The value of MRI in diagnosing lymphangioma

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Purpose

Lymphangioma is benign tumor originated from the lymphatic system. It may occur in any age and in most location of the body. The clinic appearance is diversity (1). Recently several associated case reports have been published (2-6). In this study MR imaging materials of 44 pathologically confirmed cases were analysed to investigate the value of MRI in diagnosing different pathologic type of lymphangioma and to improve the recognition of MR diagnostic characteristics.
Methods and Materials

Clinic date

Collecting 44 cases of lymphangioma confirmed by postoperative pathology, age range 1 month #71 years old, median age 4 years old. Male 29 cases, aged 5 month #71 years old, median age 4 years old. Female 15 cases, aged 1 month #40 years old, median age 10 years old.

MR Imaging Protocol

MR imaging protocol consisted of SE $T_1$WI, TSE $T_2$WI and fat suppress $T_2$WI in sagittal, transverse and coronal plan at 1.5T and 3 T. The scan parameters were as follows: $T_1$WI with TR400.0ms#719.0ms,TE 9.0ms#9.5ms,flip angle 129$^\circ$#150$^\circ$, NEX#NA#1. $T_2$WI with TR4060ms#4700ms,TE 88.0ms#119.0ms,flip angle 80$^\circ$#150$^\circ$,NEX#NA#1. The FOV was 220mm×185mm#300mm×257mm,thickness and gap was 3.0/0.3#5.0/0.5. After plain scan 30 cases performed conventional contrast enhancement scan with intravenous gadolinium injection into the elbow vein. The dose was 0.1ml/kg body weight, 1ml/s and chased by 10ml saline at the same injection rate.

Imaging analysis

The images were evaluated independently by two radiologists with 5 years experience in interpreting MR images. Final agreements were arrived by means of consensus.

The features analysed on MR images included the distribution, the shape and extent of the lesions, the vascular encasement, the signal intensity within lesions, unilocular or multilocular, the thickness of the septa and the characteristics of contrast enhancement, et. In this study, multilocular means more than three locular. The septum was included in the thick septum when the thickness was more than 2mm or papillar convex was displayed. The vascular encasement was defined when the lesion surround the vessels leaving the wall and the shape of the vessels intact.

Statistic analysis

Distribution difference of different pathologic type of the lymphangioma was analysed statisitically with Fisher’s Exact Test. The statistic software was SPSS13.0.
Results

Pathologic results

31 cystic lymphangioma, 7 cavernous lymphangioma and 6 hemangiolymphangioma were confirmed by postoperative pathology. The distribution, predilection age and pathological characteristics of different pathologic type of lymphangioma were shown in table1 and figure1-3 respectively.

MR diagnosis

22 cystic lymphangioma, 3 hemangiolymphangioma, 9 vessel tumor (8 cystic lymphangioma, 1 cavernous lymphangioma pathologically), 7 hemangioma (2 cavernous lymphangioma, 1 hemangiolymphangioma, 4 cystic lymphangioma pathologically), 1 invaded fibroma (diagnosed as cystic lymphangioma pathologically), 1 fibrohemangioma (hemangiolymphangioma pathologically), 1 cyst (cystic lymphangioma pathologically) were diagnosed in MRI.

Referenced by postoperative pathology the positive rates of MR diagnosis of the lymphangioma was (22+3)/44. The accurate of the MR diagnosis of the cystic lymphangioma was 17/31, the misdiagnosis rates was 5/31. The accurate of MR diagnosis of hemangiolymphangioma was 3/6, the misdiagnosis rates was 3/6. As for the cavernous lymphangioma, no correct MR diagnosis was made, among of which 4 were diagnosed as cystic lymphangioma, 1 was diagnosed as vessel tumor, 2 were diagnosed as hemangioma.

