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Original Research Article

De Quervain`s disease: evaluation by high resolution ultrasonography

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ABSTRACT

Background: De Quervain's tenosynovitis is a stenosing tenosynovitis of the first extensor compartment of wrist and leads to wrist pain and impaired function of wrist and hand. The aim of this study is to evaluate the role of high resolution ultrasonography in diagnosing suspected cases of de Quervain's tenosynovitis and also to evaluate the role of high resolution ultrasonography in detecting the anatomical variants of the first extensor compartment which are predisposing conditions for de Quervain's tenosynovitis.
Methods: A prospective study of 15 consecutive cases who were referred with clinical diagnosis of de Quervain`s disease was done with ultrasonography in the department of Radio-diagnosis and findings were carefully analysed.
Results: Thickened extensor retinaculum over the first extensor compartment was found in all the cases. Mean thickness of the thickened retinaculum is 1.65 mm. In 60% of cases multiple slips of APL tendon were found.
Conclusions: From the study, we conclude that extensor retinaculum thickening is a common finding in de Quervain`s disease.

Keywords: De Quervain's tenosynovitis, High resolution ultrasonography

INTRODUCTION

De Quervain's disease is a stenosing tenosynovitis of the first extensor compartment of wrist which contains tendons of the abductor pollicis longus (APL) and extensor pollicis brevis (EPB).[1-3] It is a typical example of overuse tenosynovitis of the wrist. It is also known as washerwoman's sprain. The dorsal aspect of wrist has a transverse hyperechoic fibrous band, the extensor retinaculum that holds the six extensor tendon compartments. The first compartment contains the tendons for the abductor pollicis longus and extensor pollicis brevis which have double-layered synovial sheaths to prevent friction as they pass through the first extensor compartment. These sheaths extend proximally and distally from the extensor retinaculum. These tendons form the radial boundary of anatomical snuff box.

The initiating factor is first compartment tendon overload which results in tissue irritation and further inflammatory process within the tendinous sheath, tendovaginitis. As a consequence of overuse an inflammatory-fibrous process is initiated within the pulley. Thickening and constriction of the pulley is a sequela of that process.

A cycle of microtears and repair results in pulley degeneration. Hypertrophy of the pulley restricts the tendon which may result in decreased tendon glide. Not every case of tendovaginitis of the first extensor compartment results in pulley thickening and constriction. Anatomic variations of the first extensor compartment may be a causative factor in patients with de Quervain's disease, or they may lead to failure of injection therapy.[4]

Ultrasonography is an excellent imaging modality to evaluate the patients with de Quervain's disease and also it helps to detect anatomical variations. In this study 15 patients with de Quervain`s disease was evaluated by high resolution ultrasonography with emphasis on

ultrasonographic findings of the disease and common anatomical variations.

The aim of this study is to evaluate the role of high resolution ultrasonography in diagnosing suspected cases of de Quervain's tenosynovitis, to evaluate the role of high resolution ultrasonography in detecting the anatomical variants of the first extensor compartment which are predisposing conditions for de Quervain's tenosynovitis and to advice appropriate treatment strategy based on the experience learnt from the available literature.

METHODS

This study was conducted in Silchar Medical College and Hospital from May 2016 to May 2017. A prospective Ultrasonography study of 15 consecutive cases who were referred with clinical diagnosis of de Quervain's disease. Patients of all ages were included. Informed consent was taken from the patients and care taker. A brief history was enquired from each patient. Patients were examined in either sitting or supine position, whichever comfortable for individual patient. Involved hand was positioned in pronation over a pillow and ultrasonography carried out.

Table 1: Results of ultrasonography evaluation.

Age (years)	Sex	Dominant hand	Diseased hand	Ultrasonography findings				
				Extensor retinaculum thickness (mm	Septum between APL and EPB tendons	Single Compartment involvement	Multiple APL tendon slips	Tendon sheath effusion
42	M	R	R	1.62	-	-	-	Y
46	F	R	R	1.66	-	-	Y	-
41	F	R	L	1.48	-	-	-	-
54	F	R	R	1.61	-	-	Y	Y
65	M	R	R	1.94	Y	-	Y	-
51	F	R	L	1.45	-	-	-	-
49	F	R	R	2.22	Y	Y (EPB)	Y	-
33	F	R	R	1.60	-	-	-	-
44	F	R	L	1.72	Y	Y(EPB)	-	-
53	M	R	R	2.15	-	-	Y	Y
61	F	R	R	1.25	Y	-	Y	-
58	M	R	R	1.40	-	-	Y	-
51	F	R	R	1.59	Y	-	-	-
45	M	R	L	1.75	-	-	Y	Y
47	M	R	R	1.37	Y	Y(EPB)	Y	-

APL: Abductor pollicis longus; EPB: Extensor pollicis brevis; Y: yes; R: right; L: left.

