Lo SCALPELLO (2021) 35:35-38
doi number: 10.36149/0390-5276-202

The use of megaprosthesis in elderly patients: a case series

Mario Mosconi[1,2], Eugenio Jannelli[1], Alberto Castelli[1], Gianluigi Pasta[1], Alessandro Ivone[1]

[1] Clinic of Orthopedics and Traumatology, IRCCS Polyclinic Foundation San Matteo, Pavia, Italy; [2] University of Pavia, Pavia, Italy

Summary

Objective. Herein, we present a case series of patients treated with megaprosthesis who sustained high energy trauma with comminuted articular hip or knee fracture, complex periprosthetic fractures or pathological fractures.

Methods. We retrospectively reviewed 15 consecutive patients who sustained knee replacement/revision (7 patients) and 8 patients who underwent hip replacement/revision with megaprosthesis between 2014 and 2018. In the knee group, there was 1 man and 6 women, while in the hip group there were 3 men and 5 women.

In knee group, preoperative indications were: periprosthetic fracture; highly comminuted distal femoral fracture; metastatic localization of distal femur; nonunion of distal femoral fracture in one case.

In the hip group, preoperative indications were: subtrochanteric pathological fractures; periprosthetic fracture; recurrent infection; recurrent tumoral lesions.

Preoperative evaluation included standard radiographs; CT-scan with 3D reconstruction for tailored implant planning; MRI only for pathological localization.

Results. Mean clinical follow-up with radiographic control was 44 months (range 23-71). All complications were managed before the patient left the hospital. During the follow-up period, 13 of 15 patients regained walking ability as before surgery. At the end of follow-up, 6 patients had died due to causes not related to the surgery.

Conclusions. The use of megaprosthesis offers useful solutions for different pathologies such as tumors, infections, comminuted fractures, and periprosthetic fractures in the elderly patient with good functional results.

Key words: hip, knee, megaprosthesis, tumor, periprosthetic fractures, nonunion

Received: March 16, 2021
Accepted: March 22, 2021

Correspondence
Alessandro Ivone
Clinic of Orthopedics and Traumatology, IRCCS Polyclinic Foundation San Matteo, pzz.le Golgi 19, 27100 Pavia, Italy
E-mail: Alessandro.ivone87@gmail.com

Conflict of interest
The authors have no conflict of interest to declare.

How to cite this article: Mosconi M, Jannelli E, Castelli A, et al. The use of megaprosthesis in elderly patients: a case series. Lo Scalpello Journal 2021;35:35-38. https://doi.org/10.36149/0390-5276-202

Introduction

Modular megaprostheses are defined as special bone and joint prostheses, which can bridge and compensate for large bone defects caused by loss of bone stock. The modularity and multi-component designs of these implants allow for variable resections to fit as many patients as possible. Numerous studies have been conducted to evaluate the use of megaprosthetic reconstruction in bone tumor management [1-4]. These reports showed variable functional results with a relatively high incidence of complications, such as infection, instability, and mechanical failure [2]. Megaprostheses have also been used in non-neoplastic hip and knee conditions with severely compromised bone stock. These conditions included periprosthetic and highly comminuted osteoporotic fractures [5-10], and as treatment for resistant non-union of femur fractures [5,11,12]. Indeed, these patients represent a real challenge for trauma and oncologic orthopedic surgeons. We present a case series of patients treated with megaprosthesis who sustained high energy trauma with comminuted articu-

lar hip or knee fractures, complex periprosthetic fractures, or pathological fractures.

Materials and methods

We retrospectively reviewed the data of 7 consecutive patients who underwent knee replacement/revision using megaprosthesis and 8 patients who underwent to hip replacement/revision with megaprosthesis between 2014 and 2018 at Fondazione IRCCS Policlinico San Matteo (Pavia, Italy). All surgeries were performed by the same experienced surgeon.

In the knee group, there was 1 man and 6 women with a mean age of 73 (range 62-86 years) and a mean BMI of 32 (range 24-40 kg/m^2). Operative indications in this group were: periprosthetic fracture in two cases (Fig. 1A,B); highly comminuted distal femoral fracture in two cases; metastatic localization of distal femur in two cases; nonunion of distal femoral fracture in one case.

In the hip group, there were 3 men and 5 women with a mean age of 67 (range 54-88 years) and a mean BMI of 24 (range 22-31 kg/m^2). Operative indications in this group were: subtrochanteric pathological fractures in four cases; periprosthetic fracture in one case (Fig. 2A,B); recurrent infection in one case; recurrent tumoral lesions in two cases.

