

, **, *** ,
*

* . ** . *** . .

: ,
.
: 10 , ,
, (9) .
, .
: 10 10 , 9 ,
3 , 1 . T1 3 ,
5 , T2 8 , gadolinium 6 , 5
8 가 , 5 , 5 .
, 2 , 3 , 1 , 9 ,
1 , , 1 ,
.
:
가 ,
.
:
, , ,

:

Wood(1812)가

1995 3

2000 3

10

Masson(1924)

(stratum reticularis)
(hamartoma)

3,4,5,27,34)

가

(lateral fold),

(pulp)

가

(cold sensitivity)

, 가

4,9,18)

6-8,10,13,15,16,20,21,23,26,28)

, , , , Love

9,24)

gadolinium

T1

, T2

wrist

coil(General Electrics)

Drapè

(sagittal
view)
matrix),

(nail bed),

(proximal nail fold)

¹⁰⁾(Fig. 1).

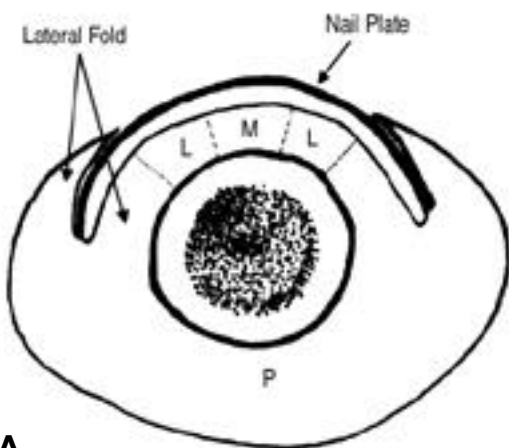
H-E

(nail plate)

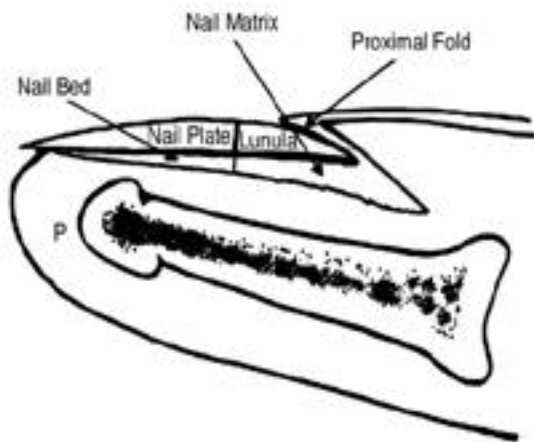
sac)

(cul-de-

⁹⁾,



A



B

Fig. 1. Glomus tumor locations were divided into 4 areas, included median(M), two laterals(L), two lateral folds, and pulp in cross section(A) and two portions, included nail bed and nail matrix in sagittal section(B).

가 10 가 2 ,
 , 가 8 , 4 , 6 ,
 5 , 3 , 1 ,
 , 2~3 1 , 35 (21~56) .
 가 , 2 ,
 , 7 ,
 2 , 1 .

Table 1. Clinical data from suspicious glomus tumors in the fingers

Case	sex/age	symptoms	durations (yrs)	initial diagnosis	involved sites	surgical approach	surgical excision	pain relief	recurrence
1	F/30	p, b	10	glomus	L ring	subungual	marginal	prompt	no
2	F/56	p, t, b	15	neuroma	R thumb	lateral	marginal	prompt	no
3	M/42	p, t, c, b	20	glomus	L index	subungual	marginal	(?)	no
4	F/36	p, t, b	10	glomus/ melanoma	R thumb	subungual	marginal	prompt	no
5	F/22	p, t, b	10	glomus	L ring	subungual	marginal	prompt	no
6	F/33	p, t, b	7	glomus/ melanoma	L thumb	subungual	marginal	prompt	no
7	M/43	p, t, c, b	10	glomus	R ring	subungual	marginal	(?)	no
8	F/21	p, t, c,	1	glomus	R ring	subungual	marginal	(?)	no
9	F/27	p, t, b	5	glomus	L ring	subungual	marginal	prompt	no
10	F/47	p, t, b	10	glomus	L middle	subungual	marginal	prompt	no

p: pain, t: tenderness, c: cold sensitivity, b: bluish discoloration, yrs: years, L: left, R: right
 ?: could not recall exactly, but pain relief within 3 days

