Offset Layered Closure May Reduce Wound Infection in EOS Surgery

Alexandra M. Grzywna, BA

Michael P. Glotzbecker, MD

John B. Emans, MD *

Disclosures:

Consultant: Medtronics, Depuy-Synthes

Royalties: Depuy-Synthes

Boston Children's Hospital
Orthopedic Center

HARVARD MEDICAL SCHOOL

Challenge: *High rate of wound infection* in EOS

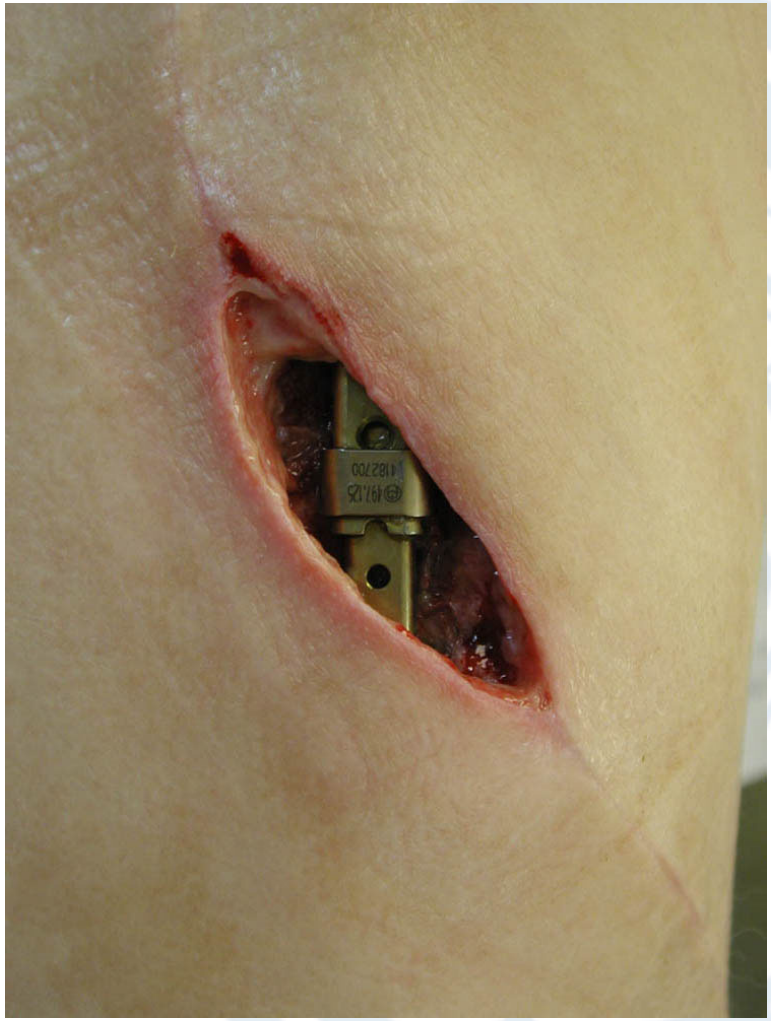
- **Reported infection rates:**
  - As high as 24% (see next paper!)
- **Known risk factors:**
  - Neuromuscular
  - Nutrition, Urosepsis
  - VEPTR
- **Known strategies:**
  - Optimize nutrition
  - Sterilize urine
  - Surgical site preparation
  - Appropriate ABX coverage

Index case changed practice – late 2001

- **11 yo with multiple prior thoracotomies for TEF repair, colonic interposition.**
  - Thoracogenic scoliosis with multiple fused ribs 60 deg
  - Prior chest wall infection, scarring
  - Multiple parallel thoracotomy scars
- **Expansion thoracotomies, VEPTR**
  - *One old scar used for part of the new thoracotomy*
  - Significant chest expansion

