THE LATERAL CONDYLAR PROMINENCE

A COMPLICATION OF SUPRACONDYLAR OSTEOTOMY FOR CUBITUS VARUS

H. K. WONG, E. H. LEE, P. BALASUBRAMANIAM

From the National University of Singapore

We reviewed 27 patients who had supracondylar closing wedge osteotomy for cubitus varus. There were 10 excellent and 12 good results. However, of these 22 patients, 14 had a significant bony prominence over the lateral condylar region caused by lateral displacement of the elbow when closing the osteotomy. This prominence was less obvious in patients who had their osteotomy at a young age, but worse after operations near or after skeletal maturity. This difference appeared to be due to remodelling.

Cubitus varus is the commonest complication of supracondylar fracture of the humerus in children. Surgical correction usually consists of a closing wedge osteotomy. The results with various techniques and types of fixation have been reviewed by Rang (1974), and Bellemore et al (1984), but the overall appearance of the elbow after osteotomy has received little attention.

This paper draws attention to the unsightly prominence in the lateral condylar region which may compromise the result despite good restoration of the carrying angle.

MATERIALS AND METHODS

Between 1977 and 1986, 32 patients underwent corrective osteotomy for cubitus varus at the Department of Orthopaedic Surgery, National University of Singapore. Of these, 27 were reviewed, four patients could not be traced and one declined to attend. There were 23 males and four females and their ages at operation had ranged from three to 21 years. The average interval between the fracture and the corrective osteotomy was four years. The indication for osteotomy in all cases was the unacceptable appearance of the cubitus varus deformity. The follow-up period ranged from one to nine years (average 4.5 years).

All patients had been treated by excision of a laterally based wedge of bone from the supracondylar region, the osteotomy closing around a medial periosteal or cortical hinge. The surgical approach was lateral in 18 cases and posterior in nine. The osteotomies were fixed with Kirschner wires in 23 patients and by contoured plates in three. One patient had fixation of the osteotomy by the method of French (1959).

At review, the carrying angle and the range of motion of both elbows were measured. The difference between the measurements of the operated and the normal elbow was used to classify the results into excellent, good and poor categories (Bellemore et al 1984).

The overall appearance of the elbow in patients who had excellent and good results after osteotomy was studied. In particular, attention was directed to the presence of a bony prominence over the lateral condylar region at the site of the osteotomy. Objective assessment of this lateral bony prominence was made by measuring on standard anteroposterior radiographs of the operated and the normal elbow (see Fig. 1).

The lateral prominence index (LP) is the difference between the measured medial and lateral widths of the bone from the longitudinal mid-humeral axis, and is expressed as a ratio of the total width of the distal humerus to minimise errors from magnification and variations of size of individual humeri. We measured 19 sets of radiographs, the unoperated elbows being used as controls. The lateral condylar prominence was then correlated with the age of the patient at osteotomy.

H. K. Wong, MMed Surg(Sing), FRCS G, MCh Orth, Senior Lecturer in Orthopaedic Surgery
E. H. Lee, MD, FRCS C, Associate Professor in Orthopaedic Surgery
P. Balasubramaniam, FRCS, Professor in Orthopaedic Surgery
Department of Orthopaedic Surgery, National University Hospital, Lower Kent Ridge Road, Singapore 0511, Republic of Singapore.

Correspondence should be sent to Dr H. K. Wong.

