

Results of a series of modular locked-stem humeral prostheses in proximal humeral fractures. Experimental Cadaver study and preliminary clinical multicenter study

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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 multicentric 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 radiographic examinations

Results : The clinical study enabled the distance from the top of the head to the tendon of 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) have been operated by 3 senior surgeons and reviewed with a mean FU 17,3 months (6-24). All patients were seen again at 3 months and 6 months and the average revealed at highest follow up an abduction of 90,7° (140-40), an active anterior elevation of 113,25° (160-60), an ER1 of 43,2°(55-30). One complication was noted : inadequate position of a locking screw. In the 17 patients operated without oms® : 50% adequate initial positioning of the tuberosities and 10% secondary displacement. In the 6 patients operated with the oms® : 100% adequate initial positioning of the tuberosities and no secondary displacement.

Discussion : The series from Sofcot, Boileau, and more recently Reuther yielded results of 40 to 66% malposition or non union 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. A multicentric study is ongoing to obtain a more long-term analysis.