

(Pin Leverage)

:
 (Pin leverage)
 : 1997 5 2002 2
 , K - 22
 : 10.5 , 2 4 , 가
 가 10 4.6 1.7 , 1.9 , 0.8 , 0
 42 , 49.6 ,
 1 , 1
 Thomas 가 가 21
 :
 : , , ,

Reduction of Pediatric Forearm Diaphyseal Fractures by Pin Leverage Technique

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Introduction: Although the majority of children's forearm diaphyseal fractures may be treated conservatively with closed reduction and cast immobilization, unstable or irreducible fractures are usually treated by surgical management. Authors performed percutaneous pin leverage reduction technique for irreducible displaced diaphyseal fractures. The aim of this study is to determine the efficacy of pin leverage technique in pediatric forearm diaphyseal fractures.

Materials and Methods: In this retrospective study, we reviewed 22 cases of forearm diaphyseal fractures reduced by percutaneous pin leverage technique between 1997 and 2002. We analyzed radiographs, operation time, hospital stay and immobilization period, range of motion, postoperative complications and functional results by Thomas.

Results: Average length of follow up was 28 months with mean age of 10.5 years. All fractures in this series healed less than 2 degrees of diaphyseal angulation. Average operation time including anesthesia was 42 minutes and hospital stay was 4.6 days. Time to union was 49.6 days in average and range of motion and functional results were satisfactory in all cases except one case of congenital radioulnar synostosis. There was one case of superficial pin track infection as complication.

Conclusion: In operative treatment of children's diaphyseal fractures of forearm bones, percutaneous pin leverage reduction technique is a good alternative method prior to open reduction in case of difficult closed reduction.

Key Words: Children, Forearm, Both bone fracture, Operative technique, Pin leverage technique

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가 21 , 가 1
10.5 (6 ~14) ,
28 (12~52)
20~33% ,
가 가 20
1 , 가 1 10
, 9 , 3
, 10
1,5,9,18)
7~30%
가 5~7,15)
(Pin leverage)
1997 2002
22
10 6

Table 1. Functional result by Thomas

	Result
Complete body union 90%< forearm ROM	Excellent
Complete body union 80%< forearm ROM	Good
Complete body union 60%< forearm ROM	Acceptable
No body union 60%> forearm ROM	Unacceptable

가 21 , 가 1
10.5 (6 ~14) ,
28 (12~52)
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1,5,9,18)
7~30%
가 5~7,15)
(Pin leverage)
1997 2002
22
10 6

(C-arm fluoroscopic apparatus)
Steinmann
0.5 cm 3.0 mm
Steinmann 가
K-
(Fig. 1, 2).

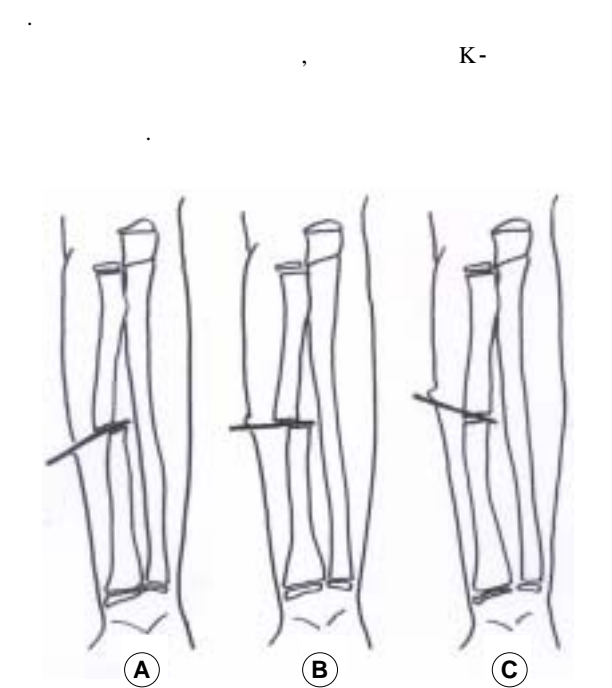


Fig. 1A-C. Schematic diagram of reduction of radial shaft fracture using pin leverage technique in alphabetical order.

