

4). 1/3

(1, 2).

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15

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38

65

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47.6

(non - steroid

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anti - inflammatory drug)

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2001 9 18

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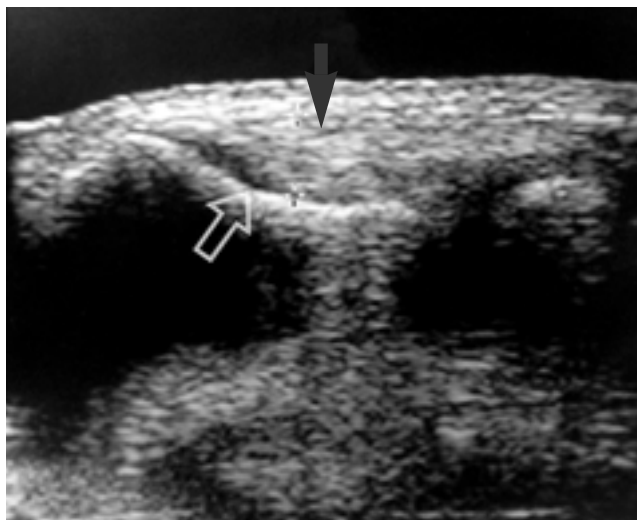
2 가 5 , 3 가 3 , 5 가 1 .

가

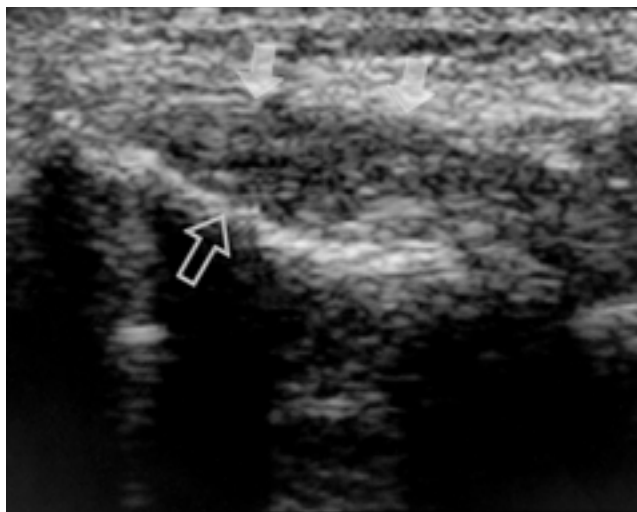
가 3

18

Acuson computed sonography 128 XP/10(Acuson, Mountain view, CA, U.S.A.)



**Fig. 1.** Normal ultrasonographic finding of extensor carpi radialis brevis (ECRB) tendon in 50-year-old female. Ultrasonographically normal ECRB tendon (arrow) is characterized by uniform fibrillar pattern of tendon running in parallel toward lateral epicondyle with smooth border, and thin hypoechoic band (blank arrow) between cortex of the lateral epicondyle and the ECRB tendon.



**Fig. 2.** Typical ultrasonographic finding of the lateral epicondylitis in 61-year-old female. US finding of lateral epicondylitis shows heterogeneous hypoechoic ECRB tendon(arrows) with swelling, loss of hypoechoic band between ECRB tendon and cortex of lateral epicondyle, and cortical irregularity of lateral epicondyle(blank arrow).

7 - 11 MHz

(linear array transducer)  
(anisotropy artifact)

90

(fibrillar pattern)

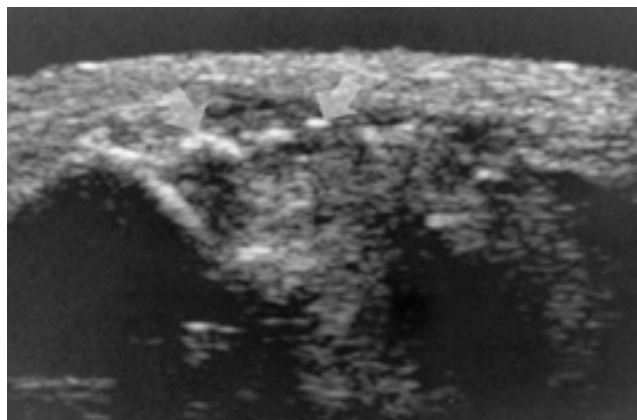
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(Fig.

1).

11

$\chi^2$  test Mantel - Haenszel



**Fig. 3.** Calcification within the ECRB tendon in 38-year-old male with lateral epicondylitis.

US of longitudinal scan of the right elbow shows multiple hyperechoic calcifications (arrows) within ECRB tendon. Conventional radiography of right elbow showed multiple calcifications in lateral aspect of the lateral epicondyle (not shown here).



**Fig. 4.** Cystic degeneration within the ECRB tendon in 57-year-old male with the lateral epicondylitis. US of longitudinal scan of the right elbow shows slightly decreased echogenicity of ECRB tendon(arrow) with loss of fibrillar pattern and internal cystic degeneration (blank arrow).

