

:
 C 1
 2 2 3
 :
 :
 : (n=6) CT 11 , 12 (1)
 MR (n=6)
 - C
 : - C 6 6
 2 (middle subtalar joint) (pos -
 terior subtalar joint) , 6 , 4
 6
 () 1 가
 CT MR 6 1
 , 5
 : - C
 :
 (subtalar coalition) , , (coalition) Lateur
 가 , (5) C (Fig. 1A).
 가 - C
 ,
 50%
 (1).
 (talar beak) , 1994 11 1999 6 -
 (lateral process)가 11 , 12 (1) (Table
 , (ball - and - socket deformity), 1). 가 8 , 가 3 , 28
 (10 - 48)
 (anterior subtalar joint) , 7
 (1 - 4). 19 (14 - 28) , 5
 23
 6 (' CT ')
 ' - C 가 , (sus - 6 (' MR ')
 tentaculum tali) C , CT (

1
 2
 3

2000 12 20

2001 5 2

CT

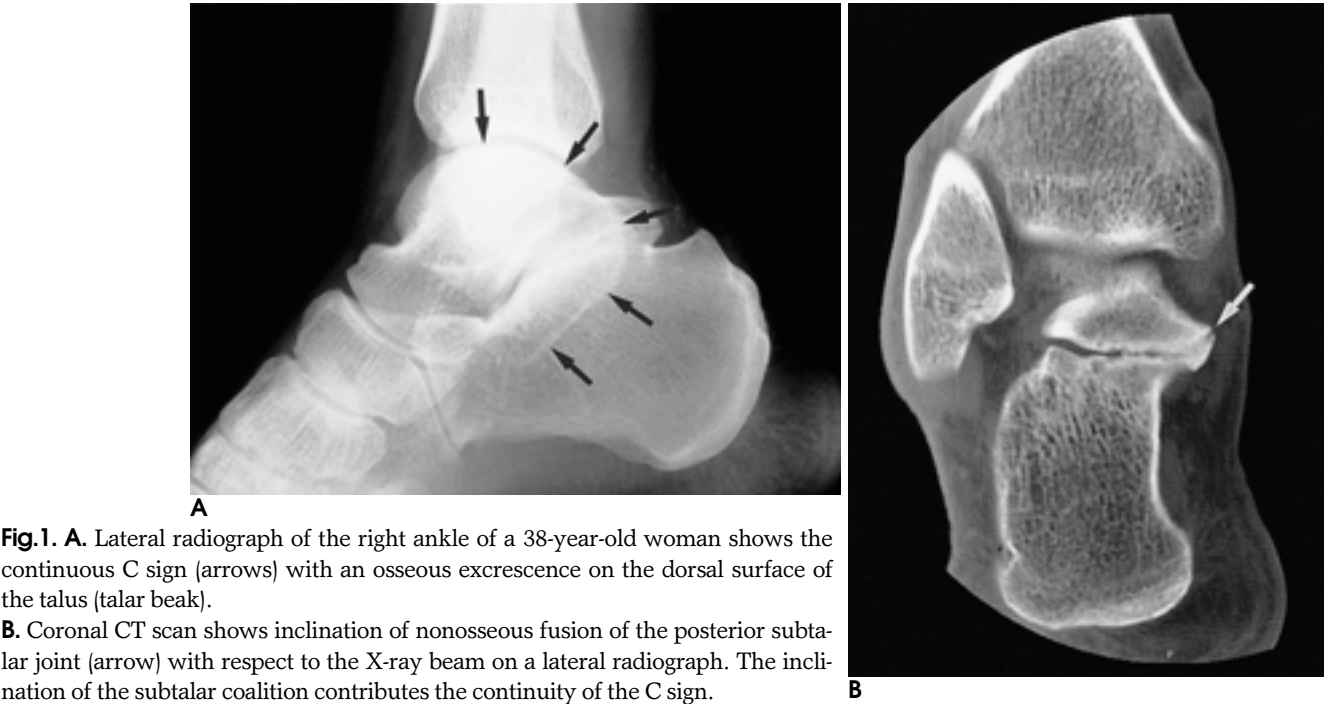
Table 1. Summary of 12 Cases of Subtalar Coalition with Radiologic Findings

