Role of Arthroscopy in Evaluation and Management of Some Wrist Disorders

Essay
Submitted for partial fulfillment of Master degree in

Orthopaedic Surgery

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2005

Index

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

Abb.	TITLE
ECU	Extensor Carpi Ulnaris muscle.
FCR	Flexor Carpi Radialis muscle
LT	Luno-triquetrial.
MRI	Magnetic Resonance Imaging.
RL	Radio-Lunate.
RSC	Radio-scapho-capitate.
RSL	Radio-scapho-lunate.
SC	Scapho-capitate.
SL	Scapho-lunate.
STT	Scapho-trpezio-trapezoid.
TC	Triquetrio-capitate.
TFC	Triangular FibroCartilage.
TFCC	Triangular FibroCartilage complex.
TH	Triquetrio-hamate.
UL	Ulno-lunate.
UT	Ulno-Triquetral

INTRODUCTION

The techniques of wrist arthroscopy are still at their infancy, stemming from the success of arthroscopic viewing and treating disease of the larger joints in a minimally invasive manner. The first arthroscope was a cystoscope placed in a cadaver knee by Takagi in 1918. The first truely successful arthroscope was produced by Watanabe in 1958. By 1962, Watanabe had performed the first arthroscopic meniscectomy. In North America Robert Jackson who began practicing clinical arthroscopy in 1965 brought tremendous attention to the technique by teaching an instructional course at the meeting of the American Academy of Orthopaedic Surgeons in 1968 ***(Jackson,1991).***

Although Chen was the first to experiment with wrist arthroscopy, clinical application lagged significantly behind the technical advances seen in the larger joints. Perhaps the birth of wrist arthroscopy as it is known today began in 1985 and 1986, when Whipple and colleagues developed standardized methods for viewing wrist anatomy using cadavers, and Whipple, Roth, and Poehling presented the technical aspects of wrist arthroscopy at a workshop in 1986 ***(Jackson ,1991).***

In less than a decade, arthroscopy as a diagnostic and therapeutic tool has become an important mean of treating disorders of the wrist; however, enthusiasm for the procedure must not be allowed to override the application of sound orthopedic principles. The importance of a thorough history and physical examination and that indications for wrist arthroscopy are still evolving must be remembered ***(Jackson, 1991).***

Now the indications of wrist arthroscopy are increasing and expanding due to advances and research performed in the world of wrist arthroscopy. Wrist arthroscopy can be used to assess the condition of ligamentous injuries and help to determine the size and extent of the interosseous ligament tears or the cause of carpal instability. It is used for the assessment of joint articular surface, interosseous ganglions, removal of loose bodies, irrigation and debridement, synovial biopsy and synovectomy. Recently arthroscopy has been used to clarify, confirm, and supplement imaging techniques of the wrist where certain imaging techniques have proven to be inconclusive. Arthroscopy can also be used to assist in the reduction and fixation of intra-articular distal radius fractures and fractures of scaphoid, acute scapholunate and lunotriquetral tears, and repairing or debriding fibrocartilage tears ***(Bettinger et al., 1995).***

CHAPTER I

GROSS ANATOMY

Introduction

Gross anatomy of the wrist provides the guide for wrist arthroscopy. It is essential to know superficial anatomy in order to choose the most appropriate arthroscopic portals and to avoid soft-tissue injuries.

The wrist, the anatomical region between the forearm and the hand, has indistinct boundaries as to where the wrist ends and the hand begins. For the purposes of this discussion, consider the wrist to include the distal radioulnar, radiocarpal, and ulnocarpal joints, as well as the eight carpal bones and their articulations and attached ligaments ***(Wright, 2003).***

General Features

The carpus contains eight bones in proximal and distal rows of four. Proximally, in lateral to medial border, are the scaphoid, lunate, triquetral and pisiform; in the distal row are the trapezium, trapezoid, capitate and hamate. The pisiform articulates with the palmar surface of the triquetral, thus separated from the other carpal bones, all of which articulate with their neighbours. The other three proximal bones form an arch proximally convex, articulating with the radius and articular disc of the inferior radioulnar joint (Figure 1). The arch's concavity is a distal recess embracing, proximally, the projecting aspects of the capitate and hamate; the two rows are

thus mutually and firmly adapted without any loss of movement ***(Crossman, 2005).***

