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Wrist Arthroscopy

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Introduction

With the introduction of smaller telescopes, smaller joints of the body have been scoped to obtain plethora of information, otherwise left alone with conservative treatment without much relief and often considered as internal derangement of joint. Wrist arthroscopy have made significant progress and many hand surgeons are trained in wrist arthroscopy as a part of the hand surgery fellowship programme and do wrist arthroscopy as a part of standard hand surgery practice. The first diagnostic wrist arthroscopy was done by Kenji Takagi in Japan and later the practice was advanced by researchers like Michael Burman, M Watanabe, Chen and T Whipple who is credited to devise the traction tower.

Indications for Wrist Arthroscopy

Diagnostic : In chronic wrist pains, either due to trauma or soft tissue affection where clinical diagnosis is not clear and conservative treatment has been not effective.

Therapeutic :

(a) ***Trauma :*** In acute trauma to the distal radioulnar joint(DRUJ) specially intra-articular fractures, carpal bone fractures and dislocations, ligamentous injuries of the wrist bones, triangular fibro-cartilage complex (TFCC) injuries and disruptions.

(b) ***Chronic injuries :*** Subluxation and instabilities of the carpal bones, non-union of the scaphoid bone and residual pain after DRUJ injury and unresolved TFCC injury.

(c) ***Inflammatory conditions :*** like rheumatoid arthritis and nonspecific arthritis for synovectomy.

(d) ***Infective arthritis :*** For lavage and debridement of the joint, for synovial biopsy and synovectomy.

(e) ***Metabolic conditions :*** For synovectomy in gouty arthritis and other crystal induced arthritis of the wrist.

(f) ***In sports trauma :*** For unresolved wrist pain such as dorsal inpingement in sportspersons

(g) ***Ganglion :*** For excision of dorsal ganglions and recurrent ganglions after open surgery.

(h) For decompression of cyst of the lunate and bone grafting.

(i) For fusion arthrodesis, as in rheumatoid, tuberculosis and septic arthritis, proximal or distal row or limited fusion in chronic traumatic conditions.

Set up and Equipment

Anaesthesia : The procedure is generally done under general anaesthesia. Brachial or axillary block can also be used in cooperative patients. The tourniquet is always used and the pressure to be maintained is 250mm of Hg.

Position : The position of the patient is always supine and the forearm flexed to 90 at the elbow, the arm and the elbow is supported over a side trolley. The arm is abducted to 90degree and the forearm is in midprone position, the fingers pointing towards the ceiling and the dorsum facing the surgeon.

Traction System : The traction system is given over a pulley to the 5 fingers either with the help of Chinese spiral traps or adhesive tape .The traction system is directly attached through a nylon

rope over a pulley to the weight or when adhesive tapes are used to the fingers, it traverses through the spaced out holes in the small wooden 12 inch ruler, to the nylon rope and then through a pulley to the traction weight. Some surgeons keep the thumb free from the traction system. The weight used for traction is around 4 kg, the counterweight being 4 kg on the portion of the arm between the tourniquet and the elbow. It is imperative that the portion of the arm used for counter traction is well padded. The traction tower devised by W.Terry can also be used but I don't have experience with the same.

JESS System : Earlier about 10 years back, I used to use the adhesive tape traction system. It is quite cumbersome and sometimes slips off during surgery due to soaking of the adhesive tape at the time of the preparation and with all these adhesive around, space during for surgery gets reduced. Therefore in the last 5 years, I regularly use the JESS fixator distraction assembly that one uses for fixation of # distal end radius. Instead of the hinge at the wrist joint, one uses a distraction apparatus, which can safely and securely distract the wrist joint to optimum level without causing neurovascular damage. The assistant stabilizes the hand with JESS fixator with one hand and allowed to hold the camera with the other. Thus the surgeon's both hands are free to work and manipulate the instruments for the necessary procedure. I find this system very versatile for this procedure and offers many advantages.

Arthroscope System : The arthroscope used is 2.7 mm. The trolley with the monitor, video, shaver, camera console and the light source is kept opposite to the extremity. Wrist arthroscopy is commonly done through the dorsal portal but a semi-invasive volar portal has been described, often because of the danger of damage to the principle neurovascular bundles on the volar aspect, it is not done regularly.

Portals : Before making the portals a thorough knowledge of the six compartments on the dorsum through which the tendons run is absolutely necessary. In the first compartment abductor pollicis longus(APL)and extensor pollicis brevis (EPB), the second extensor carpi radialis longus(ECRL) and extensor carpi radialis brevis (ECRB).The third is extensor pollicis longus (EPL), the fourth extensor digitorum longus (EDL)and extensor indicis (EI),the fifth extensor digitorum minimi (EDM) and the sixth, the extensor carpi ulnaris (ECU). The portals are made in such a way to avoid damage to the dorsal vessels and nerves and the portals are made according to the compartments.

