

Cubitus varus in adults correction with lateral closing wedge osteotomy and fixation with posterior plating

S. Pandey¹, A. Shrestha², S. Dhakal³, G. Neupane⁴, A.P. Regmi⁵

¹Associate Professor, ^{2,5}Professor, ^{3,4}Lecturer, Department of Orthopedics, Chitwan Medical College, Bharatpur, Nepal

ABSTRACT

To share the result of lateral closing wedge osteotomy and fixation with posterior reconstruction plate in correction of cubitus varus in adults. It is a retrospective case analysis of 8 cases of cubitus varus in adult treated with lateral closing wedge osteotomy through posterior triceps retracting approach. Internal fixation was done with two posterior reconstruction plates. All cases were from 15 to 29 years of age (mean 22.3) with 3 female and 5 male. All had cubitus varus ranging from 15- 28 deg (mean 20.16 deg) due to childhood malunited supracondylar fracture of humerus. Indication for operation was cosmetic reason only. Follow up duration was 4-22 months (mean 12.5 months). All the osteotomy united clinically in mean duration of 9 weeks (range 8-12 weeks) with mean carrying angle 8.33 degree in postoperative phase. There was no loss of motion, no loss of fixation, no surgical site infection, nonunion or neurovascular deficit. Lateral closing wedge corrective osteotomy and fixation with posterior reconstruction plate is easy technique with satisfactory result in correction of cubitus varus in adults.

Key words: cubitus varus, lateral closing wedge osteotomy, plating.

Introduction

Cubitus varus is the most common delayed complication due to malunion of childhood supracondylar fracture of humerus. Its incidence is higher upto 58% when managed conservatively with closed reduction and slab application.^{1,2} Medial tilt and medial rotation are the most important contributing factors for varus deformity. With easy access of C-arm, closed reduction and percutaneous pinning is the treatment of choice in displaced fractures of supracondylar region of humerus in children. This allows better assessment and achievement of anatomical or near anatomical reduction intraoperatively thereby

reducing the late complication of malunion. This deformity rarely poses any problem with function or range of motion. Most patients come for correction due to cosmetic reason. It is better corrected during childhood with different methods of corrective osteotomy. Correction of cubitus varus in adult and fixation is challenging due to mature skeleton, inherent instability at osteotomy site, risk of delayed union and nonunion, implant failure, infection, stiffness and neurovascular complications. There are different methods of corrective osteotomy and fixation technique described in treatment of adult cubitus varus. We hypothesize that this deformity can be corrected with simple lateral closing wedge osteotomy and fixation with

Correspondence: S. Pandey

E-mail: pandeys59@yahoo.com

two posterior reconstruction plate with satisfactory result.

Materials and methods

This is a retrospective and preliminary study of the 8 cases of cubitus varus in adult treated in Chitwan Hospital Pvt.Ltd. and Chitwan Medical College Teaching Hospital from 2007 June to 2011 August. Old case sheets were collected from the record and data collected about the sociodemographic profiles, preoperative state of deformity, operative details and postoperative data. Analysis of the data regarding the correction of deformity, range of motion, lateral condylar prominence after solid union was done. Preoperative X-ray was taken for each patient with both the elbow in full extension and forearm in full supination parallel to each other anteroposterior film and lateral film of affected elbow. Pre-operative carrying angle (humeroradioulnar wrist angle) was measured as angle between the bisecting line of arm and forearm in both normal and affected side. Lateral prominence index was measured in both preoperative film and last follow up film as shown in figure below.



The lateral prominence index (%) was measured on the (A) preoperative and (B) postoperative radiographs using the formula, $(CB-AB)/AC \times 100$. It is usually negative in normal elbows.

Varus angle at the affected side and angle to be corrected with lateral closing wedge osteotomy was calculated preoperatively.

Surgical Technique

Patients were operated under brachial plexus block or general anaesthesia with patient in lateral position and affected side up. Through posterior triceps retracting approach, distal humerus was exposed on posterior, lateral, medial side subperiosteally at the supracondylar region trying to leave the medial periosteum intact. Osteotomy site and lateral wedge marked with scale and wedge with lateral base osteotomized with the help of saw or drill bit and osteotome leaving the medial cortex and periosteum intact. Osteotomy completed breaking the medial cortex and reduction done to correct the varus deformity and restoring the near normal carrying angle. Then fixation of the fracture was done with posterior two 5 or 6 hole reconstruction plate and screw. Reduction, fixation and correction of deformity checked on C arm before closure. Long arm slab applied with elbow in 90 degree of flexion.

