Management of Elbow Stiffness
A Systematic Review

Essay

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By

Mohamed Nasr Mohamed

M.B.B.Ch

Under Supervision

Prof.Dr.Atef Mohamed Fathi Elbeltagi

Professor of Orthopedic Surgery

Faculty of Medicine - Ain shams University

Dr.Amr Moustafa Mohamed Aly

Lecturer of Orthopedic Surgery

Faculty of Medicine - Ain shams University

Faculty of Medicine

Ain Shams University

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This work is dedicated to my family.

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Absract

After analysis the twenty five study, we recommend conservative treatment for traumatic and a traumatic elbow stiffness when there are no extra-articular or bony abnormalities for six month duration, while open surgical release is recommended if conservative treatment failed after 6 month to 1 year, or in patient with extra articular or bony abnormalities.

In old patient > 60 years with degenerative arthritis or articular incongruity, total elbow replacement is possible.

Our systematic review has potential weakness like any systematic review. It was highly depend on the quality of the primary included studies. For example none of the studied assessed patient complication, with no randomized controlled trials.

Keywords: anterior bundle- posterior bundle- Medial collateral ligament- Lateral collateral ligament

INTRODUCTION

The elbow is a highly constrained synovial hinge joint, intolerant to trauma, with a high tendency for stiffness and degeneration. Articulations of elbow joint are formed between the trochlea and capitellum of the humerus with the trochlear notch of the ulna and radial head respectively. The soft tissue boundary of the elbow joint is the articular capsule, which is weakest anteriorly and posteriorly but has well-defined lateral and medial ligamentous complexes.[1]

Elbow motion serves to position the hand in space. the functional arc of elbow motion during activities of daily living to be 100° for both flexion–extension (30° to 130°) and pronation–supination (50° in either direction).2 The stiff or is defined as an elbow with a reduction in extension greater than 30 degrees, and/or a flexion less than 130 degrees, supination and pronation below 50 degree.

Stiff elbow can be broadly categorized as either traumatic or atraumatic. trauma [3,4] burn [5], and head injury are known causes of elbow contractures, that are directly proportional to the severity of the insult. Elbow surgery involves controlled trauma to the tissues may be complicated by postoperative stiffness. Postoperative scarring and heterotrophic ossification[6]. atraumatic causes of elbow stiffness include osteoarthritis and inflammatory arthritis, post-septic arthritis, multiple hemarthrosis, and congenital

contractures as in arthrogryposis and congenital radial head dislocation.

Elbow stiffness management begins with prevention. The aim of treating the stiff elbow is to give the patient a pain free, functional, and stable elbow. Early elbow motion is helpful after traumatic injuries and with inflammatory conditions around elbow. Established case are treated either by conservative or surgical treatment. Non-operative treatment should be considered in mild contractures of short duration, usually 6 months or less[3]. Active and passive exercises, dynamic hinged and static progressive splinting, and continuous passive motion [8,9,10], serial casting, continuous passive motion (CPM), occupational physical therapy, and manipulation under anesthesia.

Operative treatment is appropriate for those patients who have failed to achieve adequate functional range of motion after initial non-operative management. It recently has been suggested that most patients complain of functional disability and request treatment when they cannot extend the elbow more than 40 or flex beyond 110 to 120 [7,11]. Pain may be another indication for surgical release in patients with impinging osteophytes or articular incongruity.

Operative intervention in the region of elbow is fraught with risk of worsening of already existent limitation of motion, so should always be balanced with the likelihood of functional usefulness of

the planned procedure and should be undertaken if the limitation is severely affecting the function. The main lines of surgical treatment are anterior and posterior capsular release, arthrolysis, distraction arthroplasty, facial interposition arthroplasty, and elbow arthroscopic release, excision of heterotrophic ossification, lengthening of triceps aponeurosis, radial head excision, synovectomy and total elbow arthroplasty. [7-11]

Many trials in the past have examined the outcome of elbow stiffness management, although scanty attempts have been made to summarize the literature in a systematic manner.

Aim of the Work

The aim of this study is to highlight the results of management of elbow stiffness, through a systematic article review of the English literature.

Chapter 1

ANATOMY AND BIOMECHANICS

Anatomy of the elbow

Bony anatomy

The elbow joint is formed by the humerus, the radius and the ulna bones. The humerus articulates with the ulna medially and the radius laterally. The radius and ulna forming proximal and distal radio ulnar joint which is pivoting joint allowing rotation.

This articular surface directed in relation to humeral shaft to 30° degree anterior, 5° internal rotations, and 6° valgus angulations.

The carrying angle formed between long axis of humerus and ulna, is about 11° to 14°in males and 13° to 16° in females in elbow extension, this is angle allows the hand clear the hip and swing freely away from the body during walking or swimming. [1,2]

Soft tissues anatomy

Joint capsule

The capsule of the elbow joint is a part of the joint stabilizer and the ligaments are capsular thickening. The capsule is attached anteriorly to the coronoid fossa and radial fossa

proximally while distally is attached to the coronoid and the annular ligament laterally. posteriorly the capsule is attached to the distal humerus just above the olecranon fossa, and medial and the lateral margins of the olecranon. [1, 3] figure (1-1).

