# Porous Tantalum Patellar Components in Revision Total Knee Arthroplasty

## Minimum 5-Year Follow-Up

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**Abstract:** Revision total knee arthroplasty can be complicated by severe patellar bone loss, precluding the use of standard cemented patellar components. This study evaluated the midterm outcomes of porous tantalum (PT) patellar components. Twenty-three PT components were used in 6 men and 17 women (average age, 62 years). All patellae had less than 10-mm residual thickness. The PT shell was secured to host bone, and a 3-peg polyethylene component was cemented onto the shell. In 2 patients, the PT component was sutured directly to extensor mechanism. Average follow-up was 7.7 years (range, 5-10 years). At follow-up, the Knee Society scores for pain and function averaged 82.7 and 33.3, respectively, whereas the mean Oxford knee score was 32.6. Four patients underwent revision surgery. Survivorship was 19 (83%) of 23 patients. Porous tantalum patellar components can provide fixation where severe bone loss precludes the use of traditional implants. Failures were associated with avascular residual bone and fixation of components to the extensor mechanism. **Keywords:** trabecular metal, patella, revision total knee, bone loss patella, patelloplasty, porous tantalum.


Revision total knee arthroplasty (TKA) may be complicated by severe patellar bone loss that can preclude the use of standard cemented patellar components. Traditional approaches to the management of severe patellar bone loss include patelloplasty of the remnant bony shell, patellar bone grafting, or partial vs complete patellectomy.

Although patelloplasty or patellectomy is an acceptable treatment option in the setting of severe bone loss, both result in inferior functional outcomes when compared with revision TKA and resurfacing of the patella [1-6]. More recently, patellar bone grafting procedures have been described to restore a more normal quadriceps moment arm and to improve patellar bone stock [7,8]. Other techniques, such as the gull-wing osteotomy, have been described as well [9]. However, despite these advances in surgical technique, several studies highlight the continued challenges of addressing the deficient patella [10-14].

Porous tantalum (PT) patellar components have been designed to allow patellar resurfacing in the setting of severe patella bone loss [15-18]. The use of trabecular metal across all aspects of revision and primary arthroplasty procedures has grown in popularity and use [19]. We previously reported the short-term results after patellar resurfacing using a trabecular metal patella component during revision TKA in patients with marked patellar bone loss [20]. The purpose of this study is to evaluate the functional and clinical outcomes at a minimum of 5-year follow-up, along with any complications, associated with the use of PT patellar components in revision TKA.

## Materials and Methods

Twenty-three consecutive revision TKAs with marked patellar bone loss that prevented patellar resurfacing with a sta ndard cemented button were performed between April 1999 and October 2004. This study represents longer term results on a previously reported group [20]. Research ethics review board approval was

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obtained from our institution. The mean patient age was 62 years (range, 32-83 years). There were 6 men and 17 women.

All patients presented with failed patellar implants (Fig. 1A and B), and all patients received a PT patellar implant at the time of revision surgery. The indications for the use of a PT patellar component were patellae with residual thickness less than 10 mm at its thickest segment, with most of the dorsal cortex intact (at least 50%) and without a sufficient rim to contain a biconvex inset patellar component. The bone was debrided and prepared using a high-speed burr, and the vascularity of the remnant host bone was assessed by deflating the tourniquet and looking for punctate bleeding in the host bone. The PT shell was then secured to host bone/tissue using nonabsorbable sutures, and a 3-peg polyethylene component was cemented onto the shell according to our previously described surgical technique [20] (Figs. 2A and B and 3). One patient had undergone a prior patellectomy, and 2 patients had undergone a resection arthroplasty of the patella/patelloplasty during a prior revision TKA before undergoing revision using the trabecular metal patella button. Three patients presented with a fractured or fragmented patella before resurfacing with the trabecular metal patella shell. In 2 knees, the PT component was secured to the host extensor mechanism because of prior patellectomy and patellar fracture.

