

Prospective randomized trial of efficacy and safety of erector spinae catheter and intercostal nerve cryoablation protocols after pectus surgery: Interim analysis

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Background
Cryoablation of the intercostal nerves (INC), is being used increasingly for pain control used in adolescent patients for Nuss procedures. It is imperative to study the efficacy and safety of INC in randomized controlled trials.

Aims and objectives
To compare efficacy (functional recovery and clinical pain outcomes) and safety (neurological sequelae) in patients undergoing INC and multimodal ES catheter protocols for pain control after pectus surgery repair.

Methods
12- to 21-years Group ESC vs INC
Outcomes: Time to walk in the hallway and climb stairs, Morphine Milligram Equivalents (MMEs), S-LANSS score: Leeds Assessment of Neuropathic Symptoms and Signs (self-complete)
•Preop, Intraop, Postop, 6 weeks, 2-3 months and 4-6 months

Results
•INC group had a significantly lower postoperative opioid use on POD1, total opioid use, POD1 and total Integrated score
•Higher baseline and follow up S-LANSS scores in the INC group

Name Total N = 31	ES Catheter (N = 15)	Cryoablation (N = 16)	p-value
AUC0	121.67 (29.27)	107.01 (39.73)	0.0889
AUC1	92.94 (24.76)	79.43 (41.46)	0.2967
AUC2	88 (28.82)	87.87 (35.56)	0.9920
Sum AUC	296.32 (70.13)	244.25 (107.96)	0.1346
MME0 (mg/kg)	0.98 (0.48, 1.75)	0.85 (0.14, 1.17)	0.1920
MME1	0.86 (0.79, 1.11)	0 (0, 0.16)	<0.0001
MME2	0 (0, 0.19)	0 (0, 0)	0.095
Sum MME	2.12 (1.29, 2.63)	0.85 (0.34, 1.25)	0.0008
Integrated score0	35.49 (83.00)	-31.05 (75.54)	0.0292
Integrated score1	58.06 (66.12)	-50.81 (76.19)	0.0003
Integrated score2	14.79 (90.72)	-16.03 (80.76)	0.3805
Sum Integrated	107.29 (174.11)	-93.88 (182.17)	0.0046
SLANSS preop	0 (0, 0)	0 (0, 10)	0.0710
SLANSS week6	0 (0, 2) N=10	1.5 (0, 4) N=14	0.2128
SLANSS mon 2-3	0 (0, 1) N=12	3 (0, 3) N=13	0.0655
SLANSS mon 4-6	0 (0, 0) N=5	6.5 (1, 14.5) N=8	0.0762

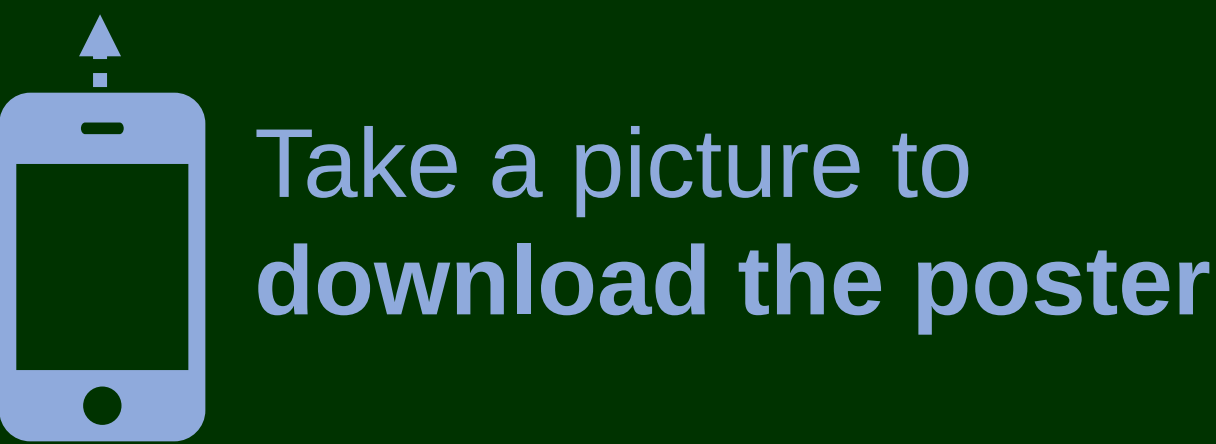
Discussion
•Study limitations: Powered for efficacy outcome
•Patients who received intercostal nerve cryoablation continue to report neurological symptoms at 4-6 months postoperatively

