Received: 5 May 2021 | Revised: 22 June 2021 | Accepted: 23 June 2021

DOI: 10.1002/ccr3.4567

CASE REPORT

Clinical Case Reports Open Access WILEY

Diagnosis and management of oral cavity lipoblastoma and lipoblastomatosis in an 8-month-old boy

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Funding information
None

Abstract

Lipoblastoma/lipoblastomatosis presents some unique diagnostic and therapeutic challenges when encountered in the oral cavity. In these rare cases, diagnostic confirmation with molecular testing and a conservative surgical resection can contribute to successful management.

KEYWORDS

lipoblastoma, lipoblastomatosis, oral cavity, pediatrics, PLAG1

1 | INTRODUCTION

This case report highlights the characteristics of lipoblastoma/lipoblastomatosis and implications for surgical resection, the limitations of MRI for diagnosing lipoblastoma/lipoblastomatosis, and the use of molecular testing for PLAG1 gene rearrangement to confirm the diagnosis. The morbidity associated with complete tumor excision must be weighed against risk of tumor recurrence.

Lipoblastomas are benign tumors of embryonal fat that occur almost exclusively in children, usually before the age of 3 years.[1] Lipoblastomas most often present in the trunk and extremities, although several case series document cervical region involvement.[2] Oral cavity lipoblastomas are extremely rare, with only two tongue cases documented in the literature.[3]

Because of the clinical presentation and imaging findings are non-specific, histopathology serves to confirm diagnosis and exclude malignancies. While histology is often sufficient for diagnosis, some lipoblastomas require molecular testing for definitive diagnosis. Lipoblastoma and lipoblastomatosis have analogous cellular composition but differ in the degree to which they invade surrounding soft tissue. Tumors that are encapsulated and well-circumscribed are termed lipoblastomas, while those that have infiltrative borders are referred to as lipoblastomatosis.[1] This distinction is not always explicit in the literature but does have clinical implications since lipoblastomatosis is associated with higher rates of recurrence after excision.[2]

Here, we present a case of concurrent multifocal lipoblastoma and lipoblastomatosis in the tongue and oral floor of an infant that required molecular testing for diagnostic confirmation. To our knowledge, this is the first report of concurrent multifocal lipoblastoma and lipoblastomatosis in a single patient.

2 | CASE REPORT

A healthy 8-month-old boy presented to the clinic with an enlarging lesion on his left tongue. First noted at 6 months of age, the lesion had grown approximately three times its original size by the time of presentation. The patient had no pain or breathing difficulties. He struggled with eating some solids although he was gaining weight appropriately. Examination of the oral cavity revealed a pale mucosal lesion with submucosal, firm, 2-cm mass on the left tongue and oral floor. No cervical lymphadenopathy was appreciated.

Pre-operative MRI of the face and neck showed three discrete yet connected, enhancing lesions in the left oral cavity (Figure 1). The oral floor lesion measured 4.4 cm, was well-marginated and contained multiple foci of T1 bright fat (Figure 2). The lesions in the left anterior and posterior tongue measured up to 3.5 cm and 2.0 cm, respectively. They showed less fat signal and more solid enhancement (Figure 3) than the oral floor lesion. Immediately after the MRI under the same anesthetic, the patient underwent diagnostic biopsies of the oral floor mass (excisional) and anterior tongue lesion (incisional).

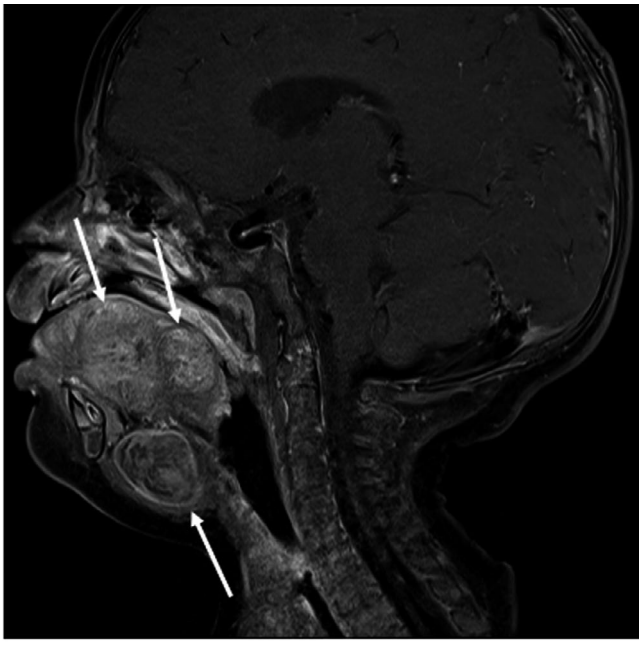


FIGURE 1 Sagittal T1 fat saturation MRI. There are 2 tongue lesions (two upper arrows) with more solid enhancement than the floor of mouth lesion (lower arrow). All three lesions connected as seen on additional images

