

1

2 2 2 3 4 5 6

가  
2 가  
215  
가 5-9 MHz  
가  
215 50 (23%) 70 133  
(62%) 203 83 133  
가 2.6 2.9  
203 201 1  
1

가 가 가  
가 가  
가 , CT, 가 , 가  
(1). 가 CT  
(2, 3). CT가 (4-6). 가  
(7).

1  
2  
3  
4  
5  
6

2006 10 16

2007 1 10

가

가

가

가 5 - 9 MHz

가                          가  
    가                 가      (callus formation)

[2]

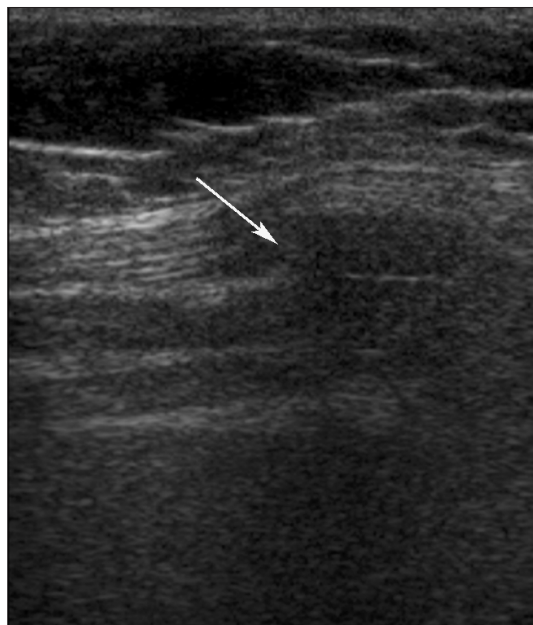


[2]



가

가 (pseudofracture) 11 17 1  
 가 2 6 3  
 가 3  
 가 16  
 가 10 가 6 60  
 가 7  
 가 50 (23%)  
 70 133 (62%)  
 203 83  
 133 (Fig 1, 2).  
 23% 가 2.6  
 62% 가 2.9  
 4 (2%) 가  
 17 (8%) 가  
 4 (Table 1).  
 203 201 1  
 1 (Fig. 3).  
 165 83 (50%)  
 15 5 6

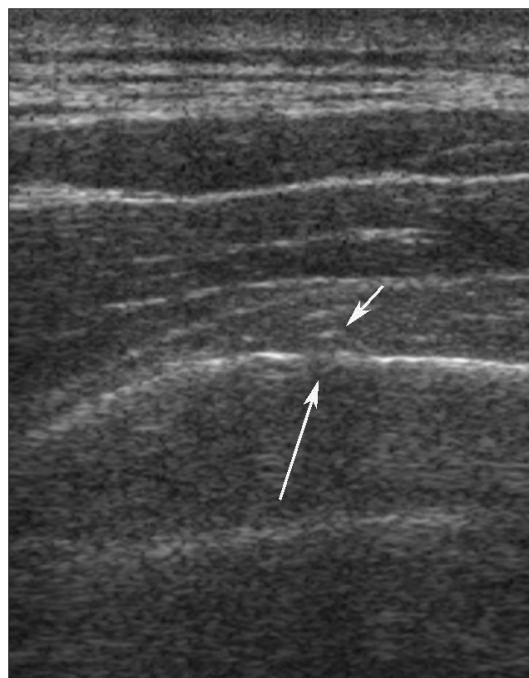


**Fig. 3.** 30-year-old woman with fractured right sixth costal cartilage. Transverse ultrasonogram shows definitely displaced disruption of anterior margin of cartilage (arrow).

