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Comparison of Post-Operative Pain Control Modalities for Pectus Excavatum Repair

Charlene Dekonenko
Children's Mercy Hospital

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Charlene Dekonenko, MD

Primary Mentor: Shawn D. St. Peter, MD

GME Research Days

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UMKC School of Medicine

BEST CHILDREN'S HOSPITALS U.S.News & WORLD REPORT RANKED IN 10 SPECIALTIES 2015-16

MAGNET RECOGNIZED AMERICAN NURSES CREDENTIALING CENTER

Disclosures

- No Disclosures
- Not previously presented
- No grant support

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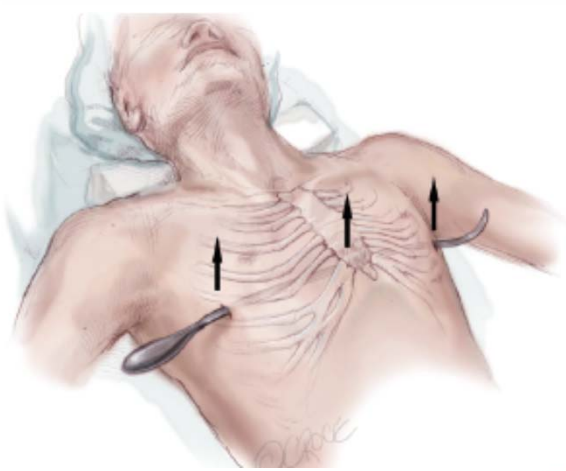
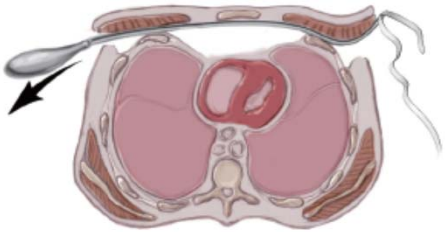
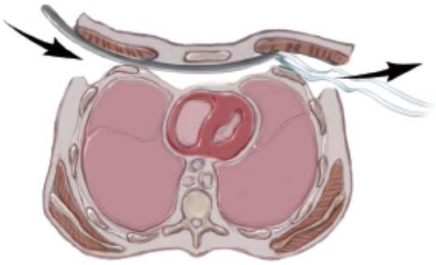
Background

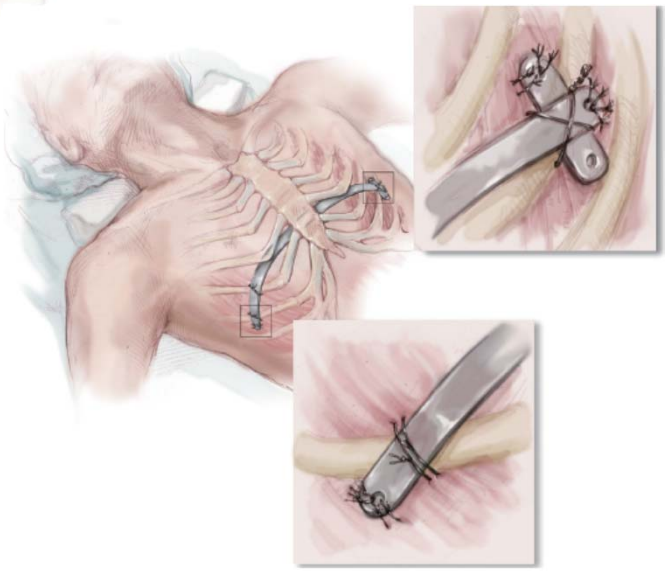
- Pectus Excavatum- posterior displacement of the sternum
- Incidence: 1 in 1000 children
- Treatment: Operative correction with a substernal bar

