

## **Reverse Total Shoulder Arthroplasty in Proximal Humerus Fractures**

The incidence of proximal humerus fractures rapidly increases with age. They represent more than one third of all fractures occurring in patients with an age older than 60 and have the highest incidence in patients older than 80 years. The majority of these fractures (approximately 85%) in the elderly is stable and therefore can be well treated conservatively. In contrast, senior patients with osteoporotic bone stock that suffer from an unstable and/ or displaced, especially 3- or 4-part, fracture may benefit from a satisfactory surgical handling. This is in particular, since patients will experience a significance loss of shoulder function as well as pain due to the fracture. But there is no general consensus regarding the operative treatment.

A variety of surgical options exist to treat proximal humerus fractures, i.e. closed reduction and percutaneous pin fixation, open reduction and internal fixation (ORIF), hemiarthroplasty, and total arthroplasty. In principal, hemiarthroplasty can release pain but in many cases results in significantly compromised shoulder function and range of motion. This is mostly due to non- or malunion of the greater tuberosity. Additionally, ORIF may be associated with a high number of complications as well, e.g. osteonecrosis with head collapse, posttraumatic degenerative joint-disease, or non-union. Therefore, the key in the surgical treatment should take into account the osteoporotic bone and confirm a probable and quick recovery to bring patients back to their activities of daily life. Moreover, this should be reached independent of the ability of a postoperative rehabilitation. Therefore, reverse shoulder arthroplasty (RSA) has been proposed an alternative in the treatment of these acute and complex fractures.

Especially, among shoulder surgeons in the US more than half of shoulder arthroplasties performed for proximal humerus fractures have been reverse shoulder arthroplasties. Several meta-analyses suggest that especially regarding the clinical outcome as well as active forward elevation and external rotation RSA achieves good clinical results. Nevertheless, tuberosity healing still remains an important issue and clinical outcomes may depend on anatomic fixation as well. RSA can be used as primary line treatment as well as after failed ORIF. In these cases, there seem to be slightly more complications than primary RSA but the results remain comparable in the short-term follow-up. Moreover, there is no difference, when RSA is used as an acute or delayed treatment option.

Regarding the mid-term clinical and radiological results, RSA is a reliable treatment option in the management of displaced and osteoporotic fractures in the elderly. Satisfied forward elevation and rotation can be expected with significant pain relief. Nevertheless, surgeons have to be aware to preserve the tuberosities wherever applicable to reach good clinical results.