Failure of metal-backed uncemented patellar components

Report on 3 cases

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We report 3 cases of metal-backed patellar component failure of the Microloc® total condylar knee, which was implanted in 51 cases. The main reason for failure was the design of the patellar and femoral components in combination with flexion of more than 100°.

We report three failures of the Microloc® patellar component used in 51 knees.

Patients and observations

Three patients had an uncemented Microloc® prosthesis due to gonarthrosis. Postoperatively, a straight mechanical axis was achieved, and radiographically the implantation was almost perfect. The operations were uncomplicated; and after 3–5 months, the patients could walk more than 1 kilometer without pain. The knee flexion ranged from 110° to 125°.

After 11–17 months, a sudden crack and crepitation was noticed when climbing stairs in one case and when attempting to rise from the sitting position in one. In the third case the onset was gradual.

A skyline radiograph of the 59-year-old female showed a lateralized patella with a damaged metal back. The lateral radiograph revealed metal beads in the tibial polyethylene from the porous coating. At revision, black synovium, fractured polyethylene, a loosened metal back, and grooves in the trochlea of the femoral component were found in all the cases. In 2 cases the tibial components also had to be changed because of wear of the plastic by the metal beads. The new polyethylene patellar implants were cemented, and the postoperative course was uneventful. At the histologic examination, synovitis was found; and in deeper layers, polyethylene debris was surrounded by a macrophagic reaction (Figure 1).

Discussion

Failure of metal-backed patellar components has recently been reported[1,6] with similar observations as ours.

Several factors can contribute to the failure. One is soft-tissue imbalance with false patellar tracking[3]. A thick patella after insufficient resection or a primarily too thick component is a second factor. Both factors will increase the stress on the patellar polyethylene[2,7]. The range of motion is another risk factor; an increased flexion enhances the load on the patella[4]. Hyperactivity, overweight, and younger age are also known to increase the risk of contracting patellar problems[5].

The thickness of the patellar component is minimized to save bone. Thinning the metal back or polyethylene increases the risk of metal fractures and polyethylene wear. Sharp metal corners under thin polyethylene might be responsible for destruction of the polyethylene. The stiffness of the metal backing also causes increased stress at the interface between the polyethylene and metal, which leads to fracture of the polyethylene.

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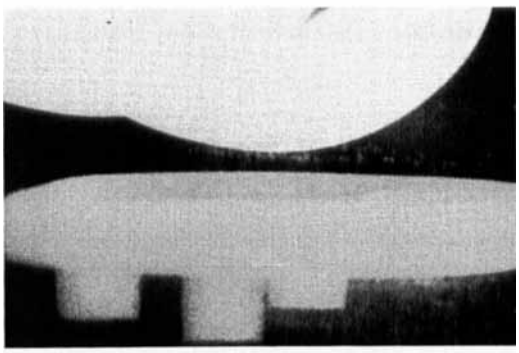
Table 1. Data on patients with patellar component failure operated on with an uncemented Microloc endoprosthesis because of gonarthrosis

Case	Sex	Age	Weight (kg)	Lateral	Alignment		Onset of failure	Time to failure	Revision (months)
					Preoperative	Postoperative			
1	F	59	55	no	8° valgus	0°	Sudden: climbing stairs	11	16
2	F	73	65	no	10° varus	2°	Gradual	17	20
3	M	68	90	yes	25° varus	0	Sudden: standing up	13	22

A



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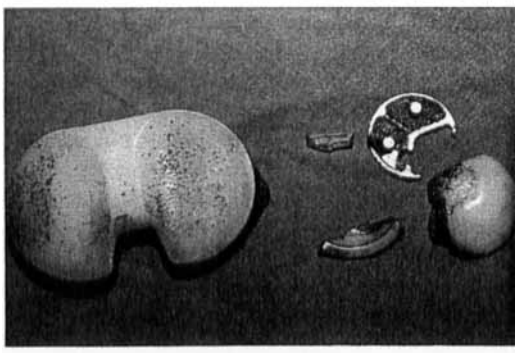

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Figure 1. Case 1. One year after operation.

A. The skyline view shows a lateralized patella with a damaged metal back.

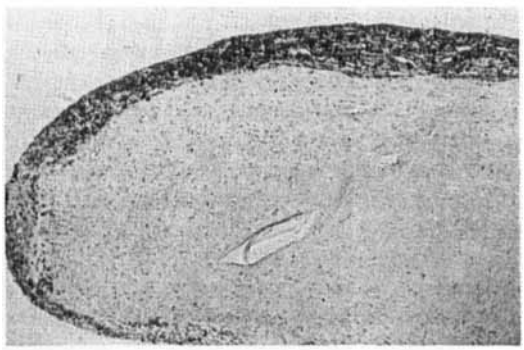
B. The lateral radiograph reveals metal beads from the porous coating of the loosened metal back in the tibial polyethylene.

C. At arthrotomy a black synovium, a fractured polyethylene, a loosened metal back, and grooves in the trochlea of the femoral component were found in all 3 cases.

D. Polyethylene and metal back were totally damaged. Balls of the microporous surface of the loosened metal back were impressed in the tibial polyethylene.

E. Histologic section shows synovitis with signs of metallosis. Small polyethylene pieces were surrounded by a macrophagic reaction in deeper layers.

C



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We think that the main factor for mechanical failure of metal-backed patellar components is conditioned by the design of the patellar and femoral components. A deep excavation of the proximal intercondylar groove with a relatively prominent edge causes stress on the patellar polyethylene, especially when the knee is flexed more than 100°. Another important factor is imbalance between the quadriceps muscle and the vastus medialis, causing uncontrolled shearing forces on the patella.

References

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