Background









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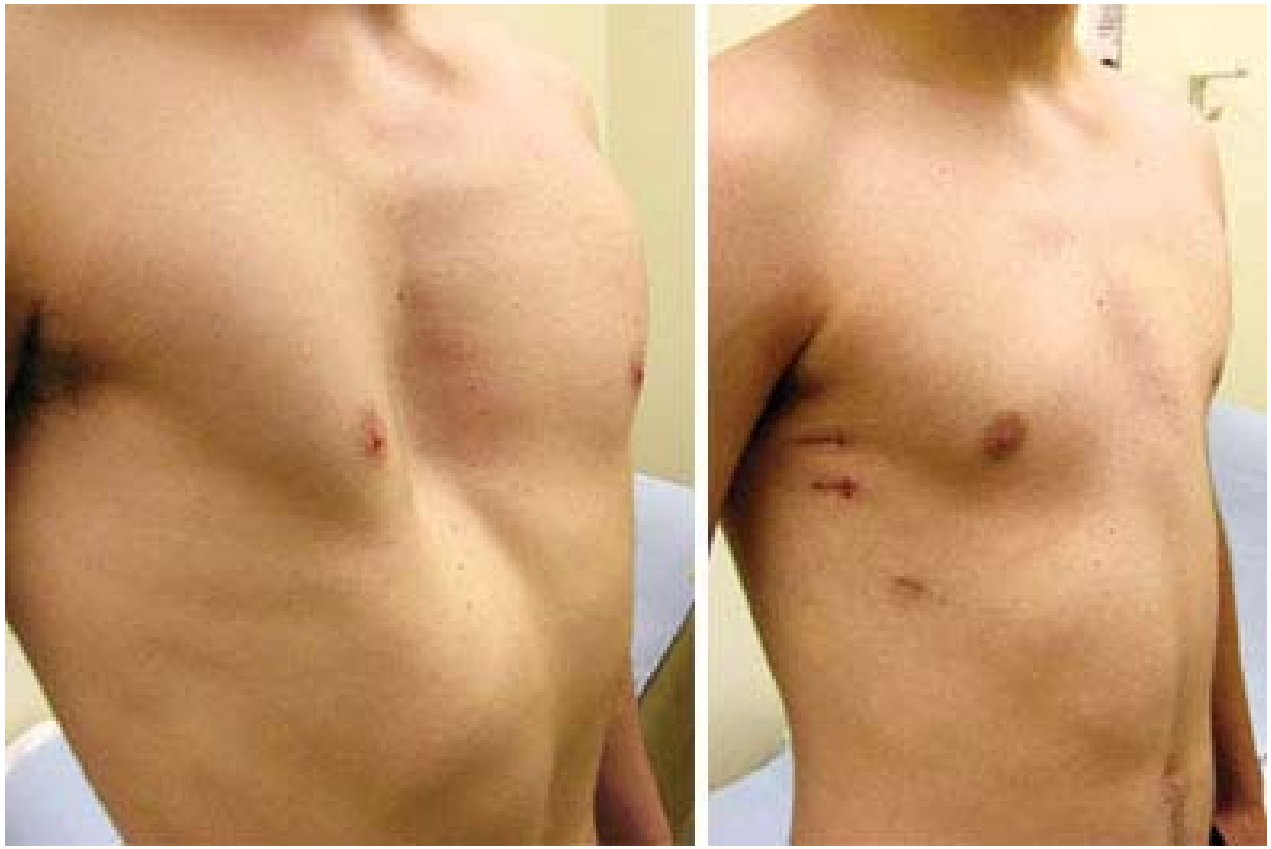
Background



