

:
 :
 26
 가 (L/T ratio) L/T 2, L/T<2 가 16 가
 10 -
 , ,
 grade 0,
 1/2 grade I, 1/2 grade
 II Chi-square test
 : - ,
 16 13 - 가 2
 10 9 - 가 2 16
 13 , 1 ,
 가 2 . 10 6 , 4
 13 0 I 2 , II 1
 0 2 , I 8 II
 : - 가 2 ,
 가

(1, 2). 가 (5).
 2-D 가
 가
 - (ratio of longitu-
 dinal diameter to transverse diameter, L/T ratio), 가
 (2-4). (1).
 2D
 (L/T <2)

:
 10 9 L/T ratio가 2 1
 2
 90% 81%
 26 26
 38.5 가 12 가 14 3 74
 가 16
 (benign reactive lymphadenopathy)가 14 ,
 (tuberculous lymphadenitis) 2 ,
 10 7 (lymphoma) 3 .
 10 40 mm (22 mm)
 10 8
 . 6
 가
 . 2
 CT 가
 26 24
 1
 ATL ultramark 9 (Bothell., Wash., USA)
 5-10MHz 2D gray
 scale image
 - L/T 2, L/T <2
 (hilar vascularity)
 (peripheral vascularity) 가
 (central), (eccentric), (absent)
 ,
 ,
 (circumferential linear vascularity)
 Grade 0
 , Grade I 1/2
 , Grade II 1/2
 Chi-square test
 L/T ratio
 (p < 0.001). (Table). 16
 13 L/T ratio가 2 3 2
 L/T ratio가 2
 가 2 , 1 .

10 9 L/T ratio가 2 1
 2
 90% 81%
 16 13
 (Fig. 1A), 1 ,
 disease (Fig. 1B), 1 Castleman's
 2
 . 10
 (Fig. 2A), 4
 (Fig. 2B),
 (p < 0.05) (Table).
 ()
 10 100% 81%
 .
 0, I, II
 13 (81%) 0 (Fig. 1A), I 2 , II 1
 . I Castleman's disease (Fig. 1B)
 II (Fig. 1C)
 0 2 , I 8 (80%) (Fig. 2A)
 II (p < 0.05). 0
 (Fig. 2C) 1
 (Table).
 29% 80%
 80% 81%

(L/T ratio), echogenecity,
 . gray scale

Table 1. Results of Gray Scale and Color Doppler Sonography

	Benign (n= 16)	Malignant (n= 10)
Shape		
L/T < 2	3	9
L/T ≥ 2	13	1
	(p < 0.001)	
Hilar vascularity		
Central	13	0
Eccentric	1	4
Absent	2	6
	(p < 0.05)	
Peripheral vascularity		
Grade 0	13	2
I	2	8
II	1	0
	(p < 0.05)	