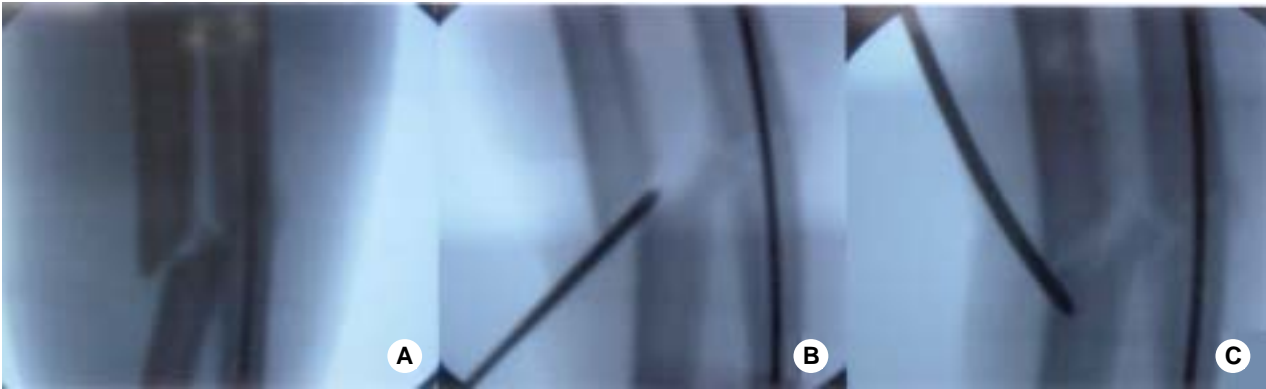


Fig. 2A-C. Photographs show sequence of reduction under fluoroscopy.

Table 2. Functional result

Result	n *	Percentage
Excellent	20	91.0
Good	1	4.5
Acceptable	0	
Unacceptable	1 [†]	4.5

*The n values refer to the number of children
[†]This case was a congenital radioulnar synostosis

가 Thomas (excellent) (Fig. 3-A, B, C, Fig. 4).

가

42 (25 ~90) , 4.6 (3 ~8) . 1,5,9,18)

11.5 , 11.8 , Carey ¹⁾ 10

13.2 , 10.0 , Daruwalla²⁾ 6

1.7 1.9 , 0.8 0 . 49.6

(32 , 94) . Sarmiento ¹¹⁾ 10

1 Högström ³⁾ 20

가 , 25

1 (excellent)가 20 , (good) Kay ⁵⁾ Sun ¹²⁾ 4,8,15)

가 (Table 2).

1.

8

Steinmann K-

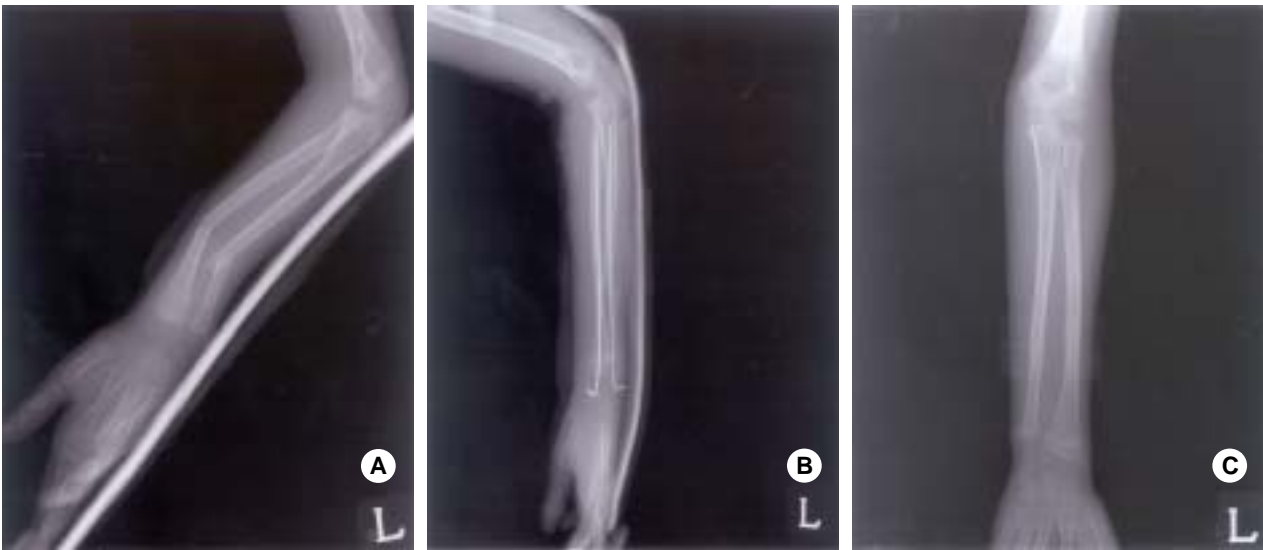


Fig. 3A-C. (A) Preoperative radiograph shows angulated and displaced diaphyseal fractures of radius and ulna. (B) Immediate postoperative radiograph of acceptable alignment. (C) Satisfactory union was obtained during follow up.



Fig. 4A-D. Range of motion is the same as uninjured arm.

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 2
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 K- Steinmann
 . Verstrecken 15)
 ,
 ,
 K-
 .
 Waseem
 Paton¹⁶⁾ K-wire T han-
 dle
 , Qidwai¹⁰⁾
 3.0 mm
 Steinmann
 ,
 , Ortega ⁸⁾
 K-
 , Van der Reis
 14)
 가

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