Case No.	Age/Sex	C sign	Involved joint	Diagnostic bases	Associated radiographic findings
1	25/M	Interrupted	M	CT, Sugery	
2	34/M	Continuous	P	CT, Surgery	Talar beaking
3	38/F	Continuous	P	CT	Talar beaking
4	30/M	Continuous	P	CT, Surgery	
5	38/F	Continuous	M, P	MR	
6	24/M	Interrupted	M	CT, Surgery	
7	15/M	Interrupted	P	CT, MR	Talar beaking
8*	23/F	Interrupted	M, P	CT, Surgery	
9*	23/F	Interrupted	M	CT, Surgery	
10	10/M	Interrupted	M	CT	
11	31/M	Continuous	P	MR	Talar beaking
12	48/M	Continuous	P	CT	

M: middle subtalar joint, P: posterior subtalar joint.

*: Bilateral involvment of same patient.

Medical Systems, Milwaukee) 5 mm
 . MR 가 , MR 1.5 T (Signa,
 가 General Electric Medical Systems, Milwaukee, Wis)
 11 , 1 T1 T2
 가 - C 4 mm matrix 256 × 256,
 , CT MR . FOV 20 × 20 mm .
 ,
 (valgus deformity) 가 .
 - C C 12 - C 가
 (continuous) (interrupted) (Table 1). 6 - C
 . CT (Fig. 1), 6 (Fig
 CT (HiSpeed Advantage, General Electric 2). 1 (hypoplasia) C