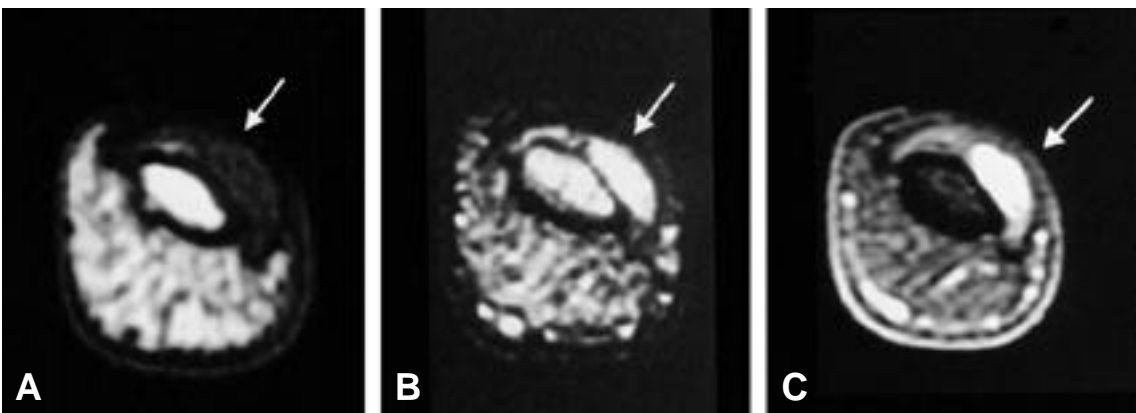


Fig. 2. MRI showed low signal intensity on T1WI(A), high signal intensity on T2WI(B) and strong enhancement on Gadolinium enhanced T1WI of the left thumb(C)(case 6).

가 T1 3 , 5
 10 , 9 , 3 , , T2 8 , gadolini-
 1 , um 8 가
 가 9 . Love 9 (Fig. 2)
 . 9.8 (1 6 , 5 ,
 ~ 20) (Table 1). 2 , 3 ,
 3 10 5 , 5 ,
 (erosion) . 1.5 ~ 11mm .
 9 (indentation)
 1 8 . (Table 2).

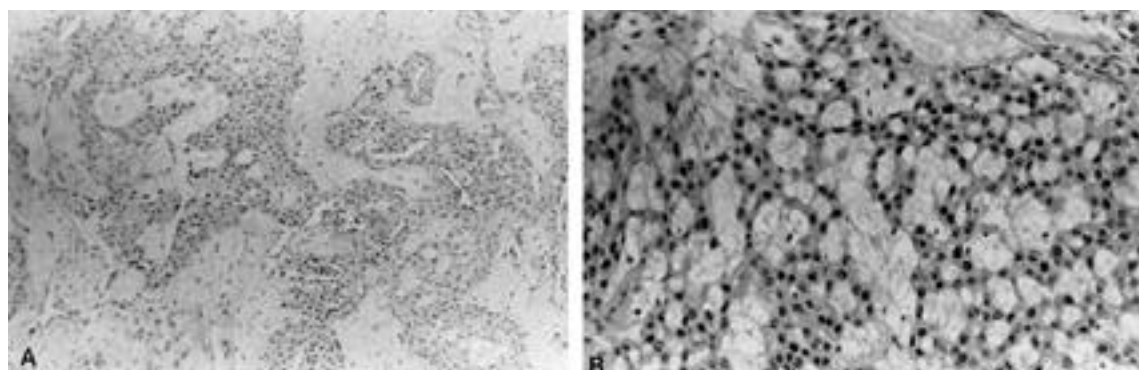


Fig. 3-A. The tumor was composed of solid sheets of round cells interrupted by thin walled blood vessels lined by normal endothelial cells. Intervening mucoid materials noted in the back ground (H-E stain, 100 ×).
B. The tumor cells were uniform appearance which had round nuclei and clear cytoplasm. Stromal tissue was mucoid(H-E stain, 200 ×).

