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Performance of Retrieved Kuntscher Intramedullary Rods: Improved Corrosion Resistance with Contemporary Material Design

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ABSTRACT

Eighteen Kuntscher-type intramedullary rods were obtained after human implantation periods ranging from 1 to 23 years. A clinical evaluation, metallurgical and chemical analyses of each implant were performed. Idiopathic, implant-related pain was the most common reason for removal, but was not related to extent of implant corrosion. When classified as early versus contemporary material compositions, a significant increase in surface corrosion, inclusion content and carbon content were demonstrated in rods made of the earlier composition of stainless steel. Intergranular corrosion was associated with structural design, rather than material microcleanliness or composition. While contemporary intramedullary fracture fixation provides excellent clinical results, the present investigation suggests that the performance of stainless steel implants may be improved through continued refinement of steel composition, careful consideration of structural design and fabrication techniques, and by routine removal of implants at the earliest opportunity.

INTRODUCTION

Numerous investigations of implants retrieved from human patients have provided a clear identification of the in-vivo corrosion behavior of 316L stainless steel.[1–7] Commonly occurring types of corrosion include pitting and fretting of the passive layer, crevice corrosion at screw–

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