

Total knee arthroplasty in patients with poliomyelitis

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ABSTRACT

We performed a retrospective chart and radiograph review of 10 patients with a history of poliomyelitis involving a limb that subsequently underwent primary total knee arthroplasty between 2000 and 2008. One posterior stabilized (PS), two condylar constrained (CCK), and seven rotating hinge (RHK) prostheses belonging to the same system were implanted. Eight patients were followed for a minimum of 2 years (mean 4.3 years, range 2 to 8.5 years); one patient required revision for prosthesis infection. The last patient was followed for just six months reporting excellent pain relief, and without complications. American Knee Society Score (AKSS) improved postoperatively in all eight patients with at least 2 years follow-up. The improvement was more marked for the knee score, which increased from a mean of 37 points preoperatively (range 20 to 51) to 75.7 points postoperatively (range 50 to 92); for the functional score the mean increase was only 15.8 points, from a mean of 38.5 points (range 20 to 70) to 54.3 points (range 20 to 80) after the intervention. One patient had a recurrence of the recurvatum deformity after implanting a CCK prosthesis. We found that a rotating hinge prosthesis that allowed hyperextension was suitable treatment for patients with knee osteoarthritis and polio as this compensated for loss of quadriceps power.

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1. Introduction

Acute Anterior Poliomyelitis (AAP) has become a rare disease since the mid seventies in most western countries thanks to a widespread policy of mass immunisation. Nevertheless, it is estimated that currently in Italy about 70,000 people are affected by deformities following this disease [1]. Although in the past it was thought that the joints of individuals affected by the sequelae of AAP were not likely to develop osteoarthritis, we have found in our clinical practice, and supported by similar experience [2], that the deformities over time cause degenerative alterations of the joints.

The knee is, according to Bonola and Perricone [3], the joint most commonly involved by acute infection after the foot, with a rate of 16.1%. Many of the patients that have infection during childhood undergo knee replacement surgery in old age.

Few reports have been dedicated to total knee arthroplasty (TKA) in limbs affected by poliomyelitis [2,4–6]; from a general point of view this type of surgery has resulted in good pain relief [6] but concerns have been raised regarding recurrence of knee instability [2,4].

The purpose of this study is to present our experience in a limited cohort series of patients submitted to TKA in limbs affected by poliomyelitis.

2. Materials and methods

Between January 2000 and June 2008, 10 consecutive TKAs were performed in patients affected by knee osteoarthritis following poliomyelitis at the Seventh Division of the Rizzoli Orthopaedic Institute of Bologna. Eight patients had been followed-up for a minimum of 2 years. At the time of the clinical assessment one patient had a follow-up of only 6 months, whereas another one underwent removal of the prosthesis because of infection 5 months after the operation.

There were two male and eight female patients. The average age of the patients at the time of surgery was 59 years (range 48 to 79 years). A retrospective clinical assessment of each patient was performed using the American Knee Society Score (AKSS) [7]. According to these parameters, an excellent score is over 85, good is between 70 and 84, and fair is between 60 and 69, whereas below 60 is poor.

The contraction force of the quadriceps was assessed according to the MRC scale [8]: 0/5, no contraction, paralysis (one patient); 1/5, slight contraction (two patients); 2/5, contraction without gravity (one patient); 3/5, contraction against gravity (five patients); 4/5, contraction against minimum resistance (one patient); 5/5, normal contraction (no patient) (see Table 1).

The preoperative X-ray assessment was performed in at least two views with the knee under load. Alignment on the coronal and sagittal planes, the height of the patella was measured using the Insall–Salvati index [9]. Any signs of loosening and/or radiolucency of the components according to the Knee Society scoring system [10] were

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Table 1
Preoperative data.

ID	Age	Prior procedures	Clinical AKSS	Functional AKSS	Quadriceps strength	Deformity (degrees)	Patella ratio
1	63	SCO	39	45	1	Valgus(8), recurvatum(25)	0.78
2	79	FTT, FA, THA	46	50	3	Varus(9), recurvatum(35)	0.59
3	66	SCO,	51	70	4	Valgus(20)	0.71
4	60	FL	21	20	0	Varus(23), recurvatum(10)	0.66
5	58	SCO, FTT	20	45	1	Varus(6)	0.5
6	54	SCO,	27	25	3	Varus(7)	0.53
7	52	SCO, FTT	47	30	3	Varus(22)	0.55
8	48	QTL, TTO	29	30	3	Varus(3)	–
9	55	SCO	39	35	2	Varus(14), recurvatum(5)	0.39
10	55	–	51	35	3	Varus(19)	0.76

SCO, supracondylar osteotomy; FTT, flexors tendons transposition; FA, foot arthrodesis; THA, total hip arthroplasty; FL, femoral lengthening; QTL, quadriceps tendon lengthening; TTO, tibial tubercle osteotomy.

assessed. In eight cases the preoperative deformity was a varus deviation of between 3 and 23°, and in two cases a valgus deviation of 8 and 20°. Recurvatum deformity was observed in four cases with a mean 18° (range 5 to 35°).

