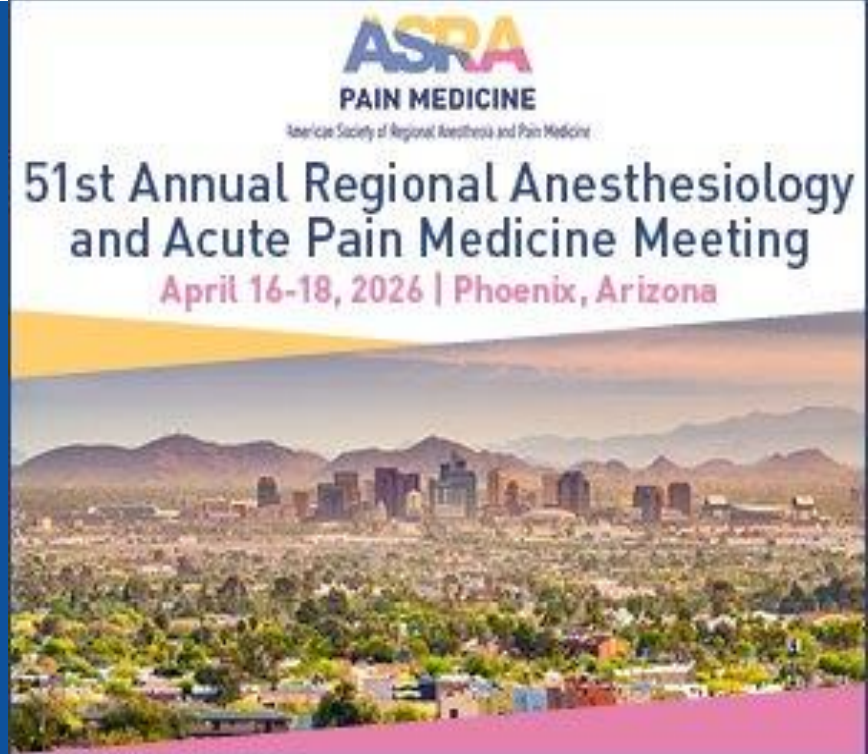




# Evaluation of Chronic Post-Surgical Pain Following the Nuss Procedure with Intercostal Nerve Cryoablation in Pediatric Patients: An Update

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## INTRODUCTION

- Pectus excavatum is a common congenital chest wall deformity that is surgically corrected via the Nuss procedure.<sup>1</sup>
- Intraoperative intercostal nerve cryoablation (INC) has been shown to reduce in-hospital opioid requirements after surgery.<sup>2</sup>
- INC carries potential risks of persistent chest wall numbness and paresthesias.<sup>3</sup>
- Objective: Evaluate the prevalence of chronic postsurgical and neuropathic pain in pediatric patients up to 1 year after the Nuss procedure with INC.

## METHODS

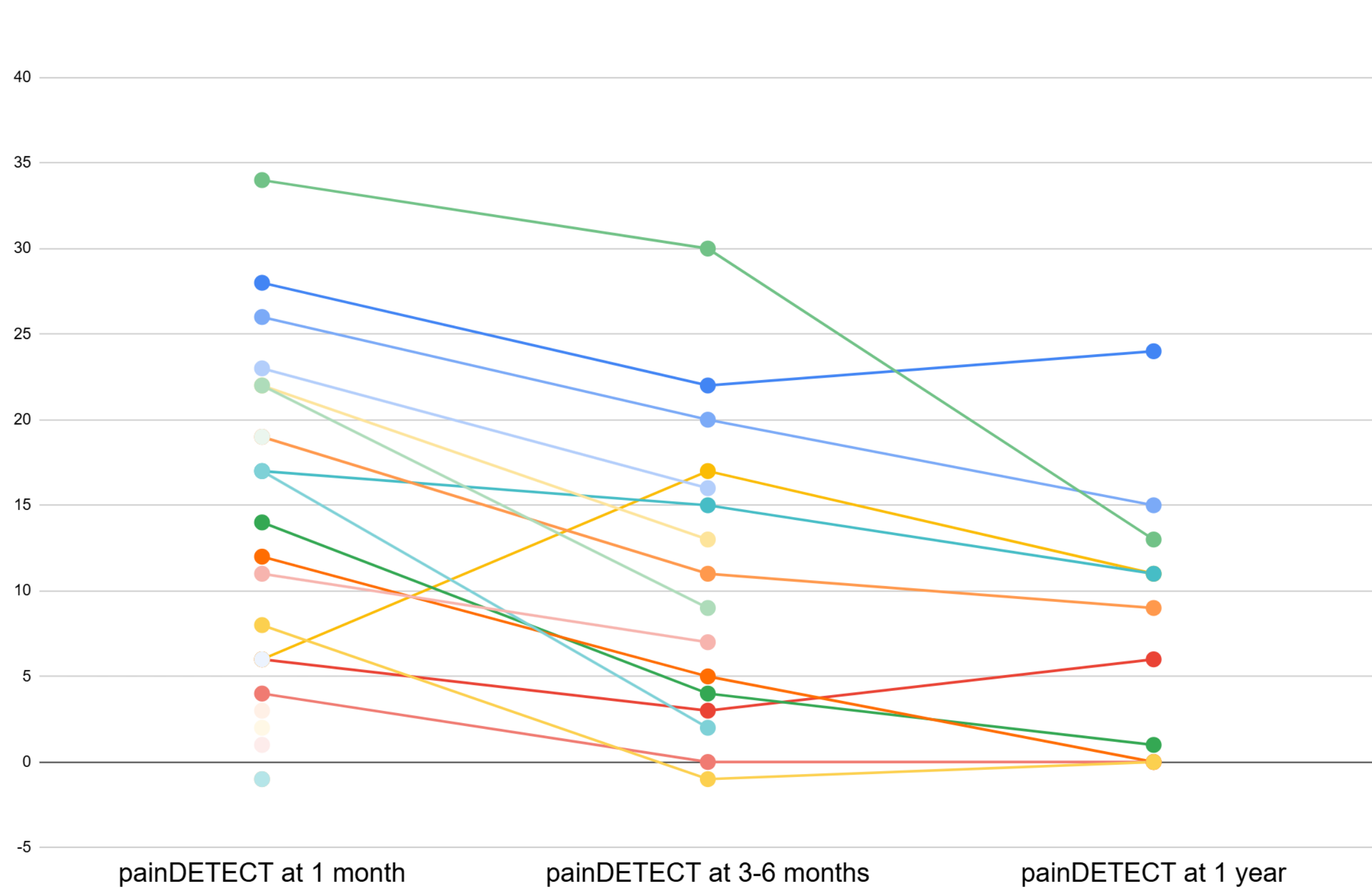
- Descriptive cohort study
- Inclusion: patients ≤21 years who underwent the Nuss procedure with INC at Duke Children’s Hospital from July 2018 to July 2025
- Patients and/or caregivers completed the follow up surveys
- PainDETECT scores were calculated at 1 month, 3-6 month, and 1 year after surgery
- Functional impairment was evaluated through the Functional Disability Inventory (FDI) at the time of the survey. (0-12 minimal disability, 13-29 moderate disability, 30 or higher severe disability)