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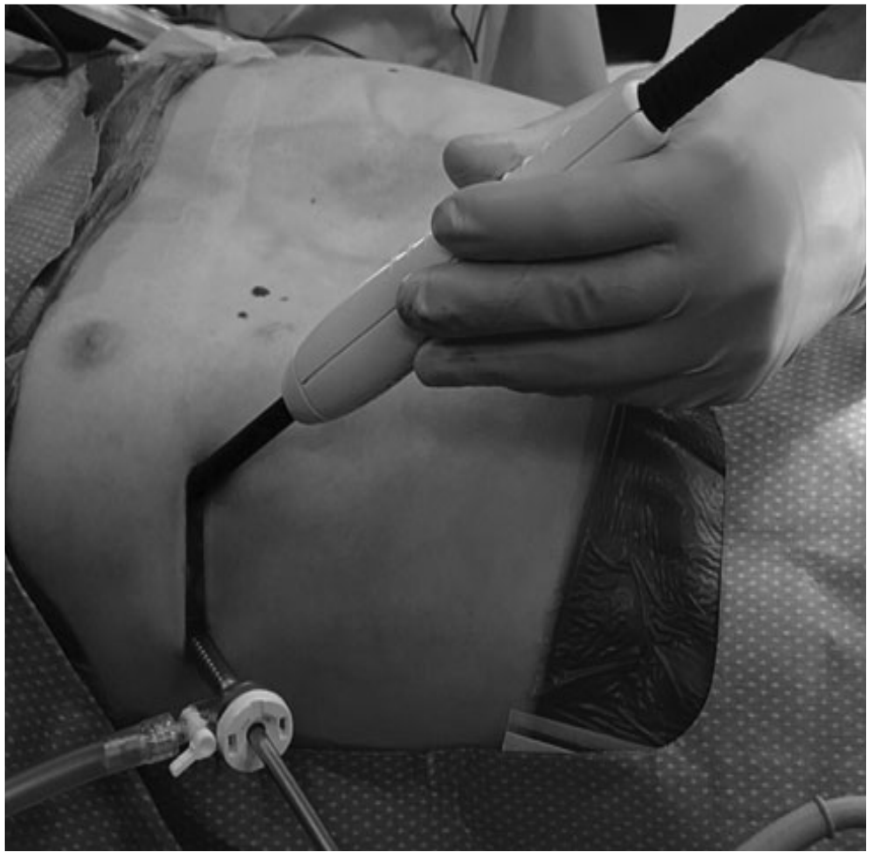
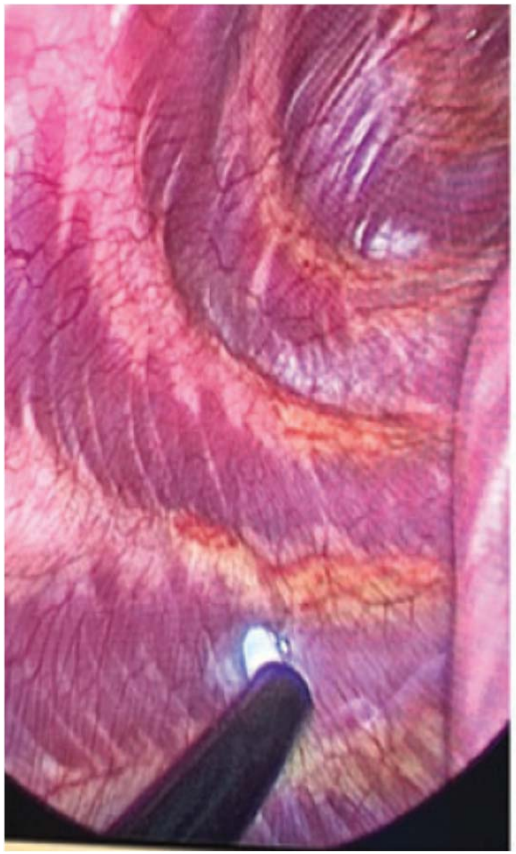
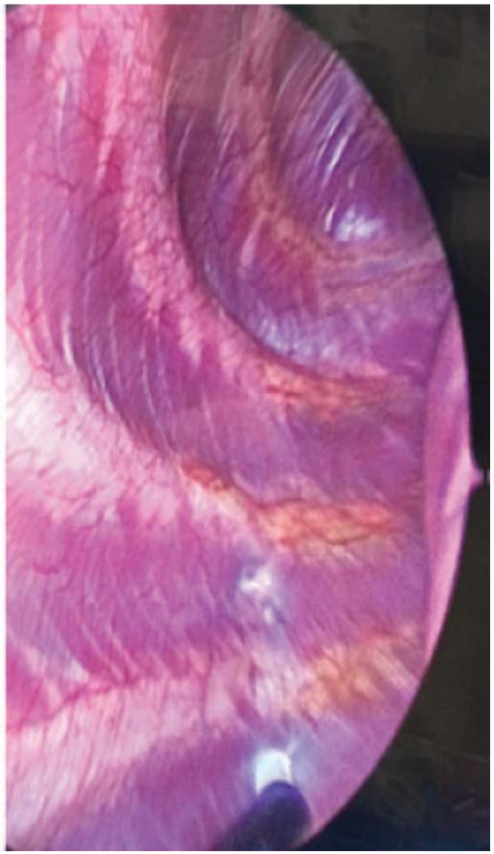
Background

