Infectious Pin Complication Rates in Halo Vest Fixators Utilizing Ceramic vs Metallic Pins

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Introduction: The Halo/Vest Fixator remains a useful modality of treatment for Cervical Spine trauma, but has been described as having a high incidence of complications, foremost pin-related complications. Ceramic pins have been introduced under the premise of lowering MRI intolerance due to material overheating and decreased pin-tract infections compared to metallic pins. We have sought to compare patients treated with ceramic (C) versus metallic (M) Halo pins by retrospective review of our patient records and our prospectively collected trauma registry for pin-related complications, including infections and aseptic loosening.

Material and Methods: This is a retrospective review using prospectively collected patient data of our spine trauma registry covering ten years comparing a historic control group (metallic Halo pins) with patients that were treated with ceramic pins, which were exclusively used over 14 months. Inclusion criteria were subjects with traumatic cervical spine injuries treated with a Halo for a period of at least 14 days.

Results: Thirty-four subjects were available for analysis in the ceramic pin group versus 263 in the metallic pin group. Overall pin complications amounted to 41.2% ceramic (C) versus 23% metal (M) pins, aseptic loosening rates 20.6% (C) compared to 8.3%(M), and pin site infections 20.6% (C) compared to 14.7%(M). A grading system for Halo pin tract infections was developed and will be presented. In all aspects of assessment ceramic pins seemed to be associated with a higher incidence of adverse events or complications compared to metal pins.

Conclusions: Despite the imbalance of size of our cohort groups there appears to be a strong trend towards the newer technology not meeting expected minimum performance standards set by the previous materials. Causes for the higher failure rate likely lay in the necessary changes made to the pin design due its inherent limitations, with ceramic pins having to feature a conical tip as opposed to the needle point tip of a stainless steel or titanium pin, which can find anchor in the cranium. Our results have prompted us to reevaluate our implementation strategy for this new technology and have lead us to return to metal pins for patients with no anticipated need for repeat neuroimaging during their treatment period.

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