ORIGINAL ARTICLE

INTRAMEDULLARY KIRCHNER WIRES FIXATION IN UNSTABLE RADIUS AND ULNA FRACTURES IN CHILDREN, IN A TERTIARY CARE HOSPITAL

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ABSTRACT

Objective: To assess outcome of pediatric unstable radius and ulna fracture fixation with intra-medullary k-wires

Material and Methods: This prospective observational study was performed over a period of 38 months from June 2014 to Aug 2017 at department of Trauma & Orthopedics Khyber Teaching Hospital Peshawar-Pakistan. Study comprised of the children with displaced fracture of both the forearm bones i-e Radius and Ulna, treated with Open reduction and internal fixation with Kirchner wires. Under General anesthesia and tourniquet control first radius was fixed with Kirchner wire and then ulna, both in a retrograde manner. Wounds were closed, back slab applied for a short duration of 02-03 weeks and then patients were followed for clinical and radiological union of the fractures on a regular basis in O.P.D. k-Wires removed on consolidation of fractures .Patients were assessed for pain, ability to participate in their activities according to their age and physical examination was performed to assess range of movements at elbow, wrist and forearm (pronation-supination).Modified Flynn criteria were used to grade the outcome.

Results: The total number of patients was 33.Twenty two(61%) were male while 13 (39%)were females. Majority of the patients 25 (76%) were of the age less than 10 years. 31 (94%) patients suffered from fracture due to a fall. Majority of the children 19 (58%) suffered from Right forearm fracture. Only 04 (12%) patients had superficial wound infection. 31(94%) patients healed satisfactorily while 02 (6%) patients end up with non-union. 01 (03%) patient needed bone grafting along with plate osteosynthesis. At the end, excellent results were achieved in 91%, good in 7% and fair in 2% (modified Flynn criteria). On average the mean interval between initial surgery and removal of K-Wire was 03 months. Incidence of re-fracture after K-Wires removal was nil.

Conclusion: Unstable forearm fractures in children treated with Open reduction and Kirchner wires fixation have good to excellent outcome.

Key words: Radius, ulna, unstable fractures, K-Wire, Open reduction

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INTRODUCTION

Fracture of forearm bones i-e Radius and Ulna are quite common in pediatric population[1]. Majority are stable, which can be addressed with plasters only. Most of these fractures unite without any deformity or dysfunction if principles of proper fracture reduction and application of cast are practiced.Non-union in children is very much uncommon[2,3]. Open physis allows remodeling. This remodeling potential is determined by age of the child, location of the fracture, magnitude and direction of the angulation. However, rotational deformity does not remodel and demands intervention[4,5].

Undisplaced fractures can be safely treated in cast[6-9]. Displaced fractures need manipulation under sedation/anesthesia and application of cast and majority of these heal satisfactorily[10]. However,some of these fractures redisplace which demands reduction and stabilization with either percutaneous pins or open reduction. Either plates and screws or Intramedullary Kirchner wires can be used for internal fixation.[3,5,11,12]

Open reduction and internal fixation provides

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an accurate reduction and stabilization but at the risk of complications like soft tissue stripping, infection, neurovascular injury, scarring, delayed union and non-union[11-15]. On the other hand second surgery for the removal of plates and screws damages soft tissues and other structures in its vicinity.[16]

In children Intramedullary fixation of the displaced forearm fracture has become very popular for the last more than 35 years[17-19] than plates and screws. Intra-medullary fixation is generally a safer and effective method but is accompanied by complications like compartment syndrome of the forearm, non-union and refractur after removal of Kirchnerwires.

In our department most of the forearm fractures in children are treated by close method.However, we treat unstable fractures with intra-medullary Rush pins or kirchner wires.This study evaluates outcome of those unstable pediatrics forearm fractures which were treated with Open reduction and intra-medullary Kirchner wires (K-Wire) fixation.