Table 2. MRI findings from glomus tumors in the fingers

Case	bony change	MRI change	T1	T2	T1 enhancement	size in MRI(mm)	size in tumor(mm)	location (transverse)	location (sagittal)
2	yes	yes	iso	high	strong	11 × 10.5 × 6	10 × 6 × 5	pulp	pulp
3	yes	yes	iso	high	strong	10 × 6 × 4	5.5 × 5 × 2.5	med/u lat	bed/matrix
4	yes	yes	low	high	strong	8 × 5 × 3.5	7 × 4	r lat/ r pulp	(bed)
5	no	yes	iso	high	strong	4.5 × 3 × 2	5 × 3	med/ u lat/pulp	bed
6	no	yes	low	high	strong	11 × 9 × 5	7 × 5 × 3	med/u lat /lat fold	matrix/bed
8	no	no	iso	high	well	6 × 1.5	4 × 3	med	bed/matrix
9	no	yes	low	high	strong	5 × 2.5 × 1.5	6 × 5	med/r lat/ r lat fold	matrix
10	no	no	iso	high	well	6 × 2.5 × 2.5	5 × 4 × 3	med	matrix

iso: iso-signal intensity, low: low signal intensity, high: high signal intensity
 med: median, lat: lateral, u: ulnar, r: radial

가 (lateral 300 μ m approach) , cm² 93 ~ 501
 9 가 ¹⁰⁾
 (transungual approach)
 , 9 20 ~ 40
 1 , 10 ³²⁾ , 50 ~ 70%
 , 1.2%
 가 , ³⁰⁾ . Enzinger Weiss¹⁾ 500
 , 1.6%
 , Shugart ³¹⁾ 73% , 24.3%가
 4 , 4 27%가
 , 1 가 Kohout
 3 , 가 4 가 Stout²²⁾가 685
 3 ~ 10mm 가 97.7%가
 10 ,
 (Fig. 3).
 10 , 9 , ⁸⁾
 , 7 ,
 3 3 ,
 3 ,
 1 ,
 9 5 9 (36) 가
 , 1cm 가
 , 가 ,
 ,
 , neuromyoarterial apparatus Love
 , Popoff²⁹⁾가 Hildreth 가
 (afferent arteri- ^{10,17,24)} Holzberg
 ole), (Sucquet-Hoyer canal), 1% lidocaine 0.05M 가
 (primary collecting vein), ¹⁸⁾
 (intraglomerular reticulum) (capsular ,
 portion) ⁴⁾ , ,
 , 가 , ,

가
 , 14 ~ 60%
 가 , 가 , 가

Fornage(1984)

가

2mm 가 3mm,

12 ~ 24%

7, 23, 28, 30, 33)

(glomangiosarcoma)

11),

1, 12)

2)

gadolinium T1 , T2

/ 가 , , 3

가 2 ~ 3mm 6, 19)

가

(mucoid cyst), 10, 15, 18, 23, 26)

REFERENCES

T1 , T2
 gadolinium

- 1) **Amillo S, Arriola FJ and Munoz G** : Extradigital glomus tumor causing thigh pain. *J Bone Joint Surg*, 79B:104-106, 1997.
- 2) **Anagostou CD, Papademetriou DG and Tomazani MN** : Subcutaneous glomus tumors. *Surg Gynecol Obstet*, 136:945-950, 1973.
- 3) **Boyes JH** : *Bunnell surgery of the hand*. 5th Ed, Philadelphia, Lippincott, 687-691, 1970.
- 4) **Carroll RE and Berman AT** : Glomus of the hand. *J Bone Joint Surg*, 54A:691-703, 1972.
- 5) **Caughey DE and Highton TC** : Glomus tumor of the knee. *J Bone Joint Surg*, 48B:134-137, 1950.
- 6) **Constantinesco A, Arbogast S, Foucher G, Vinee**