Wound inspection and dressing was done on 2nd and 4th postoperative day and case was discharged on 4th postoperative day. Suture was removed on 14th day and slab continued for 4 weeks more in 6 cases. In two cases slab was removed at 2 weeks and only arm pouch sling continued for 4 more weeks. Range of motion exercise was started at 6 weeks of operation and follow up X ray done at 2, 6, 10, 14 weeks. Range of motion, union, carrying angle, lateral prominence index was measured at final follow up and result analysed.

Results

There were total of 8 cases of young adults age ranging from 20-29 years (mean 22.3) with cubitus varus deformity of elbow ranging from 15-28 deg (mean 20.16). There were 5 male and 3 female with right hand in 5 cases. Follow up duration is from 4-22 months. All had developed deformity due to childhood malunited supracondylar fracture managed conservatively. All corrective osteotomy united clinically at 8-12 weeks (mean 9.3 weeks). Mean carrying angle was 8.3 degree with range 5-10 degree postoperatively which is near equal to normal side. There was no loss of motion postoperatively. Flexion was 130-140 deg

(mean 135) preoperatively and 130-140 deg (mean 134.3) at final follow up which is equal to normal side range of motion of 130-140 deg (mean 135). There was hyperextension of 10 deg in one case which is not clinically significant. Mean lateral prominence index was 5.25 deg (Range 2.3-7.5) preoperatively and improved to -11.58 deg (range -5 to-21.4) postoperatively. There was no case with loss of fixation, surgical site infection, nonunion or any neurovascular complication. All were happy with the result as compared to preoperative state except one case complained mild lateral condylar region prominence.

Patient data is given below.

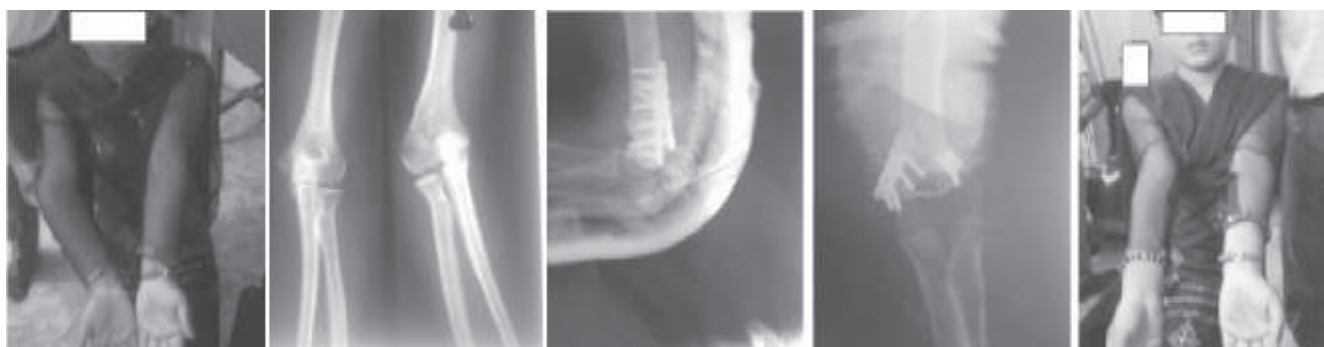
Age	Sex	CA Normal	CA Varus	CA Postop	ROM pre op	ROM Post op	Extension	Union time	Lat C index pre op	Lat C Index Post op
18	M	10	15	7	130	130	0	8	4.5	-10.5
17	M	8	12	5	140	135	0	10	2.3	-12.6
18	F	7	15	10	140	140	0	10	5.2	-8.2
20	F	8	15	8	130	130	10	12	7	-5
26	M	8	20	8	130	135	0	8	3.6	-14.3
20	F	5	18	7	140	135	0	8	6	-9
29	M	6	25	7	130	130	0	8	7.5	-21.4
21	M	7	28	10	140	140	0	10	5.2	-10.6

Discussion

There are different corrective osteotomy techniques described like lateral closing wedge, medial open wedge, step cut translational osteotomy, dome osteotomy and pentalaral osteotomy in treating cubitus varus deformity.^{3,4} There are different fixation techniques in practice like pins, screw, lateral plating posterior plating, each has got its own advantage and disadvantage. Correction in adult is different and difficult due to mature skeleton, increased instability at

osteotomy site, delayed union and chance of stiffness.⁵ In our study all cases had good correction of deformity with restoration of carrying angle to near normal. All united well with achievement of preoperative range of motion.

