

Case Study Presentation Word Template

1. Give a brief overview/introduction of your chosen topic (Max 100 words)

- The triangular fibrocartilage complex (**TFCC**) is a load-bearing structure between the lunate, triquetrum, and ulnar head.
- The function of the TFCC is to act as a stabilizer for the ulnar aspect of the wrist.
- The TFCC is at risk for either acute or chronic degenerative injury.
- Forced ulnar deviation and positive ulnar variation carry associations with injuries to the TFCC.
- Patients with TFCC injury will present with ulnar-sided wrist pain that may present with clicking or point tenderness between the pisiform and the ulnar head.
- TFCC is reported to accompany distal radius fractures in 39 to 84% of cases.
- Ultrasound and MRI imaging is useful as a preliminary diagnostic tool; arthroscopy is the diagnostic gold standard.

2. What are important aspects of pathophysiology (i.e., traumatic, benign, malignant, idiopathic, infectious, inflammatory, degenerative), symptoms, epidemiology (population at risk), aetiology (cause) for your chosen topic (Max 300 words)

Primary cause of TFCC tears are trauma: • falling accidents with pronated, hyperextended wrists [1] • distraction injuries that pull on the ulnar side of the wrist [1] • degenerative injury due to repetitive loading of wrist [2]
Symptoms: • wrist swelling, ulnar side pain, clicking sound [1] • loss of range of motion of distal radial ulnar joint (DRUJ) [2] Epidemiology • degenerative tears more common in people >50 years [2] • traumatic tears more common in people

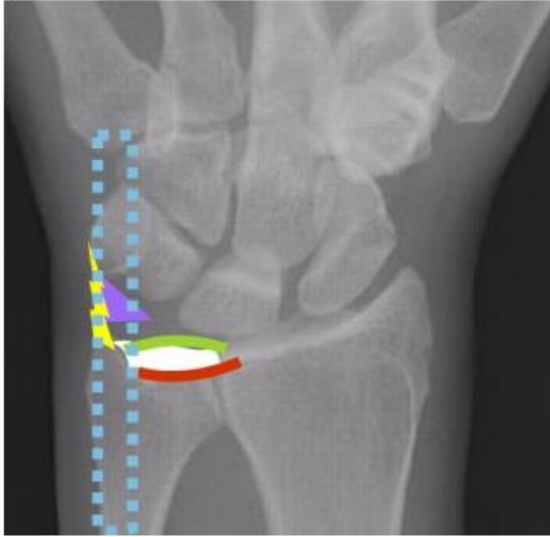
3. Given the information you have provided above, provide four key questions you will ask a patient who presents with a request to investigate the pathology/condition you have chosen (Max 100 words)

Have you had any x-rays or other imaging tests? (+what are the results?) • Do you have pain in your wrist? Where is it? • Do you have any restriction of movement in your wrist? • Have you had an injury and what happened?

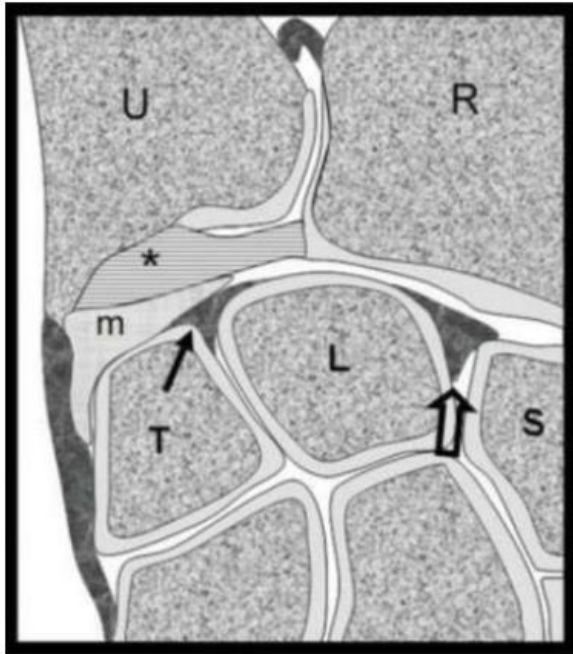
4. Describe the scanning protocol that should be used to investigate this pathology/condition (i.e., image series). Include the anatomical structures and any specific techniques that would apply for this condition. Provide information on landmarks that can be used to identify structures and relevant scanning planes. In your answer, also provide any reference measurements that can be used to help assess the presence/absence of the condition/pathology (Max 500 words)