L/T : ratio of longitudinal diameter to transverse diameter

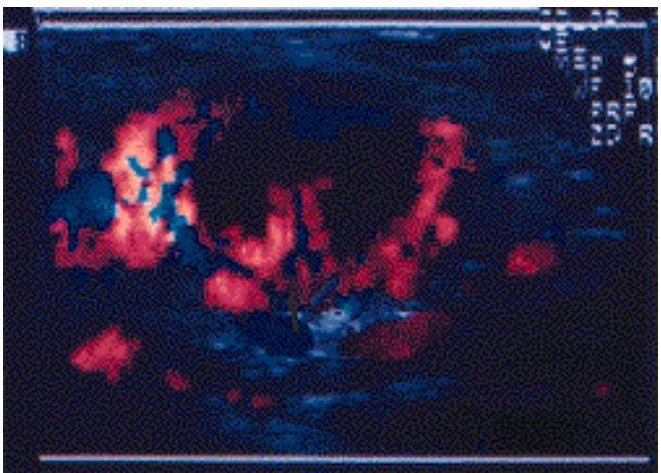
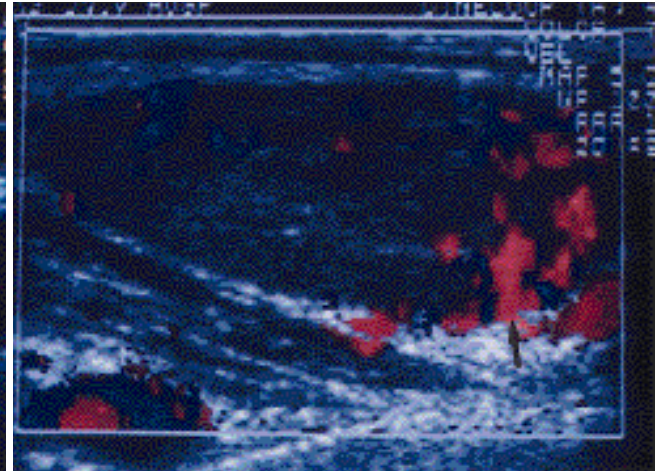
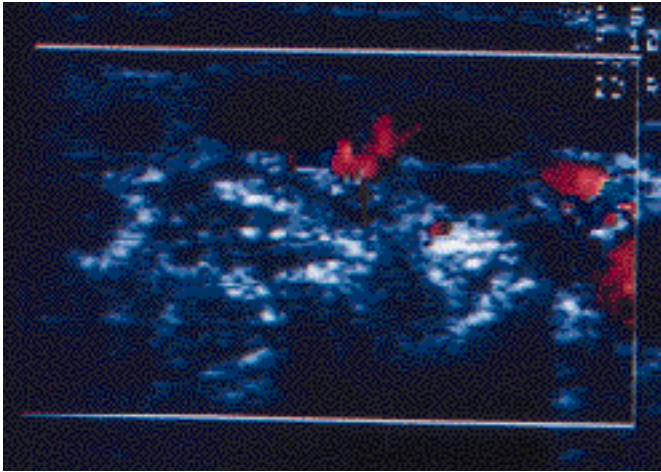


Fig 1. Benign lymph nodes

A. Reactive hyperplasia.

Color doppler image shows an ellipsoid hypoechoic cervical lymphadenopathy with the L/T ratio greater than 2. Note central hilar vascularity (arrow) and absent (grade 0) peripheral vascularity.

B. Castleman 's disease.

Color doppler image shows an ellipsoid hyperechoic cervical lymphadenopathy with L/T ratio greater than 2. Note eccentric hilar vascularity (arrow) and less than 1/2 covered (grade I) peripheral vascularity.

C. Reactive hyperplasia due to submandibular abscess.

Color doppler image shows an ovoid hypoechoic cervical lymphadenopathy with L/T ratio less than 2. Note central hilar vascularity (arrow) and over the 1/2 covered (grade II) peripheral vascularity.

(1-8).

(trabecular structure)

가

(sinusoid capillaries)

가

(1, 2). Vassallo (5) 2D

‘ radi-

al and longitudinal configuration'

가

가

2

가

가

가 2 (1, 6, 9).

가

(1).