## RESULTS

| Patient Number | Time since surgery | Age | PainDETECT 1 month | PainDETECT 3-6 months | PainDETECT 1 year |
|----------------|--------------------|-----|--------------------|-----------------------|-------------------|
| 1              | >1yr               | 14  | 28                 | 22                    | 24                |
| 2              | >1yr               | 21  | 6                  | 3                     | 6                 |
| 3              | >1yr               | 18  | 6                  | 17                    | 11                |
| 4              | >1yr               | 13  | 14                 | 4                     | 1                 |
| 5              | >1yr               | 13  | 12                 | 5                     | 0                 |
| 6              | >1yr               | 16  | 17                 | 15                    | 11                |
| 7              | >1yr               | 18  | 26                 | 20                    | 15                |
| 8              | >1yr               | 13  | 4                  | 0                     | 0                 |
| 9              | >1yr               | 19  | 8                  | -1                    | 0                 |
| 10             | >1yr               | 17  | 34                 | 30                    | 13                |
| 11             | >1yr               | 19  | 19                 | 11                    | 9                 |
| 12             | >6mo               | 18  | 17                 | 2                     |                   |
| 13             | >6mo               | 12  | 23                 | 16                    |                   |
| 14             | >6mo               | 13  | 11                 | 7                     |                   |
| 15             | >6mo               | 14  | 22                 | 13                    |                   |
| 16             | 3-6mo              | 16  | 22                 | 9                     |                   |
| 17             | 1-3mo              | 15  | -1                 |                       |                   |
| 18             | 1-3mo              | 14  | -1                 |                       |                   |
| 19             | 1-3mo              | 15  | 6                  |                       |                   |
| 20             | 1-3mo              | 13  | 1                  |                       |                   |
| 21             | 1-3mo              | 14  | 2                  |                       |                   |
| 22             | 1mo                | 14  | 19                 |                       |                   |
| 23             | 1mo                | 17  | 3                  |                       |                   |

**Table1 showing painDETECT scores at measured time points after Nuss procedure with INC**

*painDETECT scores: 0-12 nociceptive, 13-18 indeterminate, 19-38 neuropathic*



**Figure 1 showing painDETECT scores trend at measured time points after Nuss procedure with INC**

- Out of 42 eligible patients, 23 patients completed the survey
- At 1 month: 7/23 had symptoms concerning for neuropathic pain and 3 were indeterminate.
- At 3-6 months, 4/16 had symptoms concerning for neuropathic pain and 3 were indeterminate
- At 1 year, 1/11 patient had symptoms concerning for neuropathic pain and 2 were indeterminate.
- FDI scores were low with only 2 patients scoring in the moderately disability range and none in the severe range.
- The intensity of patient-reported symptoms varied; at peak severity, 12 patients experienced at least moderate numbness, 6 reported at least moderate pins and needles or burning sensations, 7 had moderate electrical shock sensations, and 9 experienced at least moderate allodynia.

## DISCUSSION

- A substantial portion of patients had nociceptive and/or neuropathic pain at 1 month and 3-6 months, with most patients having resolution at 1 year after Nuss procedure with INC.
- While initial literature had shown low incidence of neuropathic pain after the Nuss procedure with INC, more recent research suggested possible persistent neuropathic symptoms up to 1 year after surgery, with resolution in around 98.3% of patients by then.<sup>3</sup>
- Our data is potentially suggestive of a longer duration of numbness/paresthesias associated with INC than prior literature reports.

## REFERENCES

1. Obermeyer, R. J., & Goretsky, M. J. (2012). Chest wall deformities in pediatric surgery.
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