after surgery. Identifying such symptomology prior to surgery may help to strategize early interventions that could mitigate persistent postoperative pain after PSF.

REFERENCES

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