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Our Experience of Dome Osteotomy in Cubitus Varus Associated Triple Deformity.

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Abstract: *Tripple deformity of elbow in association with cubitus varus can be treated by dome osteotomy. In this study we assess the strength of fixation after a dome osteotomy for cubitus varus associated with triple deformity in terms of union and complications. We conclude with this study that dome osteotomy has its own advantages in correcting the deformity for cosmesis and also by not leaving the prominent lateral condyle after deformity correction unlike other osteotomies. Securing the osteotomy with 2 plates provide sufficient rigidity allowing functional mobility and thereby good outcome.*

I. Introduction

Tripple deformity of elbow involves coronal, sagittal and axial malalignement of distal end humerus. The most common variables of triple deformity in cases of cubitus varus are medial angulations, medial rotation, super-growth of the lateral condyle and osteonecrosis or medial condyle growth retardation. Poor reduction, poor union or non-union, bone bar in physes are the most common contributing factors for cubitus varus deformity following a childhood injury to elbow. Often the common indication for patients with triple deformity with good range of motion would be cosmetic. There are various osteotomies described to correct this deformity, with each one having its own advantages and disadvantages. Many reports have described various osteotomy techniques and their results for correction of these 3-dimensional deformities, using methods such as cross-pin fixation, plating, and external fixation.[1-4] Because each technique has its own advantages and disadvantages, there is no consensus on which produces the better final result, especially in adults. We hypothesise the advantages of dome osteotomy in adults add stability to osteotomy site than a closed wedge or open wedge osteotomy. We prefer dual plating after a dome osteotomy with four cortices holding each side using two plates giving enough stability to the osteotomy and achieve good functional outcome. In this study we present our experience of using dual plates after a dome osteotomy for triple deformity of elbow correction .

II. Methodology

During 2012-2016, 11 patients with cubitus varusunderwent corrective dome osteotomy were included in the study. All the deformities resulted from malunion of distal humeral supracondylar fractures and one patient had medial condyle osteonecrosis at presentation. There were 8 males and 3 females with mean age of 18.2 years at presentation (Range : 16-21 years). The average follow up was 8.5 months (Range : 6 months - 22 months).Preoperatively patient was clinically evaluated and the deformity was assessed. Cubitus varus was measured on a radiograph of involved extremity in extension and full supination, where in the humero-ulnar angle at elbow was measured. Hyperextension was assessed clinically with goniometer and range over the normal side is considered as deformity. Internal rotation deformity was clinically assessed as described by Yomomoto et al by having the patient bend slightly forward, placing the forearm behind the elbow flexed 90 and the shoulder hyper- extended maximally. In this position, maximum internal rotation strain is applied to the patient's arm. The angle formed between the horizontal plane of the back and the midline of the forearm represents the internal rotational deformity [5]. The necessary correction is planned on comparing carrying angle with the opposite side.

In lateral decubitus position, using posterior approach, triceps is reflected using a tongue shaped flap. Ulnar nerve is isolated and anteriorly transposed to avoid its stretching. The apex of the osteotomy site is marked about 2 cm from tip of olecranon with elbow extended. Osteotomy level is marked with cautery and a midline is marked to check the correction intra operatively.Temporary stabilisation is done with 2 k-wires. A narrow DC (dynamic compression) plate is contoured on the lateral aspect such that 2 screws can be placed each proximally and distally. Another small plate is placed on posterior aspect attaining purchase in 4 cortices. Elbow ROM is allowed as tolerated. Patients are followed up every monthly for six months and thereafter every 3rd month. Elbow range of movements, complications and radiological healing were assessed.

III. Results

The average varus deformity at elbow was 12.2 degrees (Range : 6-23), average internal rotation deformity was 17.4 degrees (Range : 10-30) and average hyperextension deformity was 6 degrees (Range 0-28). The average ROM was 136.8 (range, 120-155) preoperatively and 129.1 (range, 110-147) postoperatively. Hyperextension deformity was corrected on an average of 5 degrees in all the patients with pre operative existing deformity of more than 10 degrees. There were no cases of infection or implant failure. Average time for bone healing was 14 weeks (Range 12-20) in our series. Four patients required implant removal after bone healing due to prominent hardware on lateral aspect. One patient had decreased sensation in ulnar nerve distribution area that improved within 1 month of time. There was no recurrence of deformity in the study group.

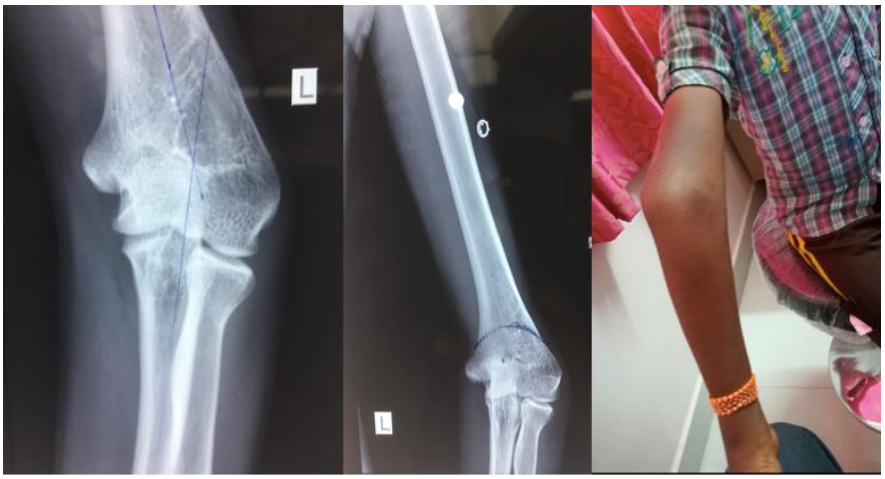

Fig 1 : Pre op profile picture of a patient with cubitus varus associated triple deformity.

Fig 2 : Post op x ray after deformity correction post dome osteotomy.

IV. Discussion

Osteotomies for deformity correction around elbow are well described in literature with its own advantages and disadvantages. Lateral wedge closing osteotomy is a simpler procedure however leaves a more prominent lateral condyle that some times may not be cosmetically acceptable. Step osteotomy could be complex when correcting multiplanar deformities. Dome osteotomy is much simpler procedure involving only one step for osteotomy and for its ability to correct sagittal, coronal and axial plane alignments. The dome osteotomy enhances mechanical stability compared to other techniques, because it has a centre of rotation in the midline of the humerus.[6]This would allow the lateral condyle to translate under the dome of osteotomy and leaving non prominent lateral condyle. The broadbony contact surface and no shortening of the humerus after correction can also be considered as advantages. Careful dissection and anterior transposition of ulnar nerve prevented stretching of it and thereby no complications related to it. In one case of cubitus varus deformity (

varus 18 degrees), we observed decreased sensation in ulnar nerve distribution that regained in a month. It could be due to handling of the nerve while anterior subcutaneous transposition.

There was no bony healing problem at the level of osteotomy in the adult group in our study. The stable implant fixation along with level of osteotomy being meta-diaphysial junction allowed good healing of the bone. Stable construct of fixation with 2 plates allowed us to mobilise ealry and thereby achieve good range of motion as pre operatively.

V. Conclusion

Dome osteotomy has its own advantages in correcting the deformity for cosmesis and also by not leaving the prominent lateral condyle after deformity correction unlike other osteotomies. Securing the osteotomy with 2 plates provide sufficient rigidity allowing functional mobility and thereby good outcome.

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