

## FAITS CLINIQUES — CASE REPORTS

### PEG FRACTURE IN A TRICON P® TIBIAL COMPONENT

by H. U. CAMERON\*

**Revision of a total knee replacement because of medial tibial plateau insufficiency revealed the base plate of a noncemented plastic-peg tibial component to have sheared off the plastic pegs which were still tightly embedded in bone. The fact that these plastic pegs remained tight indicates that even in extremely adverse situations the pegs are capable of providing fixation.**

**Keywords :** total knee replacement ; Tricon® knee ; plastic pegs ; stem tibial components ; wear debris.  
**Mots-clés :** arthroplastie totale du genou ; prothèse Tricon® ; cheville tibiale en plastique ; débris d'usure.

#### SAMENVATTING

*H. U. CAMERON. Peg fracturen bij de tibiale componenten van een Tricon P® knieprothese.*

Revisie van een totaalprothese van de knie met defekt van de mediale tibiaplateau toonde een fractuur van de steel, aan de basis van de plaat, van een niet gecementeerde Tricon P® prothese ; de stelen bleven goed ter plaatse in het bot. Dit toont aan dat zelfs in extreme situaties de plasticen stelen een betrouwbare fixatie verzorgen.

#### RÉSUMÉ

*H. U. CAMERON. Fracture d'un plot d'élément tibial d'une prothèse non cimentée Tricon P®.*

La reprise d'une arthroplastie totale du genou avec important défaut du plateau tibial interne a montré une fracture au niveau de l'implantation du plot tibial sur la plaque qui n'était pas cimentée ; les plots,

bien ancrés, restent par contre en bonne position. Cette constatation permet d'affirmer que les plots assurent une fixation stable, même en cas d'importante sollicitation.

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#### INTRODUCTION

Initial fixation of tibial components can be achieved by means of screws, stems, cement etc. The Tricon P®\*\* is a pure polyethylene tibial component held in place by ridged plastic pegs driven into undersized holes drilled in the medial and lateral tibial plateaus. The plastic-peg concept was developed by Freeman (3) and used in the ICLH and Freeman-Samuelson prosthesis as well and the Tricon P® and Tricon M® total knees. In spite of use for over 10 years no report exists of peg breakage. One case of peg breakage has recently been seen and forms the basis of this communication.

#### CASE REPORT

A 71-year old woman had previously had a high tibial osteotomy into valgus. The varus deformity slowly recurred, and she developed a stress fracture of the medial tibial plateau. The knee was quite

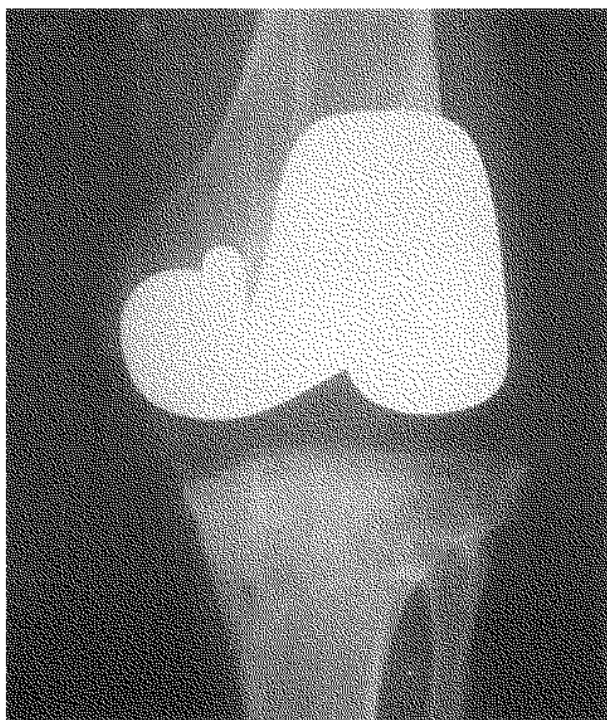
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unstable, going into 15° of hyperextension and 15° of passively correctable varus.

In September 1985, the knee was replaced with a Tricon P® prosthesis with a noncemented tibial component. Intraoperatively, the deformity was readily correctable. Unfortunately postoperative X-rays showed very poor medial support of the tibial plateau, with a significant gap between the implant and bone (fig. 1).

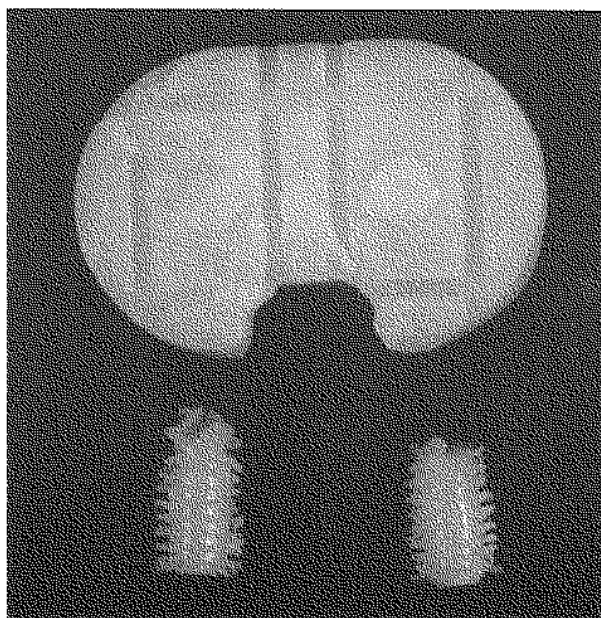


*Fig. 1.* — A Tricon P® total knee replacement was carried out for a failed tibial osteotomy. The lateral peg has partly penetrated the lateral tibial cortex. The medial tibial plateau shows a gap between the implant and bone and should have been bone grafted.

