

New research aims to measure serum metal ion levels in orthopedic oncology patients with endoprostheses

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Structure and function are reciprocally interrelated. Without a stable structure, optimal function is compromised. Drawing from this primary tenant in Osteopathic medicine, Nicholas Tedesco, DO and Taylor Harris, DO aim to identify trends in serum metal ion levels within a unique patient population.

Dr. Tedesco is the Assistant Program Director for the Samaritan Health Services Orthopedic Surgery Residency Program. The idea for this study was started during his fellowship training at Georgetown University in Orthopedic Oncology. Reconstruction of a limb is often required with an implant called a “massive endoprosthesis” after resection of an aggressive bone or soft tissue tumor. Technology in orthopedic implants is constantly evolving to improve our ability not only to salvage the limb after tumor resection, but also to provide durable constructs which maximize patients’ function and mobility by reproducing anatomic structure.

However, like many artificial implants, endoprostheses have potential for failure. Specifically, the modular junctions between components are at risk for corrosion and dissipation of metal ion debris, specifically cobalt and chromium, into local and systemic tissues. While the relationship between metal implants and this phenomenon known as “trunnionosis” has been well documented for total hip replacements, there is a deficiency in the literature regarding the effects of multiple metal junctions within a massive endoprosthesis implant on these serum metal ion levels.

Elevated serum cobalt and chromium levels from this corrosion have been associated with both local and systemic effects such as painful inflammatory pseudotumors, failure of the implant, cardiotoxicity, neurotoxicity, or

thyrotoxicity. Orthopedic oncology patients are especially vulnerable due to underlying comorbidities and the subsequent effects of chemotherapy and/or radiation.

This current study aims to address this knowledge gap by measuring serum ion levels in patients who have undergone reconstruction after tumor resection and identifying trends by time since implant placement, type of implant, or location of the implant. Assistance from local SHS programs such as the NCTN High Performing Site Initiative Grant and institutions like the American Osteopathic Academy of Orthopedics -OREO Grant have allowed for data collection to begin.

A third-year Orthopedic Surgery resident physician, Dr. Harris was initially drawn to the field because of the ability to improve patients’ quality of life through improvement of function and mobility. “This project really resonated with me because we can potentially identify trends in these ion levels which can be harmful to our current patients, and we can also provide feedback to implant manufacturers which can benefit our future patients,” said Dr. Harris.

While the population of patients who require these massive reconstructions may be small, the potential impact of the information gained is significant for the benefit of individual orthopedic oncology patients and for the continued improvement of technology to help future patients.



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