

Mennen Plate Fixation For The Treatment Of Periprosthetic Fracture Of The Humeral Shaft: A Case Report

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Citation

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Abstract

We report the case of a patient with a periprosthetic humeral fracture five months after Neer shoulder hemiarthroplasty was performed as a consequence of a four-part fracture of the proximal right humerus. The fracture had been initially treated with a plaster splint. However, two months later, no signs of bony union were present. For this reason the operative option was employed. In this sense, the Mennen plate was considered because of the difficulty in obtaining a proper fracture fixation with plate and screws or with plate and multiple cerclage wires or cables. The result obtained with this fixation system was satisfactory.

INTRODUCTION

Periprosthetic humeral fractures after shoulder arthroplasty represent a major complication and a challenging surgical problem. When this occurs various options have been proposed for the treatment of this potentially disabling condition, including conservative treatment with cast (₉), revision arthroplasty using a longer stem (₁₅), rigid internal fixation with cerclage wires (₁), plate and screws (₂), endomedular polymethylmethacrylate cement fixation (₆) and Mennen plate fixation. In this later aspect, only two cases treated with this fixation system were reported in the literature (₇).

The purpose of this article is to report the third case of humeral fracture following shoulder hemiarthroplasty in which the Mennen plate was used with good result.

CASE REPORT

A 71 year old female patient had an accidental fall for which a Neer shoulder hemiarthroplasty was performed as a consequence of a four-part fracture of the proximal right humerus. Five months later she fell down again and sustained a comminuted humeral peri-prosthetic fracture distal to the distal stem. The fracture had been initially treated with a plaster splint. However, two months later, no signs of bony union were present (Fig. 1). Because radiographs showed findings indicative of non-union, open reduction and internal fixation was performed. The humeral diaphysis was accessed through an anterolateral approach.

The radial nerve was identified and protected. The non-union site was cleared of the soft tissues down to bleeding cortical bone. After proper reduction, the fracture was synthesized by means of a Mennen plate (CMW Laboratories, Exeter, England) and a cancellous bone graft, taken from the anterior iliac crest, was placed around the non-union site (Fig. 2). Postoperatively, the arm was immobilized by application of an arm brace for six weeks and Codman-type exercises were initiated. When last reviewed at 16 months post-operatively the patient did not report any symptoms. Radiographs of the humerus showed complete fracture healing and consolidation (Fig. 3).

Figure 1

Figure 1: Anteroposterior and lateral radiographs showing the uneventful healing of the periprosthetic humeral fracture, two months after plaster splint immobilization.



Figure 2

Figure 2: Intraoperative view of the fracture reduced and immobilized by means of the Mennen plate.

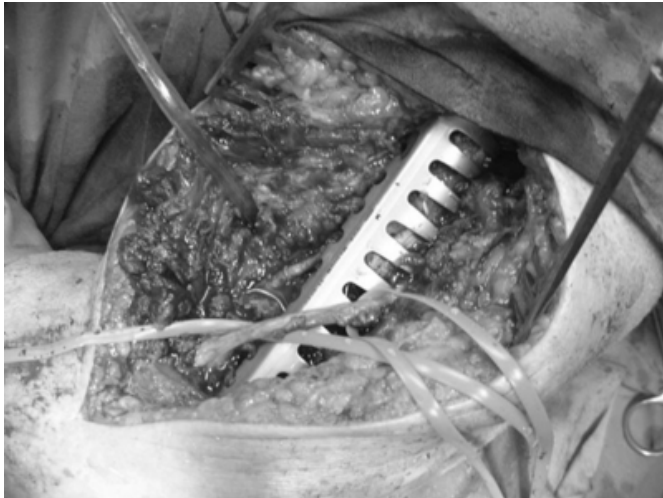
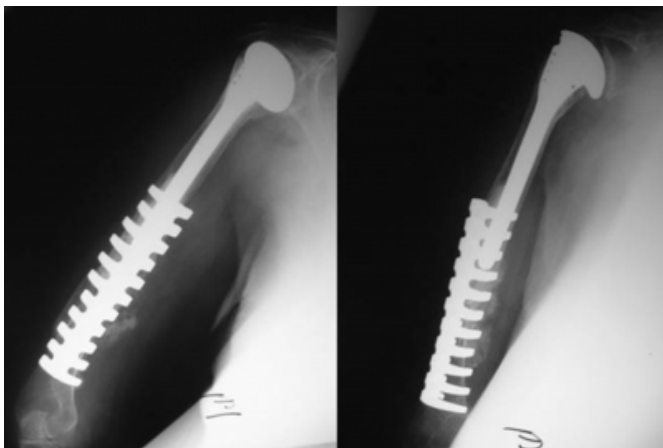


Figure 3

Figure 3: Radiographs of the humerus showed complete fracture healing and consolidation, 16 months post-operatively.



DISCUSSION

The incidence of the humeral shaft as a complication during or after total or hemiarthroplasty of the shoulder occurs in 1 % to 3 % of all shoulder arthroplasties (₁₃). Although this complication occurs infrequently it can have serious consequences. According to Worland et al. (₁₄), the periprosthetic humeral fractures are classified by fracture anatomy and implant stability in three types. Fractures about the tuberosities are designated type A. Fractures around the stem are designated type B, with type B1 being a spiral fracture with a stable stem, type B2 being a transverse or short oblique fracture with a stable stem, and type B3 being a fracture about the prosthesis with an unstable stem. Fractures well distal to the tip of the stem are designated

type C. The fracture in our patient was considered as a type C. In this sense, for treatment of these fractures, it is essential to determine if there is loosening of the stem prosthesis. If no loosening exists, fractures located distal to the tip of the prosthesis are similar to closed fractures of the humeral shaft and may be treated operatively or nonoperatively (_{3,4,8,9,13}), while since loosening exists, revision usually is recommended and, in most of these cases, fracture fixation can be achieved with the longer implant itself serving as an intramedullary rod.

In our case this option was excluded due to well-fixed, well-functioning stem. In this situation, a nonoperative or operative treatment may be employed. Although nonoperative management may be used when the fracture occurs at the tip of a well-fixed humeral implant (_{2,13}), in the light of the literature review, surgical treatment proved effective compared with conservative treatment and was associated with shorter morbidity and less limitation of shoulder motion (₇). In our case, non-union was observed after conservative treatment, and for this reason the operative option was employed. In this context, internal fixation with plates and bone grafting of the fracture site is the treatment of choice (_{2,14,15}). However, if the size of the stem will not permit the placement of screws into the adjacent cortical bone, the application of plates fixed with wires or cables may be employed (₇).

In our patient, the Mennen plate was considered because of the difficulty in obtaining a proper fracture fixation with plate and screws or with plate and multiple cerclage wires or cables. The Mennen plate or the paraskeletal clap-on plate, was first described and introduced by Ulrich Mennen in 1979 (₁₀). Mennen originally designed a clamp plate to stabilize fractures of non-weight-bearing bones (₁₀). After successful results with the use of this plate in metacarpal and forearm fractures (₁₀), the plate was further developed for use in weight bones, such as the femur in the course of periprosthetic fractures (_{5,11}) but results obtained were discouraging, because it provides negligible flexural and torsional support at the fracture site. However, in complex fractures of the humerus or following shoulder arthroplasty, the results obtained with this method of fixation were satisfactory (_{5,7}). The result in our case was excellent. In conclusion, the Mennen plate may be an alternative method of treatment for humeral peri-prosthetic fractures which are stable stem and/or when after more conventional fixation techniques failed to poor bone quality.

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