In spite of this obvious technical error the patient functioned well, scoring excellent on the Hospital for Special Surgery rating system, with a range of movement from 0 to 105°, and with stability of the knee in both anteroposterior and medio-lateral planes.

After two and a half years, she developed pain on the medial side of the proximal tibia, and the varus deformity began to recur. Radiologically there appeared to be lateral subluxation of the tibia on the femur.

Immediately prior to revision, some months later, a further stress fracture of the medial tibial plateau occurred. At operation, it was found that the plastic tibial plateau had sheared off the plastic pegs, which remained tightly embedded in bone and had to be drilled out. There was significant wear on the undersurface of the plastic, at the plastic/bone interface (fig. 2), which suggested that the plate had sheared off the pegs 6 months prior to revision when the pain recurred. The knee was revised using a long stem cemented tibial component.

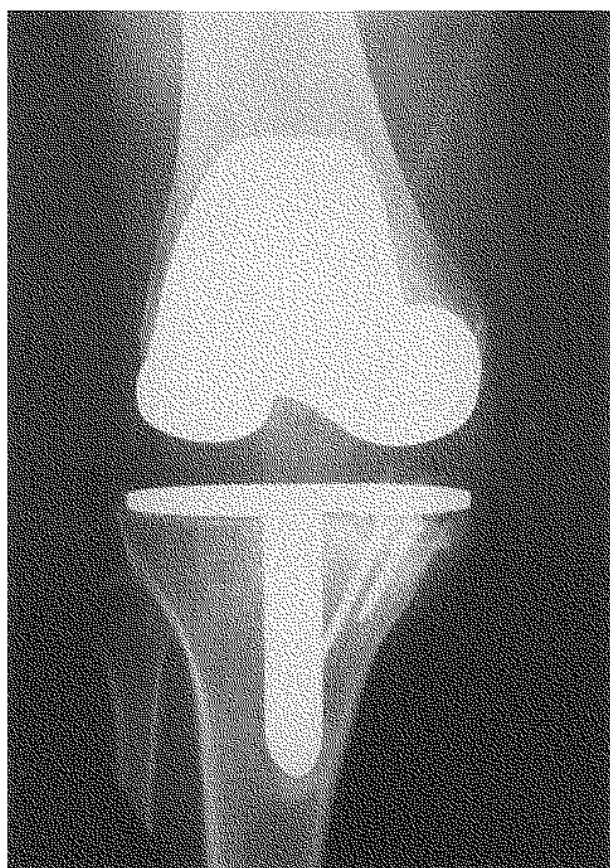


*Fig. 2.* — The pegs were quite tight and had to be drilled out. There was some wear on the undersurface of the plastic implant, which suggested that it had been loose for some time.

## DISCUSSION

This case demonstrates a technical error, as the medial tibial plateau should have been treated with a bone graft at the time of the initial surgery (4) (fig. 3). Only a very long stem tibial plateau can survive the lack of medial tibial plateau bony support, as this leads to extremely high cantilever loading. Failure due to tilting and loosening is therefore to be expected. If subjected to sufficient

loads the plastic pegs may shear off the plastic base plate. It has been assumed that the pegs merely provided initial fixation, with long-term fixation coming from bony ingrowth into the grooves on the undersurface of the implant. As peg fracture has not been reported, it was felt that if the tibial component loosened and migrated the pegs would do likewise (1). The fact that the pegs sheared off in this case indicates that even under extremely adverse conditions the plastic pegs can remain tight.



**Fig. 3.** — In this case with a deficient medial tibial plateau, the tibia has been bone grafted, the grafts being held in place with two screws. The noncemented tibial component uses the same two plastic pegs for initial fixation, with a supplementary central stem.

Polyethylene making direct contact with bone, as in the Tricon P®, must inevitably be subjected to micromotion because of the compliance of the proximal tibia and because some sinkage or settling is inevitable (5). This might, over time,

result in the generation of wear debris from the undersurface of the polyethylene plate. If sufficient wear debris accumulates, eventual reabsorption of the underlying bone may occur; this has not yet occurred with the Tricon P® knee. Nevertheless, this possibility has led the author to restrict the use of this knee prosthesis to patients over the age of 75 years.

For younger patients, a porous coated metal-backed tibial component employing the same initial plastic peg fixation, the Tricon M®, has been used, later supplemented with a smooth stem. The recent comparison of stem versus nonstem Tricon M® knees, at 2-4 years, has shown a slightly reduced incidence of sinkage only, of questionable statistical significance. The stereophotogrammetric results comparing stem versus nonstem tibial components, demonstrate such a striking improvement when a central stem is added to supplement fixation (2) that there appears little justification in continuing the use of nonstem tibial components.

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