

Improved diagnosis with Sonication Fluid Culture in Spinal Implant Infection (SII)

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Background

Spinal Implant Infection (SII) is challenging to diagnose due to often subtle clinical presentation and limitations of conventional methods. Sonication fluid culture (SFC) of spinal implants may be a valuable adjunct tool to diagnose SII. We aimed to assess the added diagnostic value of SFC for SII diagnosis.

Methods

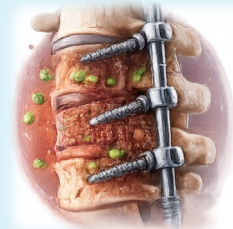
We analyzed patients who underwent spinal implant removal between 2013 and 2021. Patients were classified using consensus criteria as having confirmed SII or probable SII. Cases who did not meet these criteria were classified as aseptic. We differentiated early-onset (symptom onset ≤ 90 days) from late-onset SII (> 90 days). The added diagnostic value of SFC was defined on how frequently SFC altered the diagnostic classification and its possible impact on SII management.

Results

- SFC was essential in 6 confirmed SII (**23%**) to confirm diagnosis.
- 4 cases received non-prophylactic antibiotics preoperatively. 2/4 needed SFC to confirm SII due to inconclusive tissue cultures.
- The most common identified microorganisms by SFC were *Staphylococcus aureus*, *Coagulase-negative Staphylococci (CoNS)*, and *Cutibacterium acnes*. Discordance between SFC and tissue cultures was mainly observed in the identification of *CoNS* (tissue culture: 1, SFC: 10).
- SFC identified additional pathogens in 6 confirmed SII that were not identified by tissue culture. This included low-virulent microorganisms in 5/6 cases and virulent microorganisms in 3/6 cases.
- Tissue culture detected multiple pathogens in 6/26 cases (**23%**), and SFC in 13/26 confirmed SIIs (**50%**)
- SFC was negative in 3 confirmed SII cases (**8%**)
- In aseptic cases, SFC was frequently positive (**12/29, 41%**), but this did not impact clinical management.

Conclusion

SFC plays a significant role in SII diagnosis by enhancing pathogen detection. In every SII patient, three to five deep tissue cultures should be obtained. We recommend that in any revision spine surgery, including Debridement, Antibiotics and Implant Retention (DAIR) SFC should be performed, for instance by sending a set-screw for SFC. The additional value of SFC in spinal DAIR and aseptic cases must be further evaluated.



Population

57 patients; (mean age (SD) 34 (21) years; 53% female. In many SII cases, sonication could not be performed because the implant material was not exchanged; sending a set-screw for SFC is not yet standard care. Patients without tissue culture were excluded.

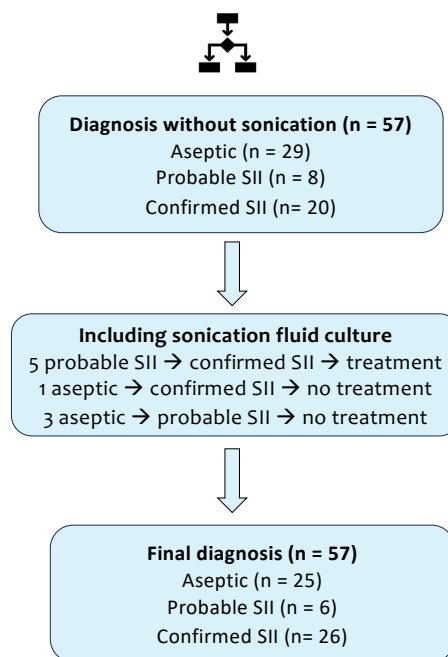


Figure 1. Flowchart SII diagnosis ▲