Na (1) Steinkamp

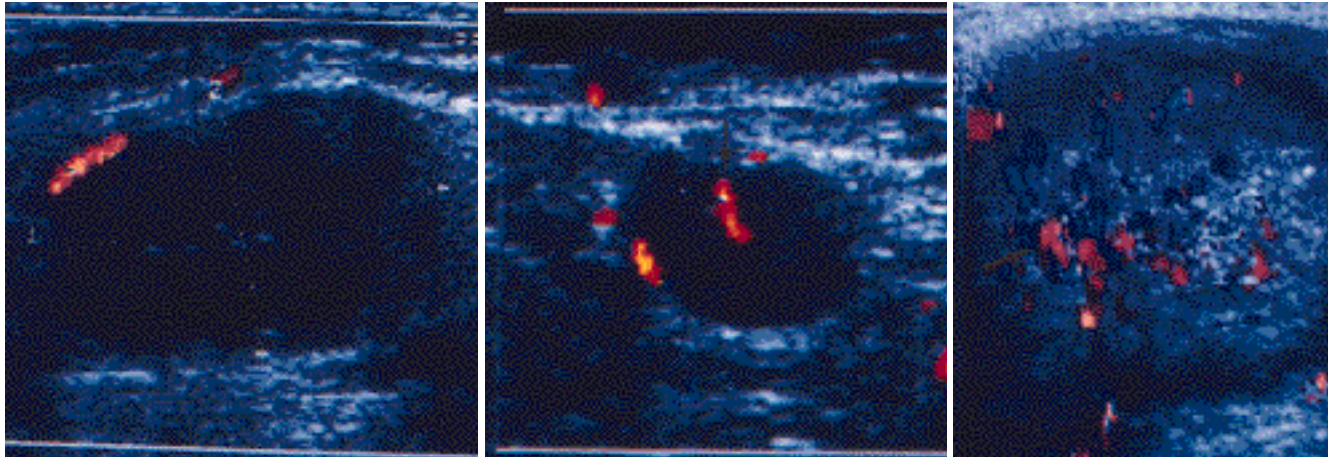
(10)

가 가

가

가 가

가



A
Fig 2. Malignant lymph node

A. Metastasis from thyroid papillary carcinoma

Color doppler image shows an ovoid hypoechoic cervical lymphadenopathy with L/T ratio less than 2. Note absent hilar vascularity and less than 1/2 covered (grade I) peripheral vascularity.

B. Metastasis from medullary breast carcinoma of axilla.

Color doppler image shows an ovoid hypoechoic axillary lymphadenopathy with L/T ratio less than 2. Note eccentric hilar vascularity (arrow) and less than 1/2 covered (grade I) peripheral vascularity.

C. Metastasis from undifferentiated small cell cancer of neck.

Color doppler image shows an ovoid hyperechoic cervical lymphadenopathy with L/T ratio less than 2. Note eccentric hilar vascularity (arrow) and absent (grade 0) peripheral vascularity.

가 , T2WI CT 가

가

CT가 MRI 20% 가

(14, 15).

CT MRI 가

90% 81%, 84% 가

가 가

가

1. Na DG, Lim HK, Byun HS, Kim HD, Ko YH, Baek JH. Differential Diagnosis of cervical lymphadenopathy: usefulness of color doppler sonography. *AJR* 1997;168:1311-1316
2. Rubaltelli L, Proto E, Salmaso R, Bortoletto P, Candiani F, Cagol P. Sonography of Abnormal Lymph Nodes In Vitro: Correlation of Sonographic and Histologic Findings. *AJR* 1990;155:1241-1244
3. Hajek PC, Salomonowitz E, Turk R et al. Lymph nodes of the neck: evaluation with US. *Radiology* 1986;158:739-742
4. Gorman B, Charboneau JW, James EM, et al. Medullary thyroid

