External Fixator With Percutaneous Pinning For Intra-articular Fractures Of Distal Radius

Thesis Submitted for Partial Fulfillment of Master Degree in Orthopedic Surgery

By

Mohamed Mosaad Maarouf

M.B,B.Ch.

Faculty of Medicine, Cairo university

Under supervision of

Prof.Ibrahim Taha El Geady

Prof. of Orthopedic Surgery

Faculty of Medicine, Cairo University

Dr.Abo Bakr Zein

Lecturer of Orthopedic surgery

Faculty of Medicine, Cairo University

Faculty of Medicine, Cairo University

2012

Abstract

Treatment of intra-articular fractures of the distal radius by bridging external fixator augmented by percutaneous K-wires to restore articular congruity and anatomical parameters (radial height , radial inclination , volar tilt) .

Aim of the work is to detect functional and radiological outcome of treating intra-articular fractures of the distal radius by bridging external fixator augmented by percutaneous K-wires .

Keywords : intra-articular , distal radius , bridging external fixator , K-wires , articular congruity , anatomical parameters .

Acknowledgement

I would like to thank prof.Dr.Ibrahim Taha Al Geady ,professor of orthopedic surgery ,faculty of medicine .Cairo university ,for his support to me in his department .

I would like to thank Dr.Abo Bakr Zein ,lecturer of orthopedic surgery ,faculty of medicine .Cairo university ,for his supervision guidance and help in finishing and fulfillment of this work .

Dedication

To my parents who supported me step by step in my life and my work reaching my goals .

Contents

List of figures

List of tables

List of abbreviations

DRL	Dorsal radiolunate
DRT	Dorsal radiotriquetral
DRUJ	Distal radioulnar joint
EPL	Extensor pollicis longus
FOOSH	Fall on out stretched hand
FPL	Flexor pollicis longus
FTZ	Fibrous transition zone
ORIF	Open reduction internal fixation
PQ	Pronator quatratus
RC	Radial collateral
RLT	Radiolunotriquetral
RND	Reflex neurovascular dystrophy
ROM	Range of motion
RSC	Radioscaphocapitate
SBRN	Superficial branch of radial nerve
TFCC	Triangular fibrocartilage complex
VR	Volar ridge
WS	Watershed

Introduction

Fractures of the distal radius is the most common fracture of the upper extremity, it represents approximately one-sixth of all fractures treated in emergency. [1]

Common mechanisms in younger individuals include falls from a height, motor vehicle accident, or injuries sustained during athletic participation. In elderly individuals, distal radial fractures may arise from low-energy mechanisms, such as a simple fall from a standing height. [1]

Treatment of such injuries can be problematic and demanding, particularly when the fracture is severely comminuted or has intra-articular involvement. The incidence of complications, including stiffness and loss of reduction, has been reported to be as high as 31%. [1]

Acceptable radiographic parameters for a healed radius in an active, healthy patient include: Radial length: within 2 to 3 mm of the contralateral wrist, Palmar tilt: neutral tilt (0degrees), Intraarticular step-off: <2 mm.Radial inclination: <5-degree loss. [2]

External fixation has been extensively used to treat intra-articular fractures of the distal radius and has shown acceptable results [3,4,5]. However, most of these studies include un-displaced or minimally displaced fractures along with unstable, comminuted fractures [3] and in many cases additional procedures are used to supplement external fixation. [6,7]

Indications for external fixation would include temporary stabilization in the management of open fractures with soft-tissue

compromise that may require repeat debridement and secondary soft-tissue procedures,external fixator can be used for stabilizing fractures in the setting of polytrauma.

Patient-specific management decisions should be made with a good understanding of the specific injury. This would include a radiographic assessment as well as an evaluation for injury to the carpus or soft tissues around the wrist. Other important conditions to consider and rule out are compartment syndrome or neurovascular compromise. It is critical to have a good understanding of the patient's social history, handedness, and future activity demands[(6)].

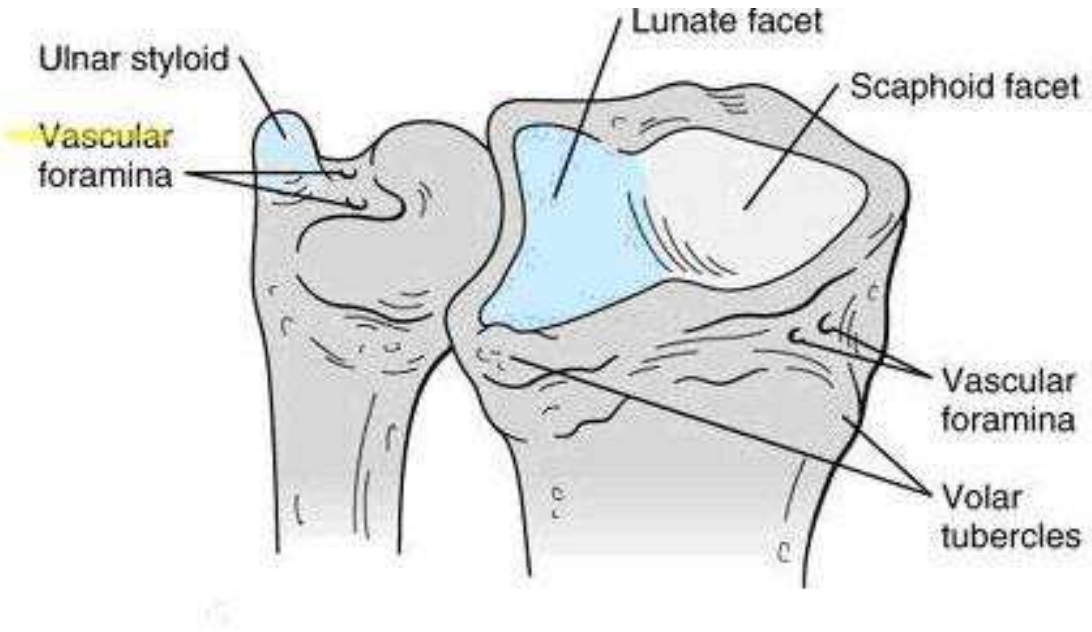
External fixation alone may be contraindicated when insufficient soft tissue is attached to the fracture fragments is noted, rendering closed reduction unsuccessful.

