Paper #28

Higher Tissue Concentrations of Vancomycin with Low-Dose Intraosseous Regional vs. Intravenous Systemic Prophylaxis in Revision Total Knee Arthroplasty: A Randomized Trial

Notes

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Introduction: Prophylaxis with low-dose vancomycin via intraosseous regional administration (IORA) achieves tissue concentrations 6-10 times higher than systemic administration in primary TKA, and has been shown to provide more effective prophylaxis in an animal model. This study compared tissue concentrations of vancomycin administered intravenously (IV) versus IORA in revision TKA. We also investigated if the presence of a tibial implant compromised IORA injection, and whether tourniquet deflation during surgery would lower tissue concentrations.

Methods: Twenty patients undergoing aseptic revision TKA were randomized to two groups. The IV group received 1g of systemic IV prophylactic vancomycin. The IORA Group received 500mg vancomycin as a bolus injection into a tibial intraosseous cannula, below an inflated thigh tourniquet before skin incision. During the procedure subcutaneous fat and bone samples were taken at regular intervals. Tissue vancomycin concentrations were measured using high performance liquid chromatography (HPLC).

Results: In all IORA patients, intraosseous tibial injection was unaffected by the tibial implant. Mean procedure length was 3.5 hours in both groups. Mean initial tourniquet inflation was 1.5 hours, with a second inflation for mean 35 minutes during cementation. Overall mean tissue concentration of vancomycin in fat samples was 4.1ug/L in the IV group versus 115ug/L in the IORA group (p<0.001); tissue concentrations in femoral bone were 7.2ug/L in the IV group vs 101ug/L in the IORA group. Vancomycin concentrations in the final subcutaneous fat sample taken before closure remained 5.3 times higher in the IORA versus IV Group (p<0.001). The intra-articular concentration of vancomycin on post-operative day 1 drain samples was similar between the two groups (mean 4.6ug/L IV group vs 6.6ug/L IORA, p=0.08)

Conclusions: IORA administration of vancomycin is effective in revision TKA, resulting in tissue concentrations of vancomycin 10-20 times higher than systemic IV administration despite the lower dose. High tissue concentrations were maintained throughout the procedure, despite a period of tourniquet deflation. IORA may be more clinically important in revision TKA, where the risk of infection is higher.