

can be accepted, it is a benign condition. Our patient has shown no deterioration in function over a long period of time, or any secondary degenerative changes in the associated joints. Previous reports of conservative treatment have described only short follow-up (Wall 1970; Herman 1973; Ahmadi and Steel 1977) and so could not comment on late dysfunction or discomfort.

The reported complications of surgery include sepsis, scars on the shoulder and at the donor site of bone grafts, and delayed or nonunion requiring reoperation (Alldred 1963; Owen 1970). Brachial plexus injury has also been reported (Toledo and MacEwen 1979). Even simple resection of the pseudarthrosis to improve the cosmetic appearance has sequelae which include a postoperative difference in length and underdevelopment of the distal fragment with drooping of the shoulder (Tachdjian 1990; Grogan et al 1991). Conservative management appears to leave mild swelling with no functional disability, and should therefore be considered.

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REFERENCES

- Ahmadi B, Steel HH. Congenital pseudarthrosis of the clavicle. *Clin Orthop* 1977; 126:129-34.
- Alldred AJ. Congenital pseudarthrosis of the clavicle. *J Bone Joint Surg [Br]* 1963; 45-B:312-9.
- Gibson DA, Carroll N. Congenital pseudarthrosis of the clavicle. *J Bone Joint Surg [Br]* 1970; 52-B:629-43.
- Grogan DP, Love SM, Guidera KJ, Ogden JA. Operative treatment of congenital pseudarthrosis of the clavicle. *J Pediatr Orthop* 1991; 11:176-80.
- Herman S. Congenital bilateral pseudarthrosis of the clavicles. *Clin Orthop* 1973; 91:162-3.
- Jenkins WJ Jr. Congenital pseudarthrosis of the clavicle. *Clin Orthop* 1969; 62:183-6.
- Owen R. Congenital pseudarthrosis of the clavicle. *J Bone Joint Surg [Br]* 1970; 52-B:644-52.
- Quinlan WR, Brady PG, Regan BF. Congenital pseudarthrosis of the clavicle. *Acta Orthop Scand* 1980; 51:489-92.
- Schnall SB, King JD, Marrero G. Congenital pseudarthrosis of the clavicle: a review of the literature and surgical results of six cases. *J Pediatr Orthop* 1988; 8:316-21.
- Tachdjian MO. *Pediatric orthopaedics*. 2nd ed. Philadelphia, etc: WB Saunders, 1990:168-74.
- Toledo LC, MacEwen GD. Severe complication of surgical treatment of congenital pseudarthrosis of the clavicle. *Clin Orthop* 1979; 139:64-7.
- Wall JJ. Congenital pseudarthrosis of the clavicle. *J Bone Joint Surg [Am]* 1970; 52-A:1003-9.

DONOR SITE MORBIDITY AT THE ILIAC CREST: COMPARISON OF PERCUTANEOUS AND OPEN METHODS

D. NEIL KREIBICH, IAN R. SCOTT, JASON M. WELLS, MICHAEL SALEH

The iliac crest is commonly used as a source for autogenous bone graft, but it may cause significant postoperative morbidity (Cockin 1971; Laurie et al 1984; Summers and Eisenstein 1989). In 1991, Saleh described a percutaneous method of harvesting bone from the iliac crest using a Meunier trephine. We have reviewed two series of patients to compare morbidity after this percutaneous approach and the standard open method.

Patients and methods. From 1985 to 1992 a total of 106 bone-grafting procedures have been performed by the senior author (MS). Of these, 86 (81.1%) were reviewed. In 73 of these procedures (in 58 patients) non-structural

bone graft had been obtained from the anterior iliac crest by one of the two methods, 40 by the percutaneous technique and 33 by an open method with careful reconstruction of the iliac crest. Because of increasing use of the newer method the mean follow-up for the percutaneous group was 16 months compared with 33 months for the open method. The indications were the same and there were no other significant differences between the groups.

Results. The percutaneous technique was associated with significantly reduced postoperative pain, less pain on walking, less sensory disturbance and less local tenderness. Figure 1 shows that postoperative pain was described as moderate or severe by 25% of the percutaneous group, but by 61% of the open group ($p < 0.02$), and also gives the numbers of patients in each group. At latest review, none of the percutaneous group had pain on walking compared with seven of the patients in the open group ($p < 0.05$). Three of the percutaneous group had abnormal sensation around the donor site compared with 13 of the open group ($p < 0.01$). There was local scar tenderness in only one patient in the percutaneous group but in nine of the open group ($p < 0.05$). We found no significant differences between the groups for chronic rest pain, hip muscle power and the ability to lie on the side of the graft.

D. N. Kreibich, FRCS, Senior Orthopaedic Registrar
Sunderland District General Hospital, Kayll Road, Sunderland SR4 7TP, UK.

I. R. Scott, FRCS, Senior Orthopaedic Registrar
J. M. Wells, MB BS, House Officer
M. Saleh, MSc, FRCS Ed, Senior Orthopaedic Lecturer and Honorary Consultant
The Limb Reconstruction Service, University Department of Orthopaedics, Northern General Hospital, Herries Road, Sheffield S5 7AU, UK.