Histologic sections of the oral floor and tongue biopsies revealed lobules of mature fat with myxoid stroma (Figure 4). Because of the paucity of lipoblasts, the specimens were sent for molecular analysis, which revealed Pleomorphic Adenoma Gene 1 (*PLAG1)* rearrangement by fluorescence *in situ* hybridization (FISH), securing the diagnosis of "maturing" lipoblastoma. After initial diagnostic biopsies, the tongue lesions were resected, with examination revealing a more infiltrative, unencapsulated architecture compared to the oral floor mass and with positive resection margins. The patient was monitored closely because of the higher risk of recurrence with lipoblastomatosis. After 6 months of close monitoring, he underwent resection of recurrent tongue lesions with the cuff of normal tongue tissue; examination revealed lipoblastoma with negative surgical resection margins.

3 | DISCUSSION

Because of non-specific clinical presentation and imaging findings of lipoblastoma, the initial differential diagnoses are broad. Lipoblastoma presents clinically as a rapidly growing, painless, soft tissue mass, or swelling. When located in the head and neck, respiratory distress, stridor, dysphagia, or dysphonia may result.[2] MRI imaging can reveal the extent of the lesion, but features of these tumors tend to be non-specific due to their variable proportions of fat and myxoid stroma (Figures 1-3).[4] On imaging, lipoblastoma/lipoblastomatosis can resemble other benign and malignant growths, including hemangiomas, lipomas, and liposarcomas,[4] so histopathology is needed for further characterization.

Histologically, lipoblastomas are circumscribed, lobular, and contain admixed mature adipocytes and lipoblasts in varying stages of differentiation.[1] The presence of lipoblasts may help to distinguish the tumors from lipomas, which lack lipoblasts and generally do not occur in children (Figure 4).[1] This particular lipoblastoma was challenging to diagnose due to the near absence of lipoblasts, necessitating molecular confirmation. The *PLAG1* gene rearrangement, implicated in pleomorphic adenomas of the salivary glands and in lipoblastomas, was identified by FISH, distinguishing this lesion from involuted hemangioma and liposarcoma.[5]

The treatment of choice for lipoblastoma/lipoblastomatosis is complete excision. However, tumor location and morphology can present challenges to management. The risks of tumor recurrence or extension must be considered against the morbidity of complete surgical excision, especially when the tumor presents in sensitive areas such as the

