

Prophylaxis and Treatment of Infection in Complex Extremity Reconstruction Using Antibiotic Loaded Ceramic Coated Interlocking Intramedullary Nails

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What was the question?

PMMA antibiotic-coated interlocking intramedullary nails (ACC-IMN) used for long bone osteomyelitis is well supported in the literature. Despite good clinical success, many clinical shortcomings of this technique remain. Synthetic calcium sulfate has emerged as a promising antibiotic carrier that is not as technically demanding to use in combination with a locked intramedullary nail. The primary aim of this study is to report on our recent experience with antibiotic calcium sulfate coated interlocking intramedullary nails (ACS-IMN) to eradicate infection as well as to prevent infection in high risk patients. The secondary aim is to compare the results of our cohort where ACS-IMN were used with curative intent with a prior cohort of patients treated with ACC-IMN.

How did you answer the question?

We retrospectively reviewed the medical records and radiographs of our patients treated from January 2010 to August 2017 who underwent a limb salvage procedure for infection cure (union or fusion) with ACC-IMN and patients treated from May 2017 to June 2020 with the use of ACS-IMN for infection prophylaxis or infection cure. We reviewed patient demographics, including host-type, pre-operative infecting organism, intra-operative cultures, as well as our main outcomes: infection control rate, achievement of union/fusion, limb salvage rate and overall complication rate.

What are the results?

Thirty three patients were treated with ACS-IMN. Mean patient age was 50 years (range 22–74 years). Mean follow-up period was 18.7 months (range 5.29–48.9 months). 12 patients (36.4%) were Cierny-Mader Host type A versus 21 patients (63.5%) type B hosts. ACS-IMN was used in 9 patients (27.3%) with goal of infection cure and in 24 patients (72.7%) for infection prophylaxis. In the infection prophylaxis group, the indication for ACS-IMN use was either a history of recent infection at the operative site in 14 patients (58.3%), presumed infected non-union in 9 patients (37.5%) and immunocompromised host infection prophylaxis in 1 patient (4.2%). In the 24 patients ACS-IMN was used as infection prophylaxis, there was a 100% (24/24 patients) prevention of infection rate, 90.9% union rate (20/22 patients) and 100% (24/24 patients) limb salvage rate. Nine patients were treated with ACS-IMN to eradicate infection and were compared to a cohort of twenty-eight patients treated with ACC-IMN. In the ACS-IMN group, 6/9 patients (66.7%) were type B hosts versus 19/28 patients (67.9%) in the ACC-IMN group ($p=1$). The infection was eradicated in 7/9 patients (77.8%) in the ACS-IMN group versus 21/26 patients (80%) in the ACC-IMN group ($p=0.44$). Bone union/fusion was achieved in 8/9 patients (88.9%) in the ACS-IMN group versus 21/24 patients (87.5%) in the ACC-IMN group ($p=0.11$). The limb salvage rate in the ACS-IMN group was 100% (9/9 patients) versus 89% (25/28 patients) in the ACC-IMN group.

What are your conclusions?

ACS-IMN is a safe technique for long bone infection prophylaxis or cure in the context of a complex lower extremity reconstruction. Although, this is our preliminary data, it appears that ACS-IMN results are promising and could be comparable to ACC-IMN for treatment of long bone osteomyelitis. Future studies with a larger cohort of patients are required to confirm these expectations.