- Pain control is the most significant issue of post-operative care
- Methods: thoracic epidural, intercostal nerve block, continuous paravertebral nerve block, patient-controlled analgesia (PCA)
- Mainstay of pain control remains opioids

Background







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Background

- Intra-operative Cryoablation: Localized freezing of intercostal nerves
- Wallerian degeneration of axons with fibrous neuronal components left intact allowing regeneration
- Preliminary small studies show decreased LOS and opioid use

Aim

- To compare patient outcomes following pectus excavatum repair using cryoablation, epidural, or PCA for post-operative pain control.
  - Primary outcomes: length of stay (LOS)
  - Secondary outcomes: operative time, pain scores, time to only oral analgesics

Hypothesis

Patients undergoing minimally invasive pectus excavatum repair using intra-operative cryoablation will have improved outcomes compared those using an epidural or PCA.

Methods

- Prospective observational study using cryoablation compared to results of a previous randomized trial comparing epidural vs PCA

- Inclusion Criteria
  - minimally invasive pectus repair w/bar placement, using cryoablation
- Exclusion Criteria
  - open repair or re-do operation

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Methods

- Primary & secondary outcomes obtained from chart review

- Statistical analyses
  - STATA v15
  - t-tests
  - Fisher's exact tests
  - Kruskal-Wallis for group comparisons

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Results

Demographics

	Epidural (n=32)	PCA (n=33)	Cryoablation (n=35)	p-value
Male (%)	91	94	82	0.20
Age (y)	15 [14,16]	14 [13,16]	16 [14,17]	0.02*
Height (m)	1.8 [1.7,1.8]	1.7 [1.7,1.8]	1.7 [1.7,1.8]	0.42
Weight (kg)	57 [52,62]	56 [48,58]	57 [50,64]	0.23
Haller Index	3.4 [3.3,4.2]	3.5 [3.3,4.7]	4.6 [3.6]	<0.01*
Correction Index (%)	30 [27,30]	30 [30,40]	35 [30,47]	<0.01*

Values reported in frequencies and medians with [IQR]

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Results

Hospital Course

	Epidural (n=32)	PCA (n=33)	Cryoablation (n=35)	p-value
Time to Incision (min)	52 [44,59]	30 [25,34]	27 [24,30]	<0.01*
Operative time (min)	58 [51,79]	57 [47,68]	101 [78,124]	<0.01*
Total OR time (min)	124 [106,144]	103 [87,115]	142 [115,163]	<0.01*
Time to only PO pain meds (hr)	72 [50,83]	67 [50,70]	21 [12,28]	<0.01*
LOS (d)	4.3 [4.1,5.1]	4.2 [3.4,5.2]	1 [1,1.3]	<0.01*

Values reported in frequencies and medians with [IQR]

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Results

Maximum Pain Scores

	Day 0	Day 1	Day 2	Day 3
Epidural	7 [4,7]	6 [4,7]	6 [4,7]	6 [6,8]
PCA	8 [6,10]	5 [4,7]	5 [4,8]	5 [4,7]
Cryo	6 [5,8]	5 [4,7]	6.5 [5,7]	4.5 [2,7]
p-value	0.01*	0.12	0.80	0.16

Pain scale 1-10

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Conclusions

Intercostal cryoablation during minimally invasive pectus excavatum repair significantly reduces LOS and time to oral analgesics alone.

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Future Directions

- Prospective observational study for long-term outcomes
  - Follow-up at 2 weeks, 3 months, after bar removal (2-3 years)
- Limitations
  - Small sample size, data limited to documentation in chart

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Acknowledgements

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Thank you.

Questions?

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