#1464 - Clinical Study / Free Papers

Comparison Of The Clinical Effectiveness Of Bone Morphogenic Protein (BMP) -2 And -7 In The Adjunct Treatment Of Lower Limb Non-Unions: A Matched Pair Analysis

Trauma / Knee & Lower Leg Trauma / Surgical Treatment

Patrick Haubruck, Wasilios Vlachopoulos, Saskia Hagelskamp, Matthias Miska, Julian Ober, Christian Fischer, Gerhard Schmidmaier, Michael Tanner

Center for Orthopedics, Trauma Surgery and Spinal Cord Injury, Trauma and Reconstructive Surgery, Heidelberg, Germany

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Background
Fracture healing is a complex physiological process that is influenced by biological and biomechanical factors 1. Reasons for failed fracture healing are varied and successful treatment of non-unions remains a considerable challenge for trauma surgeons, despite modern treatment options 2. Clinical studies have shown better outcome for consolidation if autologous bone grafting was combined with adjunct local application of bone morphogenic proteins (BMPs) 3-6. Despite substantial evidence demonstrating the effectiveness of both rhBMP-2 and -7, data comparing the clinical effectiveness of adjunct rhBMP-2 and -7 in the treatment of non-unions remains scarce.
Objectives
In the current study, we sought to compare the clinical effectiveness of both available BMPs in the applied non-union therapy of the lower limb regarding osseous consolidation and clinical outcome.
Study Design & Methods
The current study was designed as a retrospective clinical database study and was performed in concordance with the Declaration of Helsinki and the ethical committee of the University of Heidelberg. All medical records, lab data and radiological imaging of patients that received surgical treatment of non-unions between 01/01/2010 and 31/12/2016 were reviewed. Adult patients suffering from a non-union of the lower limb who underwent surgical treatment and participated in our standardized 12 month follow-up were included. Patients receiving application of BMP-2 were matched with patients that received BMP-7 and both clinical and radiological signs of consolidation were analyzed.
Results
Between 01/01/2010 and 31/12/2016 366 patients were treated with adjunct application of BMPs in our institution. Based on the exclusion criteria 181 patients had to be excluded from the current study resulting in 185 suitable patients (48 patients were treated with BMP-2 and 137 patients treated with BMP-7). Out of these 38 matching patients were assigned to each group based on the 6 matching criteria. Patients treated with adjunct application of BMP-2 showed a significantly higher radiological consolidation rate of 89% compared to 55% in patients that received additional treatment with BMP-7 ($p = 0.002$). Binary logistic regression modelling revealed a positive correlation for BMP-2 and consolidation of the non-union ($b = 2.507$ and $p = 0.001$) as well as a negative correlation for the use of intramedullary nailing with radiological consolidation regardless of the BMP used ($b = -$

1.457 and p = 0.047). Utilization of BMP-2 had no significant influence on persisting pain associated with weight bearing. However, radiological consolidation resulted in significantly lower postoperative pain associated with weight bearing (p = 0.014).

Conclusions

Despite the substantial evidence that demonstrates the effectiveness of both rhBMP-2 and -7, evidence directly comparing the clinical effectiveness of adjunct rhBMP-2 and -7 in the treatment of non-unions remains scarce. The data of the current study indicates that treatment of atrophic non-unions of the lower extremity with rhBMP-2 might be advantageous compared to the treatment with rhBMP-7. Furthermore, higher consolidation in patients treated with rhBMP-2 leads to significantly lower postoperative pain associated with weight bearing, increased mobility and higher patients satisfaction.