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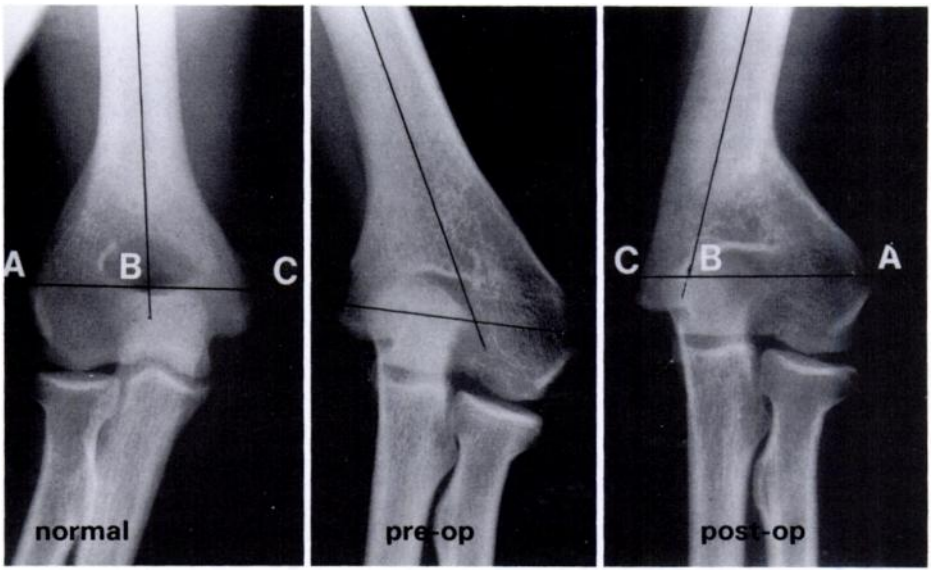


Fig. 1

The lateral prominence index LP = (AB-BC)/AC. There is normally a slight medial prominence, the LP being predominantly negative. With lateral displacement after osteotomy, the LP becomes positive.

RESULTS

There were 10 excellent, 12 good and five poor results with respect to restoration of carrying angle and preservation of the range of motion in the elbow. However, of the 22 patients who had good or excellent results, 14 were noted to have a significant bony prominence at the lateral condylar region. In six of them, the prominence was large. It is due to lateral displacement of the distal fragment when the osteotomy is closed. It was made more noticeable by wasting of the arm muscles and tethering of the surgical scar. The worst cosmetic results were in patients with residual varus deformity. Figure 2 shows the lateral bulge in three of the patients.

The effect of age at operation on the LP is shown in Figure 3. The lateral prominence increased markedly when the operation was done after the age of about 12 years. When present after osteotomy in the very young, the lateral prominence improves by remodelling during growth. Figure 4 shows a patient who had osteotomy at the age of five. His prominent lateral condyle had remodelled six years later.

DISCUSSION

Our results of closing wedge osteotomy are comparable with those of other series (Rang 1974; Bellemore et al 1984; Oppenheim et al 1984) in terms of the usual criteria, restoration of the carrying angle and preservation of elbow motion. However, there was a poor cosmetic appearance of the elbow in many of our patients, because of a bony prominence in the lateral condylar region.

The cause of the prominence is inherent in the design of the osteotomy. Excision of the wedge leaves two fragments of unequal width. Hinging on the medial cortex while closing the osteotomy effectively shifts the distal fragment laterally. Lack of remodelling in the older age groups results in persistence of the prominence.

It has been suggested by Williams and by Smith

Fig. 2

The lateral condylar prominence causes an S-shaped deformity. Residual varus after osteotomy (right) accentuates the lateral prominence.

