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RESEARCH ARTICLE

LATERAL CLOSING OSTEOTOMY FOR THE TREATMENT OF CUBITUS VARUS IN CHILDREN: ABOUT 32 CASES

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Abstract

Cubitus varus is the most common complication of supracondylar fractures of the elbow in children regardless of therapeutic modalities. The main purpose of surgical correction is to improve the cosmetic appearance and prevent functional impairment such as limitation of the elbow flexion, instability and ulnar nerve palsy. Several techniques has been described. However, the best treatment of cubitus varus deformity remains its prevention by combating traditional treatment, especially in our context. Our report is a retrospective study about 32 cases of post-traumatic cubitus varus correction performed in the surgical pediatric department of mohammed the vith university hospital center of marrakech during a period extending from february 2011 to november 2017. A minimum of 1-year post-trauma was respected and solfelt's criteria were used to assess our results. Our study included 23 males and 9 females. The average age was 9,4 years old. The x-ray of the elbow was performed in all our patients. The average preoperative baumann's angle was 108,5 °, and the average carrying angle was 20,6°. All patients underwent a lateral closing osteotomy when the varus was equal or superior to 15°. The main complications recorded in our series were residual varus in two cases, elbow stiffness in three cases and superficial infection in one case. After a mean follow-up of 45,5 months, the results were excellent in 78% of cases, good in 6% of cases, and poor in 16% of cases. The cubitus varus is responsible for functional discomfort and aesthetic damage which can considerably affect the child and his family. Lateral closing osteotomy is an interesting technique since it allows to re-establish the limb axis with a low rate of complications. However, the best treatment of this deformity remains prevention.

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Introduction:-

Cubitus varus deformity is the most common and dreaded late complication of elbow fractures, especially displaced supracondylar fractures in children.

Cubitus varus is a triplanar deformity including varus, extension and internal rotation (takeyasu y, 2011). It is secondary to a supracondylar vicious callus, that occurred because of an imperfect reduction or a secondary displacement, without any tendency for spontaneous correction.

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The main purpose of surgical correction is to improve the cosmetic appearance and prevent functional impairment such as limitation of the elbow flexion, instability and ulnar nerve palsy.

Several techniques has been described, such as medial open wedge osteotomy, lateral closing wedge osteotomy known as french osteotomy, dome osteotomy...(verka ps, 2017). However, the best treatment of cubitus varus deformity remains its prevention by combating traditional treatment, especially in our context.

The aim of our study was to evaluate the results of lateral closing osteotomy for the correction of cubitus varus deformity after post-traumatic supracondylar fractures in children.

Patients and Methods:-

Our report is a retrospective study about 32 cases of post-traumatic cubitus varus correction performed in the surgical pediatric department of mohammed the vith university hospital center of marrakech during a period extending from february 2011 to november 2017. A minimum of 1-year post-trauma was respected and solfelt's criteria were used to assess our results.

The inclusion criteria were age of patients less than 16 years and cubitus varus deformity secondary to post-traumatic supracondylar fractures.

Results:-

Our study included 23 males (71,82%) and 9 females (28,11%). The age ranged between 4 and 15 years old, with an average age of 9,4 years old. The left side was involved in 62,5%. The mean delay from injury to surgery was 30 months. The x-ray of the elbow was performed in all our patients (figure 1). The average preoperative baumann's angle was $108,5^{\circ}$, and the average carrying angle was $20,6^{\circ}$. All patients underwent a lateral closing osteotomy when the varus was equal or superior to 15° . The fixation of the osteotomy was performed by 2 pins in 9 cases, 3 pins in 15 cases, 4 pins in one case, a staple in 1 case, 2 staples in 3 cases and screws in 3 cases. The average postoperative baumann's angle and carrying angle were $77,5^{\circ}$ and $10,3^{\circ}$ respectively. The main complications recorded in our series were residual varus in two cases, elbow stiffness in three cases and superficial infection in one case. After a mean follow-up of 45,5 months, the results were excellent in 78% of cases (figure2), good in 6% of cases, and poor in 16% of cases.