MR findings

Most lymphangioma demonstrated irregular shape with ill-defined margine and vascular encasement. Compared with the adjacent muscles, the lesion appeared as iso-hyperintensity on T1WI and more hyperintensity on T2WI. Calcification was shown incidentally. The cystic lymphangioma appeared as large locular with thin septum, no or mild enhancement. Fluid-fluid level could be seen in some case. Cavernous lymphangioma appeared as different size of multilocular with thick septum or papillary convex which demonstrated markedly enhancement. The MR characteristics of hemangiolymphangioma appeared more likely between the two type of lesions above. It demonstrated different size of multilocular with various thickness of septum, within which no fluid-fluid level was seen. The MR characteristics of different type of lymphangioma were shown in table2 and figure4-16.

The statistic results
The distribution difference of different pathologic type of the lymphangioma anlysed statisitically with Fisher's Exact Test showed no significant difference$#P=0.262>0.05#$.

Table 1 distribution and median age of different pathologic type of lymphangioma

<table>
<thead>
<tr>
<th>Pathological type</th>
<th>Location</th>
<th>M.F</th>
<th>N.S</th>
<th>A.C</th>
<th>AB</th>
<th>U.L</th>
<th>L.L</th>
<th>median age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cystic lymphangioma</td>
<td></td>
<td>13/20</td>
<td>4/5</td>
<td>5/5</td>
<td>3/4</td>
<td>4/4</td>
<td>2/7</td>
<td>5</td>
</tr>
<tr>
<td>Cavernous lymphangioma</td>
<td></td>
<td>4/20</td>
<td>1/5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Hemangiolympangioma</td>
<td></td>
<td>1/4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>

Note: M.F=maxillofacial, N.S=neck and shoulder, A.C=axillary and chest wall, AB=abdomen, U.L=upper limb, L.L=lower limb. One case of hemangiolympangioma involved both abdominal wall and left thigh.

The distribution difference of different pathologic type of the lymphangioma anlysed statisitically with Fisher’s Exact Test showed no significant difference$#P=0.262>0.05#$.

Table 2 MR characteristics of different pathological type of the lymphangioma

<table>
<thead>
<tr>
<th>MR characteristics</th>
<th>Pathological type</th>
<th>Cystic lymphangioma</th>
<th>Cavernous lymphangioma</th>
<th>Hemangiolympangioma</th>
</tr>
</thead>
<tbody>
<tr>
<td>Irregular shape</td>
<td></td>
<td>28/31</td>
<td>5/7</td>
<td>5/6</td>
</tr>
<tr>
<td>Ill-defined margin</td>
<td></td>
<td>20/31</td>
<td>5/7</td>
<td>5/6</td>
</tr>
<tr>
<td>Calcification</td>
<td></td>
<td>0/31</td>
<td>2/7</td>
<td>0</td>
</tr>
<tr>
<td>Vascular encasement</td>
<td></td>
<td>13/31</td>
<td>3/7</td>
<td>1/6</td>
</tr>
<tr>
<td>Iso-hyperintensity on $T_1$WI</td>
<td></td>
<td>16/31</td>
<td>5/7</td>
<td>3/6</td>
</tr>
<tr>
<td>Fluid-fluid level</td>
<td></td>
<td>8/31</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Locular</td>
<td>Large or non</td>
<td>multiple</td>
<td>Multiple</td>
<td>Multiple and various size</td>
</tr>
<tr>
<td>Septum</td>
<td>Thin</td>
<td>Thick</td>
<td>Thick and thin</td>
<td></td>
</tr>
<tr>
<td>Septal enhancement</td>
<td>15/23</td>
<td>5/6</td>
<td>1/1</td>
<td></td>
</tr>
</tbody>
</table>
Note: 23 of 31 patients with cystic lymphangioma had enhancement scan, 6 of 7 patients with cavernous lymphangioma had enhancement scan and 1 patient with hemangiolympangioma had enhancement scan. The septal wall was defined as thick wall when the thickness of septum was more than 2 mm or had papillar convex.

