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CLINICAL IMAGING

MRI features of lipoblastoma: differentiating from other palpable lipomatous tumor in pediatric patients

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Abstract

The purpose of this study was to describe the magnetic resonance imaging (MRI) features of lipoblastomas in pediatric patients and to differentiate them from other palpable benign lipomatous tumors. The relatively specific MRI features of nonenhancing cystic change and enhancing soft tissue nodules seen in lipoblastoma may help to differentiate it from other types of lipomatous tumor in pediatric patients.

Keywords: MRI; Lipoblastoma; Children; Lipomatous tumor; Myxoma

1. Introduction

Lipoblastoma is a rare, benign mesenchymal tumor of embryonic fat [1–3]. Most pediatric patients are diagnosed under the age of three years [4]. Lipoblastoma may clinically present as a palpable soft-tissue tumor, but it is difficult to differentiate it from other tumors by physical examination alone.

Magnetic resonance imaging (MRI) is an important tool for determining the anatomical extent, tissue involvement, and composition of tumors, essential in designing a treatment strategy. There are only a few reports describing the features lipoblastoma MRI, and none appear to differentiate the MRI features of lipoblastoma from other lipomatous tumors in pediatric patients. We reviewed 711 cases in which MRI showed the presence of suspected lipomatous tumors. We compared the MRI features of lipoblastoma with other lipomatous tumors in a group of 11 pediatric patients.

2. Material and methods

2.1. Patients

We conducted a retrospective database search and review of MRI reports and images of identified patients undergoing MRI for a lipomatous tumor from January 2004 to October 2008 at our institution. A total of 711 patients were found in the picture archiving and communication system database. Of the 711 patients, we selected 11 under the age of 15 years who had a lipomatous tumor shown by MRI and pathology from surgical resections or biopsies. The available medical records, including clinical, radiological, operative, and pathological findings for these 11 cases were carefully reviewed.

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Table 1
The clinical data and pathological results of the pediatric patients with lipomatous tumor

Patient number	Gender	Age (year)	Location	Tumor size (cm)	Pathology
1	M	1	Extremities (right axilla)	5	Lipoblastoma
2	M	1	Extremities (right thigh)	5.5	Lipoblastoma
3	M	3	Extremities (left forearm)	2.8	Lipoblastoma
4	F	12	Head and neck (left posterior neck)	6.5	Lipoblastoma
5	M	1	Extremities (right palm)	3.7	Fibrous hamartoma
6	F	2	Extremities (left lower leg)	5	Angiolipoma
7	M	1	Head and neck (buccal space)	6.6	Angiolipoma
8	F	14	Trunk (buttock)	3.6	Angiolipoma
9	F	4	Trunk (buttock)	8.4	Lipoma
10	M	4	Head and neck (occipital space)	2.5	Lipoma
11	M	13	Trunk (anterior abdominal wall)	11	Lipoma

2.2. Imaging

MRI was performed using 1.5-T scanners (Eclipse, Picker, Cleveland, OH, USA; Signa, General Electric Medical Systems, Milwaukee, WI, USA; Vision Plus, Siemens, Germany) with dedicated extremity, head or body coils. Each examination consisted principally of a combination of spin-echo T1-weighted (TR range/TE range, 450–650/15–20), spin-echo T2-weighted (TR range/TE range, 1800–2200/80–90) or fast spin-echo T2-weighted (2500–3300/55–80), and fat-suppressed fast spin-echo T2-weighted (3000–3600/55–80) sequences. Variable combinations of sequences and image planes were adopted. Following intravenous administration of gadolinium (0.1 mmol/kg of body weight) to all patients, T1-weighted (TR range/TE range, 450–650/15–20) spin-echo imaging with fat-suppression was performed. The field of view varied between 14 and 45 cm, the slice thickness ranged from 3 to 5 mm, and the interslice gap was from 0 to 1 mm. There were one or two acquisitions. The imaging matrix ranged from 192×256 to 256×256.

Two experienced musculoskeletal radiologists, who recorded the radiological features of these lipomatous tumors, including tumor size (greatest dimension), location, and presence of the following MRI characteristics, reviewed the MRI images of these 11 patients: fat content, internal fibrous septae, cystic change, vascular bundles, and soft tissue nodules. The MRI signals of these features were defined as follows:

- Fat: hyperintense on T1-weighted images (T1WI), hypointense on fat saturation T2-weighted images (FS-T2WI), mild contrast enhancement after gadolinium administration on T1WI
- Fibrous septae: hypointense both on T1WI and FS-T2WI, no contrast enhancement on T1WI
- Cystic change: hypointense on T1WI, hyperintense on FS-T2WI, no contrast enhancement on T1WI
- Vascular bundle: tubular structures, hypointense on T1WI, hyperintense on FS-T2WI, strong contrast enhancement on T1WI
- Soft tissue nodules: hypointense on T1WI, heterogeneous hyperintense on FS-T2WI, heterogeneous contrast enhancement on T1WI.

These MRI characteristics were graded as marked (seen over>30% of the whole tumor), moderate (10–30%) and

Table 2
Imaging features of lipomatous tumor on MRI

Patient number	Fat content T1: hyperintense; T2: hypointense; mild contrast enhancement	Fibrous septae T1: hypointense; T2: hypointense; no contrast enhancement	Cystic change T1: hypointense; T2: hyperintense; no contrast enhancement	Vascular bundle T1: hypointense; T2: hyperintense; strong contrast enhancement	Soft tissue nodule T1: hypointense; T2: heterogenous hyperintense; heterogeneous contrast enhancement	Pathology
1	++	+	++	−	+	Lipoblastoma
2	++	+	++	+	+	Lipoblastoma
3	++	++	+	+	+	Lipoblastoma
4	++	+	+++	−	+	Lipoblastoma
5	++	+++	++	+	−	Fibrous hamartoma
6	++	++	−	++	−	Angiolipoma
7	+++	+	−	++	−	Angiolipoma
8	++	+	−	++	−	Angiolipoma
9	+++	+	−	−	−	Lipoma
10	+++	−	−	−	−	Lipoma

Present: +++, marked (seen over >30% of the whole tumor); ++, moderate (10–30%); +, mild (<10%); −, absent.