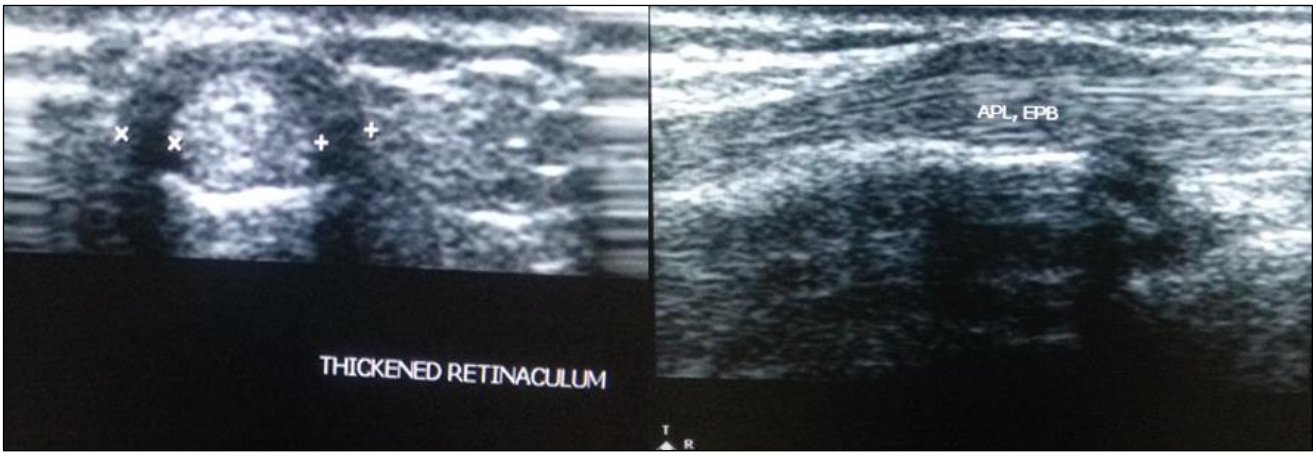


Figure 1: Transverse and sagittal images of first extensor compartment showing thickened extensor retinaculum at the level of radial styloid involving both APL and EPB tendons.

Examination of the opposite hand was also conducted for comparison. High resolution Ultrasonography were carried out on HD 11 XE PHILIPS machine, with a high frequency (5 -12 MHz) linear probe. Sufficient amount of ultrasonography gel was used for proper examination and better visualization of anatomical structures. Examination was carried out initially in transverse plane and followed by sagittal plane.

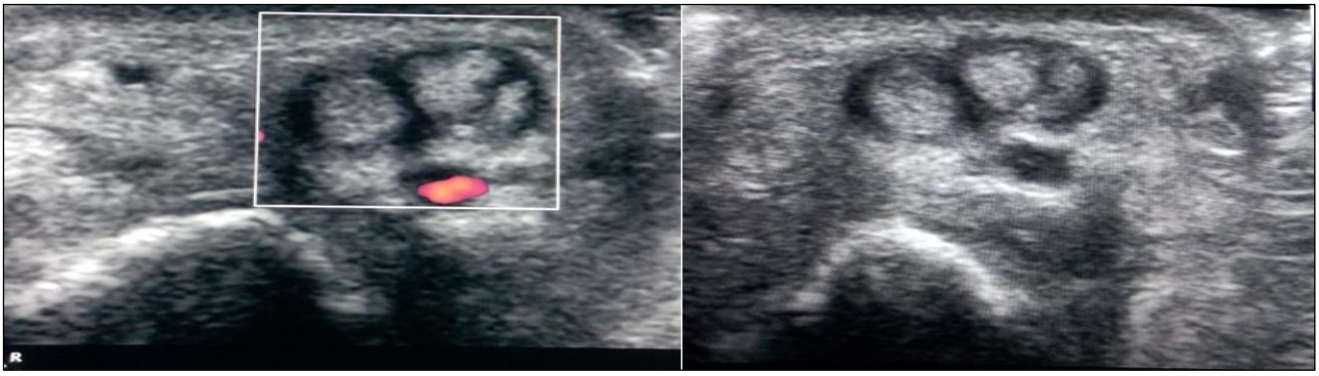


Figure 2: Transverse images of first extensor compartment at the distal end of radial styloid showing thickened tendons of APL and EPB with surrounding minimal fluid. There is hypoechoic septum separating APL and EPB tendons. Accessory slips of ABPL are also present. Radial artery and distal end of radius also seen.