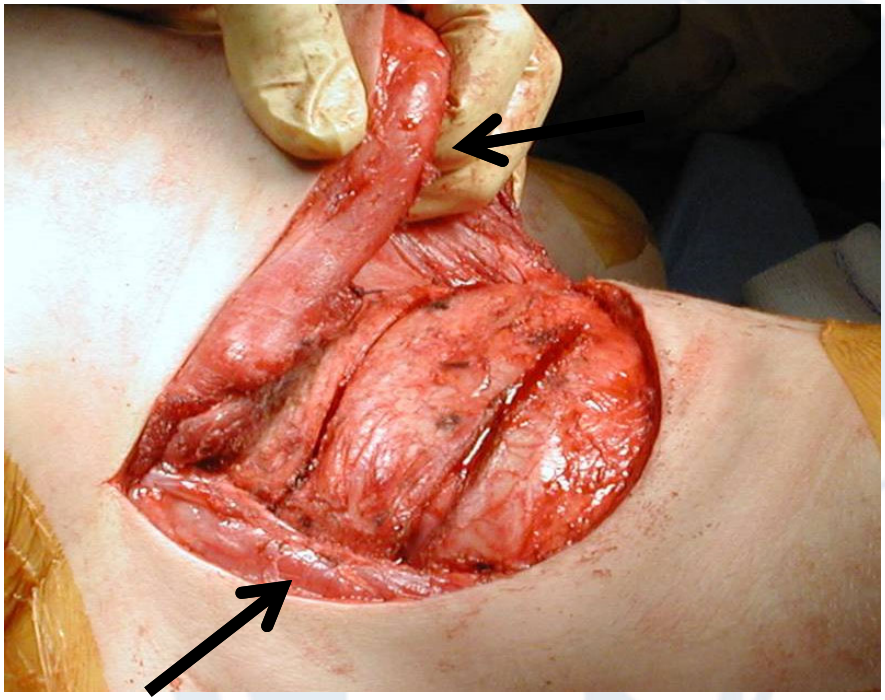
Index case changed practice – late 2001

- **1 month post op**
  - Fell, struck wound on chair while at camp
  - Dehiscence
  - Infection, device removal
- **Contributing factors**
  - Wound tension
  - Incomplete muscle coverage below
  - Full thickness incision over device