Figure 1:- a) clinical appearance of left elbow varus deformation secondary to supracondylar fracture treated by traditional healer in an 8-year-old. B) x-ray showed a varus of 25° in the left elbow compared to the right.



Figure:- Clinical and radiological aspects 1 year after valgisation and deflection osteotomy with a postoperative baumann's angle of 82° .

Discussion:-

The treatment of cubitus varus is surgical. The purpose of the treatment is to restore the physiological valgus. Distal subtraction osteotomy is the most commonly used surgical technique, because of its facility and satisfactory results and low rate of complications (solfelt da, 2014). Nevertheless, this type of osteotomy does not allow correction of rotational deformation (le pointe hd, 2000). The removed bone corner must have an angle corresponding to the correction measured preoperatively in x-ray. This angle is equal to the value of the physiological valgus measured on the normal limb added to the angle of the true varus. Some authors (lascombes p, 2008; beslikas ta, 1999) suggest deflection osteotomy associated with valgisation in patients who have functional discomfort associated to aesthetic discomfort. It allows the correction the elbow stiffness especially when it concern the flexion.

Methods of fixations varies across series:

Kasse et al, in their 18 cases study, fixation was achieved by cross pinning in all patients. The results were excellent in 33,3 % and good in 55 % of cases. He concluded that this fixation method was accompanied by significant nerve and joint complications such as ulnar paralysis and stiff joints, and that does not always give satisfactory results (kasse an, 2017).

In the kohler series of 34 cases, all patients underwent osteosynthesis by a single screw. He noted 20% of secondary displacement of the osteotomy. He concluded that this type of fixation is unstable and does not allow to achieve good results (kohler r, 1998).

For p.lascombes, the screw-in plate with four holes is preferable for osteosynthesis, since it offers more stability and efficiency than a double parallel or cross pinning (lascombes p, 2008).

Carlson described fixation by blount staple. This system may be interesting when the internal cortical is not broken (carlson jr sc, 1982).

Bellemore (bellemore mc, 1984), in his series of 27 cases, fixation was carried-out in 13 patients by placing two screws on both sides of the osteotomy, the screw's heads were then connected by a metal tape (french pr, 1959). This method was used only one time in our series with excellent results.

For other authors, the pins seem to be an easier way to fix, compared to screw, plate or even staple fixation because all require bone perforation (paraskevas, 2004; eamsobhana p,2013; ibrahim ma 2018).

In our series, all patients were treated with lateral closing osteotomy, performed by kirchner pins in 81,25% of cases. The results were excellent and good in 83.15%.

Concerning the age of surgery, it must be proposed before 11 years-old, rather than waiting until the end of the skeletal maturity, in order to leave a period of 2 to 3 years of bone remodeling before the completion of its maturity (jain a, 2000).

Surgery should only be performed after maximal remodeling. A delay of approximatively one year after the initial trauma seems the most appropriate (kasse an, 2017; srivastava a, 2016). However, we must take in consideration the patient's demands, their grow potential, and the importance of aesthetic and functional harm when planning surgery (patwardhan s, 2015). In our series the minimum period was 12 months, thus joining the different series of literature (kasse an, 2017; hui jh, 2004).

The post-traumatic cubitus varus is usually associated with a good prognosis. Our results, as well as those of jain, hui, kasse, north and chagoo, were excellent in more than 64% of cases (jain a, 2000; north d,2015; hui jh,2004; kasse an,2017; chagou a,2018). They were good in 6% of cases. Our results were poor in 15,6% of cases against 3 to 7 % in the series of jain (jain a), hui (hui jh,2004) and north (north d,2015). This disparity in outcomes can be explained by the place of traditional treatment in our context, the difference in surgical techniques and methods of fixation.

Conclusion:-

The cubitus varus is responsible for functional discomfort and aesthetic damage which can considerably affect the child and his family. Lateral closing osteotomy is an interesting technique since it allows to re-establish the limb axis with a low rate of complications. However, the best treatment of this deformity remains prevention.

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