The America Society of Anesthesiologists (ASA) Physical Status scale ranged from 2 to 3. Preoperative planning included radiographs in two planes, antero-posterior and lateral. Further X-ray views and/or other investigations such as computed tomography (CT) scan were provided as needed. Spinal anesthesia with epidural analgesia was used. Intra-operatively, the resected bone was measured to get the proper length and tension in the system. We used a modular-cemented prosthesis. For the hip prosthetic cases, an extended Moore incision was used with the patient in lateral decubitus position, while for the knee prosthetic cases, a parapatellar incision was used, with the patient lying supine. No allografts or strut grafts were used. Postoperatively, patients were allowed to bear weight as tolerated. Rehabilitation was conducted under the supervision of physiotherapists.

The institutional review board of the involved hospital decided that no ethical approval was necessary as it was thought that for this retrospective study the informed consent of the patients was sufficient.

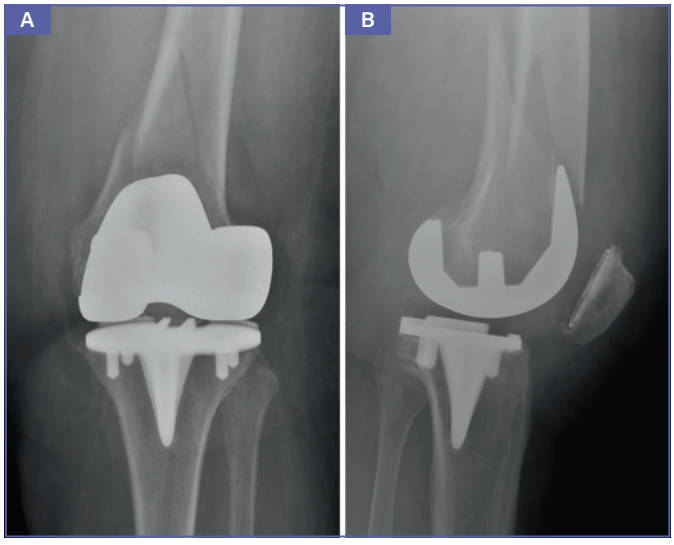

Figure 1. A,B) AP and lateral view of a periprosthetic knee fracture (Rorabeck III type).

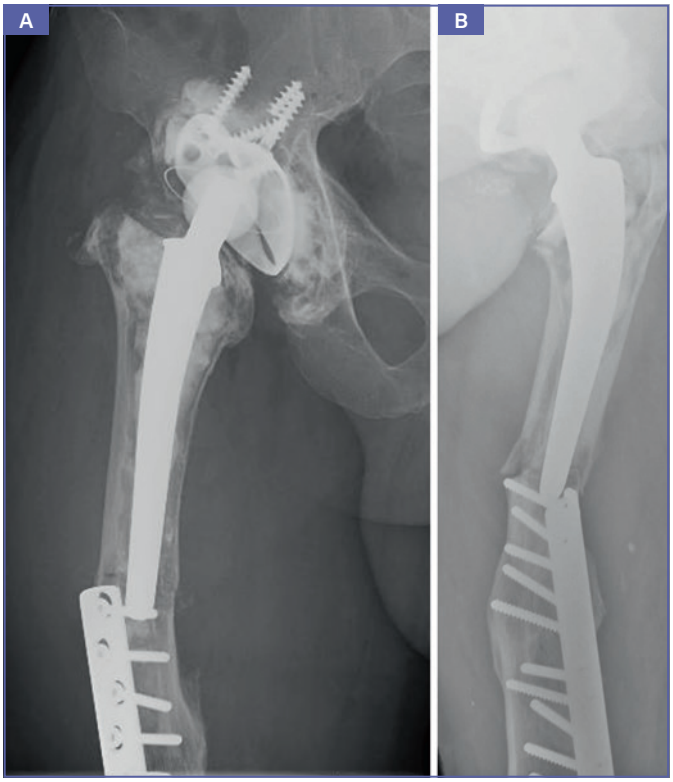

Figure 2. A,B) AP and lateral view of a periprosthetic hip fracture with loosening of acetabular revision cup.