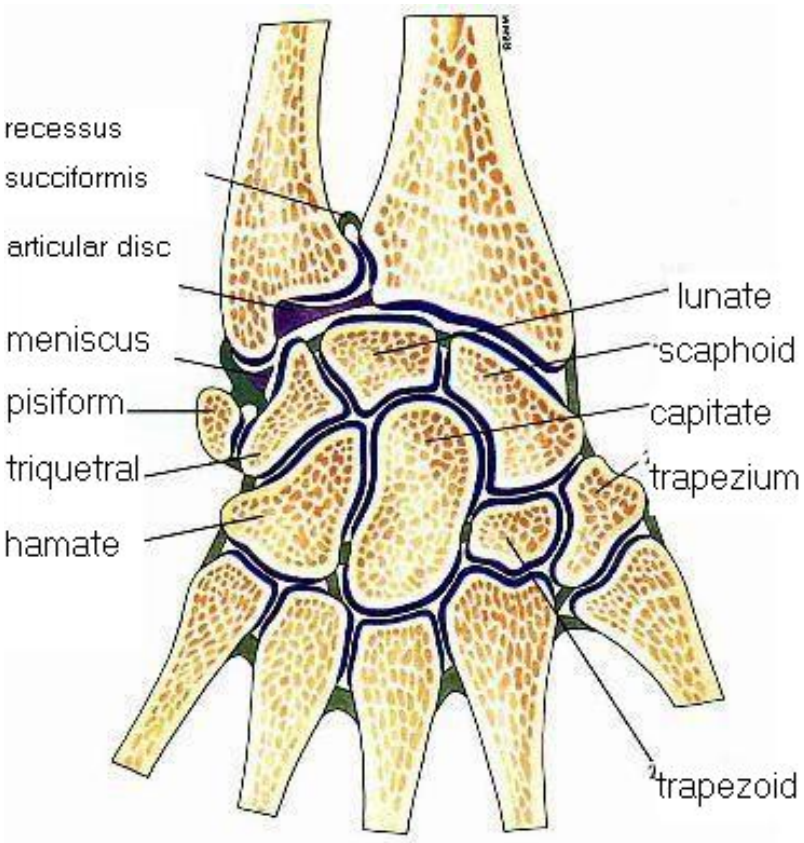

Figure: 1
Coronal section of the distal radius, ulna , carpus, and metacarpals showing the articular surface and interosseous ligaments *(soames, 1999).*

The radiocarpal joint, biaxial and ellipsoid, is formed by articulation of the distal end of the radius and the triangular articular disc with the scaphoid, lunate and triquetral. The radial articular surface and distal discal surface form an almost elliptical, concave surface with a transverse long axis; but the

radial surface is bisected by a low ridge into two concavities. A similar ridge usually appears between the medial radial concavity and the concave distal discal surface. Proximal articular surfaces of the scaphoid, lunate and triquetral and their interosseous ligaments form a smooth convex surface, received into the proximal concavity. The surface projection of the joint is a line, convex upwards, joining the radial and ulnar styloid processes. (Figure 2) ***(Crossman, 2005).***

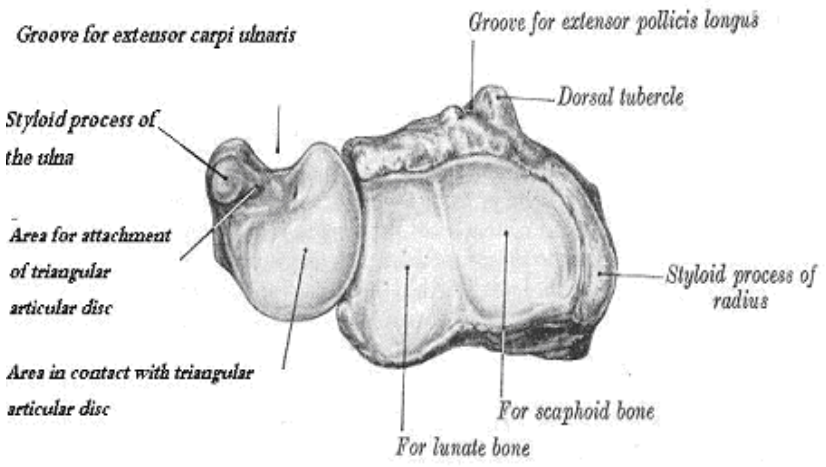

Figure (2):
The lower end of the right radius and ulna *(soames, 1999)*

Fibrous capsule

The fibrous capsule is lined by synovial membrane which is usually separate from that of the inferior radioulnar and intercarpal joints; but a protruding prestyloid recess (recessus sacciformis), anterior to the articular disc, is present and ascends close to the styloid process. The recess is bounded

distally by a fibrocartilagenous meniscus, projecting from the ulnar collateral ligament between the tip of the ulnar styloid process and the triquetral; both are clothed with hyaline articular cartilage. The meniscus may ossify. The capsule is strengthened by palmar radiocarpal and ulnocarpal, dorsal radiocarpal and radial and ulnar collateral ligaments ***(Crossman, 2005).***

Chondroligamentous stability of the joint :

The chondroligamentous supports attaching the distal radius and ulnar side of the carpus to the distal ulna, designating it the triangular fibrocartilage complex (TFCC). Attaching to the ulnar margin of the lunate fossa of the radius, these supports include the ulnar collateral ligament, the dorsal and volar radioulnar ligaments, the articular disc, the meniscal homologue, the extensor carpi ulnaris sheath, and the ulnolunate and ulnotriquetral ligament ***(Wright, 2003)***.

