

Osteotomy for cubitus varus

A simple technique in 10 children

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10 children with cubitus varus deformity after supracondylar fractures were operated on with a supracondylar lateral closing wedge osteotomy. The medial cortical periosteal hinge was left intact and the osteotomy stabilized with two Kirschner wires

and a tension-band wire loop. The osteotomies healed within 2 months, without any complications or recurrence of the deformity. The outcome was satisfactory as regards both cosmesis and mobility.

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Cubitus varus is the commonest complication of supracondylar humerus fractures in children. The deformity is a result of malunion, including medial tilting, extension and internal rotation of the distal fragment. Although the deformity seldom produces any functional loss, bad cosmesis sometimes indicates a need for correction.

Several methods of corrective osteotomy have been described. These include simple lateral closing wedge osteotomy (French 1959, Carlson and Rosman 1982, Bellemore et al. 1984, Oppenheim et al. 1984, Danielsson et al. 1991, Gaddy et al. 1994, Hernandez and Roach 1994), step-cut osteotomy (DeRosa and Graziano 1988, Laupattarakasem and Mahaisavariya 1989), dome osteotomy (Kanauija et al. 1988) and multiplanar osteotomy (Uchida et al. 1991). We report a simplified technique used in 10 children.

Patients and method

Between 1990 and 1994, we operated on 6 boys and 4 girls for cubitus varus secondary to supracondylar fracture of the humerus. Their age at injury was 3 (2-4) years and at surgery 4 (3-5) years. The interval between fracture and osteotomy was 4-12 months.

The humeral-elbow-wrist (HEW) angle was measured clinically with the elbow in full extension and supination. The preoperative varus deformity was 18 (10-30) degrees (Table 1).

Operative procedure

Using a tourniquet, a 4 cm incision was made over the lateral epicondyle, extended proximally along the lateral supracondylar ridge of the humerus. The distal incision curved posteriorly to midway between the

Table 1. Clinical data of 10 children with cubitus varus deformity who underwent osteotomy

Case	Sex	Side	Age (yr)		Interval (mo)	HEW-angle		Range of motion		RC	Healing (wk)	Follow-up (mo)
			injury	op		preop	postop	preop	postop			
1	M	L	3	4	8	-15	+8 (+8)	0-135	0-135	-	7	22
2	F	L	4	5	7	-20	+6 (+8)	5-125	0-135	+	8	13
3	F	R	3	4	10	-15	+5 (+5)	0-125	0-125	-	7	18
4	M	L	3	4	9	-20	+3 (+5)	0-120	0-125	+	7	12
5	M	R	4	4	4	-18	+5 (+5)	0-115	0-130	-	8	16
6	F	L	3	4	6	-15	+4 (+6)	5-120	0-125	-	7	10
7	M	L	4	5	12	-10	+8 (+5)	5-120	0-130	-	8	8
8	F	L	4	4	4	-14	+5 (+5)	0-120	0-130	+	8	11
9	M	L	2	3	5	-30	+3 (+5)	0-120	0-125	-	6	10
10	M	R	3	4	8	-16	+3 (+3)	0-125	0-130	-	8	6

HEW humero-elbow-wrist, + valgus angle, - varus angle (normal side), RC rotational correction.

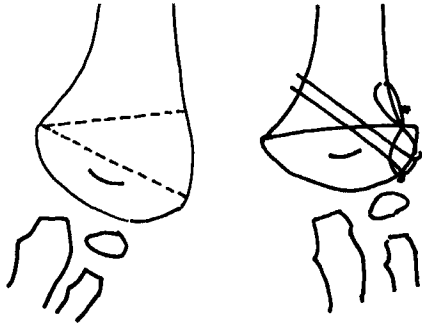


Figure 1. The supracondylar lateral closing-wedge osteotomy with intact cortical periosteal hinge fixed with 2 K-wires and tension-band wire loop.

tips of the lateral epicondyle and the olecranon. By subperiosteal dissection, the brachioradialis muscle was displaced anteriorly and the triceps muscle was displaced posteriorly. A laterally-based wedge osteotomy was made, the size of which was calculated by the difference between the HEW angles on the deformed and the healthy sides. A medial cortical periosteal hinge was preserved, the defined wedge was removed and the hinge was broken. Some degree of internal rotational deformity could be corrected by rotating the distal fragment backwards, using the medial hinge as a fulcrum. The osteotomy was stabilized by using two Kirschner wires combined with a figure of 8-tension-band wire loop (Figure 1).

The elbow was immobilized in a long-arm posterior slab in 60-degree flexion for 3 weeks. The internal fixation was removed after the osteotomy was completely healed, usually after 3 months.

Results

All osteotomies healed within 8 weeks without any complications (Figure 2). At follow-up, 13 (6–22) months after the operation, the HEW angles were within 3 degrees of difference from that of the normal side. There was no loss of correction postoperatively. The range of motion was unchanged or improved in all cases.

Discussion

Although many reports concerning correction of cubitus varus deformity have been published, there is no agreement on the best time for correction. Most series report experience in older children aged 10–14 years (Carlson and Rosman 1982, McCoy and Piggot 1988, Laupattarakasem et al. 1989, Gaddy et al. 1994). Some authors recommend early correction during childhood which improves remodeling of an extension deformity and a lateral prominence (Bellemore et al. 1984, Wong et al. 1990, Voss et al. 1994). When corrective osteotomy is performed in small children, Voss et al. (1994) has recommended a lateral closing wedge osteotomy. The intact medial periosteal cortical hinge provides some inherent stability and allows more control of the osteotomy fragments.

Although this simple wedge osteotomy may create some degree of lateral prominence, this prominence could be minimized when the distal osteotomy cut is performed close to the joint line just above the olecranon fossa (Voss et al. 1994). In our patients, the lateral prominence was clinically imperceptible in all cases.



Figure 2. Case 1. Preoperative deformity and healing of the osteotomy after 2 months.

Several techniques for stabilizing the osteotomy have been reported, including the K-wire (Sweeney 1975, Oppenheim et al. 1984), K-wire and screw (Laupattarakasem et al. 1989), screws and wire loop (French 1959, Bellemore et al. 1984, McCoy and Piggot 1988), plate and screws (Hernandez and Roach 1994) and staples (Carlson and Rosman 1982, Danielsson et al. 1991). However, most of these techniques are not applicable to a very distal osteotomy with a very small distal osteotomy fragment. Although K-wire fixation was found to be unreliable and many complications were reported in some series (Sweeney 1975, Oppenheim et al. 1984, Ippolito et al. 1990), we found the technique effective, when combined with a tension-band wire loop. This fixation technique will be more stable when the medial cortical periosteal hinge is left intact.

Correction of the rotational deformity is still controversial. However, partial correction of the severe internal rotational deformity may be sufficient to improve cosmesis (Uchida et al. 1991, Mahaisavariya and Laupattarakasem 1994). Although the medial cortical periosteal hinge is intact, some correction of the rotational deformity is possible without loss of stability and without problems of fixation or of stability.

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