There are few studies of cubitus varus in adult corrected with different techniques of osteotomy and internal fixation in the literature.



Cubitus varus preop

Preop x-ray

Post op x-ray

Correction at 3 months

Laupatterkasen et al in his study of Pentalateral osteotomy⁶ in 108 patients at the mean age of 14 years had shown satisfactory results, but information on patients older than 15 years was lacking. Matsushita et al had done Arc osteotomy⁷ in his study in three postpubertal patients with the mean age of 20 years, with pinning and 6 to 8 weeks of cast immobilization. In two of the three patients, total arc of motion decreased: in one patient by 40 deg and in the other by 10 deg. In a study of the dome osteotomy by Tienet al,⁸ olecranon osteotomy was done for two postpubertal patients to apply the plate posteriorly, and these patients lost motion by 20 to 30 deg. In a study done by Chung et al operated with three-dimensional osteotomy³ for 23 adult patients, there was one nerve palsy associated with pinning and one myositis ossificans. In a step-cut osteotomy⁹ done by Kim et al the triceps muscle was divided to apply the Y-plate posteriorly. Although the triceps-splitting approach has been used safely for many elbow surgeries, peak triceps torque does not recover fully and the deficit is still 3% to 6% at 3 years and 6 months (3.5 years) after triceps division. We are doing study for correction of cubitus varus deformity in adult with posterior reconstruction plate following lateral closed wedge

osteotomy through posterior triceps retracting approach in lateral position and early results are promising.

Limitation of our study is less sample size and hence no comparison with other study results. We have not carried out preoperative and postoperative elbow score and statistical tools due to limited number of cases, however early results are promising. This method of correction is easy and fixation is stable with satisfactory results.

Conclusion

In this small study we can say that lateral closing wedge corrective osteotomy and fixation with posterior two reconstruction plate via posterior triceps retracting approach is easy technique with satisfactory result in correction of cubitus varus in adults.

References

1. C.S. Carlson, M.A. Rosman. Cubitusvarus: a new and simple technique for correction. *J PediatrOrthop.* 1982;**2**:199–201.
2. A. Hoyer. Treatment of supracondylar fracture of the humerus by skeletal traction in an abduction splint. *J Bone Joint Surg* 1952;**34**:623–37.

S. Pandey et al. Cubitus varus in adults correction with lateral closing wedge.....

3. M.S. Chung, G.H. Baek. Three-dimensional corrective osteotomy for cubitusvarus in adults. *J Shoulder Elbow Surg.* 2003;**12**:472–5.
4. Y. Uchida, K. Ogata, Y. Sugioka. A new three-dimensional osteotomy for cubitusvarus deformity after supracondylar fracture of the humerus in children. *J Pediatr Orthop.* 1991;**11**:327–31.
5. Hyun Sik Gong, Moon Sang Chung, Joo Han Oh, Hoyune Esther Cho, and Goo Hyun Baek. Oblique Closing Wedge Osteotomy and Lateral Plating for CubitusVarus in Adults. *ClinOrthopRelat Res.* 2008; **466**(4): 899–906.
6. W. Laupattarakasem, B. Mahaisavariya, W. Kowsuwon. Pentalateral osteotomy for cubitusvarus: clinical experiences of a new technique. *J Bone Joint Surg Br.*1989;**71**:667–70.
7. T. Matsushita, A. Nagano. Arc osteotomy of the humerus to cor-rectcubitusvarus. *Clin Orthop Relat Res.* 1997;**336**:111–5.
8. Y.C. Tien, H.W. Chih, G.T. Lin, et al. Dome corrective osteotomy for cubitusvarus deformity. *Clin Orthop Relat Res.* 2000;**380**:158–66.
9. H.T. Kim, J.S. Lee, C.I. Yoo. Management of cubitusvarus and valgus. *J Bone Joint Surg Am.* 2005;**87**:771–780.