(flat) 10)

3.5

28)

2

3

- P, Choquet P and Brunot B** : Detection of glomus tumor of the finger by dedicated MRI at 0.1 T. *Magn Reson Imaging*, 12(7):1131-1134, 1994.
- 7) **Dailiana ZH, Drape JL and Le Viet D** : A glomus tumor with four recurrences. *J Hand Surg*, 24B:1: 131-132, 1999.
 - 8) **Dalrymple NC, Hayes J, Bessinger VJ, Wolfe SW and Katz LD** : MRI of multiple glomus tumors of the fingers. *Skeletal Radiol*, 26:664-666, 1997.
 - 9) **De Maerteleire W, Naetens P and De Smet L** : Glomus tumors. *Acta Orthop Belgica*, 66-1:169-173, 2000.
 - 10) **DrapJ-L, Idy-Peretti I, Goettmann S, Wolfram-Gabel R, Dion E, Grossin M, Benacerraf R, Guerin-Surville H and Bittoun J** : Subungual glomus tumors: Evaluation with MR imaging. *Radiology*, 195:507-515, 1995.
 - 11) **Enzinger FM and Weis SW** : *Soft tissue tumors*. 3rd ed, St Louis, Mosby Co: 701-733, 1995.
 - 12) **Fornage BD** : Glomus tumors in the fingers: Diagnosis with US. *Radiology*, 167:183-185, 1988.
 - 13) **Foucher G, Le Viet D, Dailiana Z and Pajardi G** : Les tumurs glomiques de la region ungueale. *Revu de chirurgie orthopedique*, 85:362-366, 1999.
 - 14) **Freier DT and Lindenauer SM** : Subcutaneous glomus tumor. *Am J Surg*, 120:359-364, 1970.
 - 15) **Goettmann S, Drapé JL, Idy-Peretti I, Bittoun J, Thelen P, Arrive L and Belaich S** : Magnetic resonance imaging: a new tool in the diagnosis of tumors of the nail apparatus. *Br J Derma*, 130:701-710, 1994.
 - 16) **Hani S, Matloub MD and Vincent N** : Glomus tumor imaging: Use of MRI for localization of occult lesions. *J Hand Surg*, 17-A:472-475, 1992.
 - 17) **Hildreth DH** : The ischemia for glomus tumors: a new diagnostic test. *Rev Surg*, 27:147-148, 1970.
 - 18) **Holzberg M** : Glomus tumor of the nail. *Arch Dermatol*, 128:160-162, 1992.
 - 19) **Idy-Peretti I, Cermakova E, Dion E and Reygagne P** : Subungual glomus tumor: Diagnosis based on high-resolution MR images. *Am J Roentgenol*, 159:1351, 1992,
 - 20) **Jablon M, Horowitz A and Bernstein AD** : Magnetic resonance imaging of a glomus tumor of the finger tip. *J Hand Surg*, 15A:507-509, 1990.
 - 21) **Kneeland JB, Middleton WD, Matloub HS, Jesmanowicz A, Froncisz W and Hyde JS** : High resolution MR imaging of glomus tumor. *J Comput Assit Tomo*, 11(2):351-352, 1987.
 - 22) **Kohout E and Stout AP** : The glomus tumors in children. *Cancer*, 14:555-565, 1961.
 - 23) **Lopes TD, Rotman MB, Levy BK and Gilula LA** : A 63-year-old woman with right small finger pain. *Am J Orthop*, 169-172, 1997.
 - 24) **Love JG** : Glomus tumors: Diagnosis and treatment. *Mayo Clin Proc*. 19:113-116, 1944.
 - 25) **Mackenzie DH** : Intraosseous glomus tumors: report of two cases. *J Bone Joint Surg*, 44-B:648-651, 1962.
 - 26) **Matloub HS, Muoneke VN, Prevel CD, Sanger JR and Yousif NJ** : Glomus tumor imaging: use of MRI for localization of occult lesions. *J Hand Surg*, 17A:472-475, 1992.
 - 27) **Murray MR and Stout AT** : Investigation and behavior and identity of its "epitheloid" cell. *Am J Pathol*, 18:183-203, 1942.
 - 28) **Opdenkker G, Gelin G and Palmers Y** : MR imaging of a subungual glomus tumor. *Am J Radiol*, 172:250-251, 1999.
 - 29) **Popoff NW** : The digital vascular system with reference to the state of the glomus in inflammation, arteriosclerotic gangrene, thromboangitis obliterans, and supernumerary digits in man. *Arch Pathol*, 18:295-330, 1934.
 - 30) **Rettig AC and Strickland JW** : Glomus tumor of the digits. *J Hand Surg*, 2(4):261-265, 1977.
 - 31) **Shugart RR, Soulle EH and Johnson EW Jr** : Glomus tumor. *Surg Gyne Obstet*, 117:334-340, 1963.
 - 32) **Smyth M** : Glomus cell tumors in the lower extremity. *J Bone Joint Surg*, 53A:157-159, 1971.
 - 33) **Tsuneyoshi WM and Enjoji M** : Glomus tumor: A clinicopathologic and electron microscopic study. *Cancer*, 23:1176, 1969.
 - 34) **Wood W** : On painful subcutaneous tubercle. *Edinburgh Med J*, 8:283, 1812.

