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Assessment of bone mass density in the surgical indication. New tool

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The proximal humerus fracture represents 5 to 8% of all fractures and is twice as frequent in women as in men. These fractures occur mainly in patients with bone fragility. They are among the most frequent along with hip and distal radius fractures in patients older than 65 years[1-4], thus presenting a multidisciplinary challenge. Since proximal humerus fractures have been considered fragility fractures, the role of general and local bone mineral density is increasingly gaining attention in the literature[5-8].

The influence of local bone mineral density on the functional outcome of the treatment of proximal humerus fractures is controversial. Classically, it has not been sufficiently addressed in the literature. However, the most recent studies show that osteoporosis can negatively affect surgical treatment and subsequent consolidation of fractures of the proximal humerus. That is why bone quality should be part of the preoperative evaluation[6,9].

Barnett and Nordin first reported the determination of cortical thickness as a predictor of skeletal mineralization in 1960[10]. Since then, measurements of the cortical thickness of the femoral shaft and metacarpals have been widely used to estimate osteoporotic changes in bone. However, cortical thickness of the distal humerus has been shown to be an even more reliable predictor for detecting generalized osteoporosis than that of femoral or metacarpal cortical osteoporosis[11].

The use of a simple measurement to determine the bone quality of the proximal humerus could help in making surgical decisions, allowing the indication of the most appropriate technique. For example, it may be possible to predict the safety of screw fixation in bone[11].

The Tingart measurement[11] is the most frequently used method to measure bone quality in AP x-rays of the shoulder. However, in patients presenting a proximal humerus fracture, the reference points required for the Tingart measurement are often involved in the fracture. In addition, measurement errors must be corrected by x-ray magnification, and there is not always a reference to perform it.

Recently, another index that relates cortical thickness to bone quality is increasing in the literature: the deltoid tuberosity index (DTI). The necessary measurements for it are made immediately above the upper end of the deltoid tuberosity. At that level, the outer cortical edges become parallel; the DTI is equal to the relationship between the external cortical diameter and the internal endostal diameter. When this ratio is less than 1.4, there will be low bone mineral density in the proximal humerus[9].

Unlike what happens with the Tingart index, the location of the precise measurements to calculate the DTI are far from the fracture lines. Furthermore, the deltoid tuberosity generally appears well defined in AP x rays, possibly due to the antalgic position that is normally adopted, with the arm in internal rotation[9].

In their study, Spross et al.[9] found that the correlation between radiographic measurements and local bone mineral density was strong for the DTI and moderate for the Tingart measurement. Likewise, inter-observer reproducibility was higher in DTI.

Thus, we consider DTI to be a reliable, simple, and applicable tool to assess local bone quality in the proximal humerus. Furthermore, its use has better clinical applicability in patients with proximal humerus fractures than the Tingart index, since sometimes the fracture lines reach the reference points of this measurement.

In this way, Spross et al.[12] have generated a comprehensive algorithm as a treatment guide for FHP, where the demands and biology of the patient are prioritized, being a useful tool for decision-making, achieving a low rate of complications and revisions.

We thus believe that a comprehensive patient assessment, with its different facets, weighing each one in its proper measure, will bring us closer to reality. Hence, considering this global vision of the patient, not limiting ourselves solely and exclusively to the fracture, will make the difference between being good or achieving excellence.

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