Portal 1-2 is between compartment 1 and 2 and helps to directly approach to the radial area of the radiocarpal joint and can visualize the radial prestyloid recess, radioscaphoid ligament and the scaphoid surface of the radius. It is very much in proximity to the radial artery and the three terminal branches of the superficial radial sensory nerve and the EPL. This portal is not very frequently used.

Portal 3-4 is made between the 3 and 4 compartments. It is the main portal for introducing the telescope, as it not only allows better visualization of the scaphoid and lunate bones but also corresponding surfaces of the radius, radioscapholunate and scapholunate ligament and the triangular fibrocartilage complex. It is on the radial side of the EDL and 3rd metacarpal.

Portal 4-5 is made on the ulnar side of the 3rd metacarpal and medial side of EDL. This portal allows us to visualize the TFCC and scapholunate ligaments, ulnar capsule, ulnar prestyloid recess and the radial and lunate surfaces of the radius, scaphoid, lunate, the triquetrum and occasionally the pisiform. This portal is commonly used for introduction of the probe and instrumentation.

Portals 6R and 6RU are made on the radial and ulnar side of the 6th compartment. It is often used for inflow portal and can help to visualize the TFCC, lunotriquetral and ulnotriquetral ligaments, ulnar prestyloid recess.

RMC (radiomidcarpal) portal is made on the radial edge of the 3rd metacarpal and 4th dorsal compartment approximately 1cm distal to the 3-4 portal. It is for better visualization of the distal row of carpal bones and distal surface of proximal row of carpus.

UMC(ulnar midcarpal)portal is located on the medial side of 3rd metacarpal and between EDL and EDM. It is often used for instrumentation for the ulnar side of the midcarpal.

Procedure

It is important to surface mark the distal radius, ulnar styloid and the various tendons of the dorsal compartments. The portals are marked with sterile marker pen. Most often, one uses the 3-4 portal and the 4-5 portal on either side of the 3rd metacarpal. The joint is infiltrated with 10cc saline entry and the skin perforated only up to the subcutaneous with a vertical 3mm incision with a stab knife, parallel to the tendons and further deepened with the help of the mosquito. The feeling of giving way signals the entry into the joint. The sheath with the blunt trochar is introduced through the 3-4 portal, the trochar is replaced with 2.7mm telescope with camera. The inflow may be through the sheath or another separate 6R or 6U portal, through a 16 gauze needle attached to the inflow system. A thorough diagnostic round is taken examining the radial stylois recess, the scaphoid, lunate, ligaments and the radius surface and TFCC and palpating the surfaces through a probe introduced through the 4-5 portal. The portals can be exchanged for the telescope and instrumentation, depending upon which side the pathology exists either on ulnar or radial side. Portals 1-2 are used for pathology in the 1 and 2 compartment. Similarly RMC and UMC portals for the midcarpal pathology.

Post-operative Care

The portals are kept open and the wrist is immobilized with a below elbow plaster slab and the hand is to be elevated for 48 hours. The slab used for immobilisation is kept for 1 to 6 weeks, whether the scopy is done only for diagnosis or as a therapeutic procedure.

Finally, the functional return of the wrist after the procedure also depends upon good rehabilitation.

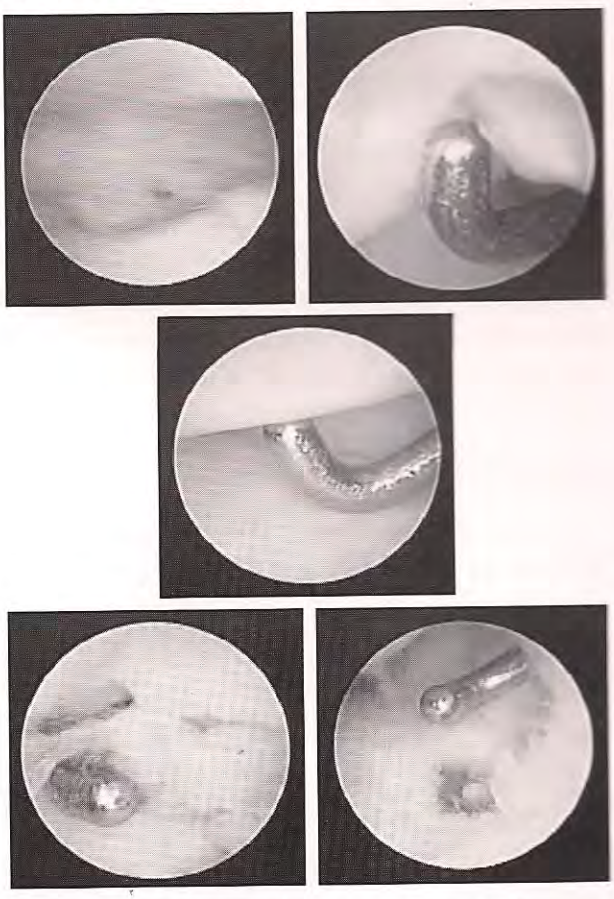

Fig. 1 : Wrist arthroscopic images of different facets of wrist joint and TFCC.

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