Magnetic Resonance Imaging in Lipoblastoma: Can it be a Diagnostic Modality?

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Magnetic resonance imaging (MRI) is generally an efficient tool for establishing the differential diagnosis of soft tissue tumours. We simultaneously encountered two patients with adipose tumours in the neck. Both had similar clinical features and MRI findings: lobular high intensity tumours on both T1- and T2-weighted images equivalent to subcutaneous fat with septal formation. The provisional diagnosis in both cases was lipoblastoma and both had complete excisions. Histopathological diagnoses, however, were different (lipoblastoma and fibrolipoma), indicating that while MRI is excellent for demonstrating the anatomical detail of soft tissue masses, it is not specific enough to be used alone for differentiating between adipose tumours. In this report, we assess the value of MRI and recommend a more appropriate and patient-friendly protocol for the evaluation for adipose tumours in children. [Asian J Surg 2006; 29(3):198–201]

Key Words: adipose tumour, lipoblastoma, magnetic resonance imaging

Introduction

Lipoblastoma is a rare, benign, encapsulated tumour that consists of a variety of fat cells and occurs exclusively in childhood. Previous reports showed that 80–90% of cases occur before the age of 3 years, and 40% before the 1st year of life. It has a good prognosis, and does not behave aggressively or metastasize, but its growth is rapid and can reach disconcerting proportions. In addition, it is known to recur locally in 9–25% of cases. Therefore, the treatment of choice is complete but conservative excision.

We simultaneously encountered two young children with benign adipose tumours arising in the neck with similar clinicoradiological features compatible with lipoblastoma and present their case histories, focusing on the efficacy and limitations of magnetic resonance imaging (MRI) for diagnosing lipoblastoma.

Case reports

Case 1
A 2-year-old boy had a soft and asymptomatic mass in the right side of his neck that had been enlarging rapidly for the few weeks prior to presentation. When he was hospitalized for assessment of the mass, it was of firm and elastic consistency and measured 7 × 5 cm. There were no signs of inflammation on biochemical screening and all conventional tumour markers were normal. Ultrasonography (US) demonstrated a superficial, highly echoic mass that was relatively well defined, with scattered punctuate, low-echoic areas. MRI was performed to characterize the tissue and to evaluate the extent of the mass exactly. On both T1-weighted (T1-W) and T2-weighted (T2-W) images, most of the mass was of high signal intensity equivalent to the level of subcutaneous fat. There were several septa present within the mass (Figure 1A). Based
on the clinicoradiological features and his age, a provisional diagnosis of benign adipose tumour (lipoblastoma) was made. Complete surgical excision was performed. The postoperative course was uneventful and he recovered with no evidence of recurrence after a follow-up period of 2 years. Gross examination of the surgical specimen showed a well-circumscribed, yellowish, moderately soft mass measuring 7.7 × 6.0 × 3.5 cm. Microscopic examination demonstrated an encapsulated tumour composed of many fibrovascular septa and lobules of immature lipoblasts and mature lipocytes in various proportions (Figure 1B). There was no evidence of mitosis, necrosis or invasion into surrounding tissues. The final histopathological diagnosis was the same as the preoperative provisional diagnosis—lipoblastoma.

Case 2
A 3-year-old girl had a mass in the left side of her neck with clinical features almost identical to those of Case 1. US revealed a mass of mixed echogenicity. Colour Doppler imaging showed that it had distinct margins and was avascular. MRI was performed and the appearance of the mass was similar to Case 1; high intensity on both T1-W and T2-W consistent with the signal produced by subcutaneous fat. Lobular and septal formations were clearly identified, and the margins of the mass were easily confirmed (Figure 2A). Fat-suppression sequencing was used and there was typical suppression of high signal intensity areas on T1-W images (Figure 2B). A provisional diagnosis of lipoblastoma was made based on the clinicoradiological features, her age and the experience gleaned from Case 1. Complete surgical excision of the mass was performed and she recovered with no evidence of tumour recurrence after a follow-up period of 2 years. Macroscopically, the mass was similar to that of Case 1: encapsulated, yellowish-white and soft. However, microscopic examination showed that the mass was composed of fibrovascular septa and only mature lipocytes without typical lipoblasts (Figure 2C).

Liposarcoma was excluded because there were no atypical cells in the lobules and fibrous septa and the final diagnosis of fibrolipoma was made based on histopathological findings.

