

Open Wounds with Exposed Hardware

Open wounds with exposed hardware are a challenging problem with several potential complications, such as exposed fracture line, fracture instability and bacterial contamination. Once hardware is exposed the term “infected hardware” is often used to describe it. This is an inappropriate term as hardware cannot be infected. Rather, it becomes coated with bacteria, leading to biofilm formation and a secondary infection of the underlying bone (osteomyelitis). *Staphylococcus aureus/epidermidis* followed by Methicillin-resistant *Staphylococcus aureus (MRSA)* are the most common infecting bacteria of orthopedic implants and accounts for approximately 70% of exposed hardware infections. These microorganism adhere to the implant surface and produce an extracellular matrix that protects the bacteria from antibiotics as well as from any host immune response. As a result, retained hardware that has been exposed to bacteria may become a nidus for persistent infection if it is not treated or removed.

Traditional methods to managing exposed hardware include irrigation, excisional debridements, antibiotics, negative pressure wound therapy with instillation, and the removal of hardware if warranted. More advanced treatments usually consist of substitution of internal hardware with external fixation devices and excisional debridement with complex soft tissue surgical reconstruction.

Biofilm formation on exposed hardware is increasingly recognized as a serious healthcare problem. Infected wounds with exposed orthopedic hardware usually involves underlying osteomyelitis. The screws or joint stems used to attach this hardware are connected to bone creating a direct pathway for microorganism deep into the bone.

Once orthopedic hardware is exposed and a biofilm starts to form the human body begins to recognize the implant as a foreign body. Since orthopedic hardware is devoid of microcirculation which is crucial for host defense and delivery of antibiotics it allows bacteria to exist within a biofilm and resist against external agents, such as antimicrobial agents and host immune system. Early intervention for wounds with exposed hardware initially starts with an excisional debridement to remove dead tissue and bioburden. Antibiotic therapy is started concurrently to eradicate bacteria. Unfortunately, neither of these treatments individually effectively addresses the biofilm issue; even more unfortunately, the combination does not address the issue either. In dehisced wounds that have hardware still covered with tissue, excisional debridements must be performed with caution so as to not expose the underlying hardware. Excisional debridements increase the chance for exposure of hardware. End result: exposed hardware is nothing more than a biofilm associated infection in a wound that more than likely needs a debridement.

New biofilm-disrupting technology allows for the eradicate of biofilms and infections in these difficult wounds. Thus, allowing these wounds to be driven to closure without removal of the hardware.

References

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