Case report

Posttraumatic progressive cubitus varus deformity managed by lateral column shortening: A novel surgical technique

Amit Srivastava*, Anil Kumar Jain, Ish Kumar Dhammi, Rehan Ul Haq

Department of Orthopaedics, University College of Medical Sciences and Guru Teg Bahadur Hospital, Delhi 110095, India

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A B S T R A C T
The outward angulation of elbow with supinated forearm is cubitus varus deformity. This deformity is often seen as sequelae of malunited supracondylar fracture of humerus in paediatric age group of 5–8 years. The deformity is usually non-progressive, but in cases of physeal injury or congenital bony bar formation in the medial condyle of humerus, the deformity is progressive and can be grotesque in appearance. Various types of osteotomies are defined for standard non-progressive cubitus varus deformity, while multiple surgeries are required for progressive deformity until skeletal maturity. In this study we described a novel surgical approach and osteotomy of distal humerus in a 5 years old boy having grotesque progressive cubitus varus deformity, achieving good surgical outcome.

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Introduction

Outward angulation of supinated forearm with elbow extended is called carrying angle. Average carrying angle is 6°–14° with more angle in girls than in boys. Any reduction in the normal carrying angle of the elbow produces cubitus varus deformity. The most common cause of this deformity is late complication of supracondylar fracture of the humerus.1,2 It is a poorly tolerated cosmetic deformity with no practically functional impairment, although there is some difficulty in carrying heavy loads. This deformity can be progressive or non-progressive. The deformity following humeral supracondylar fracture is non-progressive, while progressive deformity could be due to physeal injury of medial condyle, mal-united fracture of lateral condyle and congenital cubitus varus deformity.2

Non-progressive deformity is usually treated by one surgery while progressive cubitus varus deformity may require repeated surgeries. Various corrective osteotomies have been described for the cubitus varus such as lateral closing wedge osteotomy, medial opening wedge osteotomy, dome osteotomy, step-cut osteotomy and pentalateral osteotomy.1,2 We reported a case of progressive cubitus varus deformity secondary to medial humeral condyle physeal arrest, managed by lateral closing wedge osteotomy of lateral pillar of distal humerus, which was a novel surgical technique.

Case report

A 5 years old boy presented with complaint of cubitus varus deformity of the right upper limb. According to his father, the patient had the history of falling on outstretched hand three years ago, and afterwards he was not able to move his right elbow and was taken to local hospital. There he was managed conservatively on above elbow cast for two months. After removal of cast, the parents noticed deformity of the right elbow which was kept on progressing over the next three years.

At presentation, the patient brought no old records, so the type of fracture and the initial follow-up was not known. In clinical examination, the child had the cubitus varus deformity of 30° as compared to carrying angle of 6° on the left upper extremity. Three-point bony relationship of the right elbow was distorted. There was flexion arc of 100° on the affected side as compared to 120° on the opposite side. The supination and pronation were comparable to the other side.

The patient underwent X-ray examination of both the upper limbs, with elbow extended and forearm supinated. The plain radiograph showed the shortening of medial column of the elbow with deformed distal humeral anatomy. Humeroulnar angle was...
25° on the affected side as compared to 5° on the left side. MRI of the affected elbow joint was done, indicating physeal scarring of the medial condyle of the humerus (Fig. 1). As the deformity was progressive and grotesque, his father was told about the requirement of operative intervention and informed consent was obtained for surgery.

Preoperative planning was done for osteotomy required for the deformity. A line diagram of the radiograph with elbow extended and forearm supinated was made on the tracing paper, humerus-oulnar angle was calculated and the wedge of 1.5 cm was removed from the lateral pillar, without breaching the medial cortex of the distal humerus.

The patient was operated under general anaesthesia in supine position. A 5 cm incision was made over the lateral aspect of the distal humerus. The site of osteotomy was marked distally, at the level of olecranon fossa and another point 15 mm proximal. Osteotomy was done and 15 mm wedge of bone was removed from the lateral column. The condyle of the humerus was rotated proximally and laterally and fixed with two K-wires.

The patient was given above elbow cast and followed up. Six weeks later, K-wires were removed under local anaesthesia. He was given splintage for another 4 weeks, and then active elbow range of motion was started.

After 12 months of follow-up, he had cubitus rectus at the elbow, with flexion arc of 120° and full supination and pronation (Fig. 2).

Discussion

Cubitus varus deformity is one of the most common complications seen in paediatric patients (age group: 5–8 years) following trauma.1–3 The cubitus varus can increase the risk of lateral condylar fracture, pain, tardy posterolateral rotatory instability, internal rotational malalignment and poor cosmesis.2

Various corrective surgeries are described for the deformity. Bellemore et al4 reported supracondylar osteotomies in 16 patients using a modified French method. This technique, originally described in 1959 with a lateral closing wedge through a posterior approach, used an intact periosteal hinge medially and two screws with a wire loop laterally to control the distal fragment.2 Kanaujia et al7 reported the osteotomies in 11 children to correct the varus. Various wedge osteotomies were also reported. Voss et al9 described lateral closing wedge osteotomies through lateral approaches in 36 patients. Hui et al10 used a medial approach with a lateral closing wedge in 14 cases, with one case of transient ulnar nerve paresis with residual varus. DeRosa and Graziano1 applied a step-cut technique of distal humerus valgus osteotomy using one cortical screw for fixation in 11 patients.

All the described techniques were for cubitus varus deformity following malunited fracture of supracondylar humerus. In the present case, the deformity was progressive and it was caused by medial condyle physeal injury with altered condyle anatomy. So in such scenario, usual lateral closing wedge and medial opening wedge osteotomy could not correct the deformity. Thus the novel approach of lateral column resection was done with good post-operative outcome.

In conclusion, cubitus varus deformity is common entity, physeal injury is one of the cause and should not be missed. The non-progressive deformity can be easily managed by single surgery while progressive deformity may require multiple surgeries. In case of progressive deformity, different osteotomy pattern can be devised for distorted distal humerus anatomy with good clinical outcome.

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