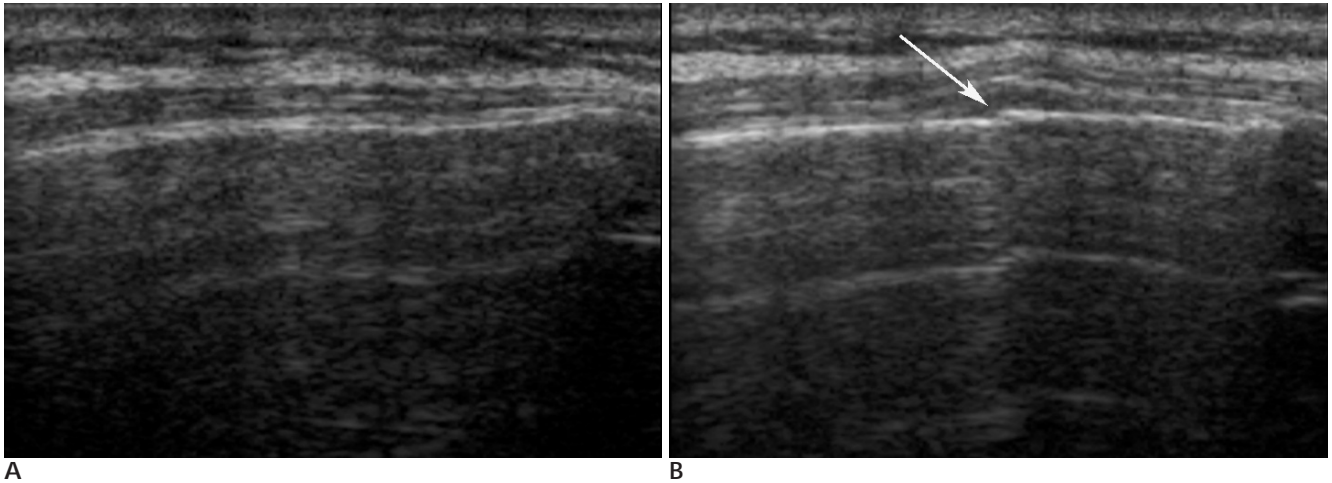
가 14 1 1 가  
 (Fig. 4).  
 16 3 5 가  
 2 3 , 1  
 (Fig. 5).  
 2

**Table 1.** Frequency of Fractures Revealed by Radiography and Ultrasonography

No. of Fractured Ribs	No. of Patients in Whom Fractures shown	
	Radiography	Ultrasonography
1	36	87
2	10	29
3	4	12
4	0	2
5	0	3



**Fig. 4.** 49-year-old man with fractured left fourth rib. Transverse ultrasonogram obtained 2 weeks after injury shows cortical disruption (long arrow) and early callus formation (short arrow) above fracture.



A

B

Fig. 5. 45-year-old woman with follow-up ultrasonography.

A. Initial ultrasonogram cannot show rib fracture at left ninth rib.

B. Follow-up ultrasonogram shows cortical disruption with minimal displacement at left ninth rib (arrow).

(8). 14 가  
10% . Wustner (14)  
100 65% ,  
(9). , CT, 36% 11% 가  
가 . Niitsu (4) 37%, . , Griffith (8) 50  
(hot spot) CT 17 47 가  
가 가 , 10 6 37 9 12 가  
가 . 4 2.9 가 2.6  
(7). 가 3 16 Griffith (8)  
가 가 , 가 가 5 가  
, 가 , 가 (2, 10, 11).  
가 (8), 가 가 Kara (7)  
가 가 (40.5%) 7 37 15  
가 165 83 (50%)  
(12). Wischofer (13) Malghem (15) CT  
21 16 (76%) 가  
16 11 . Griffith

(8)

Kara (7) 11%가  
1%

가  
2-3 가  
14

가 가 ,

가 .

Deluca (8)  
가 32 - 42%

.  
65%  
(8,  
78%  
13, 15).  
가  
62%

가 . ,

가 가 가

가 가 ,

가 가 ,

가 가 ,

가 가

2.6  
2.9

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## Detection of Rib Fractures in Minor Chest Injuries: a Comparison between Ultrasonography and Radiography Performed on the Same Day

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**Purpose:** We wished to compare the ability of ultrasonography and radiography performed on the same day to detect rib fractures in minor chest injuries.

**Materials and Methods:** Two hundred and fifteen patients with minor chest injuries were selected. Radiography and ultrasonography were performed on the same day with these patients. Chest wall pain was the only presenting symptom. Two radiologists performed ultrasonography. Fractures were identified by a disruption of the anterior margin of the rib and costal cartilage. The incidence and location of fractures and complications revealed by radiography and ultrasonography were compared.

**Results:** Radiographs revealed the presence of 70 rib fractures in 50 (23%) of 215 patients and ultrasonography revealed the presence of 203 rib fractures in 133 (62%) of 215 patients. Ultrasonography uniquely identified 133 rib fractures in 83 patients. Ultrasonography identified a 2.9 fold increase in the number of fractures in a 2.6 fold number of subjects as compared to radiography. Of the 203 sonographically detected fractures, 201 were located in the rib, one was located at the costochondral junction, and one in the costal cartilage. There were no complications seen by either radiography or ultrasonography.

**Conclusion:** Ultrasonography reveals more fractures than those that may be overlooked on radiography for minor chest injuries.

**Index words :** Ribs, fractures  
Ultrasound (US)  
Thorax, injuries

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