The presence of patella infera, was found preoperatively in all the patients treated, and in seven patients after the arthroplasty; in one patient it was not possible to perform the assessment, as she had previously undergone patellectomy.

The type of prosthesis chosen depended on the deformity to be corrected, the degree of instability and the quality of the bone. The operation was performed by the same surgeon (DT) in all cases. The following knee arthroplasty were used: two Nex Gen Legacy CCK (LCCK), seven Nex Gen RHK, one Nex Gen Legacy PS (LPS) (Zimmer, Warsaw, Ind, USA).

3. Patients

3.1. Case 1

Sixty-three-year-old man, affected by sequelae of AAP, presented with severe pain in the right knee and a radiographic aspect of bilateral knee osteoarthritis more marked on the right side (Fig. 1). The patient wore a rigid brace on the lower right limb. The left knee was flexed under load and the foot had a fixed equinus deviation due to a previous fusion. This limb was also supported by a brace with mechanical extension locking. The patient, therefore, underwent arthroplasty on the right knee. At the end of the follow-up period the patient reported almost no pain, had a normal load-bearing axis of the treated knee and no recurrence of the recurvatum.

3.2. Case 2

Seventy-nine-year-old woman with sequelae of AAP. The patient came to our observation with a hyperextension deformity in the left knee combined with weak quadriceps and gluteus maximus. The foot had a fixed equinus deviation with a few degrees of range of motion (ROM) due to previous arthrodesis of the calcaneocuboid, subtalar and talonavicular joints. Following left knee arthroplasty, the correction of the recurvatum was satisfactory. Nevertheless, after one year the patient had a recurrence of the recurvatum, which required a knee brace with permanent hyperextension block.

3.3. Case 3

Sixty-six-year-old woman with a history of poliomyelitis, presented with pain in the right knee, which had become more acute two years earlier following a trauma. The radiograph showed signs of knee osteoarthritis and a severe valgus deformity of the femur, partly due to a previous supracondylar osteotomy of the femur (Fig. 2). The patient had 4/5 quadriceps contraction strength and right knee ligament stability on all planes. Therefore, the patient underwent arthroplasty

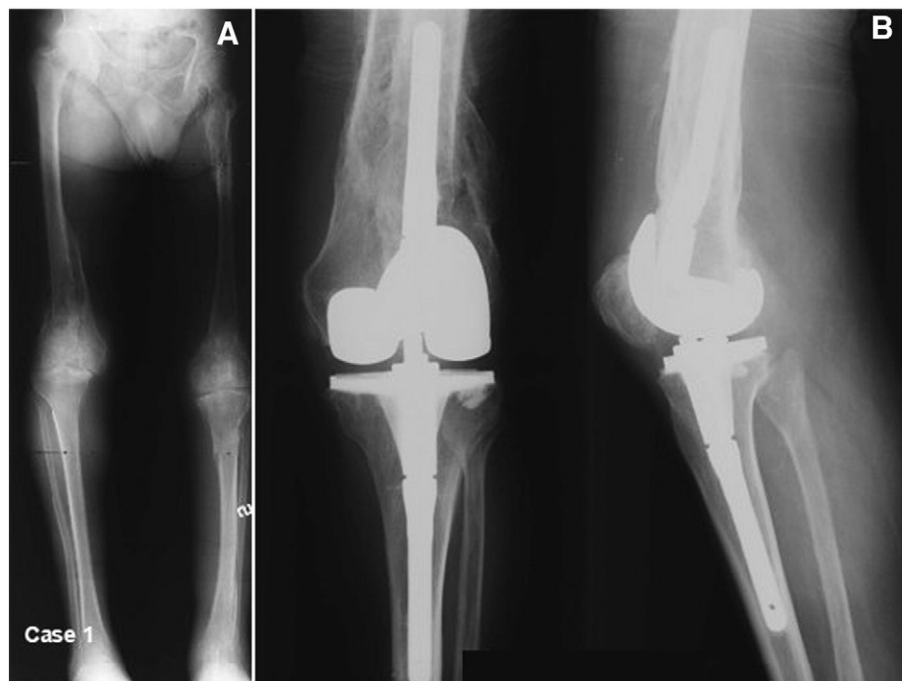


Fig. 1. Case 1. (A) Bilateral knee osteoarthritis in sequelae of knee osteotomy. In (B) is shown correct positioning of the prosthetic components without radiographic signs of loosening.

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