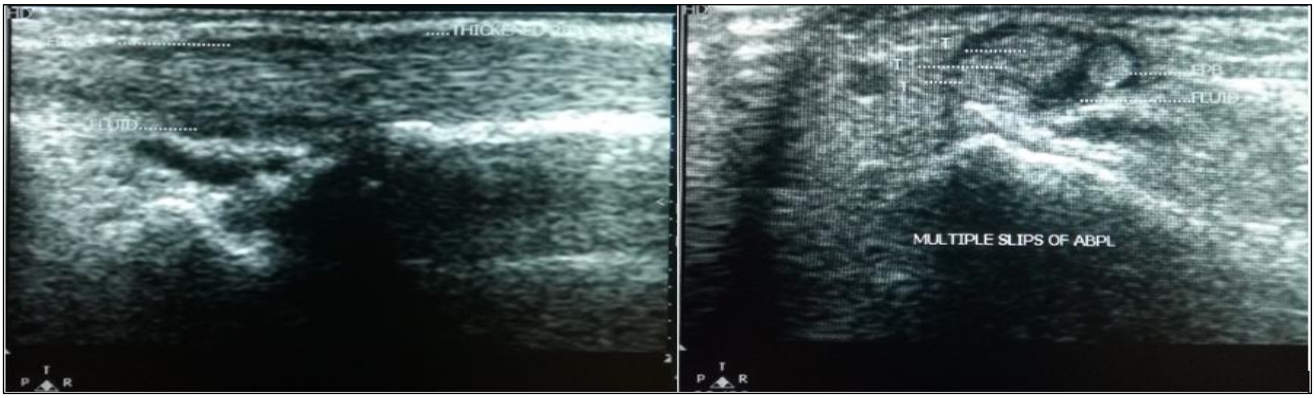
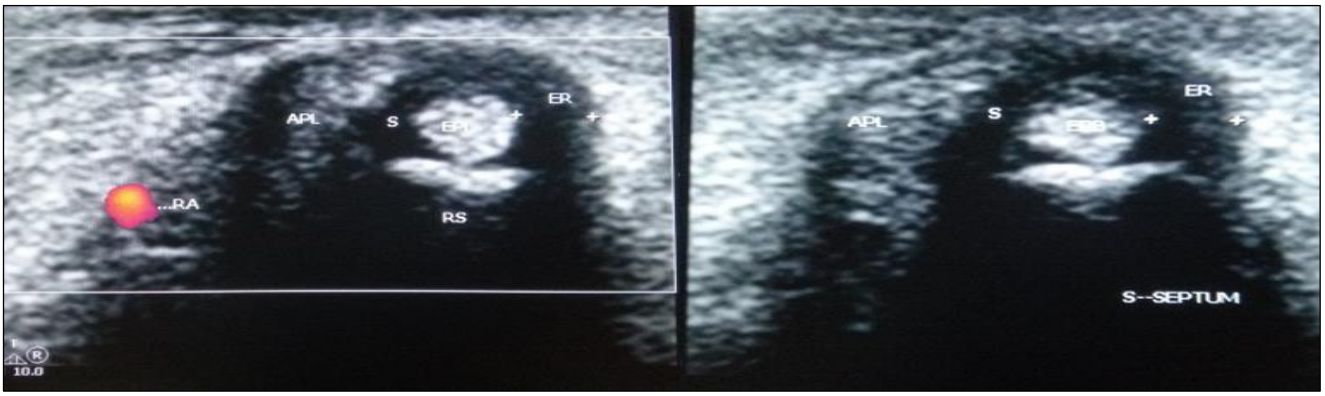


Figure 3: Transverse image showing thickened tendons in first extensor compartment with mild thickening of extensor retinaculum. Minimal synovial sheath fluid collection seen distal to the retinaculum. Hypoechoic septum seen between APL and EPB. Multiple slips of APL are present.



EPB: Extensor pollicis brevis; S: Septum; ER: Extensor retinaculum; RS: radial styloid; RA: radial artery.

Figure 4: Transverse image of first extensor compartment showing hypoechoic thickening of extensor retinaculum overlying EPB tendon. Vertical septum noted in between APL and EPB tendons.

To avoid anisotropy, the angulation of the transducer was adjusted continuously. Doppler imaging was used wherever indicated in detecting hyperemia. The APL tendon was identified as being located more laterally and inserted onto the radial metacarpal base or at the level of the trapezium, and the EPB tendon was identified as being located more medially and running along the proximal phalanx level. Thickness and echotexture of tendons and extensor retinaculum were evaluated. Sub compartmentalization within this compartment and the number of APL tendon slips were evaluated. Synovial sheath fluid collection was evaluated.

RESULTS

In the present study 15 cases with clinical diagnosis of de Quervain's disease was examined using high resolution Ultrasonography. Among these 15 cases 9 were female and 6 were male. Average mean age in the present study was found to be 49.3 years, the youngest being 33 years and the oldest being 65 years. Among these 15 cases all were of right hand dominance. We had 12 cases to have their right hand as diseased and 3 cases with left hand as diseased. Rheumatoid arthritis and other arthropathies or dermopathies was not present any of these patients.