•This research was funded by AIP grant, Department of Anesthesia, CCHMC

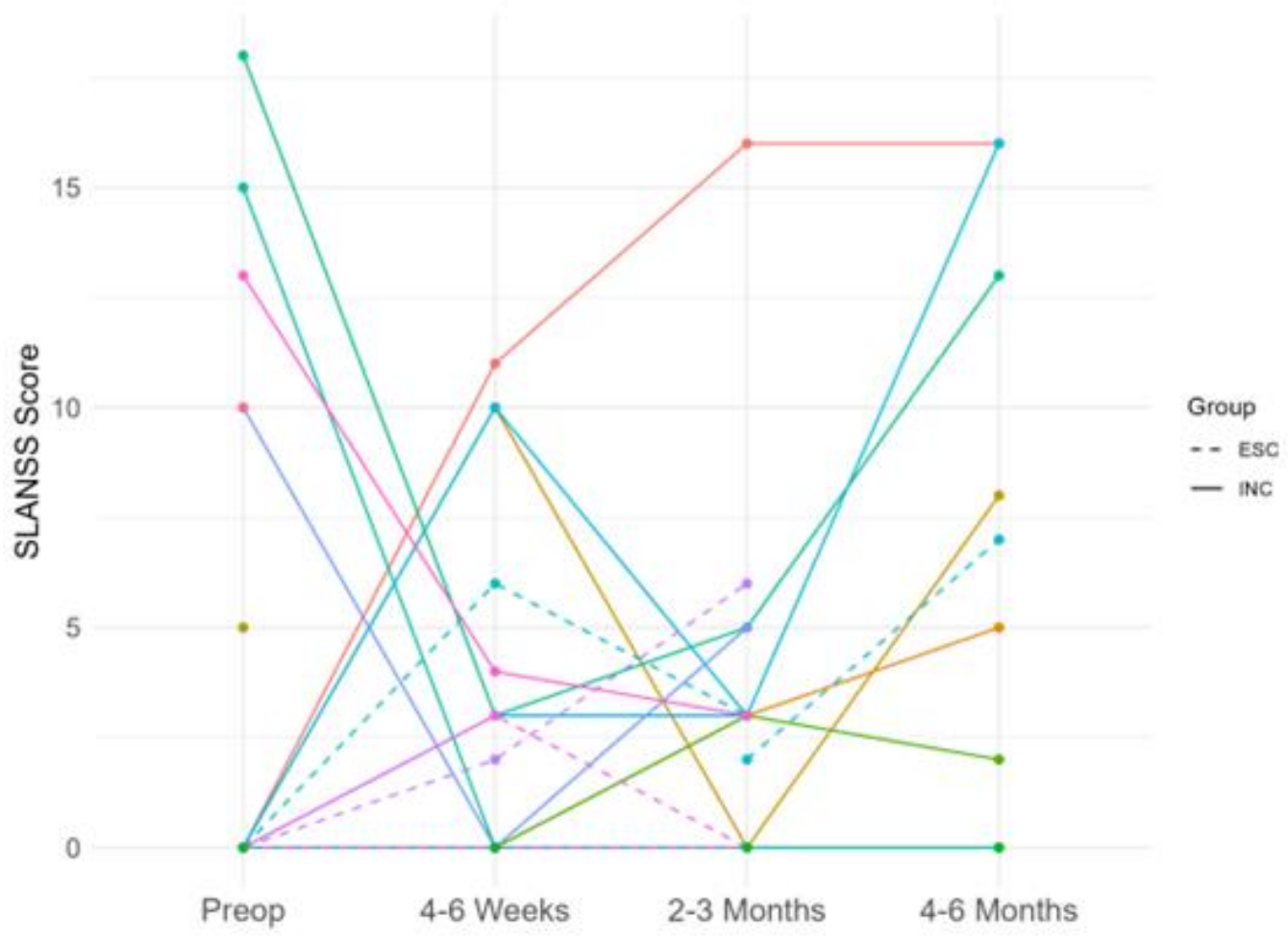


Acute pain scores and opioid use are significantly lower in intercostal cryoablation when compared to erector spinae catheters for adolescent pectus excavatum repair