Results

Mean clinical follow-up with radiographic control was 44 months (range 23-71). Eight patients received a blood transfusion postoperatively, and one had transient renal failure. All complications were managed before the patient left the hospital. Two superficial infections were managed with oral antibiotics and local superficial debridement. In one case of hip implant dislocations were managed with closed reduction. During the follow-up period, 13 patients regained their walking ability as before surgery (Figs. 3A,B and 4A,B). One patient devel-

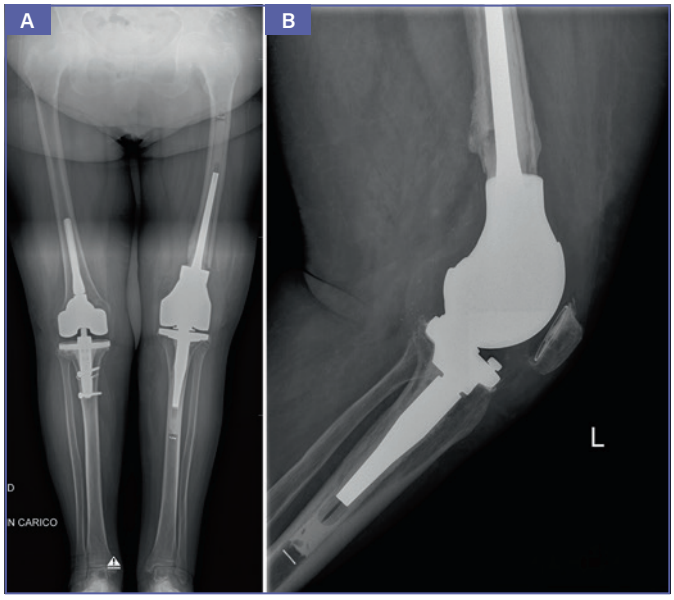

Figure 3. A,B) Control x-rays (AP and lateral view) of a megaprosthesis knee implant.

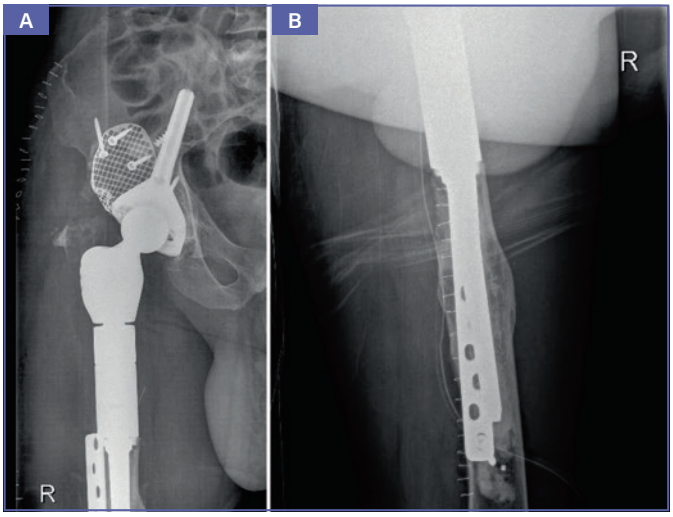

Figure 4. A,B) Control x- rays (AP and lateral view) of a megaprosthesis hip implant.

oped knee joint contractures and became wheelchair dependent. All patients were discharged to independent living, either at previous residency or a rehabilitation center. At the end of follow-up, 6 patients had died due to causes not related to the surgery.