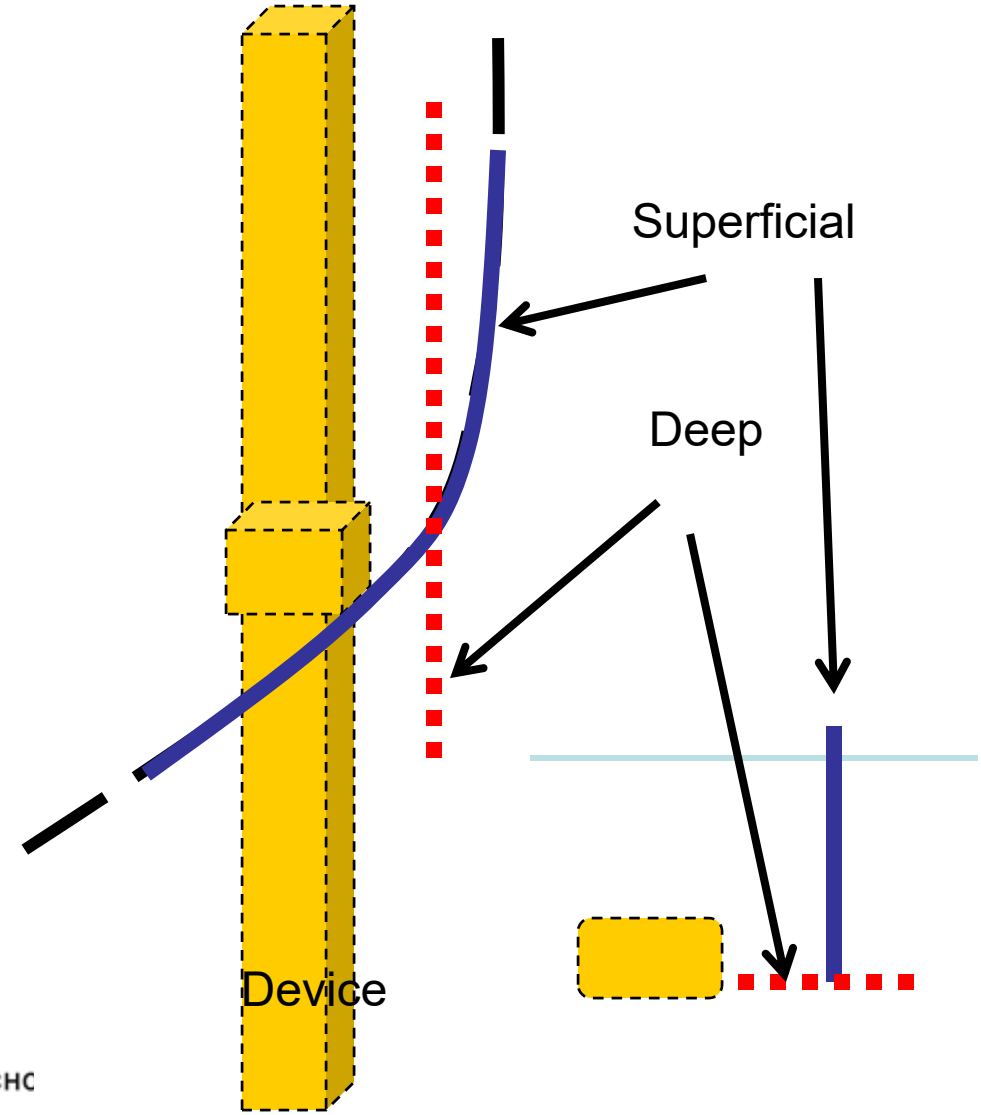
2002 – Staggered Layered Closure

- **Primary incisions:**
  - VEPTR:
    - Not over device
    - Staggered layers
    - Minimize tension
  - GR:
    - Separate proximal and distal incisions
    - Submuscular placement per Akbarnia

