Original Article

Should Postoperative X-Rays be done in Supracondylar Humerus Fractures after Pinning?

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Abstract

Background: Most author advocates the need for early postoperative clinical and radiographic follow-up in operative treatment of completely displaced supracondylar fractures of the humerus in children but in central India specially rural population is there, for whom it is difficult to get weekly X-rays done. Therefore we decided to determine the necessity of postoperative x rays after k-wire fixation for the operative treatment of completely displaced supracondylar fractures of the humerus in children.

Methods: 103 patients who underwent operative management of Gartland type III fractures at our institution from November 2012 to January 2016 were reviewed. Intraoperative C-arm images were compared with postoperative radiographs to identify changes in fracture alignment and k-wire placement.

Results: A total of 103 patients (48 females, 55 males) with a mean age of 7.1 years (range, 3.1 to 12.0) were reviewed which were classified as type III. Fracture displacement or k-wire back out was seen in three patients (2.9%) at the first postoperative visit. None of these patients required further operative management. On statistical evaluation, no significant difference was seen in terms of time to first postoperative visit, days to k-wire removal, or average follow-up time. The overall complication rate was 7.76% (9/103)

Conclusions: Fracture displacement and k-wire migration observed in postoperative radiographs after k-wire fixation of supracondylar humerus fractures have little effect on clinical management or long-term complication. Radiographs can therefore be delayed until the time of k-wire removal provided sufficient intraoperative stability was obtained.

Key-words: Supracondylar Humerus Fractures, K-Wire, Radiographs

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Introduction

Paediatric supracondylar humeral fractures are the most common fracture, accounting for 50–60% of fractures in the elbow region and 30% of all extremity fractures [1]. In the treatment of non-displaced humeral fractures conservative methods are used, while in displaced cases, closed or open reduction and percutaneous Kirschner-wire (K-wire) fixation may be used [2]. Most author advocates the need for early postoperative clinical and radiographic follow-up [3,4,5]. In central India where the rural population is predominant it is practically impossible for them to come for weekly follow-up X-rays, therefore this study was undertaken with purpose of determining the necessity of postoperative x rays after K-wire fixation

Materials and Methods

123 paediatric patients who had undergone treatment for supracondylar humeral fracture from November 2012 to January 2016 were evaluated. Exclusion criteria

were; 1) Any neurological and vascular injuries, 2) Ipsilateral arm or forearm fractures, 3) open fractures, 4) Patients treated by other methods or whose medical records were incomplete, and 5) Fractures having intra-articular extension.

103 patients who were able to attend up to the final examination were included in the study. Fractures were classified according to Gartland's system. Operative fixation was performed by three different surgeons. The patients were operated upon within 48 hours after the trauma. Closed reduction was performed on all patients, the adequacy of which was assessed by C-arm fluoroscopy. Then k-wire fixation was done with all aseptic precaution. More than ninety percent cases fracture were treated with percutaneous two parallel lateral entry k-wires. They were considered stable only if near anatomic configuration was obtained and fracture remains stable intraoperative range of motion under continuous mode of C arm machine. After fixation K-wires were left out of the skin after bending for subsequent removal. Patients were placed in an above elbow slab postoperatively. There was postoperative assessment for any complications and treated according to guidelines. The patients were discharged after twenty four hours after completion of surgery.

Intraoperative C-arm images were compared with postoperative X-rays taken at 3 follow up visits: the first postoperative visit (third day), second visit on the date of k-wire removal (three weeks), and third visit on the date of final follow-up (three months). Radiographs were assessed for fracture displacement and k-wire migration.

Changes in k-wire alignment and fracture displacement were assessed by the attending surgeon during subsequent follow up. The Student t test was used to determine differences relative to patient age and follow-up time between those with k-wire back out and those with maintenance of k-wire configuration.

Results

Our results were based on 103 displaced fractures in Hundred and three patients (48 females, 55 males) with a mean age of 7.1 years (range, 3.1 to 12.0) which were classified as type III. The causes of injury were as follows: a fall from height in sixty two cases (61%), bicycle and game accidents in thirty one cases (30%) and motor vehicle accidents in ten cases (9%). Superficial k-wire site infection was seen in five cases (4.8%) K-wire back out or fracture displacement was seen in three patients (2.9%) at the first postoperative visit. None of these patients required further operative management. On statistical evaluation, no significant difference was seen in terms of time to first postoperative visit, days to k-wire removal, or average follow-up time. Fracture severity did not correlate with change in alignment. The overall complication rate was 7.76% (9/103).

No postoperative neurological deficit was observed in patients. K-wires were removed at an average of twenty six days after fixation (range, 21 to 35 d). Time to final clinical follow up was ninety nine days,(range, 90 to 150 d).

Discussion

Supracondylar fractures of the humerus are the commonest types of elbow fractures in children and adolescents accounting for 50–70% of all elbow fractures. They are seen most frequently in children between the ages of three to ten years [1,2]. Some of the methods used in the treatment of paediatric humerus supracondylar fractures are traction, closed reduction and plaster fixation, closed or open reduction and K-wire fixation.

There has been no uniformity of postoperative follow up of these patients clinically as well as radiographically to determine healing, alignment, and appropriate time for k-wire and cast removal. Most author advocate procuring serial radiographs to identify changes in fracture alignment and k-wire position [3,4,5]. Very few studies are there regarding true requirement of radiological follow-up in the early postoperative period. In central India rural population it is practically impossible to obtain weekly follow-up moreover it is time consuming as well as increases economic burden over parents. So this study was panned to examine whether these observed radiographic changes provoked a change in clinical care or in final patient outcome.

Ponce and colleagues reviewed hundred and four supracondylar humerus fractures to evaluate the need for early follow-up and in these patients they found no increased rate of complications in those who had late radiographic follow-up [6].

Our series demonstrated a 2.9% rate of k-wire back out or change in fracture alignment. In all cases, the change in fracture alignment was <2 mm. None of these patients showed clinical evidence of postoperative neuropraxia or cubitus varus at final follow-up. K-wire-site infections are another identified complication of percutaneous k-wire fixation, with published rates from 2% to 7% [7]. In our series, k-wire-site infections were seen in five patients (4.8%). All of these infections were superficial and resolved with a short course of oral antibiotics. Compartment syndrome was diagnosed in one patients in the early postoperative period. Neither of these patients was observed to have neurological deficits or loss of fixation. According to Karamitopoulos et al if stability of pin construct is confirmed at surgery, mild alignment changes and pin migration observed in postoperative radiographs after pinning of supracondylar humerus fractures have little effect on clinical management parameters or long term sequelae [8], our study had similar results. Within the obtained results, complications, and limitations of the present study, delaying postoperative X-rays can be considered without significant risk of complication until the time of expected k-wire removal provided that adequate intraoperative radiographic stability was obtained. If stability of k-wire construct is confirmed at surgery, mild alignment changes and k-wire migration observed in postoperative radiographs after k-wiring of supracondylar humerus fractures have little effect on clinical management parameters or long term complication.

Conclusions

Fracture displacement and k-wire migration observed in postoperative radiographs after k-wire fixation of supracondylar humerus fractures have little effect on clinical management or long-term complication. Radiographs can therefore be delayed until the time of k-wire removal provided sufficient intraoperative stability was obtained.

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