Aim of the work

The aim of this prospective study is to look at the functional and radiological outcome of comminuted, displaced intra-articular fractures of the distal radius treated by external fixation with percutaneous pinning.

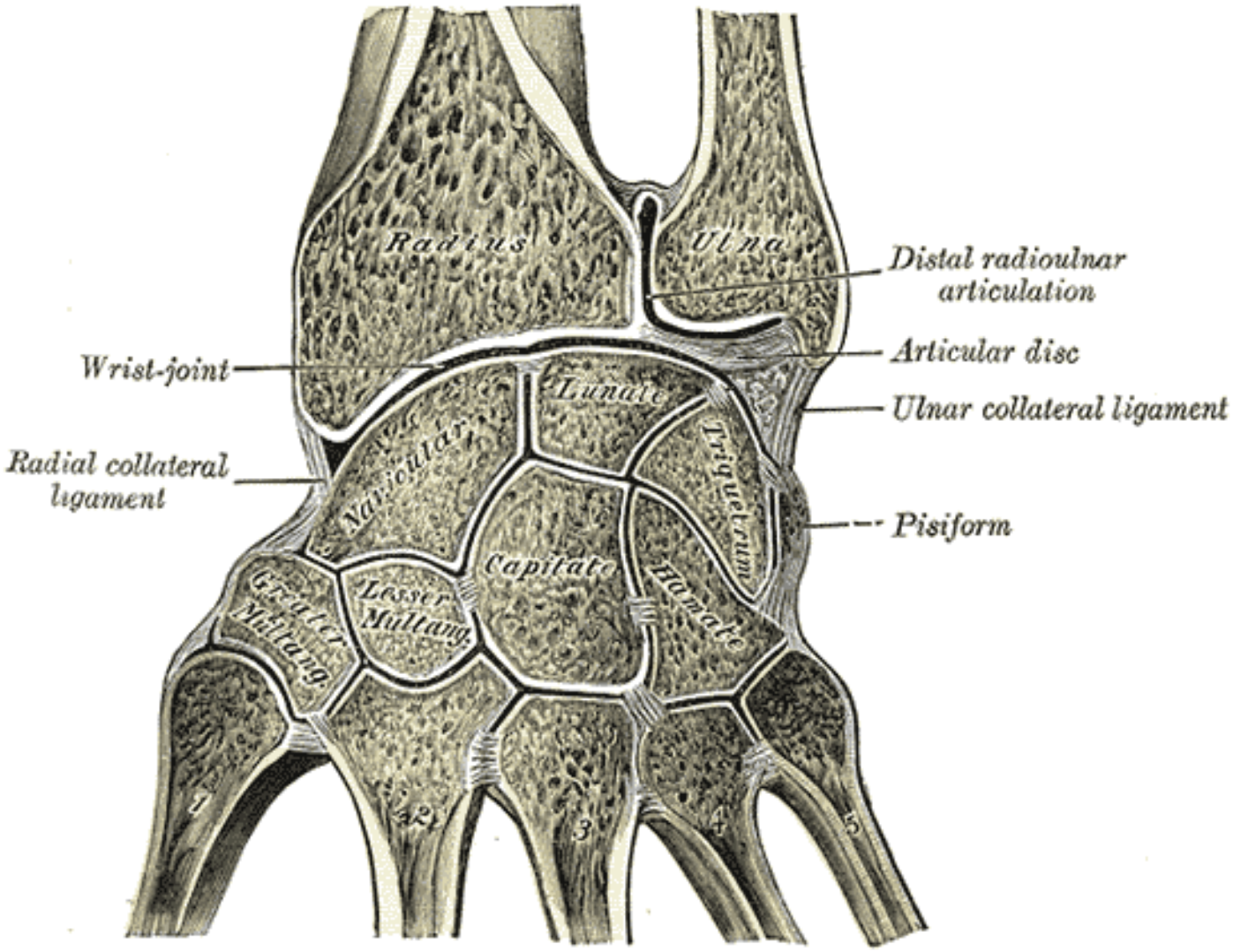
ANATOMY AND BIOMECHANICS OF DISTAL RADIUS

The articular surface of distal radius is biconcave, triangular, and covered with hyaline cartilage. A smooth anteroposterior ridge divides the articular surface into two facets: a triangular lateral facet, which articulates with the scaphoid, and a quadrilateral medial facet, which articulates with the lunate. The medial surface of the distal radius forms a semicircular notch covered with hyaline cartilage, which articulates with the ulna head. This articulation enables the radius to swing around the ulna. [8] (fig.1,2)