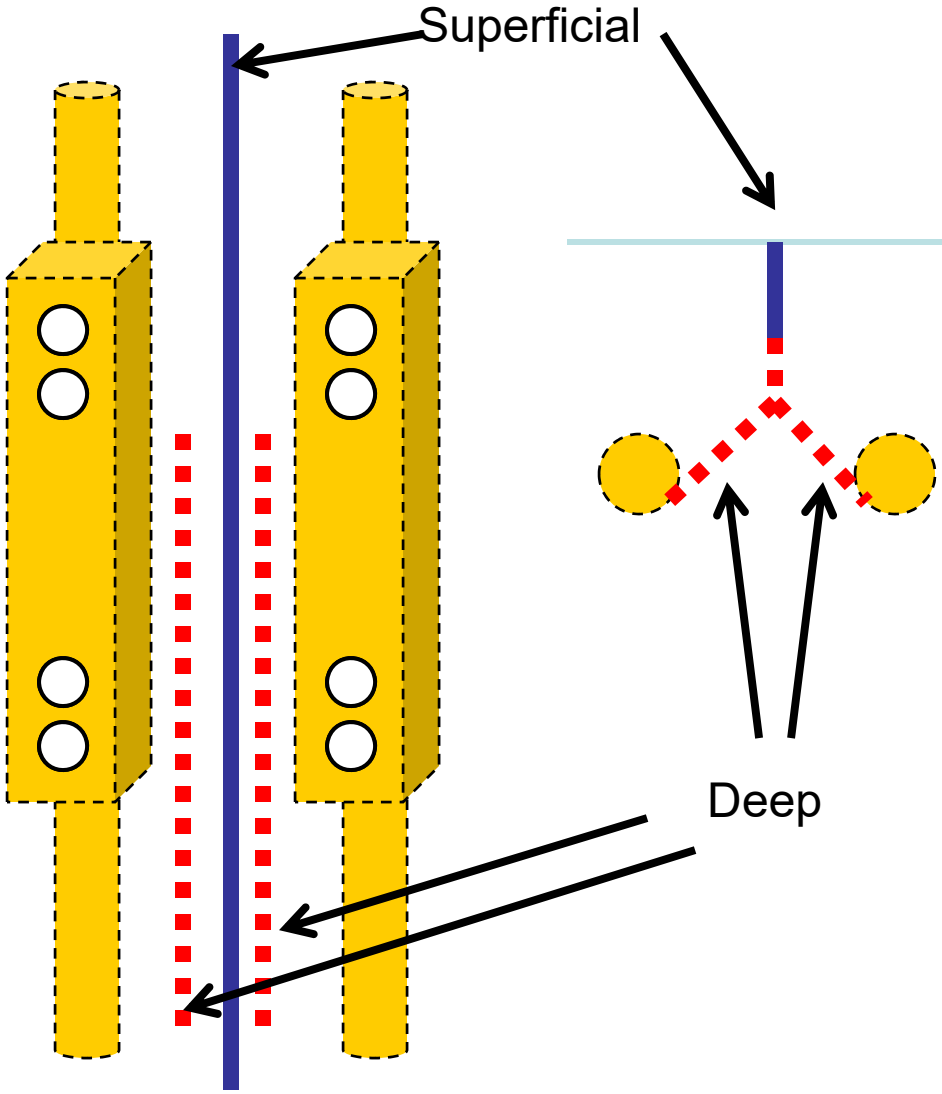


2002 – Staggered Layered Closure

- **Lengthening incisions - VEPTR**
  - *No full thickness incisions over device*
  - *Staggered layers*
  - Tissue approximation to minimize dead space
  - Watertight closure, dressing
  - Closure – *attending participation*



Staggered superficial and deep incisions



- **Lengthening incisions - GR**
  - *No full thickness incisions over device*
  - *Staggered layers*
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Clinical Series of EOS Surgeries 1981-2014:

- **Single site, surgeon:**
- **137 pts**
- **Age - Median 4.9 yr**
- **Etiologies:**
  - Congenital - 72
  - Syndromic - 22
  - Idiopathic -17
  - Neuromuscular - 16
  - Iatrogenic – 10
- **Procedures:**
  - VEPTR 64
  - GR 63
  - VEPTR/GR 10

- **1267 operations:**
  - Index – 121
  - Lengthening – 852
  - Exchange/revision – 249
  - Final fusion – 45
- **Length of treatment:**
  - Mean 5.97
  - 0.1 – 14.7 yrs
- ***Infections:***
  - *7*

Staggered layered closure begun in 2002:

	< 2002	> 2002
Operations	94	1130
Infections	4	3
Infection Rate	**4.3%**	**0.26%**
95% Confidence Interval	1.2-10.6%	0.05-0.75%

- **Exact binomial proportion test:**
  - **p<0.001**
- **Odds Ratio = 16.7**
  - 95% Confidence Interval: 3.7 – 75.8
  - **p = .0003**

