

[PR2-115] Incidence and Predictors of Chronic Post-Surgical Pain (CPSP) and Persistent Pain After Spine Fusion In Adolescents

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Introduction:In the US, 2 to 4% of children between the ages of 10 and 16 years have idiopathic scoliosis. Annually about 38,000 children undergo spinal fusion. The prevalence of chronic post-operative pain (CPSP), defined as pain attributable to the surgical procedure and lasting for more than 2 months after surgery, is estimated to be high (up to 50%) especially in adolescents, but there is little literature about the development and maintenance of CPSP in pediatric patients after spinal fusion. Factors like anxiety, catastrophization and postoperative pain have been suggested to play a role^{2,3}. This study aims to evaluate the trajectory of CPSP after spine fusion in adolescents over 4 years and identify risk predictors.

Methods:After IRB approval and consent, a prospective study was conducted between 2009-13 in 78 adolescents with idiopathic scoliosis undergoing posterior spine fusion under standard anesthesia and postoperative analgesia via morphine PCA. Data regarding preoperative pain, anxiety, postoperative pain and morphine consumption (POD 1 and 2) were collected prospectively. Retrospectively, validated questionnaires were administered to assess parental and child anxiety, catastrophization and functional disability (CASI, PCS-C, PCS-P and FDI). CPSP outcomes evaluated are chronic pain/CP (NRS>3 at 3 months post-surgery) and persistent pain/PP (NRS>3 at one year after surgery). Groups with and without CP and PP were compared for all factors and significant factors ($p<0.05$) were included in the multivariable logistic regression models to identify the significant risk factors.

Results:Average time since surgery is 2.4 ± 1 years. Collection of questionnaire data for prospectively recruited 78 patients is ongoing. Of the 36 patients we have reached thus far, 17 (46%) had CP and 13 (30%) had PP. Of patients with CPSP, 81% complained of upper back pain mostly of a sharp nature (47%). The average duration of pain after surgery is 5 ± 6 months. Those with CP had significantly higher postoperative pain scores ($p=0.009$) and morphine requirements ($p=0.03$) on POD 1 and 2. Significant predictor for development of CP is higher median pain score on POD 1 and 2 (Odds Ratio: 2.07 (CI: 1.03—4.15) $p = 0.04$), and surgical duration for PP ($p= 0.05$). The FDI was found to correlate both with the development of CP ($p=0.02$) and PP ($p=0.02$). Remaining results are presented in Table 1.

Conclusions: About 50% of adolescents undergoing spine surgery have chronic pain at 3 months after surgery, development of which is predicted (2-fold increased risk) by higher immediate postoperative pain scores. There is a correlating trend towards increased parental anxiety contributing to CP. Preoperative identification of risk of CPSP may allow potential interventions to minimize development of a chronic pain syndrome.

References:

- 1.Kristensen AD, Br J Anaesth. 2010;104(1):75–79.
- 2.Pagé et al. J Pain Res. 2013;6:167-80.
- 3.Masselin-Dubois A, J Pain. 2013;14(8):854-64

Table 1. Demographics and Characteristics of Pain in Adolescents after Spine Surgery over 4 years & Comparison of patients with and without Chronic and Persistent Pain (Preliminary results)

	Total population (n=78) Mean(SD), N (%)	Chronic pain 20(17.56)	No chronic pain 20(19.36)	P- value†	Persistent pain 20(13.56)	No persistent pain 20(23.56)	P- value†
Age (yr)	14.6(1.9)	15(1.9)	14(1)	0.23	15.3(1.9)	14.7(1.7)	0.22
Sex (M/F)	25(32%)/33 (48%)	7(1)	4(1)	0.28	5(8)	5(1)	0.70
Weight (kg)	39.3(14.8)	39(17)	38(14)	0.84	39.0(18.3)	39.2(15.3)	0.96
Consent Rate	66 (87%)	13	1*	0.39	11	13	1.00
Non-Consent Rate	13 (17%)	4	2		2	3	
Preoperative anxiety (VAS) for child*	3.8(2.7)	3.8(2)	3.6(2.8)	0.85	4.1(2.5)	2.7(2.2)	0.20
Preoperative anxiety for parent*(VAS)	5.4(2.4)	4.3(2)	6.5(2.2)	0.06	5.2(2.0)	5.3(2.7)	0.88
No. of vertebral levels fused	11(2)	12(2)	11(2)	0.21	12(2)	11(2)	0.12
Surgical time (min)	220(78.3)	236(53)	238(100)	0.17	347(64)	286(90)	0.04
Mean NRS POD1	5(1)	5.0(1.4)	4.2(1.8)	0.15	4.6(1.2)	4.5(1.9)	0.83
Mean NRS POD2	4(2)	5.2(1.5)	3.8(1.6)	0.01	4.9(1)	4.4(1.6)	0.40
Median NRS (POD1 & POD2)	4(2)	5.1(1.2)	3.8(1.5)	0.009	4.6(1.1)	4.3(1.6)	0.65
Morphine consumption mg/kg	1.9(0.7)	2.2(2)	1.6(2)	0.03	2.11(2.07)	2.07(2.36)	0.87
NRS Mean(SD) 6 months - 4 years after surgery		6-12 months: 3.3(0.6) 24-36 months: 2(2)			12-24 months: 3.7(0.8) 36-48 months: 1.6(2.3)		
PCS-C (Overall)	15(11)	14(13)	16(9)	0.75	15(14)	16(9)	0.90
Remotivation	8(2)	8(2)	8(4)	0.76	8(2)	8(2)	0.78
Magnification	3(2)	2(2)	3(2)	0.53	3(2)	3(2)	0.91
Helplessness	5(5)	5(5)	5(5)	0.92	4(6)	5(5)	0.57
PCS-F (Overall)	23(11)	24(10)	22(13)	0.70	26(9)	23(12)	0.43
Remotivation	11(2)	11(2)	11(2)	0.96	12(2)	11(2)	0.54
Magnification	4(2)	4(2)	4(2)	0.77	5(2)	4(2)	0.49
Helplessness	8(6)	8(6)	8(6)	0.69	9(6)	9(6)	0.69
CAS	26(2)	27(2)	26(2)	0.38	29(2)	26(2)	0.22

*p<0.05; †Significance at p<0.05

Abbreviations: VAS= Visual Analog Scale (0-10); POD= Postoperative day; NRS= Numerical Rating Scale (0-10);
FDS= Functional Disability Index (Score Range 0-50); PCS-C= Pain Catastrophizing Scale - Child (Score Range 0-52);
PCS-F= Pain Catastrophizing Scale - Parent (Score Range 0-52); Remotivation, Magnification and Helplessness are
subscales of PCS (Score Ranges 0-16, 0-12, 0-24 respectively); CAS= Childhood Anxiety Sensitivity Index (Score
Range 11-34)