that they recognise that we did discuss the basic approach which they describe and we did refer to the publication by Jupiter and Goodman in 1992.

I note that in the 13 patients of McKee et al the average age was 39+ years while the average age of our patient population was 68 years.

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Jupiter JB, Goodman LJ. The management of complex distal humerus nonunion in the elderly by elbow capsulectomy, triple plating, and ulnar nerve neurolysis. *J Shoulder Elbow Surg* 1992;1:37-46.

A CADAVER STUDY ON THE OBLIQUE PART OF VASTUS MEDIALIS

Sir,

The paper by Goh et al in the March 1995 issue entitled 'A cadaver study of the function of the oblique part of vastus medialis' (1995;77-B:225-31) was slightly confusing when it stated that some authors "... thought that VMO was of significance mainly in the last phase of extension and our experiments support this belief". I assume that they do not imply that VMO works as a knee extensor in the last few degrees of this movement, but as a medial dynamic stabiliser during terminal knee extension (Bose et al 1980).

Hallen and Lindahl (1967) showed that vastus medialis had no specific function in the terminal extension of the knee, disproving the view that full knee extension could be achieved only by the action of this muscle. It has taken a long time to change this incorrect impression and it should not be allowed to return.

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Bose K, Kanagasuntheram R, Osman MHB. Vastus medialis oblique: an anatomic and physiologic study. *Orthopedics* 1980;3:880-3.

Goh JCH, Lee PYC, Bose K. A cadaver study of the oblique part of vastus medialis. *J Bone Joint Surg [Br]* 1995;77-B:225-31.

Hallen IG, Lindahl O. Muscle function in knee extension: an EMG study. *Acta Orthop Scand* 1967;38:434-4.

Author's reply:

Sir,

I agree with Mr M. J. Callaghan that the VMO does not work as a knee extensor and the statement made in our article did not imply that it does. It assumed general acceptance that the VMO is active as a medial dynamic stabiliser during the last phase of knee extension.

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COMPLICATIONS OF PAEDIATRIC FEMORAL NAILING

Sir,

The paper in the March 1995 issue by González-Herranz et al (1995;77-B:262-6) on the complications of femoral nailing in children emphasised the problems involving the trochanterofemoral growth plate, but attention should be drawn to the potentially more severe, although less common, complication of avascular necrosis of the femoral head itself. There is an increasing number of reports suggesting that the blood supply to the

femoral head may be in jeopardy when conventional antegrade rigid nailing is used in femoral fractures in children. Mazur, O'Malley and Cummings warned of this at the Paediatric Orthopaedic Society in 1993, and in 1994 Mileski, Garvin and Crosby reported a case in a 14-year-old of avascular necrosis of the femoral head after nailing. The clinical presentation was delayed, with signs and symptoms appearing about a year after the operation. A similar occurrence was reported in the series of 31 cases described by Beaty et al (1994). This complication had earlier been recorded in the German literature (Herzog, Affolter and Jani 1976) which was quoted by González-Herranz et al (1995).

We wish to re-emphasise the risk of this potential complication in such operative treatment of femoral fractures in children.

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N. M. P. CLARKE, ChM, FRCS
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Beaty JH, Austin SM, Warner WC, Canale ST, Nichols L. Interlocking intramedullary nailing of femoral shaft fractures in adolescents: preliminary results and complications. *J Pediatr Orthop* 1994;14:178-83.

González-Herranz P, Burgos-Flores J, Rapariz JM, et al. Intramedullary nailing of the femur in children. *J Bone Joint Surg [Br]* 1995;77-B: 262-6.

Herzog B, Affolter P, Jani L. Spätfunde nach Marknagelung kindlicher Femurfrakturen. *Z Kinderchir* 1976;19:74-80.

Mazur JM, O'Malley DE, Cummings RJ. Avascular necrosis of the femoral head following intramedullary nailing in the growing child. Paediatric Orthopaedic Society of North America annual meeting, White Sulphur Springs, 1993.