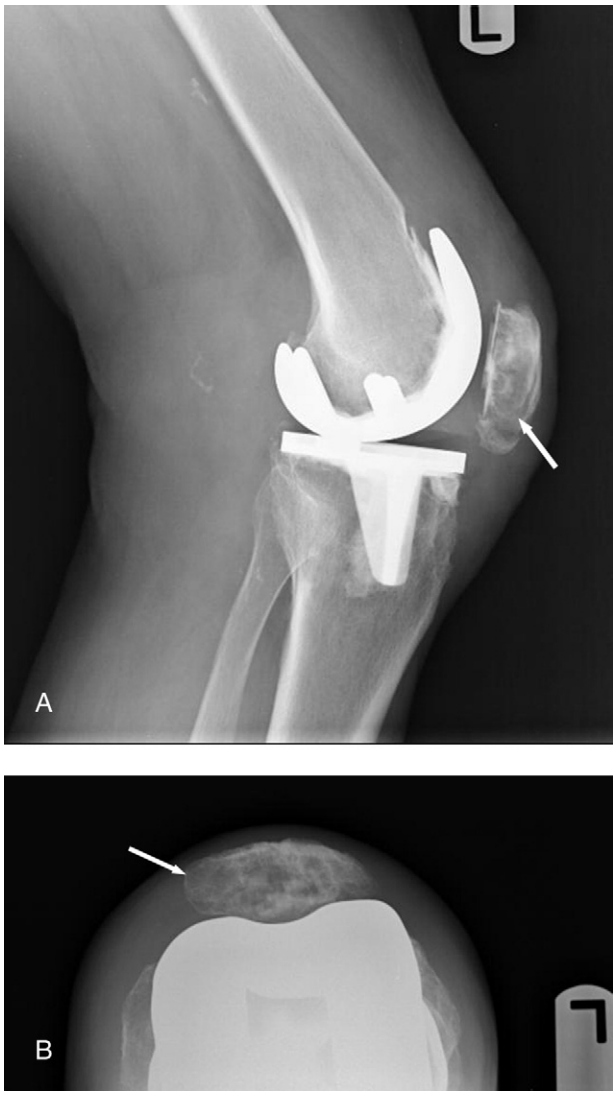


**Fig. 1.** (A) Lateral radiograph of a failed TKA before revision, demonstrating osteolysis about all 3 arthroplasty components. Severe osteolysis is demonstrated behind the polyethylene patellar button (arrow). (B) Merchant view radiograph of the patellofemoral articulation with evidence of osteolysis about the patellar button (arrow). After removal of the old patellar component and membrane, the residual shell of bone was too thin to accept a traditional patellar component and was resurfaced with a PT patellar component.

The procedures ranged from patellar resurfacing alone to complete revision TKA with revision of the femoral, tibial, and patellar components. Five patients underwent patellar component revision without revision of the tibial or femoral components; the remaining 18 patients underwent femoral and tibial revision at the time of implantation of the trabecular metal patella. Standard physical therapy regimens were used for most patients with immediate full weight-bearing, continuous passive motion machines, and range-of-motion exercises and gait training under the supervision of a physical therapist.

All patients were followed up with Knee Society [21] and Oxford Knee scores. Patients were also evaluated regarding the presence and severity of anterior knee pain, the presence or absence of an extensor lag, and extensor mechanism function as previously described [20]. Radiographs were evaluated for osseous integration of the implants or evidence of component loosening. Demographic statistics were analyzed descriptively and calculated with SPSS version 15.0 (SPSS, Inc, Chicago, Ill).

## Surgical Technique

Using a high-speed burr, the host bone is thoroughly debrided, removing all cement or membranous debris. The remnant bony shell and soft tissues are reamed using the appropriate-diameter hemispherical reamer. Attempt is made to minimize bony resection while providing a healthy hemispherical surface for attachment of the trabecular metal shell (Zimmer, Inc, Warsaw, Ind). Trials were used with a goal of restoring normal patellar thickness (approximately 26 mm for men and 23 mm for women). The appropriate-sized shell was positioned using the existing patellar shell as a guide: placement of the inferior pole of the patella was at or near the joint line. Using numbers 2 or 5 nonabsorbable sutures through the peripheral holes of the trabecular metal shell, the implant was then fixed without cement to the remaining bone and soft tissues. A 1.6- or 2.0-mm drill was then used to pass sutures through bone using Keith