On Ultrasonography, we found hypoechoic extensor retinaculum thickening in all the 15 cases. Mean thickness of the thickened retinaculum was 1.65 mm, least thickness being 1.37 mm and maximum being 2.22 mm. Involved tendons of the first compartment were mildly thickened as compared to opposite wrist. Four cases were seen to have tendon sheath effusion distal to the caudal edge of extensor retinaculum. In six cases, we found vertical septum separating the APL and EPB tendon. Among these six cases three cases had only involvement of EPB tendon with normal appearing extensor retinaculum overlying APL and other three cases had involvement of both tendons. Nine cases had multiple tendon slips of APL.

DISCUSSION

De Quervain`s disease is a typical example of overuse tenosynovitis which involves the first extensor compartment of wrist. The dorsal aspect of wrist has a transverse hyperechoic fibrous band, the extensor retinaculum that holds the six extensor tendon compartments. The first extensor compartment is a fibro-osseous tunnel directly over the radial styloid process. The fibro-osseous tunnel is a tubular passageway, 2.5 cm in length, formed by a groove on the radial styloid and the overlying extensor retinaculum. The first compartment contains the tendons for the abductor pollicis longus (APL) and extensor pollicis brevis (EPB) which have double-layered synovial sheaths to prevent friction as they pass through the first extensor compartment. Two anatomic variations involving this fibro-osseous tunnel have been widely reported in anatomic and surgical studies: a vertical septum, which splits the compartment into two distinct sub-compartments, and the presence of multiple slips instead of a single APL tendon.[5-6] Anatomic variations may be a causative factor in patients with de Quervain's disease. A vertical septum splitting the compartment seems to predispose to local tendon friction.[4]

The initiating factor of the disease process is the tendon overload and overuse. Which results in chronic micro-trauma of the overlying extensor retinaculum at the level of radial styloid process. Retinaculum becomes thickened due to inflammatory-fibrous process. Thickening of the retinaculum narrows the first compartment and subsequent impingement and inflammation of the extensor pollicis brevis and abductor pollicis longus tendons. Tendon sheaths are thickened and shows myxoid degeneration.[7-8]

De Quervain's tenosynovitis is more common in women, particularly those 30 to 50 years of age.[9] New mothers are especially noted to have this problem from picking up a child.[10] People who perform repetitive movements of the thumb such as typists and piano players are usually affected.[11] Patients complains of tenderness and pain over radial styloid and it exacerbate during movement of thumb or grasping heavy objects. The Finkelstein test is performed by making a fist over the thumb and then moving the hand into ulnar deviation, which passively stretches the thumb tendons over the radial styloid and it increases the pain.[12] An alternative test is to abduct the patient thumb while keeping the wrist in radial deviation. It pushes the tendon against the retinaculum and not the bone. This is more specific maneuver as Finkelstein test may be positive in Radial styloiditis.[7]

Both longitudinal and transverse Ultrasonography images are performed over the radial styloid. The affected tendons are typically swollen and have a rounder cross section under the retinaculum. In acute phase, synovial sheath effusion surrounding the tendons can be demonstrated caudal to the distal edge of retinaculum. Extensor retinaculum is thickened and hypoechoic.[7] Lee K et al have stated that cutoff value of the extensor retinaculum for diagnosing de Quervain's disease to be 0.45 mm.[13]

Vertical septum appears as thin hypoechoic vertical bands intervening between the tendons.[14] Accessory tendon slips are better seen over the scaphoid as within the tunnel crowding of the tendon slips may prevent their detection. Demonstration of a vertical septum has clinical implications because it acts as a barrier to diffusion of injected steroids and require opening of both tunnels at surgery.[15] If anatomical variations are present these may also challenge the onward intervention, and the patients may fail to improve despite repetitive palpation-guided injections.[16-17] Thus USG guided injections may help in relieving the disease. Identifying multiple slips of abductor pollicis tendon will help the operating surgeon for proper planning. In the postsurgical follow-up of

patients with de Quervain's tenosynovitis, an ultrasound examination can rule out the development of neuromas of the terminal branches of the radial nerve and tendon dislocation.[18]

CONCLUSION

Though the study group is small, from the study we conclude that de Quervain's disease is more common in female. Average age of occurrence in this study is 49.3 years. Right hand is more commonly involved. External retinaculum is thicker and hypoechoic in de Quervain`s disease, average thickness in this study is 1.65 mm. Involved tendons are thickened in de Quervain`s disease as compared to opposite side. In sub-compartmental involvement only Extensor pollicis brevis tendon was involved in the study.

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