

Weight Bearing Capability Of An Antibiotic Loaded Pre-Formed Articulated Knee Spacer: A Case Report

A Schulz, C Jürgens, M Faschingbauer

Citation

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Abstract

One of the solutions for the problem of infected total knee arthroplasty is a two-staged procedure with the use of an antibiotic impregnated acrylic articulated spacer. Such an implant is commercially available on the German market. It has been thoroughly tested; directions supplied with this implant strongly recommend light partial weight bearing.

We report the case of a patient, who, despite instruction about partial weight bearing, used this implant under full weight bearing over the period of 4 months. The implant showed no sign of weakening or breakage at the time of removal, wear was minimal.

INTRODUCTION

One solution after the infection of a total knee arthroplasty (TKA) is the use of an antibiotic loaded bone cement spacer after removal of the implant. In a second stage this spacer is then again replaced by an orthopaedic implant once the infection has settled.

The technique has hereby shifted over time from pure spacers⁽¹⁾ over hand moulded implants mimicking knee prostheses^(2,3) to prefabricated articulated spacers allowing a wide range of movement of the knee^(4,5). Advantage of these new implants is next to the high local level of antibiotic achieved in the intermediate period between arthroplasties⁽⁶⁾, the preservation of limb length with its impact on soft tissue preservation and at the same time allowing movement of the knee joint with the avoidance of muscular wastening in the intermediate period⁽⁷⁾.

Since two years a commercially produced articulated gentamicin loaded polymethylmethacrylate (PMMA) spacer (Spacer-K©, Tecres Medical SpA, Sommacampagna (VR), Italy) is available on the German market. It is a pre-formed articulated spacer, with the biomechanical characteristics of an ultra-congruent condylar knee-prosthesis, available in three sizes⁽³⁾. The directions supplied with this implant (by Merete Medical, Berlin, Germany) state that a low grade partial weight bearing status has to be maintained over the whole period of use. Full weight bearing using such an

implant has not been reported in the literature.

CASE PRESENTATION

A 62 year old male patient with a height of 1.82 m (6 ft 1) and a weight of 91 kg (BMI 27.5) underwent bicondylar sledge knee arthroplasty for osteoarthritis with valgus deformity. In the further course he developed recurrent effusions requiring several aspirations. After 6 months diagnostic arthroscopy showed extensive synovialitis, microbiology was positive showing methicillin sensitive staphylococcus aureus. Partial synoviectomy was performed, a constant irrigation system installed. When infection did not settle under this regime, the patient was referred to our institution a further 8 weeks later.

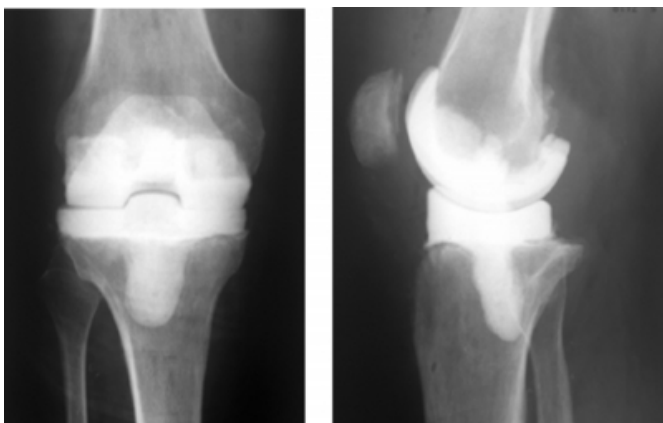
We discussed the treatment options with the patient and recommended removal of the implants, debridement, synoviectomy, a temporary external frame fixator and gentamicin-PMMA-chain inlay with a planned revision after 6-8 weeks. This was agreed upon and the procedure performed. Bone stock showed to be of satisfactory condition at the operation.

Three weeks later the patient was readmitted, the frame fixator showed 2 broken Steinmann-pins, one was loose with a surrounding pin-tract infection. The patient stated he might have inadvertently put full weight on the leg on a few occasions. As his long standing infection had clinically not

fully settled, we recommended revision of the fixator. The patient strictly refused and demanded instant re-implantation of a prosthesis as the external fixator would significantly restrict him in his schedule as a business-man. Confronted with this situation we opted for a Gentamicin loaded articulated acrylic spacer system (Spacer-K), size large, implanted with 40 g of Gentamicin containing cement (Figure 1). This was the first time that we have used this system.