Additional ligaments are found in two locations:

(1) between the carpal bones (interosseous intrinsic ligaments) connecting the carpal bones in the proximal and distal carpal rows

(2) extending from the radius and ulna distally across the carpal rows (extrinsic ligaments). ***(wright, 2003).***

The interosseous ligaments include the scapholunate and lunotriquetral interosseous ligaments connecting the proximal carpal row and the ligaments connecting the trapezium to the trapezoid, the trapezoid to the capitate, and the capitate to the

hamate in the distal carpal row. The extrinsic or crossing ligaments include the radial collateral ligament from the radial styloid to the scaphoid waist, the ulnar collateral ligament from the base of the ulnar styloid attaching to the pisiform, and the transverse carpal ligament. The volar extrinsic or crossing ligaments also include the radioscaphocapitate ligament, the radiolunotriquetral ligament, and the radioscapholunate ligament on the radial side and the ulnolunate and ulnotriquetral components of the triangular fibrocartilage complex on the ulnar side ***(Wright, 2003).***

On the palmar side of the carpus, between the radiolunotriquetral ligament and the radioscaphocapitate ligament, is a relatively thin area, the space of Poirier, overlying the palmar surface of the lunate ***(Wright, 2003).***

Dorsally, the identifiable extrinsic ligaments include the dorsal radiocarpal and the dorsal ulnocarpal ligaments. The trapezoidal dorsal radiocarpal ligament attaches along the dorsal radial articular margin of the lunate fossa, from Lister's tubercle to the lesser sigmoid notch. It spans the lunotriquetral joint and inserts on the dorsal surface of the triquetrum. The dorsal intercarpal ligament, which is attached to the distal, dorsal surface of the triquetrum, passes across the midcarpal joint to attach to the dorsal surfaces of the scaphoid waist and the trapezoid. The laminated structure of the dorsal intercarpal ligament allows for changing shape with wrist movement. (Figures 3, 4) ***(Crossman, 2005).***

Carpal Synovial Membrane

This is most extensive, lining an irregular articular cavity, its proximal part being between the distal surfaces of the scaphoid, lunate and triquetral and the proximal surfaces of the second carpal row. It has proximal prolongations between scaphoid and lunate, lunate and triquetral and three distal prolongations between the four bones of the second row.

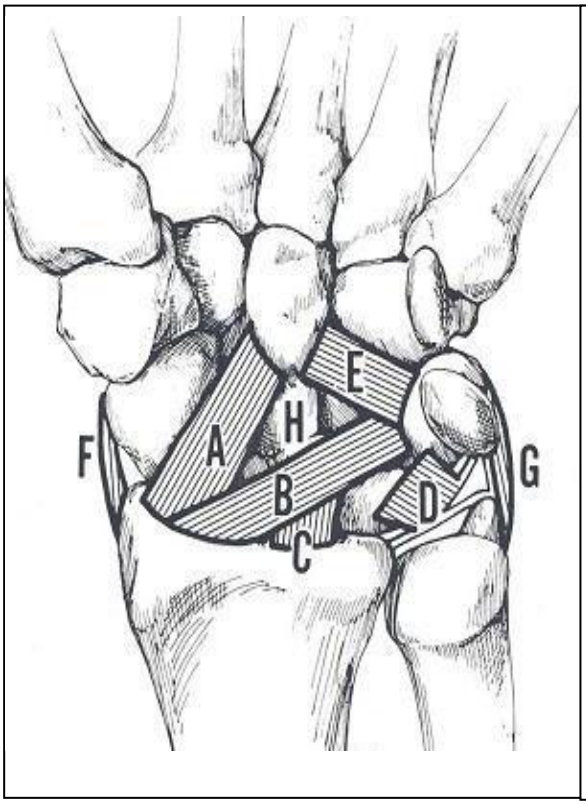

Figure 3:
Palemr ligaments of the wrist:

A: radiocapitate and radioscapholunate ligaments,
B: radiotriquetral ligament
C: radioscapholunate ligament,
D: ulnolunate ligament
E: capitotriquetral ligament
F: radial collateral ligament,
G: ulnar collateral ligament.
H: space of Poirier.
(Cooney 1998)