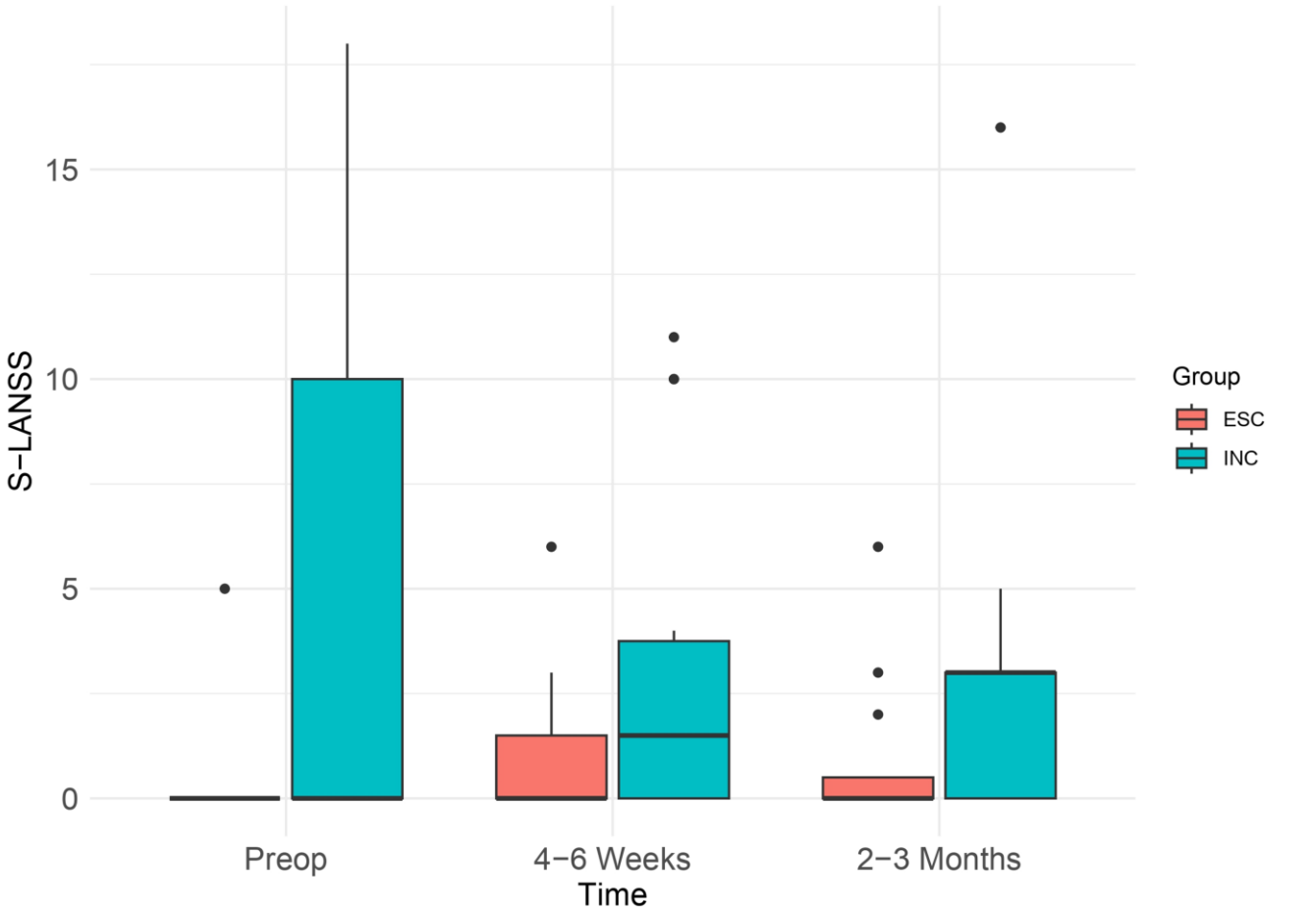
Patients who receive cryoablation may need long-term follow-up to ensure complete neurological recovery



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S-LANSS	ESC 0	INC0	ESC 6 wk	INC 6 wk	ESC 3 mo	INC 3 mo	ESC 6 mo	INC 6 mo
1. 'pins and needles', tingling or prickling sensations?	1/15	4/17	0/10	1/14	0/12	3/14	0/6	2/8
2. Does the painful area change color	0/15	0/17	0/10	0/14	0/12	0/14	0/6	0/8
3. abnormally sensitive to touch?	0/15	2/17	1/10	4/14	1/12	2/14	0/6	4/8
4. sudden electric shock like pain	0/15	4/17	1/10	2/14	1/12	2/14	1/6	3/8
5. burning pain?	0/15	0/17	0/10	1/14	0/12	0/14	0/6	0/8
6. pins and needles sensation to touch	0/15	5/17	0/10	2/14	0/12	1/14	1/6	4/8
7. numbness to touch	0/15	3/17	2/10	4/14	2/12	7/14	0/6	4/8



Name		Overall	By group		p-value
Total N = 31		Mean (sd) / Median (Q1, Q3) / N (%)	ES Catheter (N = 15)	Cryoablation (N = 16)	
Stairs1	Yes	7 (16.67)	1 (6.67)	6 (37.5)	0.0829
	No	24 (83.33)	14 (93.33)	10 (62.5)	
Stairs2	Yes	28 (96.55)	15 (100)	13 (92.85)	0.4828
	No	1 (3.45)	0 (0)	1 (7.15)	
Hallway1	Yes	19 (66.67)	9 (60)	5 (55.56)	0.8864
	No	12 (33.33)	6 (40)	4 (44.44)	
Hallway2	Yes	29 (100)	15 (100)	14 (100)	X
	No	0 (0)	0 (0)	0 (0)	