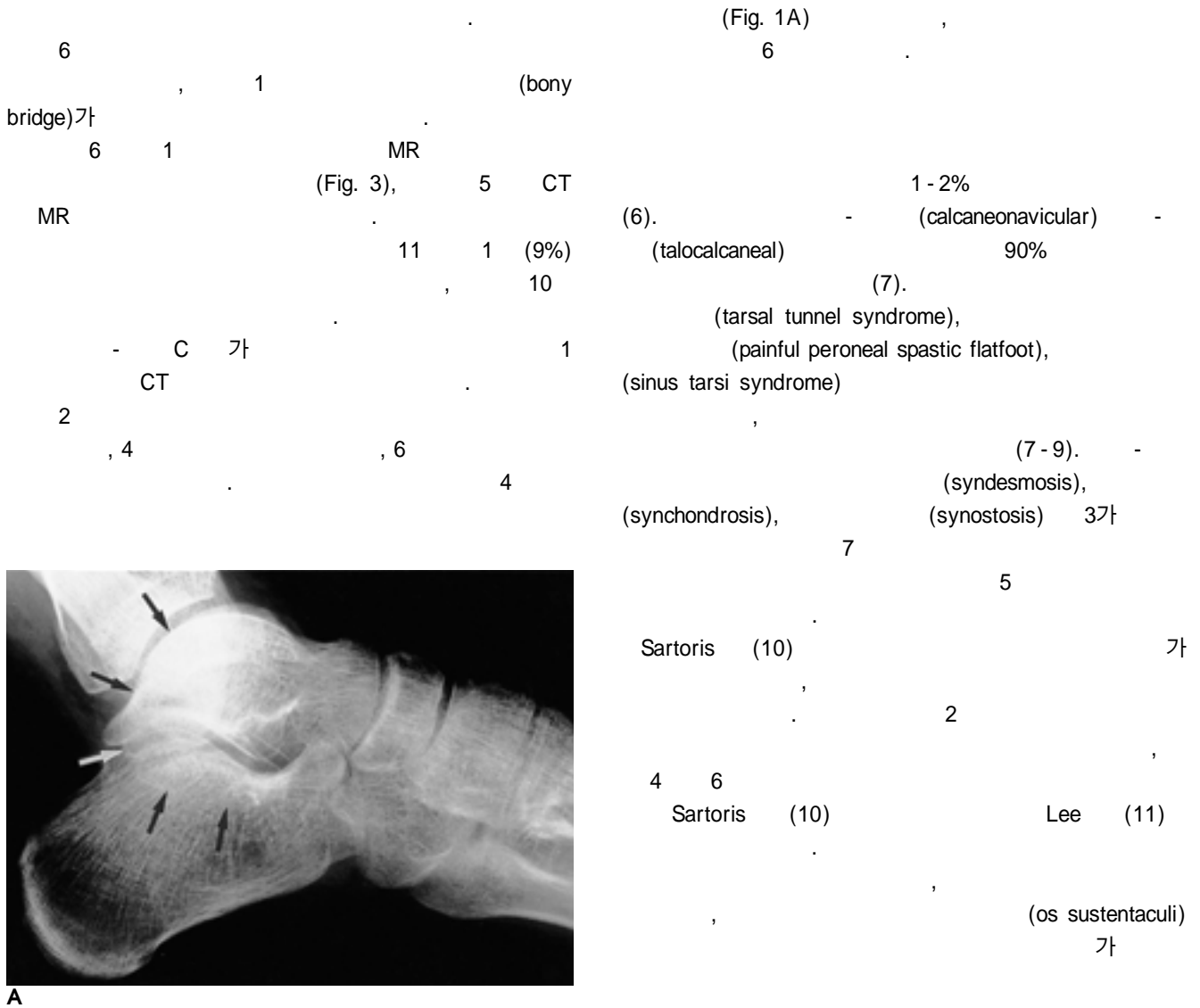


Fig. 2. A. Lateral radiograph of the left ankle of a 24-year-old man shows an interrupted C sign (arrows).

B, C. Coronal CT scans show sparing of the left posterior subtalar joint (arrow in