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CORR Insights®: The John N. Insall Award: Higher Tissue Concentrations of Vancomycin Achieved With Intraosseous Regional Prophylaxis in Revision TKA: A Randomized Controlled Trial

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Where Are We Now?

Prosthetic joint infection (PJI) prevention in arthroplasty has focused on patient selection, medical optimization, and the selection and administration of parenteral antibiotics. Other approaches to avoid PJI are seeing more-common use, including antibiotic loaded bone cement (ALBC) [9], vancomycin powder [7], or other beaded delivery mechanisms [6]. However, these approaches have come under scrutiny because of concerns like antibiotic resistance and toxicity following prolonged exposures [1].

In their current study, Young and colleagues propose using intraosseous regional administration (IORA) to increase antibiotic levels at the site of surgery. Their proposed method of delivery would provide lower doses in a more rapid fashion to decrease the risk of toxicity while still seeking to maintain adequate tissue perfusion. The authors look at maximizing the local concentration of antibiotics while limiting exposure, toxicity, and duration of use after surgery. They also evaluate the use of this technique in revision knee arthroplasty, which is important because further prospective clinical studies will likely be carried out in this population, given their increased risk for postoperative infections. Bringing IORA into the clinical setting will be a challenge since the technique is one that many of us soon forgot after our days of Advance Trauma Life Support training. Local administration of antibiotics through a foot vein has been explored, but getting to the vein would require adjustments to draping since access to the foot intraoperatively after the elevation of the tourniquet would be necessary [4].

For years, the value of ALBC has been debated. Do the purported benefits justify the significant cost increases? Perhaps the utilization of IORA can provide the regional administration of antibiotics without the inflated cost of ALBC [2, 3, 9]. Techniques like IORA provide an alternative that may meet the challenges of both groups, while also providing the clinical benefits to the patients in need of adequate prophylaxis.

Where Do We Need To Go?

Minimizing the risk of infection after primary and revision arthroplasty is important given the increasing demand for arthroplasty surgery [8]. However, we must also be mindful about how we use antibiotics given the risks of antibiotic resistance and the increase in more-resistant organisms as primary pathogens in PJI [1]. Parenteral antibiotics have been a mainstay of practice since the 1970s; to cause a major shift from this to IORA, more-compelling evidence will be needed. Although we

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have seen recommendations to discontinue the use of prophylactic antibiotics once the surgical incision is closed regardless of drain presence [1], a switch to IORA is more likely to occur now due to the increased calls for improved antibiotic management and postoperative administration practices [5]. Future studies will need to provide evidence of comparable tissue concentrations after surgery, decreased systemic toxicity, and the ease of administration before using IORA in the clinical setting. There are also complication concerns, specifically improper administration of fluid causing extravasation, which could lead to compartment syndrome. Other complications such as fracture, hematoma, or pain are less significant, but are likely to occur more frequently.

How Do We Get There?

Although the current study was robust, replication of research is important; we first need to ensure that the findings generalize well to other settings by repeating this study in other centers. Next, researchers should evaluate IORA in patients with renal insufficiency and evaluate the safety in these patient populations. Because infection is so uncommon after primary TKA, enormous studies would be needed, and this seems impractical; it seems to me that evaluating IORA in revision TKA patients is a more-promising approach, given that their risk of infection after surgery is so much greater. A comparison of IORA versus ALBC, vancomycin powder, and antibiotic bead delivery mechanisms would be of interest to many surgeons.

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