Discussion

The incidence of periprosthetic femoral fractures has risen during last decade [13]. With increasing population ageing, osteoporosis and popularity of joint replacement surgery, it is expected that this incidence will continue to increase and management will be more demanding. Lindahl et al. [13] found one reason for mechanical failure in hip prosthesis was that these fractures were inadequately treated with internal fixation while the prostheses were loosened, i.e. the treating surgeon misdiagnosed the fracture as type B1 Vancouver instead of B2. In fractures around knee prostheses, Kim et al. [14] suggested that reducible or irreducible fractures in patients, with poor bone stock and in the vicinity of loose or malpositioned components (type III fracture according to their classification) should be treated with distal femoral replacement. Moreover, the poor general health status commonly encountered in these elderly patients renders them unable to tolerate bed rest and weight-bearing restrictions. Previous studies have shown variable outcomes and complications after treatment of non-oncologic conditions of the hip and knee [5-12]. For proximal femoral megaprostheses, instability and aseptic loosening are the most common complications [9]. Parvizi et al. [9] reported a 2% infection rate and 19% instability in 43 patients with proximal femoral reconstructions. For the distal femoral reconstructions, Mortazawi et al. [8] reported follow-up (average of 5 years) of 22 knees revised with distal femoral arthroplasty. They had 10 postoperative complications and 5 re-operations. Despite this, there was good patient satisfaction. The authors recommended this type of prosthesis when no other treatment alternative is available. Literature reports on patients with primary reconstruction with modular prosthesis after a severely comminuted fracture or loss of bone are sparse. Freedman et al.[5] reported two cases with knee fractures and concomitant osteoporosis and osteoarthritis. They had one amputation due to infection in a medically compromised patient. Several studies [6,7,9,10] have suggested megaprostheses as an alternative for the very old patients or for cases with severe comorbidities. We agree that their use in traumatology should not be considered routinely, but this technique can benefit active elderly patients for whom immediate full-weight- bearing could diminish a loss of autonomy and complications due to prolonged decubitus such as bedsores, thromboembolic disease, pneumonia, loss of autonomy, and sarcopenia [15] . The limitations of this report include its retrospective design and heterogenic material. However, the use of these implants is uncommon and requires specially equipped and experienced centers. Therefore, each report discussing their results will add to the literature body.

Conclusions

The use of megaprosthesis offers various useful solutions for different pathologies such as tumors, infections, comminuted fractures, and periprosthetic fractures in the elderly patient. Among the main advantages there is early recovery of total weight bearing. It would be useful for further studies to

compare the differences between the costs incurred by public health system for the recovery of patients and the purchase of implants.

References

1 Myers GJ, Abudu AT, Carter SR et al. Endoprosthetic replacement of the distal femur for bone tumours: long-term results. J Bone Joint Surg Br 2007;4:521-526.

2 Heisel C, Kinkel S, Bernd L, et al. Megaprostheses for the treatment of malignant bone tumours of the lower limbs. Int Orthop 2006;6:452-457.

3 Chandrasekar CR, Grimer RJ, Carter SR, et al. Modular endoprosthetic replacement for tumours of the proximal femur. J Bone Joint Surg Br 2009;1:108-112.

4 Tan PK, Tan MH. Functional outcome study of mega- endoprosthetic reconstruction in limbs with bone tumour surgery. Ann Acad Med Singapore 2009;3:192-196.

5 Freedman EL, Hak DJ, Johnson EE, et al. Total knee replacement including a modular distal femoral component in elderly patients with acute fracture or nonunion. J Orthop Trauma 1997;3:231-237.

6 Dean BJ, Matthews JJ, Price A, et al. Modular endopros – thetic replacement for failed internal fixation of the proximal femur following trauma. Int Orthop 2012;4:731-734.

7 Sewell MD, Hanna SA, Carrington RW, et al. Modular proximal femoral replacement in salvage hip surgery for non – neoplastic conditions. Acta Orthop Belg 2010;4:493-502.

8 Mortazavi SM, Kurd MF, Bender B, et al. Distal femoral arthroplasty for the treatment of periprosthetic fractures after total knee arthroplasty. J Arthroplasty 2010;5:775-780.

9 Parvizi J, Tarity TD, Slenker N, et al. Proximal femoral replacement in patients with non-neoplastic conditions. J Bone Joint Surg Am 2007;5:1036-1043.

10 Springer BD, Sim FH, Hanssen AD, et al. The modular segmental kinematic rotating hinge for nonneoplastic limb sal vage. Clin Orthop Relat Res 2004;421:181-187.

11 Davila J, Malkani A, Paiso JM. Supracondylar distal femoral nonunions treated with a megaprosthesis in elderly patients: a report of two cases. J Orthop Trauma 2001;8:574-578.

12 Vaishya R, Singh AP, Hasija R, et al. Treatment of resistant nonunion of supracondylar fractures femur by megaprosthesis. Knee Surg Sports Traumatol Arthrosc 2011;7:1137-1140.

13 Lindahl H. Epidemiology of periprosthetic femur fracture around a total hip arthroplasty. Injury 2007;6:651-654.

14 Kim KI, Egol KA, Hozack WJ. Periprosthetic fractures after total knee arthroplasties. Clin Orthop Relat Res 2006;446:167-175.

15 Butt MS, Krikler SJ, Ali MS. Displaced fractures of the distal femur in elderly patients. Operative versus non-operative treatment. J Bone Joint Surg Br 1996;78:110-114.