b) and bony bridge (arrow in c) of the left middle subtalar joint. A synostosis with synchondrosis of the left middle subtalar joint was found at surgery.

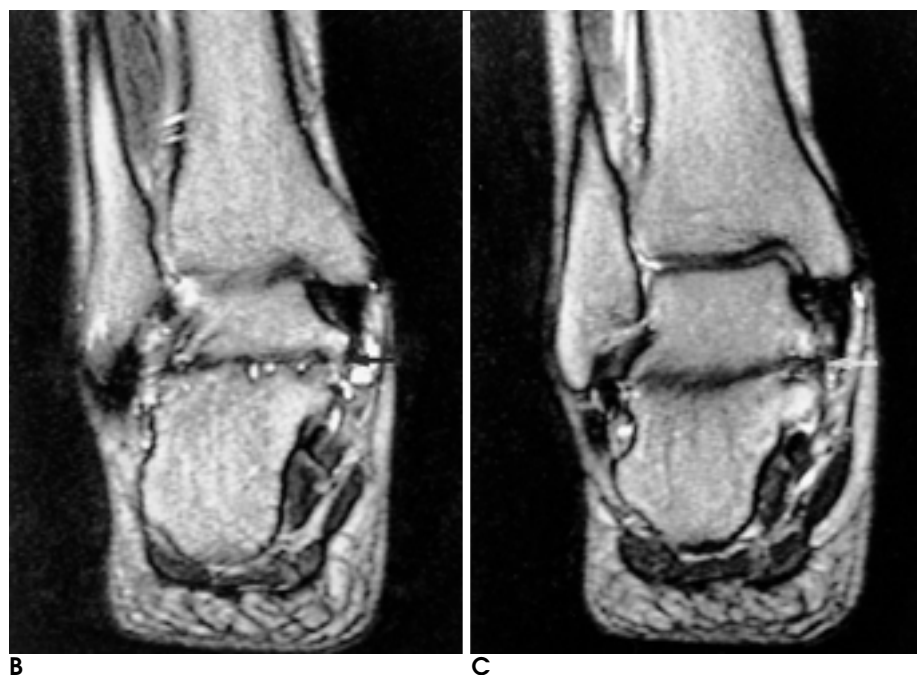
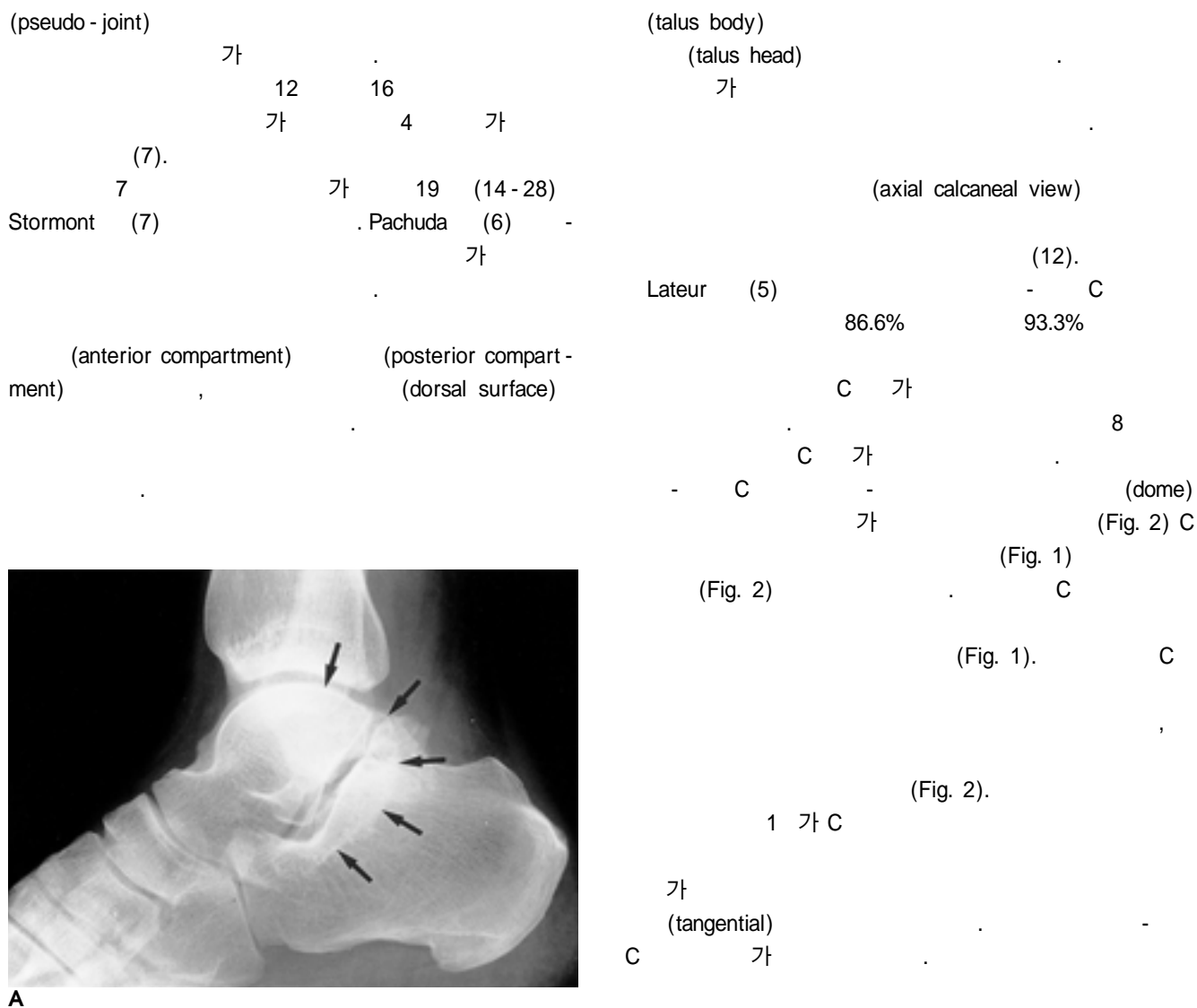


