PATELLAR WEAR PATIENTS IN TOTAL KNEE REPLACEMENTS

by H. U. CAMERON*

In revising knee replacements 3 wear patterns have been noted ; severe single facet wear which only occurs when the patella is dislocated or severely tilted, mild single facet wear from contact with the trochlear groove, and double facet wear. Double facet wear can occur when the knee flexes to more than 105-110 degrees, the edges of the patellar component then making contact with the edges of the femoral condyles across the cruciate gap. This double facet wear is potentially serious and may result in the patellar component wearing through.

Keywords : total knee replacement ; patellar replacement ; patellar wear ; metal backed patellae ; metal synovitis.
Mots-clés : prothèse totale du genou ; remplacement de la rotule ; usure de rotule ; synovite du métal.

RÉSUMÉ

H. U. CAMERON. Type d'usure rotulienne dans l'arthroplastie totale du genou.

En revoyant les arthroplasties totales du genou, l'auteur constate 3 types d'usure rotulienne :
— une usure importante d'une seule facette qui ne survient que lorsque la rotule est luxée ou fort basculée
— une usure limitée à une seule facette, résultant du contact avec la trochlée
— une usure des 2 facettes ; l'usure sur les 2 facettes survient lorsque le genou fléchit à plus de 105/110°, les bords de la rotule étant alors en contact avec les bords des condyles fémoraux de part et d'autre de la région intercondylienne. Cette double usure de facettes est potentiellement grave et peut évoluer vers une usure complète de la rotule.

SAMENVATTING

H. U. CAMERON. Type van patellaire slijtage na totale arthroplastiek van de knie.

Bij na-onderzoek van totaalprothesen van de knie werden 3 types patellaire slijtage vastgesteld :
— ernstige slijtage van een facet welke alleen gebeurt wanneer de patella geluxeerd is of opmerkelijk gekipt ;
— lichte slijtage van een facet door kontakt met de trochleaire gleuf ;
— slijtage van de 2 facetten. De slijtage van de 2 facetten gebeurt wanneer de knie verder dan 105/110° buigt, zodanig dat de randen van de patella in kontakt komen met de randen van de femurcondylen, over de intercondylaire streek. Een soortgelijke bifacettaire slijtage is potentieel vrij ernstig en kan evolueren naar een verdere degradatie van de patellaire componente.

INTRODUCTION

With the improvement in flexion often now achieved in total knee replacement (3) a new problem has appeared, that of patellar "wear-through" (1, 4). This is especially of significance if the patella is metal backed.
In an attempt to study this problem the author has reviewed his series of knee revisions.

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MATERIALS AND METHODS

All patellae removed at revision of total knee replacement by the author in the last 6 years were examined and the degree and site of wear noted. The operation records of all other knee revisions done in the same time frame were studied, along with the pre-revision X-rays.

RESULTS

Sixty-four knee revisions have been carried out, 24 being Freeman-Swanson knees, 6 Tricon P*®, 7 Tricon M*® and 27 knees of other types. Of these 38 had a simple patellar shaving and 25 a patellar replacement. The patellar component was revised in 11 cases.

In all cases a patellar meniscus was found i.e. a thick overgrowth of fibrous tissue surrounding the patella (2). In 7 cases no patellar wear was present, these cases either being infected or having in retrospect, reflex sympathetic dystrophy.

Single facet wear was found in 14 cases and was severe in 5 cases, 3 of which had dislocated laterally and were articulating with the lateral side of the femoral condyle. Two severe single facet wear cases had tilted more than 10 degrees in the trochlear groove. In 4 cases, 3 of which were removed, double facet wear was noted and was severe in two (fig. 1). Either single facet or double facet wear occurred but not both.

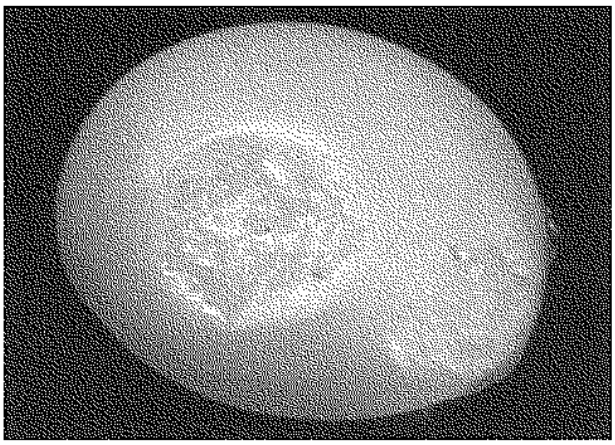

Fig. 1. — This Tricon M patella shows significant double facet wear. As this occurs in a thinner area of plastic "wear-through" may occur in time.

The only factor which appeared to distinguish the double facet wear patients was that all had more than 110 degrees of flexion.

DISCUSSION

The reason for double facet wear is obvious. It occurs when the patient has enough flexion that the patella leaves the trochlear groove and makes contact with the edges of the cruciate gap thus significantly reducing the contact area and therefore increasing the pressure on the plastic.

The fact that the pattern seen was either single facet wear or double facet wear but not both indicates that the facets are unlikely to be produced by wear, otherwise the central area in the double facet cases should also show a facet. The facets would seem likely therefore to be produced primarily by cold flow and would seem to occur at the time of a maximum loading. Maximum loads on the patellofemoral joint are likely to occur when the knee is loaded in maximum flexion, i.e. in rising from a chair.

The reason why double facet wear has not yet been reported is that the majority of the original artificial knees seldom flexed beyond 95 degrees (3), and a few of them had a patellar resurfacing.

Double facet wear is of considerable concern as the facets are produced at the periphery where the plastic is thinnest. "Wear-through" is likely to occur sooner with this pattern than with single facet wear which usually occurs where the plastic is thickest, unless significant patellar tilting has occurred.

This suggests that if the patient develops a range of motion of greater than 100 degrees patellar plastic wear through is likely to occur in time. The thickness of the plastic patella cannot be increased without decreasing the flexion which the knee can obtain as the extensor mechanism will be over-tightened. In order to reduce the chances of plastic "wear-through" therefore, the area of plastic/metal contact must be increased especially in the all important cruciate gap region.

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