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SEMICONSTRAINED ELBOW REPLACEMENT FOR DISTAL HUMERAL NONUNION

Sir,

We read with interest the article by Morrey and Adams in the January 1995 issue regarding semiconstrained elbow replacement for distal humeral nonunion (1995;77-B:67-72). The use of this elbow prosthesis has made a great improvement in the care of such injuries in the older patient or in patients in whom bone stock is insufficient for reconstruction. The results which they report are most encouraging and support the continued use of this prosthesis in that role.

In younger patients, however, there is another reasonable option. While Morrey and Adams refer to the "... very low incidence of satisfactory results" after secondary osteosynthesis for this condition reported in two earlier papers, no mention is made of a more recent study which describes a more optimistic outlook. We have published (McKee et al 1994) a series of 13 patients who had internal fixation of malunion and nonunion of intra-articular fractures of the distal humerus, using a comprehensive approach which included rigid fixation, iliac-crest bone graft, elbow release, ulnar neurolysis and early motion. The patients in this series showed a gratifying decrease in pain and increase in function, obtaining an average arc of motion of 97° postoperatively (average 43° preoperatively) and an average Morrey elbow score of 83.

Although elbow replacement remains an excellent option for the older patient, our results support the use of open reduction and internal fixation in the younger patient when bone stock permits. The two techniques complement each other and both should be available to the orthopaedic surgeon who chooses to deal with this challenging problem.

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McKee MD, Jupiter J, Toh CL, et al. Reconstruction after malunion and nonunion of intra-articular fractures of the distal humerus: methods and results in 13 adults. *J Bone Joint Surg [Br]* 1994;76-B:614-21.

Morrey BF, Adams RA. Semiconstrained elbow replacement for distal humeral nonunion. *J Bone Joint Surg [Br]* 1995;77-B:67-72.

Author's reply:

Sir,

I agree completely with the comments of Dr McKee and Dr Jupiter. It is important to emphasise that total elbow replacement is not an appropriate option for younger individuals with nonunion of the distal humerus. My surgical approach and technique for this problem in the younger age group are precisely those described in their article; the latter was not cited because our paper was submitted before it appeared in March 1994. I am sure

Authors' reply:

Sir,

We thank Åkerman and his colleagues for their comments but fear that they have not appreciated our central point. A normal ultrasound examination excludes a mass lesion and obviates the need for further examination or referral to a tumour centre. Their advocacy of fine-needle aspiration of popliteal and meniscal cysts is difficult to reconcile with their wish to see tumours referred 'untouched' to tumour centres.

They are wrong to say that ultrasound can characterise only cystic lesions since both muscle hernias (Van Holsbeeck and Introcaso 1991) and myositis ossificans (Thomas, Cassar-Pullicino and McCall 1991), which may simulate soft-tissue sarcoma clinically, have characteristic appearances. Malignant fibrous histiocytoma may present with a spontaneous haematoma and have microscopic tumour in the wall of the haematoma undetected by imaging and only found at surgery, hence our suggestion of early intervention.

The debate over the form of biopsy is by no means settled (Shives 1993). We acknowledge the excellent results achieved by Åkerman, Rydholm and Persson (1985). We continue to use fine-needle aspiration cytology but our findings of 20% false-negative and 10% false-positive results are disappointing and have been found by others (Shives 1993). Biopsy with a cutting (e.g. Tru-cut) needle or open biopsy provides specimens with the original architecture preserved and a high diagnostic accuracy and we continue to rely on such techniques. Specific tumour type and histological grade can also be established (Kissin et al 1986; Ball et al 1990; Simon and Biermann 1993).

Åkerman and his colleagues write from the perspective of a tumour centre, but our experience is as clinicians faced with patients who may (or may not) have soft-tissue masses.

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Åkerman M, Rydholm A, Persson BM. Aspiration cytology of soft-tissue tumors: the 10-year experience at an orthopedic oncology center. *Acta Orthop Scand* 1985;56:407-12.

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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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.

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