**Fig. 1:** Cystic lymphangioma: The lymphatic appear extremely cystic dilatation with thin wall. (HE X 200)

**Fig. 2:** Cavernous hemangioma: The lymphatic ducts expend with lymph. The Hyperplasia of interstitial fibrous tissue and the accumulation of lymphocytes can be seen. (HE X 200)

**Fig. 3:** Hemangiolympangioma: The variously dilated lymphatic and vessel intertwine. (HE X 200)

**Fig. 4:** Cystic lymphangioma in the right elbow. T₁WI: An oval shaped cystic lymphangioma in the right elbow appears as moderate hyperintensity compared with the adjacent muslces, within which mild hypointensity septum can be seen.

**Fig. 5:** Cystic lymphangioma in the right elbow. T₂WI. The lesion demonstrates hyperintensity with well-defined margin, mild hypointensity septum can be seen within it.

**Fig. 6:** Cystic lymphangioma in the right elbow. Transverse T₂WI. Fluid-fluid level can be seen within the lesion (arrow head). The arrow demonstrates the liver.

**Fig. 7:** Cystic lymphangioma in the right elbow. Contrast enhancement of T₁WI: the wall and the spetum shows mild enhancement.

**Fig. 8:** Cystic lymphangioma of the right upper limb. Coronal fat supress T₂WI of the right upper limb. The vascular encasement is shown within the cystic lymphangioma in the soft tissues (arrow).
Fig. 9: Cystic lymphangioma of the right upper limb. Transverse T₂WI of the right upper limb. The vascular encasement is shown within the cystic lymphangioma in the soft tissues (arrow).

Fig. 10: Cavernous hemangiolympangioma in the right parotid gland.

T₁WI shows a multicystic or multilocular mild hypointensity lesion in the right parotid gland.

Fig. 11: Cavernous hemangiolympangioma in the right parotid gland.

T₂WI shows a hyperintensity cystic change and the thick septum within the lesion. Sporadic punctate hypointensity calcification is shown within the lesions.

Fig. 12: Enhancement of T₁WI. The lesion displays remarkable enhancement.

Fig. 13: Hemangiolympangioma of the right maxillofacial region. Transverse fat suppress T₂WI.

Fig. 14: Hemangiolympangioma of the right maxillofacial region. Transverse T₁WI after contrast media injection. The lesion involves the right maxillofacial region, shows multiple locular sized variously and various thickness of septa. The septa shows contrast enhancement.

Fig. 15 Hemangiolympangioma of the left thigh and the lower abdominal wall. Coronal T₂WI. A multilocular lesion sized variously in locular is displayed in the subcutaneous fat with various thickness of septum. Thrombosis is seen in several locular (arrow)

Fig. 16 Hemangiolympangioma of the left thigh and the lower abdominal wall. Coronal T₁WI after intravenous injection of contrast media shows remarkable enhancement.
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**Fig. 5:** Cystic lymphangioma in the right elbow. T2WI. The lesion demonstrates hyperintensity with well-defined margin, mild hypointensity septum can be seen within it.

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Lymphangioma is rare benign lesions. Redenbacher first reported the disease(7). It may be defined as hemangiolymphangioma when the lesion includes either purple red vein or clear fluid lymphatic vessels. About 90% was diagnosed before 2 years old. It accounts for approximately 6% benign tumor of the children. It can involve almost every organs, more prevalent in head and neck, axillary and mediastinum. Lymphangioma often appeared as soft, fluctuation and gradually enlarged mass. The mass may be rapidly enlarged when accompanied by hemorrhage and infection(8).MRI is the superior examination because its high soft tissue resolution, especially in the lymphatic fibromatosis that involved the whole body(9). It can demarcate the lesions and displays the involvement of the surrounding tissues. MRI features in different pathologic type of lymphangioma are characteristic. MRI is a valuable method to differentiate the cavernous lymphangioma from the cystic lymphangioma. However, it might be difficult to differentiate the cavernous lymphangioma from the hemolymphangioma.
References


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