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22 8 (35%)  
(5). Potter  
가 T2 가 ,  
(Mucoid degeneration)  
(neovascularization) (6). Martine  
18 가 (Fig. 2), 3 T1,  
13 가 2 . 18 10 T2 가 ,  
(Fig. 3), 4  
2 가 , 9 (7).  
(Fig. 4), 14  
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4 ,  
11 , (fibrillar pattern)  
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6 , 3 가 3 가 . Maffulli  
가 (Table 1).  
(fibrillar pattern) 가  
(8). David  
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, 40 50 (intra -  
가 substance fiber rupture)  
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(fibroblast)  
(disorganized collagen)  
(angiofibroblastic  
hyperplasia) (3, 4).

**Table 1.** Relationship between Ultrasonographic Findings of Lateral Epicondylitis and Duration of Symptomatic Improvement after Conservative Treatment

Ultrasonographic Findings	Duration of Symptomatic Improvement			
	1 week	2 weeks	3 weeks	5 weeks
Swelling of ECRB* tendon	0	2	3	0
Echotexture of ECRB tendon				
Heterogeneous hypoechogenicity	1	4	2	1
Homogeneous hypoechogenicity	0	1	0	0
Heterogeneous mixed echo	1	0	1	0
Calcification within ECRB tendon	1	0	0	0
Cystic degeneration of ECRB tendon	1	1	3	1
Loss of hypoechoic band between ECRB tendon and lateral epicondyle	1	2	3	1
Cortical irregularity of lateral epicondyle	0	1	0	0
Fluid collection around ECRB tendon	0	0	0	0

\* ECRB : Extensor carpi radialis brevis

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1. Carl O, Robert P. Tennis elbow: current concepts of treatment and rehabilitation. *Sport Med* 1996;22(2):133-139
2. Verhaar JA. Tennis elbow, anatomical, epidemiological and therapeutic aspects. *Int Orthop* 1994;18:263-267
3. Krausharr SB, Nirschl RP. Current concept review : tendinosis of the elbow (Tennis elbow). *J Bone Joint Surg* 1999;81:259-276
4. Regan W, Wold LE, Coonrad R, Morrey BF. Microscopic histopathology of chronic refractory lateral epicondylitis. *Am J Sports Med* 1992;20:746-749
5. Gondos B. Tennis elbow: a re-evaluation. *AJR Am J Roentgenol* 1958;79:684-691
6. Potter HG, Hannafin JA, Rosemarie M, et al. Lateral epicondylitis: correlation of MR imaging, surgical, and histopathologic findings. *Radiology* 1995;196:43-46
7. Martin CE, Schweitzer ME. MR imaging of epicondylitis. *Skeletal Radiol* 1998;37:133-138
8. Maffulli N, Reigne R, Carrillo F, Capasso G, Minelli S. Tennis elbow: an ultrasonographic study in tennis player. *Br J Sports Med* 1990;24:151-154
9. David C, Frank B, Peter C, et al. Sonographic examination of lateral epicondylitis. *AJR Am J Roentgenol* 2001;176:777-782

## Ultrasonographic Findings of Lateral Epicondylitis of Humerus<sup>1</sup>

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**Purpose:** To evaluate the ultrasonographic findings of lateral epicondylitis and their relationship with clinical outcome.

**Materials and Methods:** The findings of ultrasonographic examinations of eighteen elbow joints in 15 patients [M:F = 5:10 ; age:38 - 65(mean, 47.6) years] with lateral epicondylitis were reviewed. Two patients underwent surgery, two were not treated, and the remaining 11 were treated conservatively. Symptomatic improvement was noted 1 week after conservative treatment in two cases, at 2 weeks in five cases, at 3 weeks in three cases, and at 5 weeks in one case. With patients in the 90 degree flexed elbow position and in a supinated wrist, we examined the extensor carpi radialis brevis (ECRB) tendon around the lateral epicondyle using ultrasound equipment with a 7 - 11-MHz linear transducer. The findings were assessed in terms of swelling of the tendon, changes in its echotexture, the presence of calcification or cystic degeneration, loss of the hypoechoic band between the tendon and bony cortex of the lateral epicondyle, cortical irregularity of the lateral epicondyle, and fluid collection around the tendon. Any relationships between each ultrasonographic finding and the treatment interval after which symptomatic improvement was noted were evaluated.

**Results:** In the 18 joints, change was observed in the echotexture of all ECRB tendons. This included homogeneous hypoechogenicity in two cases, heterogeneous hypoechogenicity in 13, and heterogeneous mixed echogenicity in three. Other ultrasonographic findings were swelling of the tendon in ten cases, loss of the hypoechoic band in 14, cortical irregularity in five, calcification in four, cystic degeneration in nine, and fluid collection around the tendon in four. In patients treated conservatively, there was no statistically significant difference between each ultrasonographic finding and the treatment interval after which symptomatic improvement was noted.

**Conclusion:** Ultrasonography can be used to assess changes in the ECRB tendon and lateral epicondyle occurring in lateral epicondylitis, but fails to provide information on the rapidity of symptomatic improvement.

**Index words :** Elbow, injuries  
Tendons, US  
Tendinitis

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