

BIOMECHANICAL ANALYSIS OF THREE DIFFERENT K-WIRE CONFIGURATION FOR SUPRACONDYLAR HUMERUS FRACTURE WITH MEDIAL OBLIQUITY PATTERN

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INTRODUCTION:

SCHF with medial obliquity is easily missed on initial radiograph and challenging to fix. This is the first study to our knowledge, that compares stiffness between intramedullary K-wire fixation paired with lateral bicortical K-wire fixation (Configuration B) in supracondylar of humerus fracture with three lateral divergent K-wire fixation (Configuration A) and intramedullary K-wire fixation with lateral and additional medial bicortical K-wire fixation (Configuration C). The objective of this study is to compare their stiffness in supracondylar of humerus fracture (SCHF) with medial obliquity pattern.

METHODS:

Eighteen synthetic humeri were osteotomized to simulate SCHF with medial obliquity. The fracture is fixed using 1.6 mm K-wire. Each underwent one rotational force testing either external or internal rotational force and repeated five times to get the mean stiffness.

RESULTS:

We conclude that Configuration C provide the highest stiffness. Table 1 shows comparison of stiffness between the three configurations.

External Rotation Stiffness			Internal Rotation Stiffness		
Mean Rank	Kruskal-Wallis H	p-value	Mean Rank	Kruskal-Wallis H	p-value
A (5.50)	6.252	0.044	A (5.00)	7.261	0.027
B (2.00)			B (2.00)		
C (7.50)			C (8.00)		

DISCUSSIONS:

Achieving adequately divergent two lateral bicortical K-wire fixation is extremely difficult in medial obliquity SCHF. K-wire may bounce into intramedullary. Although medial placement of K-wire may risk ulna nerve, it should be considered. Safe methods have been described in literature. Stable fixation is crucial to avoid loss of reduction and multiple attempts that may injure the physis.

CONCLUSION:

We recommend the most stable fixation for this rotationally unstable SCHF. Medial K-wire fixation should be considered when lateral divergent bicortical fixation is not achievable. Larger study with composite humeri would give more accurate data for clinical practice.

REFERENCES:

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2. Kwak et. al. The Clin Risk Manag 2018; 14: 1061-1066.