Discussion
The term “lipoblastoma” was initially used by Jaffe to describe a benign tumour of immature fat cells.4 The term was not widely known as a distinct entity until 1958, when Vellios et al, described lipoblastomatosis as a benign lipoblastic tumour occurring in infancy and childhood.5 Chung and Enzinger suggested using the terms lipoblastoma for encapsulated lesions and lipoblastomatosis for the unencapsulated diffuse form based on a series of 35 cases.6 Lipoblastoma is, nevertheless, a rare developmental tumour of fat cells. The classical presentation of lipoblastoma is a rapidly enlarging, soft, non-tender mass, but there are multiple differential diagnoses and accurate preoperative clinical diagnosis is difficult.

Imaging modalities such as US and MRI have been used to improve the accuracy of diagnosing lipoblastoma.
preoperatively. US can determine the presence or absence of fluid collections, and colour Doppler can be utilized to assess vascularity. However, this modality is limited in that it cannot define the full extent of large masses located within soft tissues. In contrast, MRI allows precise assessment of the location and size of a mass within soft tissues. Although the experience of using MRI in cases of lipoblastoma is limited, previous reports suggest that the morphological features identified by MRI may be sufficient enough to make a definitive diagnosis and pre-operative evaluation. Following on from our experience with Case 1, we were confident that the clinicoradiological findings in Case 2 were suggestive of lipoblastoma because the MRI appearance of the mass was similar to that of Case 1 and previous case reports of lipoblastoma in the literature. However, the histopathological diagnosis proved to be fibrolipoma, another rare, benign adipose tumour that is found predominantly in middle and later life rather than in childhood. Generally, the term “fibrolipoma” is recognised as an uncommon variant of lipoma with a mixture of fibrous connective tissue, which is often associated with a capsule or fibrous septa and absence of lipoblasts. Thus, differences between the two cannot be determined from MRI appearance alone.

Based on our experience of these two cases and a review of reports in the literature, we believe that MRI is not specific enough to be used alone for investigating adipose tumours, although MRI is undoubtedly an excellent tool for demonstrating anatomical detail which contributes greatly to successful complete excision. Even if lipoblastoma is the most likely diagnosis, other benign adipose tumours such as fibrolipoma, lipomatous hamartoma or pleomorphic and spindle cell lipoma should be considered in the differential diagnosis. In fact, if US can demonstrate that an adipose tumour is encapsulated and has defined margins without infiltration to the surrounding tissues, then MRI may not always be necessary. Another disadvantage associated with MRI is that sedation may be required.

Figure 2. Case 2 (fibrolipoma). (A) Axial T1-weighted magnetic resonance imaging shows that the mass has high signal intensity and well-defined margins with lobules and septa. (B) Fat-suppression sequencing shows typical suppression of the high intensity T1-weighted image. (C) The histological appearance is similar to Case 1, but there are no typical lipoblasts, only mature lipocytes.
required for some patients depending on age, although in most cases, there is no need for general anaesthesia or deep sedation. Certainly, computed tomography (CT) can be used for investigating a paediatric adipose tumour, but it is usually not more specific than MRI and is associated with additional risks from radiation exposure. Investigations must be cost-effective and patient-friendly and we recommend US followed by MRI if necessary as a simple protocol for investigating a soft, asymptomatic mass because the most important difference between MRI and CT is the radiation exposure associated with CT, and sedation may also be required for CT in some infants or smaller children. Thus, we believe MRI to be superior to CT for investigating paediatric adipose tumours.

Adipose tumours in infants and young children are difficult to differentiate on clinicoradiological findings alone. Several authors have recommended biopsy in the first instance in order to confirm the diagnosis.8,12 However, there is a high risk that a biopsy result will be inconclusive, identifying only fibrous tissue and small amounts of fatty tissue, a fruitless result for such an invasive procedure. In addition, liposarcoma, the condition that would worry all caregivers in such circumstances, is actually statistically rare before 5 years of age,13 which means that it can virtually be excluded in infancy and early childhood. If surgical intervention is chosen as the treatment of choice for a rapidly enlarging soft tissue mass, primary complete excision is recommended.

In conclusion, our protocol for the assessment of adipose tumours in infancy and early childhood, which we believe to be both cost-effective and patient-friendly, is: (1) US, (2) MRI, (3) complete excision. US is indispensable; MRI may not always be required if US can accurately demonstrate the features of the mass and the surrounding tissues without unduly stressing the patient.

References