Anatomy: The TFCC consists of articular disk (triangular fibrocartilage), ligaments (dorsal and volar radioulnar), meniscus homologue, ulnar joint capsule and the subsheath of the extensor carpi ulnaris (ECU) tendon. See images below. [6,7]

Case Study Presentation Word Template



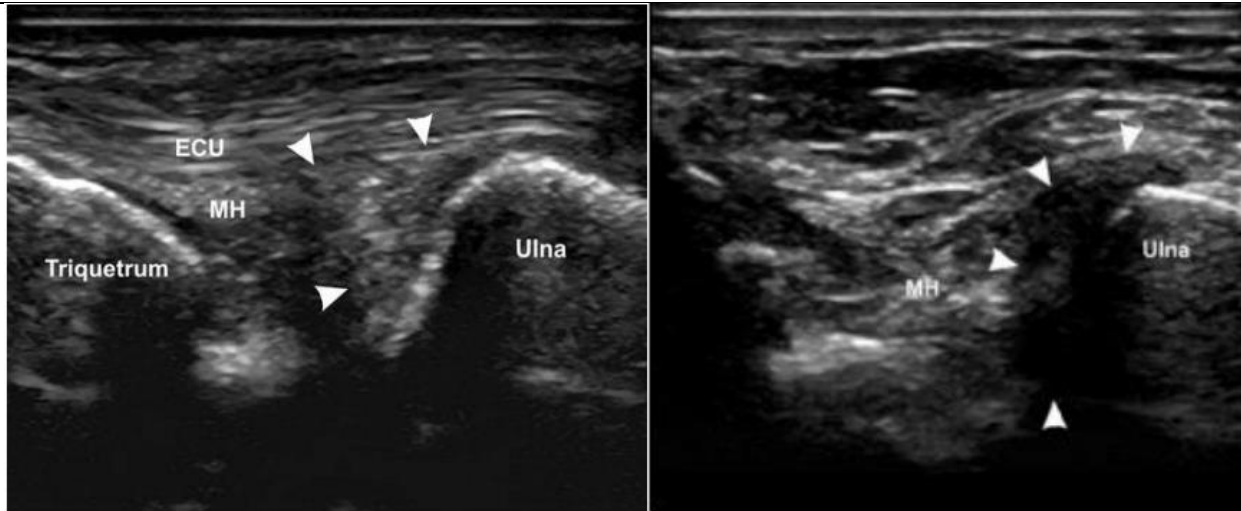
White=triangular disc, purple= meniscus homologue, blue=extensor carpi radialis sheath, red=dorsal radioulnar ligament, green=palmar radioulnar ligament, yellow=ulnar joint capsule



Coronal section medial wrist. Asterisk= triangular disc, m=meniscus, T=triquetrum, S=scaphoid, U=ular, R=radius, open arrow =scapholunate ligament, closed arrow= lunotriquetral ligament

Ultrasound Protocol: Coronal views of TFCC (see images below)[6] Dorsal aspect: • Wrist pronated, slight radial deviation, use ECU as acoustic window. [6] Volar aspect: • Wrist supinated [6] Transverse views help confirm findings.

Case Study Presentation Word Template



Left [6]: dorsal approach

Right [6]: volar approach

ECU= extensor carpi ulnaris tendon, MH= meniscus homologue, arrowheads=volar aspect of triangular fibrocartilage disk.