MATERIAL AND METHODS

Thirty three children with unstable Radius and Ulna fractures treated with Open Reduction and Intra-medullary Kirchner Wires fixation were selected between June 2014 and Aug.,2017. After checking stability both the wounds were closed, above elbow back slab was applied for a couple of weeks. Patients were reviewed in OPD regularly for wound assessment, removal of skin stitches and clinical and radiological bone healing and for any complications. On complete bone healing and consolidation patients were re-admitted for K-Wires removal. Patients were encouraged for range of movement exercises, daily activities and participation in sports activities with gradual increments. Physical examinations were done to check range of movements at wrist,elbow and forearm (pronation/supination) .Results were quantified according to Modified Flynn et al., Criteria.

MODIFIED FLYNN CRITERIA

	Loss of elbow flexion / extension	Loss of forearm supination / pronation	Loss of wrist flexion/ extension	Change in carrying angle
Excellent	0 to 5	0 to 15	0 to 15	0 to 5
Good	6 to 10	16 to 30	16 to 30	6 to 10
Fair	11 to 15	31 to 45	31 to 45	11 to 15
Poor	>15	>45	>45	>15

RESULTS

A total of 33 patients included in the study 20 (61%) were male while 13 (39%)were females. 25 (76%) patients were of the age less than 10 years while 08 (24%) patients were between 10 and 15 years of age. In most of the children middle third was fractured. 31 (94%) patients suffered from fracture due to a fall while only 2 (6%) secondary to (Road traffic accident) RTA. Majority of the children 19 (58%) suffered from Right forearm fracture. Average time for clinical and Radiological union was 06-08 weeks, 04 (12%) patients had superficial wound infection with exposed k-wire at the tips which was resolved with dressing and oral antibiotics. 02 (6%) patients end up with non-union while only 01 (03%) patient needed bone grafting and plate osteosynthesis. At the end, excellent results were achieved in 91%, good in 7% and fair in 2%. On average the mean interval between initial surgery and removal of K-Wire was 03 months. Incidence of re-fracture after K-Wires removal was nil.

DISCUSSION

Promotion of fracture union and restoration of maximal function is the aim of management of every fracture[5]. Over 90% fractures of the forearm bones can be treated in children non-operatively[3,9,18]. Role of plaster treatment in literature is well established[21]. Similarly, status of long arm and short arm plaster is well understood but some of the unstable fractures cannot be reduced satisfactorily or redisplace which need fixation either with closed or open methods.[23] When facilities are available, close reduction and per-cutaneous fixation of pediatrics fracturesunder Image intensifier is preferred[4,17,19,20]. Open reduction and Internal fixation with plates and screws has been used in children but with added risks and complications at time of removal of implants[12,18]

Intra-medullary fixation has been gaining popularity for fixation of pediatrics forearm fractures over the last more than 35 years due to easy surgical technique, good functional outcome and decreased damage at the time of removal[4,19,25]. All of our fractures united within expected time except two which suffered from

non-union needing additional procedures in form of platting ± bone grafting.Even open fractures unite well in children[13]. Smith etal[11] and Yuan[20] reported union in all of their patients. Ogonda et al[15] had only one delayed union and one non-union ulna in his series. Mittal et al[14] had reported a case of refracture of ulna with elastic nail in situ.However, stiff K-Wire is better than elastic nail b/c its modulus of elasticity is closer to the bone and it is easier to drill in bone in a retrograde fashion.

Recent studies have shown no evidence of growth disturbance with K-wire fixation[17], though in past it was thought that K-wire damages growth plate. The good to excellent outcome in over 90% of our patients make K-wire fixation a preferable choice in forearm fractures in children.

CONCLUSION

Open reduction and K-Wire fixation can produce good to excellent outcome in pediatric unstable forearm fractures.

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AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under:

Shah SDBA: Main Idea,Operating Surgeon.

Jamil M: Data Collection.

Kabir SK: Manuscript writing.

Khan MA: Overall Supervision.

Hayat S: Operating Surgeon.

Muhammad A: Bibliography.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.