Fig. 3. A. Lateral radiograph of the right ankle of a 38-year-old woman shows continuous C sign (arrows). This radiograph was originally interpreted negative for subtalar coalition.

B, C. Coronal MR images show signal intensity of synostosis and non-osseous fusion (arrows in b and c) of the right posterior and middle subtalar joints on T2-weighted image.

- C ,
(pes valgus deformity)
(5, 13, 14). C 가
,
,
(6).
CT MR
. CT
CT MR
(15 - 18).
Lateur (5) CT
12 6
. ,
가 . , C 가
C
가
. ,
가
C 가
C

- ed. Philadelphia, Pa: W.B. Saunders, 1995;4294-4301
2. Resnick D. Talar ridges, osteophytes and beaks: a radiographic commentary. *Radiology* 1984;151:329-332
3. Sarno RC, Carter BL, Bankoff MS, Semine MC. Computed tomography in tarsal coalition. *J Comput Assist Tomogr* 1984;8:1150-1160
4. Herzenberg JE, Goldner JL, Martinex S, Silvermann PM. Computerized tomography of talocalcaneal tarsal coalition: a clinical and anatomic study. *Foot Ankle* 1986;6:273-288
5. Lateur LM, Van Hoe LR, Van Ghillewe KV, Gryspeerdt SS, Baert AL, Dereymaeker GE. Subtalar coalition: diagnosis with C sign on lateral radiographs of the ankle. *Radiology* 1994;193:847-851
6. Pachuda NM, Lasday SD, Jay RM. Tarsal coalition: etiology, diagnosis and treatment. *J Foot Surg* 1990;29:474-488
7. Stormont DM, Peterson HA. The relative incidence of tarsal coalition. *Clin Orthop Relat Res* 1983;181:28-36
8. Takakura Y, Sugimoto K, Tanaka Y, Tamai S. Symptomatic talocalcaneal coalition: its clinical significance and its treatment. *Clin Orthop Relat Res* 1991;269:249-256
9. Takakura Y, Kitada C, Sugimoto K, Tanaka Y, Tamai S. Tarsal tunnel syndrome: causes and results of operative treatment. *J Bone Joint Surg [Br]* 1991;73:125-128
10. Sartoris DJ, Resnick DL. Tarsal coalition. *Arthritis Rheum* 1985;28:331-338
11. Lee MS, Harcke HT, Kumar SJ, Bassett JS. Subtalar joint coalition in children: new observation. *Radiology* 1989;172:635-639
12. Schlefman BS, Ruch JA. Diagnosis of subtalar joint coalition. *J Am Podiatry Assoc* 1982;72:166-170
13. Shaffer HA Jr, Harrison RB. Tarsal pseudocoalition: a postional artefact. *J Can Assoc Radiol* 1980;31:236-237
14. Weissman B, Sledge C. *Orthopedic Radiology*. Philadelphia, Pa: Saunders, 1986;640-641
15. Emery KH, Bisset III GS, Johnson ND, Nunan PJ. Tarsal coalition: a blinded comparison of MRI and CT. *Pediatr Radiol* 1998;28:612-616
16. Wechsler RJ, Schweitzer ME, Deely DM, Horn BD, Pizzutillo PD. Tarsal coalition: Depiction and characterization with CT and MR imaging. *Radiology* 1994;193:447-452
17. Faroozniah H, Colimbu C, Rafii M, Rauschning W, Weinreb J. *MRI and CT of the musculoskeletal system*. St Louis, Mo: Mosby-Year Book, 1992;828-839
18. Pineda C, Resnick D, Greenway G. Diagnosis of tarsal coalition with computed tomography. *Clin Orthop Relat Res* 1986;208:282-288

1. Resnick D. *Additional congenital or heritable anomalies and syndromes* In: Resnick D, et al. *Diagnosis of bone and joint disorders*. 3rd

Subtalar Coalition: Usefulness of the C Sign on Lateral Radiographs of the Ankle¹

Seong Hyun Kim, M.D., Joong Mo Ahn, M.D., Sung Moon Kim, M.D.², Min Hee Lee, M.D.,
Hye-Kyung Yoon, M.D., Myung Jin Shin, M.D.², Heung Sik Kang, M.D.³

¹Department of Radiology, Sungkyunkwan University School of Medicine

²Department of Diagnostic Radiology, College of Medicine, University of Ulsan

³Department of Radiology, Seoul National University College of Medicine

Purpose: To assess the usefulness of the talocalcaneal C sign in the diagnosis of subtalar coalition, as seen on lateral radiographs of the ankle.

Materials and Methods: Lateral radiographs of 12 ankles in 11 patients were included in this study. Twelve subtalar coalitions were confirmed by surgery (n = 6), or by CT and/or MR (n = 6). The presence of the talocalcaneal C sign on lateral ankle radiographs was determined.

Results: The C sign was continuous in six feet and interrupted in the remaining six. Subtalar coalition occurred simultaneously in the middle and posterior subtalar joints in two cases, the posterior subtalar joint only in six, and in the middle subtalar joint only in four. In six cases confirmed at surgery, subtalar coalitions consisted of both synostosis and non-osseous fusion (synchondrosis and/or syndesmosis) and in one case of middle subtalar coalition, there was a bony bridge. The remaining six cases, confirmed at CT or MRI, involved both synostosis and non-osseous fusion (n = 1) or non-osseous fusion only (n = 5).

Conclusion: In the diagnosis of subtalar coalition, the talocalcaneal C sign, seen on lateral radiographs of the ankle, is a useful indicator.

Index words : Ankle

Ankle, abnormalities

Computed tomography (CT)

Ankle, MR

Address reprint requests to : Joong Mo Ahn, M.D., Department of Radiology, Sungkyunkwan University, School of Medicine
135-710

Tel. 82-2-3410-2508 Fax. 82-2-3410-0084 E-mail: jmahn@smc.samsung.co.kr