Prevalence of Intra-operative Tissue Bacterial Contamination in Posterior Pediatric Spinal Deformity Surgery

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BACKGROUND

• Surgery to correct pediatric spinal deformity has risks for early or late surgical site infection.

•Prevalence of deep surgical site infection varies from 1-14%, depending on the severity of spinal deformity and type of patient.[1]

•The most common bacterial causes of infection are normal skin flora such as *Propionibacterium acnes, Staphylococcus epidermidis, as well as Staphylococcus aureus.*[2, 3]

•However, little is known about intra-operative contamination of the surgical site and its role in postoperative deep surgical site infection.

•In this study we sought to determine if children with neuromuscular scoliosis with fusion to the pelvis, and thus longer duration of surgery, have higher intra-operative culture positive rates than children receiving surgery for adolescent idiopathic scoliosis (AIS).

Complications in 4369 Posterior Instrumentations and Fusions for AIS

Complication Type	No.	Incidence
Wound infection	59	1.35%
Other	59	1.35%
Pulmonary (not pulmonary embolus)	42	0.96%
Implant related	28	0.64%
Neurologic	14	0.32%
Dural tear	8	0.18%
Nonfatal hematologic	6	0.14%
Deep venous thrombosis	2	0.05%
Pulmonary embolus	1	0.02%
Blood loss (fatal)	1	0.02%
Air embolus (fatal)	1	0.02%

2006 SRS Morbidity and Mortality Report

METHODS

•Patients who underwent posterior spinal deformity surgery between January 2009 and December 2010 and had a pre-closure tissue culture as part of their standard treatment were selected for this study.

•Two patient groups were created; those with positive and those with negative tissue cultures.

•After surgical implants were placed, the paraspinal muscle tissue had surface damage due to compression by the self retaining retractors.

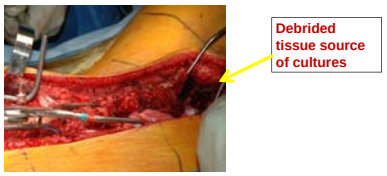
•This tissue was routinely debrided before the final irrigation and incision closure sent to the microbiology laboratory for aerobic and anaerobic culture.

•Back acne was also evaluated since patients with back acne may be at high risk for *P. acnes* contamination.

•Photographs of each patient received an acne severity grading, blinded to the results of the patient's bacteria cultures.

•The prevalence of *P. acnes*, which has a documented role in deep surgical site infections in spine surgery, was correlated with the presence of back acne.

Source of Culture Sample

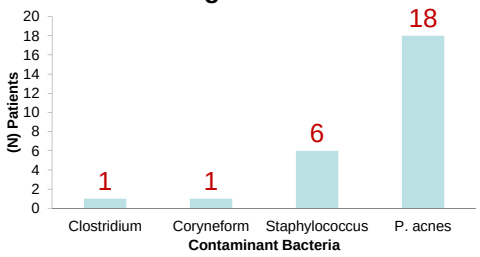


RESULTS

•**Total:** 114

- **Culture Positive:** 26 (23%)
- **Culture Negative:** 88 (77%)
- **Infections**: 3(2.6%)

Bacteria Isolated From Surgical Site



• *P acnes* was seen only in children 11 years or older (p=0.02) and only with back acne (p <.0001).

• 8/19 (42%) patients with pelvic fusion had positive cultures (p=.04) and all 8 were neuromuscular patients.

•Duration of surgery greater than 6 hours is common in cases with pelvic involvement and is a significant risk factor (p <.02)

•81% of culture positive patients were older than 11 years of age (p= .01).

•3/114 (2.7%) patients developed an early deep SSI, all with positive cultures (p=.01).

CONCLUSIONS

•Neuromuscular patients fused to the pelvis, children older than 11 years, and surgery duration greater than 6 hours was associated with positive cultures.

•Back acne is may be a preventable risk factor for *P acnes* seeding.

•Intra-operative bacterial contamination indicates a need to consider the type of surgery and patient age to determine prophylactic antibiotics and other modalities to prevent infection.

•Proposals that have been implemented as a result of this study

- Consult with dermatology to treat back acne
- Preoperative shower with antibicrobial wash
- Strict timing of prophylactic antibiotics
- 3M™ Ioban™ 2 Antimicrobial Incise Drape with Mastisol® adhesive
- Pulse lavage
- Antibiotics tethered to bone graft

References

1. Master DL, Connie PK, Jochen SH, et al. Wound Infections After Surgery for Neuromuscular Scoliosis: Risk Factors and Treatment Outcomes. *Spine* 2011; 36: 179-85.
2. Richards BR, Emara KM. Delayed Infections After Posterior TSRH Spinal Instrumentation for Idiopathic Scoliosis. *Spine* 2001; 26: 1990-96.
3. Rihn JA, Lee JY, Ward WT. Infection After the Surgical Treatment of Adolescent Idiopathic Scoliosis. *Spine* 2008; 33: 289-94.
4. Muschik M, Luck W, Schlenzka D. Implant Removal for Late- developing Infection after Instrumented Posterior Spinal Fusion for Scoliosis: Reinstrumentation Reduces Loss of Correction. A Retrospective Analysis of 45 Cases. *Eur Spine J* 2004; 13: 645-51.
5. Ho C, Skaggs DL, Weiss JM, et al. Management of Infection After Instrumented Posterior Spine Fusion in Pediatric Scoliosis. *Spine* 2007; 32: 2739-844.
6. Hill MJ, Marsh PD. Human Microbial Ecology. Boca Raton, FL: CRC, 1990.
7. Shiono Y, Watanabe K, Hosogane N, et al. Sterility of Posterior Elements of the Spine in Posterior Correction. *Spine* 2011; Epub ahead of print.
8. Coe, JD, Arlet J, Donaldson W, et al. Complications in Spinal Fusion for Adolescent Idiopathic Scoliosis in the New Millennium. A Report of the Scoliosis Research Society Morbidity and Mortality Committee. *Spine* 2006; 31: 345-49.
9. Ho C, Sucato DJ, Richards BS. Risk Factors for the Development of Delayed Infections Following Posterior Spinal Fusion and Instrumentation in Adolescent Idiopathic Scoliosis Patients. *Spine* 2007; 32: 2272-77.
10. Clark CE., Shufflebarger HL. Late-Developing Infection in Instrumented Idiopathic Scoliosis. *Spine* 1999; 24: 1909-912