

Hemi arthroplasty for 4 part fracture: how to do better with a dedicated stem and technique: anatomical and preliminary clinical prospective multicentre study

L. Obert, F. Loisel, A. Adam, E. Jardin, J. Uhring, S. Rochet, P Garbuio

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Orthopaedic and Traumatology Unit, Inserm Chu, Besançon, France
laurentobert@yahoo.fr

Abstract

Introduction: Tuberosity healing is strongly correlated with functional results in all series of three- and four-part fractures of the proximal humerus treated by hemiarthroplasty. We formed a working group to improve position of the implant and fixation of the tuberosities on an implant specifically intended for traumatology.

Material and Methods: An anatomic study on 11 cadavers and a prospective multicentre clinical study of 32 cases were performed to validate extrapolable original solutions at the patient scale: placement of the stem at a height indicated in relation to the insertion of the clavicular bundle of the pectoralis major, locking of the stem, placement (based on bone quality) of a variable volume metaphyseal frame (offset modular system® OMS®), avoiding medialisation of the tuberosities, and fixation of the tuberosities using strong looped sutures, brightly coloured so that they can be located more easily. Evaluation by Dash score and Constant score was correlated with positioning of the tuberosities using radiographs.

Results: The clinical study enabled a distance of the top of the head to pectoralis major of 5.5 cm +/- 5 mm to be determined, confirming the results of the anatomic study and data from the literature. The distal double-locking ancillary device and the suturing technique for the tuberosities using looped sutures was judged to be effective by all of the surgeons. 23 patients (5 males, 9 CT4 and 8 CT3) with an mean age 69,6 (33–90) were operated on by 3 senior surgeons and reviewed at a mean follow-up of 17,3 months (6–24). All patients were seen again at 3 months

and 6 months and the average motion at last follow was abduction of 90,7° (140–40), active anterior elevation of 113,25° (160–60), and external rotation of 43,2°(55–30). One complication was noted: inadequate position of a locking screw. In the 17 patients operated without oms® 50% had adequate initial positioning of the tuberosities and 10% secondary displacement. In comparison the 6 patients operated with the oms® 100% had adequate initial positioning of the tuberosities and no secondary displacement occurred.

Discussion: The series from Sofcot, Boileau, and more recently Reuther yielded results of 40 to 66% malposition or nonunion of the tuberosities. The initial clinical results from our series are encouraging and demonstrate that using a variable volume metaphyseal frame in synthesis of the tuberosities with control of the height of the implant is reliable. This multicentre study should be extended by a more long-term analysis.

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