Mileski RA, Garvin KL, Crosby LA. Avascular necrosis of the femoral head in an adolescent following intramedullary nailing of the femur. *J Bone Joint Surg [Am]* 1994;76-A:1706-8.

Author's reply:

Sir,

I thank Messrs Bowyer and Clarke for their letter and agree with their comments about avascular necrosis of the head of the femur which is a rare complication (Galpin, Willis and Sabano 1994), but most severe. Herzog, Affolter and Jani (1976) described coxa valga, avascular necrosis and disturbances in the growth of the trochanter as direct consequences of the operation because of damage to the posterior ascending circumflex artery (Chung 1976). To prevent these complications Ziv, Blackburn and Rang (1984) advised against reaming and suggested retrograde introduction of the nail. Placing the reamer through the trochanter may decrease the risk of vascular damage but increases the possibility of injury to the trochanteric physis (Ogden 1995). Beaty et al (1994) have pointed out also the possibility of an unrecognised hip injury. Mileski, Garvin and Crosby (1994) and Mileski, Garvin and Huurmen (1995) believe that the aetiology of this complication is not known.

We have observed two cases of avascular necrosis of the femoral head after intramedullary nailing. Both patients had tumours and retrograde reamed nailing had been used.

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Beaty JH, Austin SM, Warner WC, Canale ST, Nichols L. Interlocking intramedullary nailing of femoral shaft fractures in adolescents: preliminary results and complications. *J Pediatr Orthop* 1994;14:178-83.

Chung SMK. The arterial supply of the developing proximal end of the human femur. *J Bone Joint Surg [Am]* 1976;58-A:961-70.

Galpin RD, Willis RB, Sabano N. Intramedullary nailing of pediatric femoral fractures. *J Pediatr Orthop* 1994;14:184-9.

Herzog B, Affolter P, Jani L. Spätfunde nach Marknagelung kindlicher Femurfrakturen. *Z Kinderchir* 1976;19:74-80.

Mileski RA, Garvin KL, Crosby LA. Avascular necrosis of the femoral head in an adolescent following intramedullary nailing of the femur. *J Bone Joint Surg [Am]* 1994;76-A:1706-8.

Mileski RA, Garvin KL, Huurmen WW. Avascular necrosis of the femoral head after closed intramedullary shortening in an adolescent. *J Pediatr Orthop* 1995;15:24-6.

Ogden JA. Editorial. Femoral shaft fractures. *J Pediatr Orthop* 1995;15:1-2.

Ziv I, Blackburn N, Rang M. Femoral intramedullary nailing in the growing child. *J Trauma* 1984;24:432-4.

RETROGRADE LOCKED NAILING OF HUMERAL SHAFT FRACTURES

Sir,

I read with interest the article entitled 'Retrograde locked nailing of humeral shaft fractures' by Rommens et al in the January 1995 issue (1995;77-B:84-9).

I have two concerns regarding this series. The first is the authors' statement that there was no "over-riding indication" for operative intervention in half (19/39) of their patients. The exposure of these patients to the inherent risks of an operative procedure, when the literature clearly documents the favourable outcome of closed treatment for such fractures, must be questioned. Even one surgical complication in this group is too many. The inclusion of this group of patients, whose outcome is intrinsically good, artificially inflates the proportion of good or excellent results in this series.

Secondly, I am surprised at the length of hospital stay for the patients with isolated injuries, an average of 10.6 days. For the group of 19 patients with isolated injuries and no over-riding indication for operation this represents over 200 inpatient-days. In the era of shrinking budgets for health care I doubt if this is cost-effective treatment for a group of patients who could have been discharged home for the cost of a well-fitted coaptation splint.

I believe that the risks and benefits of this technique would be better illustrated by a series with carefully-defined operative indications and a complete description of the postoperative regime used.

