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ORIGINAL ARTICLE

Rare implant-specific complications of the MoPyC radial head prosthesis

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Background: According to currently available data, the clinical short-term results of the MoPyC radial head prosthesis (Bioprofile, Tornier, Montbonnot-Saint-Martin, France) seem favorable. However, we have encountered several implant-specific complications in recent years. Hence, this case series reports rare complications after radial head arthroplasty with the MoPyC prosthesis to make surgeons aware of their existence and to provide information about the underlying cause and possible salvage strategies.

Methods: A retrospective chart review from 2011 to 2016 was conducted to identify all adult patients with a minimum 2-year follow-up who underwent or were referred after radial head arthroplasty with the MoPyC radial head prosthesis and experienced implant-related complications.

Results: Five patients with 7 implant-related complications were found. One patient experienced breakage of the pyrocarbon head. In another patient, breakage of the stem and—after revision surgery—partial breakage were observed. Disassembly of the prosthesis was seen in 1 case. Extensive periprosthetic stress shielding was seen in 3 patients resulting in symptomatic loosening (1), periprosthetic radial neck fracture (1), and stem migration (1).

Conclusions: Whereas clinical short-term results of the MoPyC radial head prosthesis are satisfactory, rare implant-related complications can occur. Surgeons should be aware of these complications as they may lead to a poor outcome.

Level of evidence: Level IV; Case Series; Treatment Study

Keywords: MoPyC; radial head fracture; radial head replacement; radial head arthroplasty; complications; implant related

Depending on the underlying injury pattern, fractures of the radial head are frequently accompanied by concomitant lesions to the surrounding ligamentous and osseous structures.[14,28] Restoration of the radial column is of vital importance to preserve valgus and posterolateral and longitudinal stability of the elbow and the forearm.[4,6,19,22,23,29] Whenever

The Institutional Review Board of the Medical Faculty of the University of Cologne approved this study.

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open reduction and internal fixation is not feasible, radial head replacement is considered the treatment of choice, even though some evidence suggests satisfying results after primary excision of the radial head.[15]

The clinical outcome after radial head replacement is generally favorable.[1,2,5,7,10,12,16,18,20,21,25-27] Whereas radial head arthroplasty cannot provide anatomic restoration of the radiocapitellar and proximal radioulnar joint,[6,11,30] modular prosthesis designs reproduce the individual anatomy more closely compared with monoblock prostheses and have thus been promoted in recent years.[17] The modular MoPyC radial head prosthesis (Bioprofile, Tornier, Montbonnot-Saint-Martin, France) provides 48 different possibilities for assembly of the prosthesis as it consists of 4 stem and 4 neck sizes as well as 3 head sizes. It is a noncemented long-stem prosthesis with primary press-fit fixation due to a dynamic expansion device of the stem. Whereas the stem and the neck are made of titanium alloy, the spherical head is made of pyrolytic pyrocarbon, which provides good biocompatibility, high wear resistance, and an elasticity modulus close to that of human bone and cartilage.[1,8-10,12,25,27] According to the current literature, short- and medium-term outcome of the MoPyC prosthesis seems promising with good overall functionality and low complication rates.[1,10,12,25,27]

However, we have encountered different implant-specific complications of the MoPyC radial head in recent years. Hence, this article presents a case series of patients with rare complications after radial head arthroplasty with the MoPyC prosthesis to make surgeons aware of their existence and to provide information about the underlying cause and possible salvage strategies.

Materials and methods

A retrospective chart review from 2011 to 2016 was conducted to identify all patients who underwent or were referred after radial head arthroplasty with the MoPyC radial head prosthesis and experienced implant-related complications. Inclusion criteria for this case series were as follows: (1) patient's age of at least 18 years; (2) radial head replacement with the MoPyC; (3) implant-related complication according to plain radiographs or computed tomography scans; and (4) minimum 2-year follow-up.

Patients younger than 18 years and patients with general complications not specifically related to the MoPyC radial head (eg, overlengthening, underlengthening, infection) were excluded from this study. Complications were classified as implant related or not related to the MoPyC by 2 surgeons (M.H., K.W.). Discrepancies were resolved by discussion with a third surgeon (L.P.M.).

Results

Demographic data

During the 5-year study period, 5 patients with 7 implant-related complications after implantation of a MoPyC radial head prosthesis were identified. The mean age of patients at the time of injury was 46 years (range, 20-71 years). The mean follow-up was 54 months (range, 32-118 months). Four patients were female and 1 patient was male. All patients underwent radial head arthroplasty because of a comminuted, non-reconstructable radial head fracture (4) or avascular necrosis after open reduction and internal fixation (1). The injury occurred on the left side in 3 patients and on the right elbow in 2 patients.

Complications

Breakage of the pyrocarbon head

A 71-year-old female patient sustained a valgus distortion of her right elbow with a Mason type III radial head fracture and an O'Driscoll type 2.2 fracture of the coronoid (Fig. 1, *A*). Radial head arthroplasty with the MoPyC prosthesis was performed. However, the coronoid fracture was not addressed (Fig. 1, *B*). The patient presented 6 months postoperatively with persisting limited range of motion and intermittent blocking of the right elbow joint. No recurrent trauma was reported. Plain radiographs revealed breakage of the pyrocarbon head of the prosthesis (Fig. 1, *C*). The patient was subsequently revised to replace the head of the prosthesis (Fig. 1, *D*) and went on to have a satisfying outcome with a free range of motion at 3 years postoperatively.

Breakage of the stem

In a 20-year-old female patient with avascular necrosis of the radial head 1 year after open reduction and internal fixation of a Mason type III fracture, radial head arthroplasty with a MoPyC prosthesis was performed. Six years after radial head arthroplasty, the patient reported decreased range of motion and pain on exertion. Plain radiographs revealed breakage of the titanium stem around the expansion screw with advanced capitellar erosion and ulnohumeral degeneration (Fig. 2, *A*). The prosthesis was subsequently revised. Two years after revision of the radial head replacement, plain radiographs showed partial breakage of the stem with subsequent stress shielding and malalignment of the MoPyC prosthesis (Fig. 2, *B* and *C*). The patient was then referred to our clinic for further treatment. She presented with a flexion arc of 90° and a flexion contracture of 30°. Pronosupination was only mildly limited. We recommended surgical revision with removal of the malaligned implant. As a result of her low pain levels, the now 30-year-old patient denied surgery and opted for continuation of conservative therapy.

Disassembly of the prosthesis

A 49-year-old female patient suffered a left-sided elbow dislocation with an associated comminuted fracture of the radial head and underwent radial head arthroplasty with a MoPyC prosthesis. She was referred to our hospital because of persisting pain and limited range of motion. Overstuffing of the prosthesis was diagnosed,[3] and 13 months after initial operative treatment, revision surgery was performed with additional repair of the lateral collateral ligament because of posterolateral rotatory instability (Fig. 3, *A* and *B*). Fourteen days