Shoulder arthroplasty for complex proximal humeral fractures

Abstract Displaced proximal humeral fractures represent less than 4%-5% of all fractures. The management of these fractures varies widely and includes conservative treatment, open reduction with internal fixation and hemiarthroplasty. Even if shoulder replacement has increased exponentially over the past decades for the treatment of these injuries and has been studied in large series, there is no general agreement on the optimal management of these fractures. Therefore, the objectives of this study were to collect and evaluate the scientific evidence supporting the different treatments for complex proximal humeral fractures, with particular attention to the real value of shoulder arthroplasty compared to nonoperative treatment or internal fixation. A literature analysis was performed on the different strategies, to find the best scientific evidences on this topic.

Key words Evidence-based medicine • Proximal humeral fractures • Shoulder arthroplasty • Shoulder fractures • Treatment outcome

Introduction

Proximal humeral fractures represent less than 4%-5% of all fractures. Women are affected more than twice as often as men, and the incidence is greater in the elderly. The management of these fractures varies widely and includes conservative treatment, open reduction with internal fixation (ORIF) and hemiarthroplasty. Many factors influence the clinical outcome after a correctly performed surgery, such as bone quality, patient’s age and compliance, and rehabilitation program.

Vascularization of the humeral head is a fundamental factor when deciding on the management of complex intra-articular proximal humeral fractures. The Neer four-segment classification of proximal humeral fractures is the most widely accepted system with prognostic value and has become a guide for treatment.

Shoulder replacement has increased exponentially over the past decades: it is generally performed in Neer 4-part fractures, fracture-dislocations, head-splitting fractures, impression defect fractures involving more than 40% of the humeral head and selected 3-part fractures and fracture dislocations in elderly patients with poor bone quality and in extensive comminution. Even though the outcome of shoulder replacement in selected proximal humeral fractures has been studied in several large series, there is no general agreement on the operative treatment of these fractures. What is the effect of different devices in the management of complex intra-articular proximal humeral fractures? Is there any evidence to demonstrate the real value of shoulder arthroplasty compared to nonoperative treatment or internal fixation?
Materials and methods

A bibliographic search was conducted for articles describing ORIF and shoulder arthroplasty in proximal humeral fractures. We searched for meta-analyses, systematic reviews, guidelines and randomized controlled trials (RCTs) that compared two or more approaches in the management of complex fractures of the proximal humerus. We used the following databases: Cochrane Musculoskeletal Injuries Group Specialised Register, Cochrane Central Register of Controlled Trials, Health Technology Assessment (HTA), PEDro, MEDLINE (1966 to February 2005), EMBASE (1980 to February 2005), CINAHL (1982 to February 2005), AMED (1985 to 2005), DARE, TRIP, and the UK National Research Register. The search was completed in February 2005.

The search terms, selected from the US National Library of Medicine’s Medical Subject Headings (MeSH) database, were: human; shoulder fractures; arthroplasty; hemiarthroplasty; prostheses; humerus; shoulder; fractures; humeral fractures; osteosynthesis.

Results

Our research identified 5 RCTs, 3 systematic reviews, 1 meta-analysis and no guidelines. Here, we briefly describe the different papers found.

Randomized controlled trials

Of the 5 RCTs identified, 3 compared a surgical treatment to conservative treatment (Table 1).

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SP, Steinmann pin; CM, closed manipulation

Systematic reviews

Bhandari et al. [6] carried out a systematic review on fractures of the proximal humerus, and concluded that there is insufficient evidence from randomized trials to determine the optimal intervention in patients with displaced four-part fractures.

Handoll et al. [7] performed a Cochrane systematic review on interventions for treating proximal humeral fractures. They aimed to identify the most appropriate treatment for fractures of the proximal humerus in skeletally mature adults, and asserted that only tentative conclusions can be drawn from the randomized trials available in the literature. Sufficient evidence for many of the decisions that need to be made in fracture management is unavailable. It is not clear whether surgical treatment, even for selected fracture types, will produce tangibly better long-term outcomes.

Finally, Olivito et al. [8] evaluated evidence for the use of shoulder arthroplasty in patients with degenerative or traumatologic conditions. They concluded that shoulder arthroplasty is efficacious in patients with functional lim-