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J Orthop Trauma Surg Rel Res 2018, Volume 13

10th International Conference on

Orthopedics, Trauma and Rheumatology

March 08-09, 2018 London, UK

Regeneration of severe femoral bone defects due to hip revision surgery

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Introduction & Aim: Revision after hip joint replacement failures can be associated with high grade bone defects. Especially after one and more changing procedures patients suffer from the loss of periprosthetic bone substance which is essential for the fixation of the next hip implant. Reliable primary implant stabilization and a successful regeneration of the femoral bone for secondary implant fixation is the aim of our operative strategy. New cement less, modular hip revision stem with proximal plasma spray coating and an additional dicalcium phosphate surface layer was studied with this technique and compared with our previous results with a non-modular long hip stem.

Materials & Method: In high grade femoral bone defects (Paprosky 3-4) the treatment principle is based on a transfemoral approach and high primary stability by press fit fixation of a long revision stem. The proximal bone shell remains in contact with the surrounding tissue to support the healing mechanism of the fractured and osteotomized femur. Distal interlocking with one or two screws is routinely used for a reliable implant fixation. After proximal bone regeneration (acc.to WAGNER) and bone remodeling the distal interlocking bolts are removed to switch the load introduction from the distal to the proximal part of the femur. The clinical and radiological outcome of this procedure is analyzed in a prospective study within 40 patients (evidence EAST Level II) using the above mentioned new implant device. The results are compared with a previous study group treated in equal method using a non-modular hip revision stem.

Result: After 3.3 years, all 40 patients were available for follow-up. Femoral bone defects grade-3a occurs in 45%, grade-3b in 35% and grade-4 in 15% classification. The middle age at time of surgery was 73 years, 35% had more than one revision interventions and 15% has three and more. Two cases had to be re-revised. All the others showed successful femoral bone remodeling. In 86% of these cases, the distal interlocking could be removed. Screw removal was done at an average time of 14 months. The majority results were comparable with the previous used implant device. The axial stem subsidence of the femoral implant after interlocking bolt removal was at an average value of 3.5 mm which was found in the comparison group at 5.0 mm.

Conclusion: The early results of this study demonstrate femoral bone remodeling, which seems to be more influenced by the fracture healing mechanism of the transfemoral approach and the reliable distal implant fixation, which is used temporary. Any connection between the femoral bone remodeling and the coating surface from point of view mono block or modular device could not be found. However, the improved stem subsidence might be influenced by a better implant fitting due to modularity options.

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