Figure 1

Figure 1: Radiograph 4 month after implantation of the articulated knee spacer.



Despite detailed preoperative instructions, especially regarding the restrictions of this system, soon after the implantation a compliance problem became apparent. A day before discharge the patient demonstrated his capability of full weight bearing by lifting the contra-lateral leg to the physiotherapist.

At 3 months after insertion, the revision was scheduled; this had to be delayed due to a trade fair that the patient had to attend. On re-admission he stated that he was full-weight bearing since about 13 weeks, as the supplied crutches collided with his private and professional life.

Living alone, he saw no chance to carry items around in his home, walking on crutches at the same time. Although some home help was organized via the hospital social services, these covered only up to 2 hours per day. Active range of motion at this stage was 5° extension deficit with a maximal flexion of 90°.

As the infection had settled, the implanted spacer was removed, in the same session a rotational-knee prosthesis was implanted. The explanted acrylic prosthesis showed no breakage (Figure 2), the wear of the weight bearing surfaces was minimal (Figure 3).

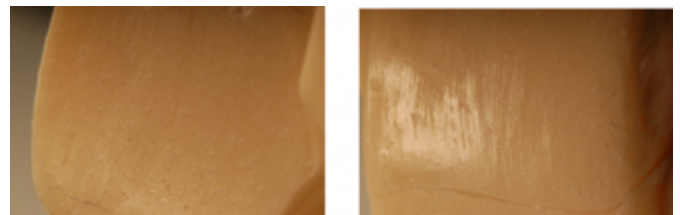
Figure 2

Figure 2: The spacer after explantation. There was no macroscopic damage visible, the breakage and gross damage occurred during the explantation process.



Figure 3

Figure 3: Macro-photography of the spacer demonstrating wear in the area of maximal weight bearing.



DISCUSSION

There are several treatment options for infected knee endoprosthesis: In early postoperative infection local debridement with primary exchange of inlay or all components is possible (8). For the chronic infection or after failure of other methods a complete implant removal with arthrodesis is sometimes unavoidable (9).

If preservation of knee function seems feasible, the two stage exchange method with the use of acrylic bone cement spacers has gained widespread acceptance with a high percentage of knee joints salvaged (1,3,10).

Extensive biomechanical testing has been performed with the implant described here (Spacer-K, Tecris, Italy). Castelli reported no implant breakage after in vitro testing with 500.000 cycles in dynamic mechanical testing at 1300N (5,11) and concluded a safe usage for up to 6 months under strict partial weight bearing.

It is difficult for patients to maintain a strict partial weight bearing status with a predefined weight under the

circumstances of every day life. In the case presented the patient involved stated that the implant that was used should have the capability to withstand full weight, otherwise it had no use. The technical restrictions by the implant used clearly collided with the necessities of his private and professional life.

CONCLUSION

The Spacer-K is useful in the two-stage treatment of infected knee joint Arthroplasty, joint motion can be upheld during the treatment period. In this case it showed its full weight bearing capability and we conclude that for its use a less strict regimen of weight bearing can be applied, possibly with advance to full weight bearing in patients with a normal Body-Mass-Index and predictable compliance.

CORRESPONDENCE TO

Arndt P. Schulz, MD BG Trauma Hospital Hamburg
Department of Trauma and Orthopaedic Surgery
Bergedorfer Strasse 10 21033 Hamburg/ Germany Tel.:
+49-40-7306-1991 Fax +49-40-7306-2406 e-mail:
a.schulz@buk-hamburg.de

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Author Information

Arndt P. Schulz, MD, MRCS

Department of Trauma and Orthopaedic Surgery, BG Trauma Hospital Hamburg

Christian Jürgens, MD, PhD

Department of Trauma and Orthopaedic Surgery, BG Trauma Hospital Hamburg

Maximilian Faschingbauer, MD

Department of Trauma and Orthopaedic Surgery, BG Trauma Hospital Hamburg