

## Free Papers B

### [O20] LOW-GRADE-INFECTION IN THE PATHOGENESIS OF PRIMARILY ASEPTICALLY CLASSIFIED NONUNION OF THE LOWER EXTREMITY – BASED ON TIBIAL-SHAFT-NONUNION

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**Aim:** The pathogenesis of nonunion is multifactorial. Pathobiological factors, mechanical factors, and low-grade-infection contribute to impaired bone healing. Aim of this study was to determine the rate of low-grade-infection in patients with long bone nonunion of the lower extremity without signs of acute infection, the influence of CRP (C-reactive protein), and the outcome.

**Method:** In a retrospective study (2003-2013), all patients who underwent surgery for treatment of tibial- or femoral-shaft-nonunion without any clinical evidence of infection were assessed. Bacterial cultures harvested during nonunion revision, the CRP and WBC (white blood cells) values at hospital admission, the outcome, and epidemiological data were analyzed.

**Results:** In 88 patients with tibial-shaft-nonunion without any clinical signs of infection, bacterial samples remained negative in 51 patients (46 yr; 33% open fracture; 33% nicotine abuse; 8% diabetes mellitus; revision of nonunion 10.9 months following primary osteosynthesis). In 37 patients (46 yr; 54% open fracture; 42% nicotine abuse; 11% diabetes mellitus; revision of nonunion 15.2 months) microbiological diagnostic studies after long-term-culturing demonstrated positive bacterial cultures whereas after short-term-culturing for 2 days only 17 positive cultures were observed. Among patients with negative bacterial cultures bone healing was achieved after 13.2 months, whereas in 29% additional surgical interventions (1.3 procedures) were necessary. Nonunion with positive bacterial cultures required 22.9 months (p-value<0.01) until bone healing, and even 57% of these patients required additional operations (2.9 procedures; p-value<0,01). Hematological studies performed at hospital admission demonstrated no significant difference regarding CRP (negative vs. positive culture: 0.8 mg/dl vs. 1.9 mg/dl) and WBC (negative vs. positive culture: 7.6/nl vs. 7.8/nl). Comparable results were observed in 86 patients with femoral-shaft-nonunion (38 patients with positive bacterial cultures after long-term-culturing and 18 patients after short-term-culturing) with an increased number of required operations (0.8 vs. 1.6 procedures; p-value<0.05) and a longer time period until bone healing (18.2 months vs. 27.2 months; p-value<0.05) in the group with positive bacterial cultures. In contrast to tibial-shaft-nonunion, a significant difference of the CRP level was observed (negative vs. positive culture: 0.8 mg/dl vs. 2.7 mg/dl; p-value<0.01).

**Conclusions:** The pathogenesis of nonunion may originate from low-grade-infection even in patients without any signs of infection and may result in increased number of required surgical interventions. Therefore, during any nonunion revision surgery, multiple bacterial samples should be harvested for long-term-culturing. Possibly, increased CRP levels may be a predictor for low-grade-infection in femoral - but not in tibial-shaft-nonunion.