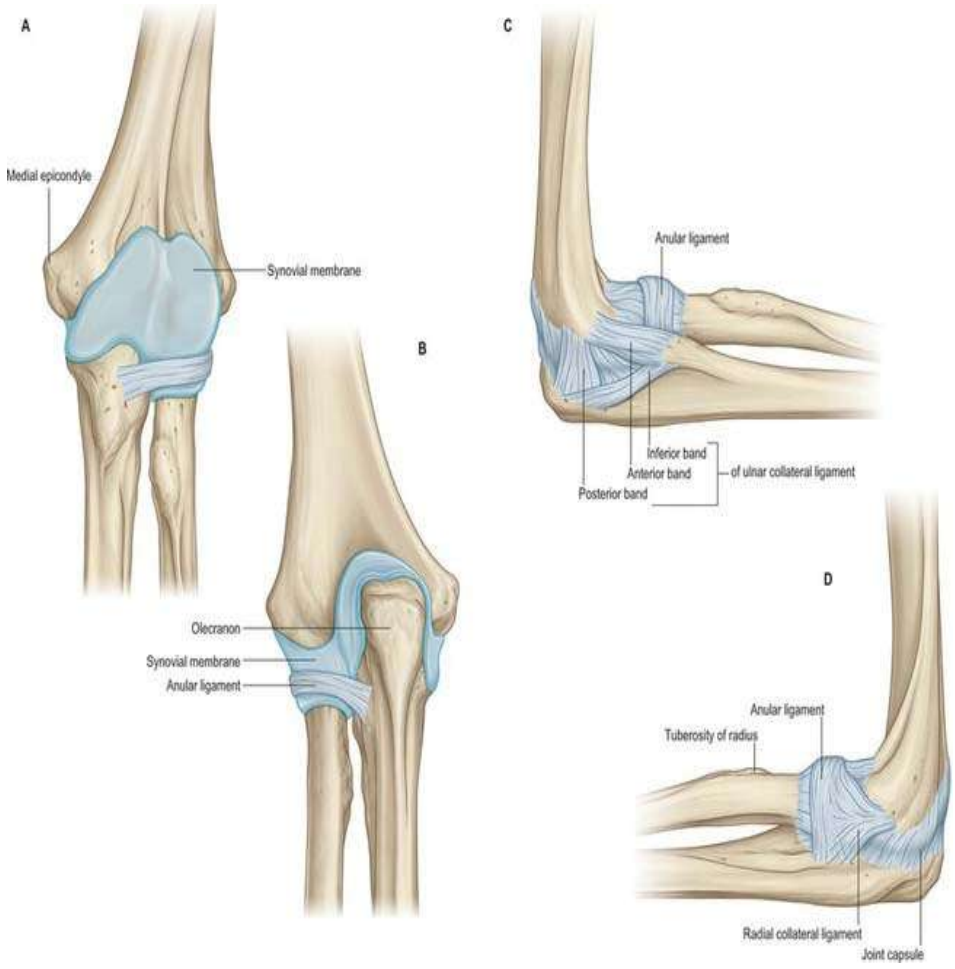

Figure (1-1): The left elbow joint. A anterior aspect. B, posterior aspect C, Medial aspect. D, Lateral aspect. [47]

Medial collateral ligament (MCL)

The MCL originates from the broad antro-inferior surface of the medial epicondylar surface it consists of three bundles: anterior bundle (AMCL) posterior bundle (PMCL), and a transverse ligament (fig 1-2).

The AMCL is fan-shaped, it's functionally divided into anterior and posterior band, the anterior band tightens with full extension while the posterior band tightens from 80^0 flexion to full extension. The (PMCL) (Bardinet ligament), is a posterior capsular thickening and is best defined at 90° flexion. The AMCL is stronger than the (PMCL) and more essential as joint stabilizer. The transverse ligament (ligament of Cooper) has little significant rule in stability.

The MCL complex (MCLC) acts as a primary valgus stabilizer between 20° and 120° of flexion. At the extremes of motion (< 20° and >120°) stability is provided by both the ulno-humeral and the radio-ulnar articulations.[1,4]

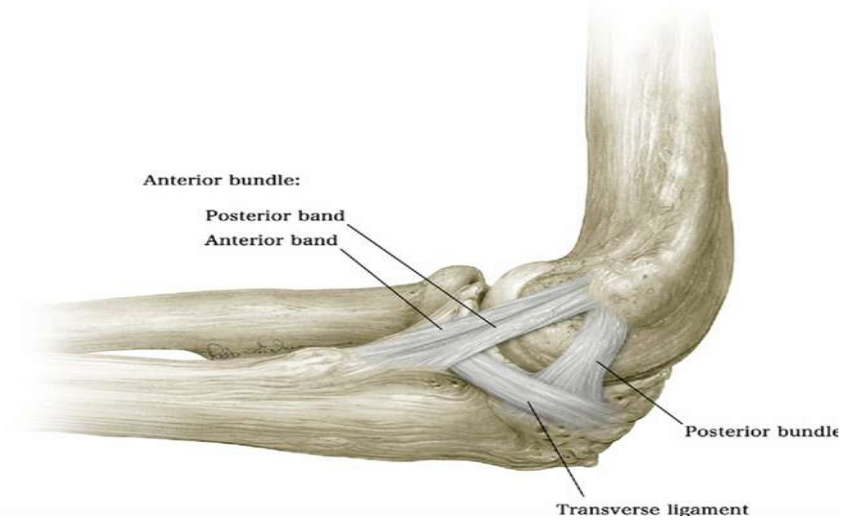

Figure (1-2): MCL. Medial collateral ligaments of the elbow showing AMCL, PMCL and transverse ligament [48].

Lateral collateral ligament (LCL)

The (LCL) complex is formed of three or four bundles: the annular ligament (AL), the radial collateral ligament, the lateral ulnar collateral ligament (LUCL) and the accessory lateral collateral ligament. It protects the elbow from varus deformity and postero-lateral rotation instability (Fig 1-3).

(LCL) attaches to the lateral epicondyle and inserts on the annular ligament, as the origin located over the center of rotation so it tighten with both flexion and extension. [1,5]