

Artificial radial head replacement for Mason type III comminuted fracture

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Summary

Radial head fractures are relatively common. The radial head is a pivotal point for stability in relation to elbow valgus. Furthermore, maintenance of radial length and preservation of the radial head are important for preventing proximal movement of the radius. We present the case of a woman in her 50s who fell while riding her bicycle and injured her left radial head fracture. Although osteosynthesis was attempted, intraoperative findings indicated severe comminution, resulting in poor plate fixation. Therefore, artificial radial head replacement was performed. The utility of an artificial radial head replacement for severe radial head fractures has been reported. We also achieved a good functional outcome at a 6-month follow-up.

Background

Radial head fractures are relatively common, accounting for approximately 18% of elbow trauma [1,2]. The radial head is a pivotal point for stability in relation to elbow valgus and is also responsible for load transmission dispersal. Furthermore, maintenance of radial length and preservation of the radial head are important for preventing proximal movement of the radius [3]. We will report on how we achieved a good outcome by performing radial head replacement in a case of radial head comminuted fracture for which plate fixation was impossible.

Case presentation

A previously healthy woman in her 50s fell while riding her bicycle and injured her left radial head fracture (AO21-B2.3, Mason Type 3; Figures 1A and 1B). Although osteosynthesis was attempted with an LCP Radial Head Rim Plate, intraoperative findings indicated severe radial head comminution, resulting in poor plate fixation (Figure 1C). Therefore, the radial head was removed, a radial head made with bone cement was used to fix the diaphysis with the plate, and surgery was concluded. Postoperatively, left elbow range of motion (ROM) was -30/110° and external/internal rotation (ER/IR) was 25/60°. Two months after initial surgery, radial head replacement was performed using an EVOLVE implant (Figures 2A and 2B). At 6 months postoperatively, the left elbow improved to ROM -20/130°, with ER/IR 90/90°. Motion was smooth and daily lifestyle was not impaired, although the patient experienced pain in her elbow when lifting heavy objects.

Discussion

As in our patient, internal fixation is difficult in radial head comminuted fractures, which are classified as Mason Type 3 injuries. Cases such as this have used to undergo radial head resection because the long postoperative casting period makes elbow contracture a concern [4]. However, the radial head is associated with valgus

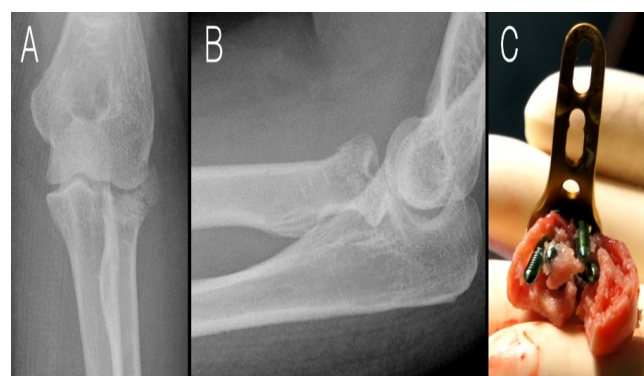


Figure 1. A. The anteroposterior radiograph shows radial head fracture B. The lateral radiograph shows radial head fracture C. The clinical picture depicts the severe radial head comminution, resulting in poor plate fixation

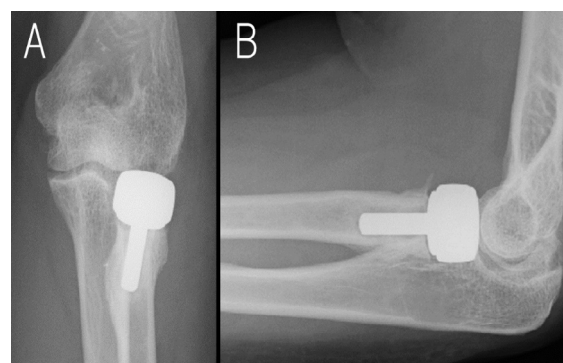


Figure 2. A. The anteroposterior radiograph shows radial head replacement B. The lateral radiograph shows radial head replacement

instability and joint pain due to distal radioulnar joint impingement caused by proximal movement of the radius. The utility of an artificial radial head replacement for cases such as this has been reported [5,6].

Ruan *et al.* [7] performed artificial radial head replacement in 14 Mason type 3 cases and achieved satisfactory outcomes in 13 (92.9%); in contrast, a satisfactory outcome was only achieved in 1 of 8 cases (12.5%) that underwent open reduction and internal fixation. Judet *et al.* [8] performed artificial radial head replacement in 12 Morrey Type

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3 cases and reported favorable outcomes for in of the 12 after 2 or more years of follow-up. We also achieved a clinically favorable outcome for our patient with artificial radial head replacement.