Correspondence to Mr D. N. Kreibich at 42 Sanderson Road, Jesmond, Newcastle upon Tyne NE2 2DS, UK.

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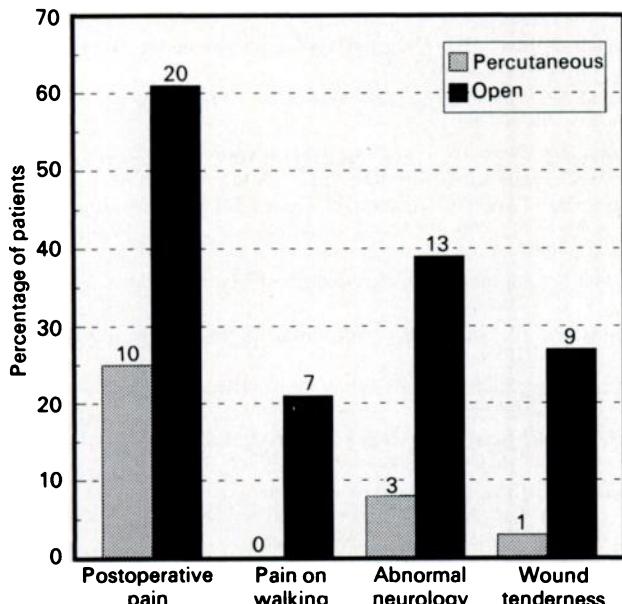


Fig. 1

There were two minor complications: one patient developed a bone spur after an open approach, and one had a small local haematoma after the percutaneous technique. In this patient the protocol had not been

followed and a drain had not been used; the wound settled, however, without surgical drainage.

Discussion. In the percutaneous method, the incision is below the crest, through the muscle bulk of the glutei. In the open method it usually lies over the crest. The percutaneous incision is smaller, and less likely to damage the subcutaneous nerves passing over the crest into the thigh. The technique requires less dissection and less muscle stripping from the outer table of the iliac wing.

For non-structural graft we now routinely use the percutaneous technique provided that not more than 10 ml of bone are required. We have found it safe, reliable and associated with decreased early and late morbidity.

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REFERENCES

- Cockin J. Autologous bone grafting: complications at the donor site. *J Bone Joint Surg [Br]* 1971; 53-B:153.
- Laurie SWS, Kaban LB, Mulliken JB, Murray JE. Donor-site morbidity after harvesting rib and iliac bone. *Plast Reconstr Surg* 1984; 73: 933-8.
- Saleh M. Bone graft harvesting: a percutaneous technique. *J Bone Joint Surg [Br]* 1991; 73-B:867-8.
- Summers BN, Eisenstein SM. Donor site pain from the ilium: a complication of lumbar spine fusion. *J Bone Joint Surg [Br]* 1989; 71-B:677-80.

PULLED ELBOW IN AN ADULT PATIENT

A. ADENIRAN, W. F. MERRIAM

'Pulled elbow' is thought to occur only in young children. We believe that there are no previous reports of its occurrence in adults.

Case report. A 21-year-old woman presented with a history of sudden onset of pain in her left elbow caused by a strong pull on her forearm. The joint was held immobile in slight flexion and pronation. There was tenderness over the radial head, and pain was aggravated by passive movement. During the positioning of her elbow for radiography, the patient felt a sudden click in the joint, with complete relief of pain. Movement returned to normal and the radiographs showed no abnormalities.

Discussion. Pulled elbow is thought to be due to radial

head subluxation in young children as a result of sudden traction on the extended elbow. Jongschaap, Youngson and Beattie (1990) reported an annual incidence of 1.2% in children aged between 5 and 66 months. Illingworth (1975) reviewed 100 cases; most were under two years of age and none was older than six years. Cyriax (1982) considered that it occurred only under eight years of age and we have been unable to find any reference to the condition in older patients.

Some deny that the syndrome exists, but others claim to have demonstrated it in cadaver experiments on stillborn infants (McRae and Freeman 1965). Amir, Frankl and Pogrund (1990) found a significant association with general joint hypermobility.

In our patient the diagnosis was made because the presenting features, apart from age, were typical, as was the 'spontaneous' reduction by the gentle supination needed for the anteroposterior radiograph.

The clinical presentation of pulled elbow is typical enough to allow an experienced doctor to manipulate without radiological examination except for the exclusion of other injuries or for medicolegal documentation. Successful reduction by full supination of the slightly

A. Adeniran, FRCS, Senior House Officer in Plastic Surgery
Salisbury District Hospital, Salisbury SP2 8BJ, UK.

W. F. Merriam, FRCS, Consultant Orthopaedic Surgeon
Coventry and Warwickshire Hospital, Stoney Stanton Road, Coventry,
West Midlands CV1 4FH, UK.

Correspondence to Mr A. Adeniran.

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