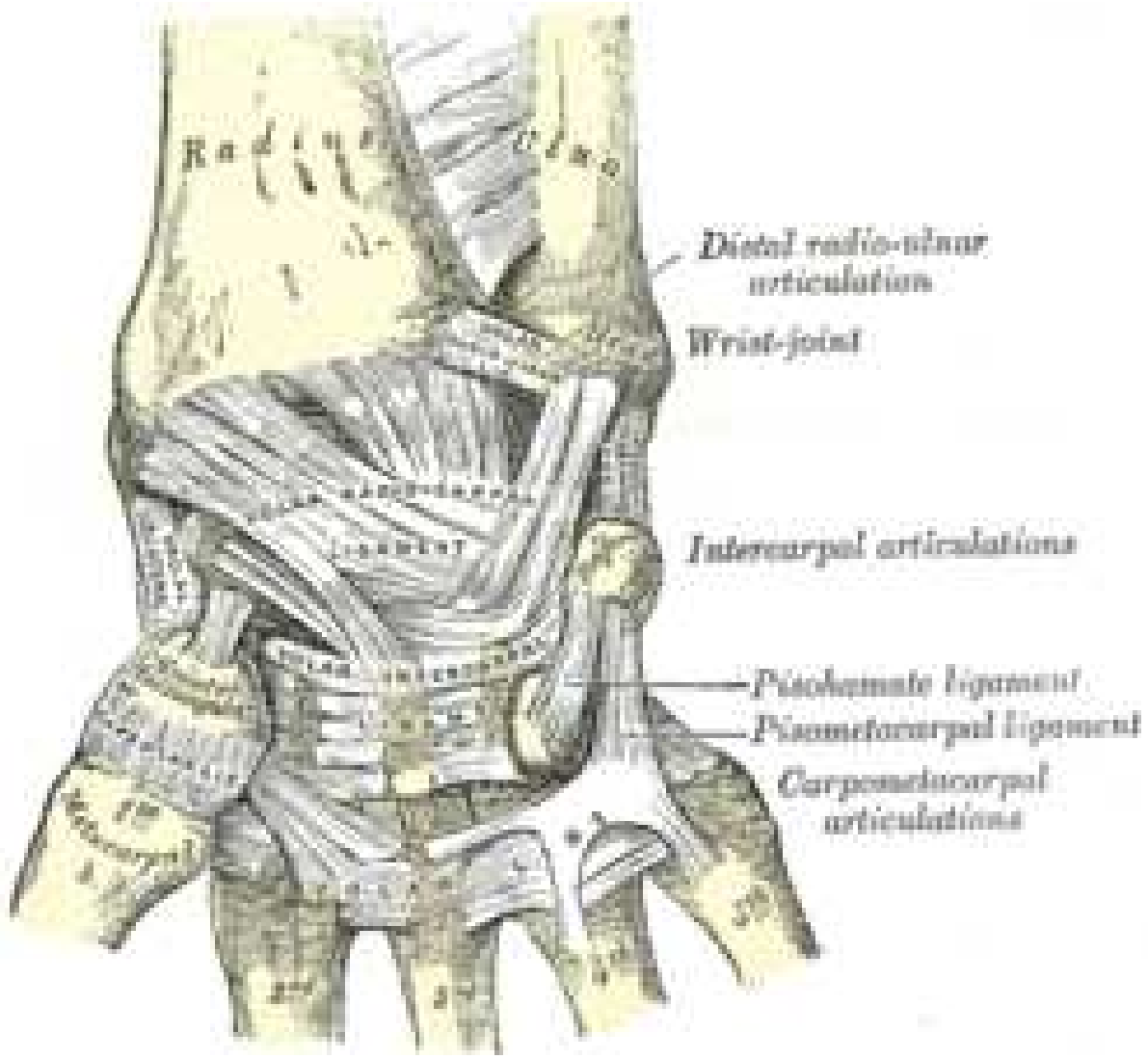


(fig.1) anatomy of distal radius and ulna. [8]

The lateral surface of the radius elongates into a prominent styloid process, which gives attachment to the brachioradialis muscle and ligaments. [8]



(Fig.2) coronal view of distal articular surface. [8]



(Fig.3) ligamentous of wrist joint. [8]

The metaphysis of distal radius is composed primarily of cancellous bone. 80% of axial load is supported by the distal radius and 20% by the ulna and the triangular fibrocartilage complex (TFCC). Reversal of the normal palmar tilt results in load transfer onto the ulna and TFCC; the remaining load is then borne