Bipolar and loose-fitting implants are currently available [9]. With a bipolar artificial radial head prosthesis, the stem is fixed with cement and a movable part is created between the head and stem to respond to individual differences in radial head shape [10]. With loose-fitting artificial radial head prostheses, however, the fixation between the stem and radial diaphysis is actually loosened to respond to individual differences in radial shape [11].

We used a loose-fitting artificial implant in our patient. Harrington et al. reported on outcomes over a mean period of 12 years (6-29 years) for loose-fitting radial head prostheses in 20 cases, indicating that a gap of 1 -2 mm was noted around the stem in all cases at final evaluation [12]. Shore et al. reported on outcomes over a mean period of 8 years for two-stage surgery using loose-fitting radial head prostheses in 31 cases for which osteosynthesis failed and indicated that loosening was seen in 16 cases at final evaluation [13]. Based on the implant concept itself, it is conceivable that loosening will develop between the stem and radial head diaphysis, but there is no consensus regarding adverse events associated with progression of loosening.

References

1. Mason ML (1954) Some observations on fractures of the head of the radius with a review of one hundred cases. *Br J Surg* 42: 123-132. [[Crossref](#)]
2. Herbertsson P, Josefsson PO, Hasselius R, Karlsson C, Besjakov J, et al. (2004) Uncomplicated Mason type-II and III fractures of the radial head and neck in adults. A long-term follow-up study. *J Bone Joint Surg Am* 86-86A: 569-74. [[Crossref](#)]
3. Neumann M, Nyffeler R, Beck M (2011) Comminuted fractures of the radial head and neck: is fixation to the shaft necessary? *J Bone Joint Surg Br* 93: 223-228. [[Crossref](#)]
4. Radin EL, Riseborough EJ (1966) Fractures of the radial head. A review of eighty-eight cases and analysis of the indications for excision of the radial head and non-operative treatment. *J Bone Joint Surg Am* 48: 1055-1064. [[Crossref](#)]
5. Brinkman JM, Rahusen FT, de Vos MJ, et al. (2005) Treatment of sequelae of radial head fractures with a bipolar radial head prosthesis: good outcome after 1-4 years follow-up in 11 patients. *Acta Orthop* 76: 867-72. [[Crossref](#)]
6. Grewal R, MacDermid JC, Faber KJ, Drosdowech DS, King GJ (2006) Comminuted radial head fractures treated with a modular metallic radial head arthroplasty. Study of outcomes. *J Bone Joint Surg Am* 88: 2192-2200. [[Crossref](#)]
7. Ruan HJ, Fan CY, Liu JJ, Zeng BF (2009) A comparative study of internal fixation and prosthesis replacement for radial head fractures of Mason type III. *Int Orthop* 33: 249-53. [[Crossref](#)]
8. Judet T, Garreau de Loubresse C, Piriou P, et al. (1996) A floating prosthesis for radial-head fractures. *J Bone Joint Surg Br* 78: 244-9. [[Crossref](#)]
9. Kamineni S, Hirahara H, Pomianowski S, Neale PG, O'Driscoll SW, et al. (2003) Partial posteromedial olecranon resection: a kinematic study. *J Bone Joint Surg Am* 85-85A: 1005-11. [[Crossref](#)]
10. Pomianowski S, Morrey BF, Neale PG, Park MJ, O'Driscoll SW, et al. (2001) Contribution of monoblock and bipolar radial head prostheses to valgus stability of the elbow. *J Bone Joint Surg Am* 83-83A: 1829-34. [[Crossref](#)]
11. Ashwood N, Bain GI, Unni R (2004) Management of Mason type-III radial head fractures with a titanium prosthesis, ligament repair, and early mobilization. *J Bone Joint Surg Am* 86-86A: 274-80. [[Crossref](#)]
12. Harrington IJ, Sekyi-Otu A, Barrington TW, Evans DC, Tuli V (2001) The functional outcome with metallic radial head implants in the treatment of unstable elbow fractures: a long-term review. *J Trauma* 50: 46-52. [[Crossref](#)]
13. Shore BJ, Mozzon JB, MacDermid JC, Faber KJ, King GJ (2008) Chronic posttraumatic elbow disorders treated with metallic radial head arthroplasty. *J Bone Joint Surg Am* 90: 271-280. [[Crossref](#)]