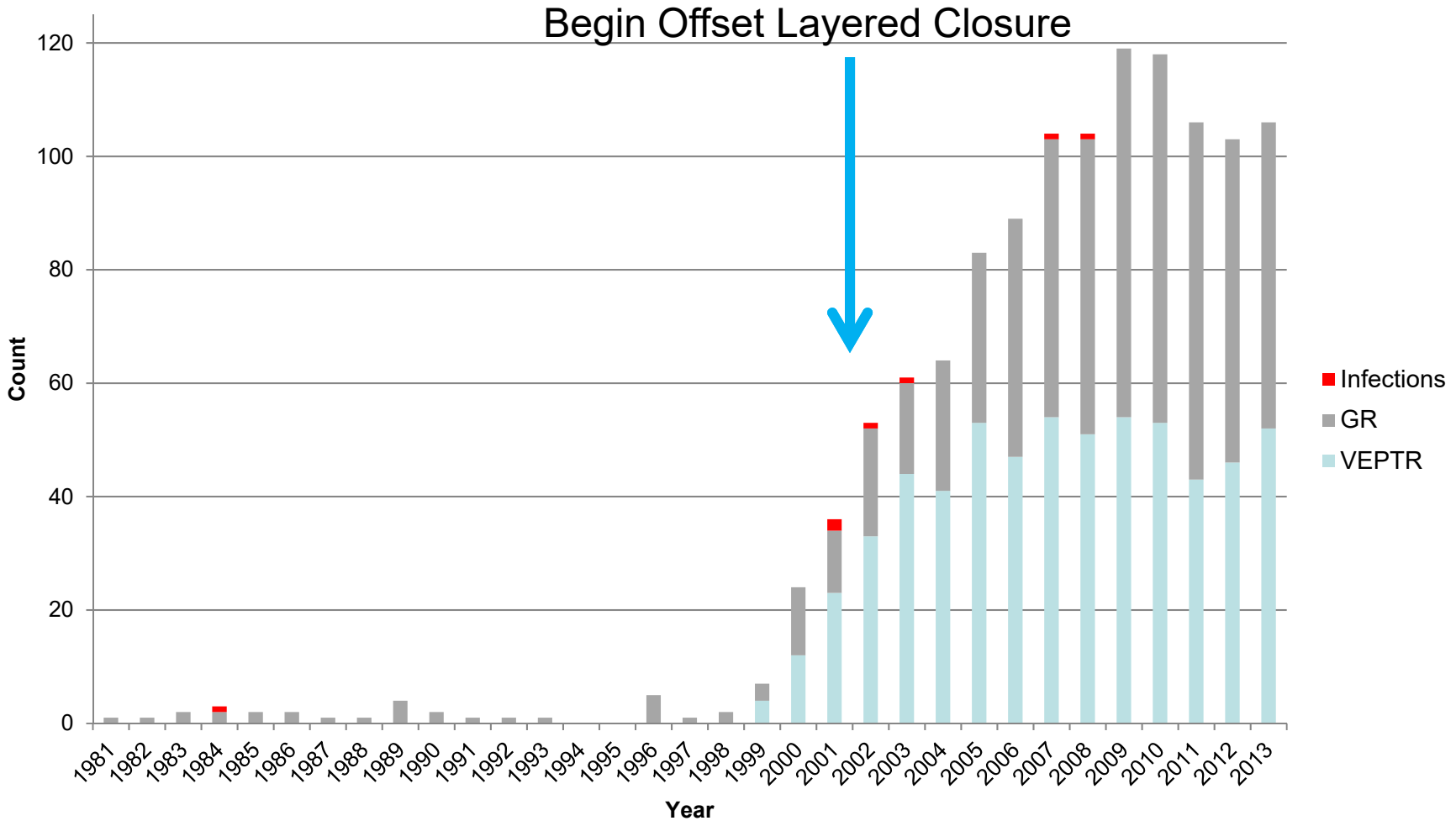
Discussion:

- **Some precedent for effect of layered closure:**
  - Feldman 2014
    - Multilayered closure technique found to lowered wound complication rate of non-idiopathic spine fusion incisions
  - Levi 2013
    - Layered soft tissue closure lowered wound complications in tethered cord repair

Limitations:

- **Single Institution**
- **Single Surgeon**
  - ?Implications?
- **Pre 2002 vs Post 2002**
  - Early series
    - Much smaller
    - Includes single rods
    - Includes subcutaneous rods
- ***How much is just learning curve?***

Surgeries & Infections 1981-2013



Conclusions?

- **Offset layered incision/closure and attention to soft tissue may help decrease EOS wound infections**

- **2002 – present infection rate is 0.26% in EOS surgery > 1000 procedures**
  - *Encouraging data* compared to reported rates of infection.

Thanks to Ali Gryzwna