Technical considerations: • High frequency transducer (10-15 MHz) [6] • Gel stand off [6] • Tissue harmonic imaging improves axial and lateral resolution [6] • Real time imaging with radial deviation may assist in assessment [6].

Other structures to examine (pathology relating to them may cause ulnar sided wrist pain). • ECU tendon [8] • flexor carpi ulnaris tendon [8] • Hypothenar hammer syndrome (ulnar artery) [8,9] • lunatotriquetral ligament [10]

5. Describe any potential difficulties/pitfalls that may arise when imaging the relevant anatomy, and how they can be overcome. Your answer may refer to anatomic variations, patient habitus, image resolution, common patient presentations with this condition etc (Max 200 words)

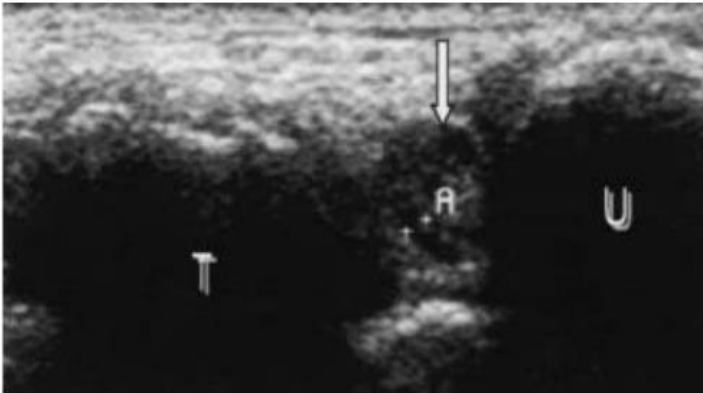
One limitation of US is the difficulty of visualizing the entire length of the disk, especially its radial attachment site, which is required for complete evaluation. The styloid process may obstruct visualisation, but this may be overcome scanning the wrist in a supine position, allowing the styloid process to rotate and move dorsally so that the radial attachment of the disk becomes visible. There may be improved visualisation if there is a radiocarpal joint effusion. [6]

6. Describe the sonographic appearances of the relevant anatomical structures that would be seen if the pathology /condition was present. Use images to demonstrate (Max 200 words)

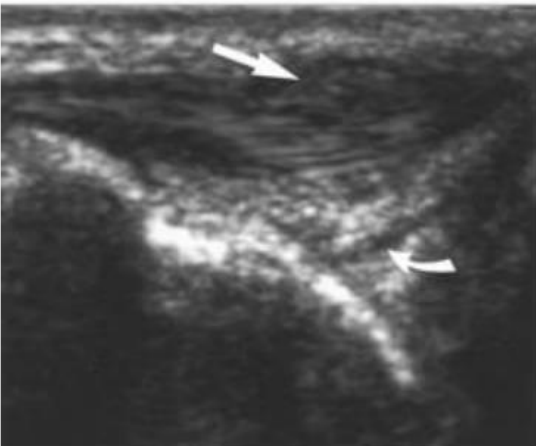
The normal appearance of the TFCC is as a homogenous inverted triangular structure deep to the ECU tendon on coronal imaging. [2] If torn there will be a hypoechoic cleft or defect evident. The images below demonstrate tears of the TFCC.

Case Study Presentation Word Template

1. Coronal image. 'A' demonstrates fluid filled tract which is consistent with a tear. [10]



2. Coronal image. Sagittal tear demonstrated by curved arrow. ECU tendon also appears thickened and heterogenous (straight arrow). [10]



3. Coronal image shows longitudinally oriented hypoechoic line representing a surgically confirmed tear (arrows). [11]

Case Study Presentation Word Template



7. Comment on the value of using ultrasound for this condition. I.e. is it good for screening, ruling out, confirming, surveillance, or following up after treatment for the pathology/condition. Use quality resources and research evidence to support your answer (Max 200 words)

