

**Discussion.** Ultrasound does not normally provide good images of bone, but the periosteum and its elevation can be well visualised (Howard and Einhorun 1991). Plain radiography cannot detect this until some new bone has been laid down. The upper humeral epiphysis is at risk of injury during difficult births. Ekengren, Bergdahl and Ekström (1978), reporting a series of 20 patients with epiphyseal birth injuries, noted that treatment was complicated and prolonged in seven with a delay in diagnosis. Such an injury may cause rotation of the upper humeral epiphysis sufficient to require corrective osteotomy in later life (Blount 1955; Ogden 1982).

When initial radiographs are normal, arthrography may be necessary to make the diagnosis, but we have shown that real-time ultrasound examination does not only show the movement between the head and the shaft, but can also confirm accurate reduction with the limb

immobilised in the optimal position. We recommend the use of ultrasound when there is a possibility of an epiphyseal injury.

No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.

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## PATELLOTIBIAL IMPINGEMENT IN KINEMAX STABILISED TOTAL KNEE REPLACEMENT

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The factors influencing success in total knee replacement (TKR) include soft-tissue balance and limb and component alignment. Sound design of the prosthesis is a pre-requisite. We report two cases in which there was abutment of the patellar button on the tibial stabiliser peg of stabilised Kinemax prostheses (Howmedica International Inc, England). The operations were performed by two different surgeons using general anaes-

thesia and tourniquets with mid-line approaches and Gobot instrumentation for bone preparation and limb alignment (Ewald, Walker and Sledge 1988).

**Case 1.** A 75-year-old woman with rheumatoid arthritis had a left TKR, using medium-sized components with an 8 mm stabilised tibial element. After insertion of the prosthesis, abutment of the patellar button on the tibial peg was noted at 80° of flexion. She was able to flex to 90°

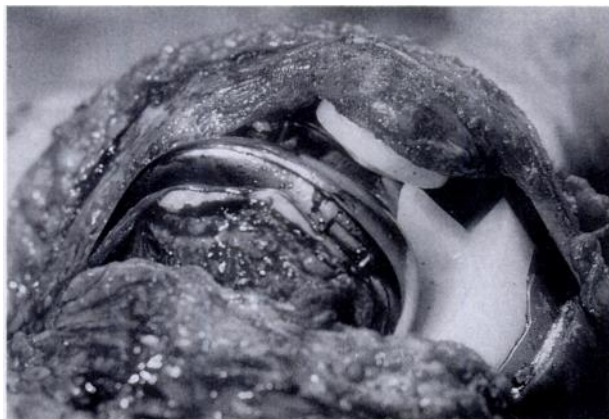


Fig. 1



Fig. 2

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on discharge. At seven-month follow-up she had knee flexion of 100° and some anterior knee pain.

**Case 2.** A 67-year-old woman with rheumatoid arthritis had a left TKR, using small components and a 15 mm stabilised tibial element (Fig. 1). Again, patellar abutment against the tibial peg was observed at 80° of flexion, and further flexion resulted in forward displacement of the patella (Fig. 2). Knee flexion of 100° on discharge

from hospital was maintained at eight-month follow-up.

**Discussion.** Total knee arthroplasty has evolved rapidly but some recent designs have relied on features of previous models which remain controversial. Problems with the patellofemoral joint are a common mechanism of failure (Figgie et al 1986; Aglietti, Buzzi and Gaudenzi 1988), but impingement of the patellar button against the tibial stabilising peg has not previously been described.

Apart from design considerations, impingement may be due to excessive elevation of the joint line, a low positioning of the patellar button, or an anatomically low patella. Joint line elevation was 1 mm in case 1, and 10 mm in case 2. Figgie et al (1986) described a mean joint line elevation of 8.9 mm in 116 posterior stabilised knee arthroplasties, while Aglietti et al (1988) reported it to be 12 mm in a series of 73 posterior stabilised total condylar arthroplasties. In our cases the patellar buttons were not inferiorly placed (see Fig. 1). In the pre-operative radiographs of both patients the patellar position was within normal limits by the Insall-Salvati ratio.

We investigated possible design error, by considering the geometry of the five sizes of stabilised tibial inserts. The profile of the stabilising peg is identical in all sizes, but it is nearer the anterior edge of the component in the smaller sizes, being nearest in the extra

small component. This gives a disproportionate decrease in the space available for the free excursion of the patella, and an increasing probability of patellotibial impingement in the smaller sizes.

The inclination of the anterior face of the stabiliser peg in the Kinemax prosthesis is almost vertical, while, in contrast, the Insall-Burstein and press-fit condylar designs have a posterior inclination making patellotibial impingement less likely.

Although there have been no significant problems in the short term, we fear that the impinging components will be subject to early loosening and wear. We consider that patellotibial impingement is due to design error and recommend modification of this prosthesis.

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