Clinical Significance of MR Imaging for the Diagnosis and Treatment of Subungual Glomus Tumor in the Fingers

Byoung-Suck Kim, M.D., Woo Sig Kim, M.D.*, Kyoung Jin Han, M.D., Jae-Hyun Cho, M.D.**,
Kyi-Beom Lee, M.D.***, Heon Kyo Ha, M.D., Shin Young Kang, M.D.

*Department of Orthopaedic Surgery, Diagnostic Radiology** & Pathology***,
Ajou University School of Medicine, Suwon, Korea*

*Department of Orthopaedic Surgery, Konyang University School of Medicine, Taejeon, Korea**

Purpose : Authors investigated the efficiency of preoperative MRI in suspicious glomus tumor and the clinical outcomes after marginal excision.

Materials and Methods : In 10 cases of glomus tumors in the fingers, authors retrospectively analyzed the clinical data, including previous trauma, treatment history, preoperative symptoms, physical examination, plain radiography, MRI (9 cases), pathological findings and post-operative complications.

Results : The patients had pain in 10 cases, tenderness in 9 cases, cold sensitivity in 3 cases and edema in one case. MRI showed low signal (3 cases) or iso-signal (5) intensity on T1 weighted image, high signal intensity (8) on T2 weighted image, and all the lesions were enhanced in gadolinium enhancement images. The exact locations of glomus tumors were median in 6 cases, lateral in 5, lateral fold in 2 and pulp in 3 in transverse section and nail bed in 5 cases and nail matrix in 5 in sagittal section. Marginal excision was performed by lateral approach in one case and transungual in 9 cases. Histologically, all 10 cases were composed of solid sheets of round cells interrupted by thin-walled blood vessels. Most of clinical symptoms were disappeared in all cases after operation. Nail deformity was found in one case, which was originated from nail matrix, however, there was no recurrence.

Summary : Clinical symptom was the most important factor in diagnosis of glomus tumor in the fingers. However, preoperative MRIs were helpful in patients, who had obscure pain or prolonged clinical symptoms with suspicious glomus tumors. Preoperative MRI might be one of the most useful tools for establishing the exact diagnosis and detecting the location of glomus tumors, in spite of the relatively high expenses.

Key Words : Finger, Glomus tumor, Magnetic resonance imaging, Marginal excision

Address reprint requests to

Byoung-Suck Kim, M.D.

Department of Orthopaedic Surgery, Ajou University School of Medicine, Suwon, Korea

#5 San, Wonchon-dong, Paldal-gu, Suwon, 442-749, Korea

Tel : 82-31-219-5224, Fax : 82-31-219-5229, E-mail : bskim@madang.ajou.ac.kr