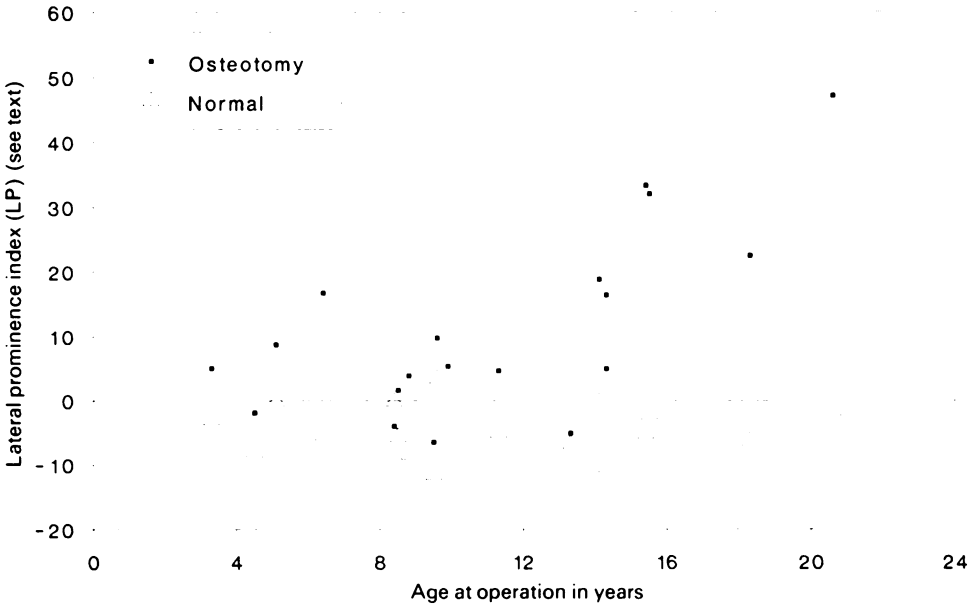
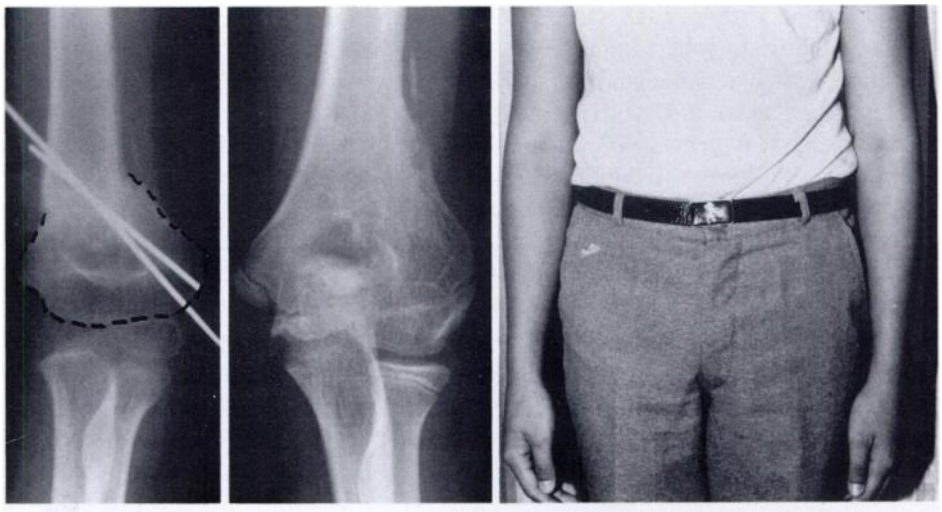


Fig. 3

The lateral prominence increases with the age of the patient at osteotomy. There is lack of remodelling after the age of 12 years. The LP on the unoperated humerus does not alter with age.



Lateral displacement of the elbow is present in the postoperative radiograph. Six years later there is restoration towards the normal.

Fig. 4

during discussion that the cosmetic result could be improved by medial displacement of the distal fragment (Nasser 1974; Sweeney 1975), and a technique for achieving this at a late correction operation has recently been described by Laupattarakasem et al (1989).

Where possible, closing wedge osteotomy for cubitus varus should be done at an early age when remodelling of the distal humerus can be depended upon to give a good cosmetic result. When the operation is performed on a patient nearing skeletal maturity, medial displacement of the distal fragment will avoid the lateral prominence at the elbow.

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REFERENCES

Bellemore MC, Barrett IR, Middleton RWD, Scougall JS, Whiteway DW. Supracondylar osteotomy of the humerus for correction of cubitus varus. *J Bone Joint Surg [Br]* 1984; 66-B:566-72.

French PR. Varus deformity of the elbow following supracondylar fractures of the humerus in children. *Lancet* 1959; ii:439-41.

Laupattarakasem W, Mahaisavariya B, Kowsuwon W, Saengnipanthkul S. Pentalateral osteotomy for cubitus varus: clinical experiences of a new technique. *J Bone Joint Surg [Br]* 1989; 71-B:667-70.

Nasser A. Correction of varus deformity following supracondylar fracture of the humerus. *J Bone Joint Surg [Br]* 1974; 56-B:572-3.

Oppenheim WL, Clader TJ, Smith C, Bayer M. Supracondylar humeral osteotomy for traumatic childhood cubitus varus deformity. *Clin Orthop* 1984; 188:34-9.

Rang M. *Children's fractures.* Philadelphia, etc: JB Lippincott Company, 1974:95-104.

Sweeney JG. Osteotomy of the humerus for malunion of supracondylar fractures. *J Bone Joint Surg [Br]* 1975; 57-B:117.