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Rommens PM, Verbruggen J, Broos PL. Retrograde locked nailing of humeral shaft fractures. *J Bone Joint Surg [Br]* 1995;77-B:84-9.

Author's reply:

Sir,

Most fractures of the shaft of the humerus can be treated conservatively. There are circumstances, however, where operative treatment of solitary lesions is justified. In their book *The rationale of operative fracture care* Schatzker and Tile mention the long spiral fracture, the short oblique fracture, the transverse fracture and failure to maintain reduction. Moreover, the co-operation of the patient is always needed for good conservative functional treatment and this may be difficult in elderly patients, in alcoholics, or in obese women with large breasts. In addition, because of their professional activities, some patients may wish rapid comfort and freedom from pain. All our patients with a solitary lesion belonged to one or more of these groups.

Retrograde nailing is not such an extensive procedure as plate and screw osteosynthesis and can be regarded as a minimally invasive procedure with biological osteosynthesis. It combines the advantages of operative and conservative treatment and its indications can be wider than for plate and screw osteosynthesis.

Every patient with a solitary fracture of the humeral shaft

cannot be treated on an outpatient basis. The decision to admit is often related to concomitant diseases, the co-operation of the patient, the age of the patient and the sociofamilial situation. The high average hospital stay of our group of patients with solitary lesions was due to the long stay of the four eldest patients all of whom were over 80 years of age.

We agree that the correct indications for intramedullary nailing and the appropriate postoperative treatment regime must be the subject of a further prospective investigation.

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OSTEOLYSIS AROUND CEMENTLESS POROUS-COATED KNEE PROSTHESES

Sir,

We read with interest the paper by Kim et al in the March 1995 issue on osteolysis around cementless porous-coated anatomic (PCA) knee prostheses (1995;77-B:236-41). We are a little surprised that the authors did not cite earlier published work (Moran et al 1991; Jones et al 1992). The paper raises some interesting questions regarding the definition of loosening and osteolysis. The distinction between the two is a grey area since loosening of a cemented prosthesis is often termed 'osteolysis' in an uncemented implant. In either event, we believe that these are radiological signs of implant failure.

We now have a long and bitter experience with the earliest version of the PCA knee. The knees have continued to fail and we have found that areas of 'simple osteolysis' may rapidly progress to gross bone destruction. This is often asymptomatic and we would not advise surgeons to wait until there is evidence of implant migration. By this stage revision is extremely difficult, often requiring a fully constrained design.

The study by Kim et al emphasises the need for continued surveillance of all new implants. We would strongly urge all surgeons who have used uncemented knee replacements to keep their patients under long-term clinical and radiological review.

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I. M. PINDER, FRCS
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Jones SMG, Pinder IM, Moran CG, Malcolm AJ. Polyethylene wear in uncemented knee replacements. *J Bone Joint Surg [Br]* 1992;74-B:18-22.

Kim Y-H, Oh J-H, Oh S-H. Osteolysis around cementless porous-coated anatomic knee prostheses. *J Bone Joint Surg [Br]* 1995;77-B:236-41.

Moran CG, Pinder IM, Lees TA, Midwinter MJ. Survivorship analysis of the uncemented Porous Coated Anatomic knee replacement. *J Bone Joint Surg [Am]* 1991;73-A:848-57.

Author's reply:

Sir,

We thank Messrs Moran and Pinder for their interest in our article. The reason why we did not cite the earlier published articles was that we were interested in osteolysis around well-fixed cementless total knee prostheses. Both articles clearly indicated a high incidence of polyethylene wear of the tibial liner in PCA cementless total knee prostheses, but did not comment on osteolysis.

We agree that the distinction between loosening of a prosthesis and osteolysis is a grey area. My earlier article (Kim 1990) reported no evidence of either loosening or osteolysis with PCA knee prostheses but our new review of the same group of patients with a longer follow-up shows a significant increase in osteolysis without loosening of the prosthesis.