carcinoma: role of high-resolution US. *Radiology* 1987;162:147-150

5. Vassallo P, Wernecke K, Roos N, Peters P. Differentiation of benign from malignant superficial lymphadenopathy: the role of high-resolution US. *Radiology* 1992;183:215-220
6. Taylor GA, Pelman EJ, Scherer LR, Gearhart JP, Levenhal BG, Wiley J. Vascularity of tumors in children: evaluation with color Doppler imaging. *AJR* 1991;157:1267-1271
7. Van den Brekel MWM, Castelijns JA, Snow GB. Detection of lymph node metastases in the neck: radiologic criteria. *Radiology* 1994;192:617-618
8. Van den Brekel MWM, Stel HV, Castelijns JA et al. Cervical lymph node metastasis: assessment of radiologic criteria. *Radiology* 1990;177:379-384
9. Schor AM, Schor SL. Tumor angiogenesis. *J Pathol* 1983;141:385-413
10. Stenkamp HJ, Maurer J, Cornehl M, Knobber D, Hettwer H, Felix R. Recurrent cervical lymphadenopathy: differential diagnosis with color-duplex sonography(abstr). *Eur Arch Otorhinolaryngol* 1994;251:404
11. Taylor KJW, Ramos I, Carter D, Morse SS, Snower D, Fortune K. Correlation of Doppler US tumor signals with neovascular morphologic features. *Radiology* 1988;166:57-62
12. Campenhout IV, Patriquin H. Malignant microvasculature in abdominal tumors in children: detection with Doppler US. *Radiology* 1992;183:445-448
13. Michiel W.M. van den Brekel, Herbert V. Stel, Jonas A. Castelijns, Jos J.P.Nauta, Isaak van der Waal, Jaap Valk, Chris J.L.Meyer, Gordon B. Snow. Cervical Lymph Node Metastasis: Assessment of Radiologic Criteria. *Radiology* 1990;177:379-384
14. Peter M. Som. Detection of Metastasis in Cervical Lymph Nodes: CT and MR Criteria and Differential Diagnosis, Review Article. *AJR* 1992;158:961-969
15. David M. Yousem, Peter M. Som, David B. Hackney, Frederick Schwaibold, Robert A. Hendrix. Central Nodal Necrosis and Extracapsular Neoplastic Spread in Cervical Lymph Nodes: MR Imaging versus CT. *Radiology* 1992;182:753-759

Benign versus Malignant Lymphadenopathy : The Usefulness of Color Doppler Sonography¹

Yun Woo Chang, M.D., Hyun Sook Hong, M.D., Jae Ho Park, M.D., Yong Il Lee, M.D.,
Hae Kyung Lee, M.D., Kui Hyang Kwon, M.D., Deuk Lin Choi, M.D.

¹Department of Radiology, Soonchunhyang University Hospital

Purpose : To evaluate the vascular pattern of lymph nodes, and the usefulness of color Doppler sonography in differentiating benign from malignant superficial lymphadenopathy.

Materials and Methods : Twenty-six patients were pathologically and clinically confirmed to be suffering from benign reactive lymphadenitis and tuberculosis (n= 16) or lymphoma and malignant lymphadenitis (n= 10). Lymph node shape was assessed by the ratio of longitudinal diameter to transverse diameter(L/T), and patients were thus assigned to one of two groups : L/T \geq 2, or L/T < 2. The hilar vascular pattern of lymph node was assessed by color Doppler sonography and classified as central, eccentric, or absent. On the basis of peripheral vascularity, patients were divided into three groups according to circumferential linear vascularity. An absence of peripheral vascularity was classified as grade 0. If less than half the periphery was covered by linear vascularity, a patient was assigned to as grade I, and if more than half was covered by a vessel, the classification was grade II.

Results : Statistically significant differences in L/T ratio were noted between malignant and benign node (p< .001). Of the 16 benign reactive nodes, 13 showed L/T \geq 2, and 3 L/T < 2. while in nine of the ten malignant nodes, L/T < 2 was noted. Among 16 benign reactive nodes, hilar vascularity was central in 13, eccentric in one, and absent in two. Among the ten malignant nodes, the corresponding totals were nil, four, and Six. The hilar vascular pattern showed statistically significant differentiation between malignant and benign node (p< .05). Among 16 benign reactive nodes, 13 were grade 0, two were grade I, and one was grade II, while among ten malignant nodes, two were grade 0 and eight were grade I. On the basis of vascular pattern, the difference between benign and malignant nodes was statistically significant (p< .05).

Conclusion : L/T ratio< 2, absent or eccentric hilar vascularity, and the presence of peripheral vascularity are suggestive of malignant lymph node. The shape of LN and pattern revealed by an analysis of nodal vascularity using color Doppler sonography are useful in differential diagnosis of benign and malignant lymphadenopathy.

Index words : Lymphatic system, US
Ultrasound (US), Doppler studies

Address reprint requests to : Hyun Sook Hong, M.D., Department of Radiology, Soonchunhyang University Hospital,
#657-58 Hannam-Dong, Yongsan-Ku, Seoul, 140-743, Korea.
Tel. 82-2-709-9396, Fax. 82-2-795-3928, E-mail. hshong @ hosp. sch. ac. kr