Sonography is used to investigate the cause of wrist pain. There are few studies that report on the diagnostic accuracy of ultrasound to detect TFCC tears. In a small study, thirteen symptomatic patients underwent sonography, MR and arthroscopy. Sonography correlated with arthroscopy results (n=8, four ulnar tears, three radial tears, and one normal) in all cases excepting one (a case of small perforation at the dorsal radial attachment). Sonography correlated with MR in 11/13 cases. In one of these cases a tear was identified with sonography which was not seen on MR, however this case was not confirmed with arthrography. [11]

8. Describe the possible future pathways clinical pathways that the patient may follow if the pathology is confirmed or suspected on the ultrasound examination and how that may impact on the information that needs to be presented in your images/sonographer report (Max 200 words)

Untreated TFCC tears may result in an unstable DRUJ, [2] painful wrist with eventual arthritic changes, loss of grip and mobility [1] and possible carpal translocation [2]. Treatments: • Conservative (splinting, immobilisation, anti-inflammatory medication, rest, job restriction) [2] • debridement of TFCC [1] • Surgical repair (reattachment, ulnar shortening, ulnar head excision, limited or complete wrist fusion) [2] According to the authors of one study [11], different surgical approaches are used for ulnar tears (repair and suture) compared to radial tears (debridement). Therefore, it would be prudent for sonographers to try and determine if the TFCC tear is on the ulnar or radial aspect of the TFCC.

9. Summarise the key points that need to be made in your sonographer report for this pathology/condition. Include important clinical observations, relevant measurements, key diagnostic ultrasound criteria and anything else you think might be relevant (Max 200 words)

Are there any limitations to the visualisation of the TFCC i.e. Was the radial attachment seen, or obstructed by the radial styloid? • Is there associated tendinopathy of the ECU or flexor carpi radialis tendon? • Does the ulnar artery appear normal? • If there is an apparent tear, is it on the radial or ulnar aspect of the TFCC? • Note any clinical signs or results of any complementary diagnostic tests

10. Reference List (IEEE referencing style to be used)

Case Study Presentation Word Template

- [1] M. Infanger and D.Grimm D, "Meniscus and discus lesions of triangular fibrocartilage complex (TFCC): treatment by laser-assisted wrist arthroscopy," Journal of Plastic, Reconstructive & Aesthetic Surgery, vol. 62, no. 4, pp.466-471, Apr. 2009.
- [2] I. Amirsys and T.I. Ovid, "Imaging reference center," Amirsys, Inc., Ovid: Salt Lake City, Utah, 2005. [Online]. Available: <https://app-imagingreferencecentercom.access.library.unisa.edu.au/main> [Accessed: June 23, 2017].
- [3] S. Joshy, K. Lee K, and S.C. Deshmukh, "Accuracy of direct magnetic resonance arthrography in the diagnosis of triangular fibrocartilage complex tears of the wrist," International orthopaedics, vol. 32, no.2, pp 251-253, Apr. 2008.
- [4] R.K. Lee et.al., " Intrinsic ligament and triangular fibrocartilage complex tears of the wrist: comparison of MDCT arthrography, conventional 3-T MRI, and MR arthrography," Skeletal radiology, vol. 42, no.9, pp. 1277-1285, Sep. 2013.
- [5] T.A. Forman, S.K. Forman and N.E. Rose, "A clinical approach to diagnosing wrist pain," Am Fam Physician, vol.72, no. 9, pp. 1753-1758, Nov. 2005.
- [6] M.S. Taljanovic et.al., "US of the intrinsic and extrinsic wrist ligaments and triangular fibrocartilage complex—normal anatomy and imaging technique", Radiographics, vol.31, no. 1, pp.79-80. Jan.2011.
- [7] L. Pesquer et. al., "Normal ultrasound anatomy of the triangular fibrocartilage of the wrist: a study on cadavers and on healthy subjects', Journal of Clinical Ultrasound, vol.37, no.4, pp. 194-198, May 2009.