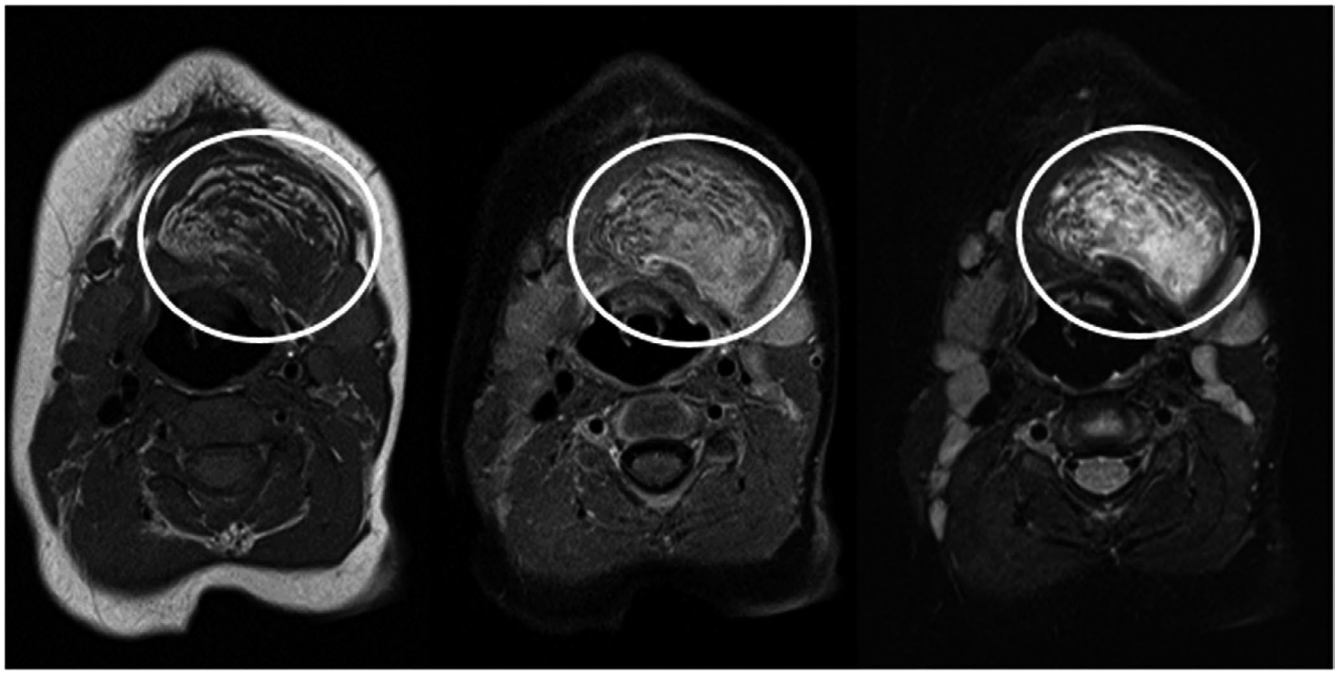
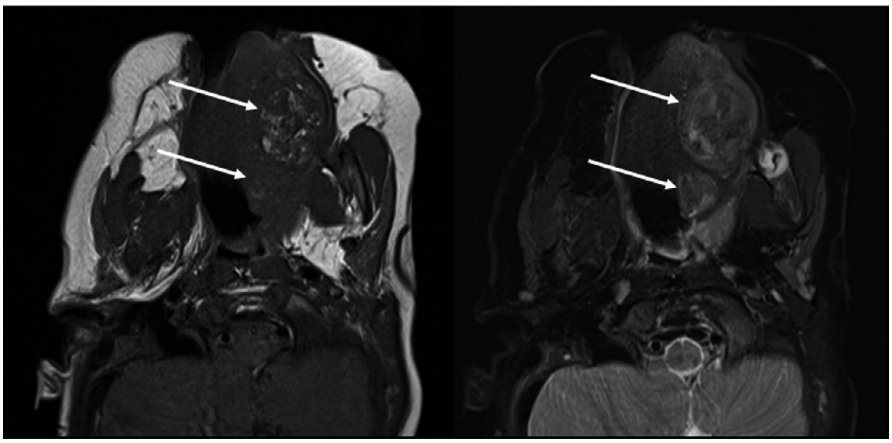


FIGURE 2 MRI images of floor of mouth lesion. Axial T1 pre-contrast image (left) shows the floor of mouth lesion with internal bright fat signal pre-contrast that matches subcutaneous fat signal. Axial T1 fat saturation (FS) post-contrast image (center) show the fat signal as dark, again matching the subcutaneous fat signal. Note how the non-fatty internal soft tissue enhances post-contrast. Axial T2 FS image (right) shows internal fat signal as dark, matching the subcutaneous fat, while the non-fatty internal tissue is very T2 bright

FIGURE 3 MRI images of the two tongue lesions. Axial T1 image (left) shows scattered areas of bright fat signal in the more anterior tongue lesion with scant fatty signal in the more posterior tongue lesion. Axial T2 FS image (right) shows the two tongue lesions have significantly darker T2 signal than the floor of mouth lesions; compare to Figure 2



tongue. Because malignant transformation is unlikely and distant metastases have never been reported,[2] a conservative approach with functional preservation to avoid significant morbidity is acceptable. Multidisciplinary discussions with input from pathology, radiology, and surgery helped guide the management decisions throughout the course of this patient's care.[6]

In summary, this is an unusual case of an infant with a rapidly growing tongue lesion that presents a diagnostic and management conundrum. The pre-operative MRI revealed three distinct masses with two different signaling characteristics but no clear diagnosis. For tissue diagnosis, the oral floor mass was removed transcervically in toto as it shelled out easily; however, an incisional biopsy of the left tongue mass was initially performed as it appeared more adherent to the tongue muscle. Definitive diagnosis of lipoblastoma took three weeks to be confirmed with *PLAG1* in situ hybridization. After the benign diagnosis of lipoblastoma, the remaining two lesions in the left tongue were removed conservatively to prevent significant morbidity to the patient. Pathological review revealed lesional fat at the margins. The patient ultimately required a second resection for recurrent lipoblastomatosis. Removing a cuff of normal tongue with the tumors resulted in negative resection margins and no recurrence to date.

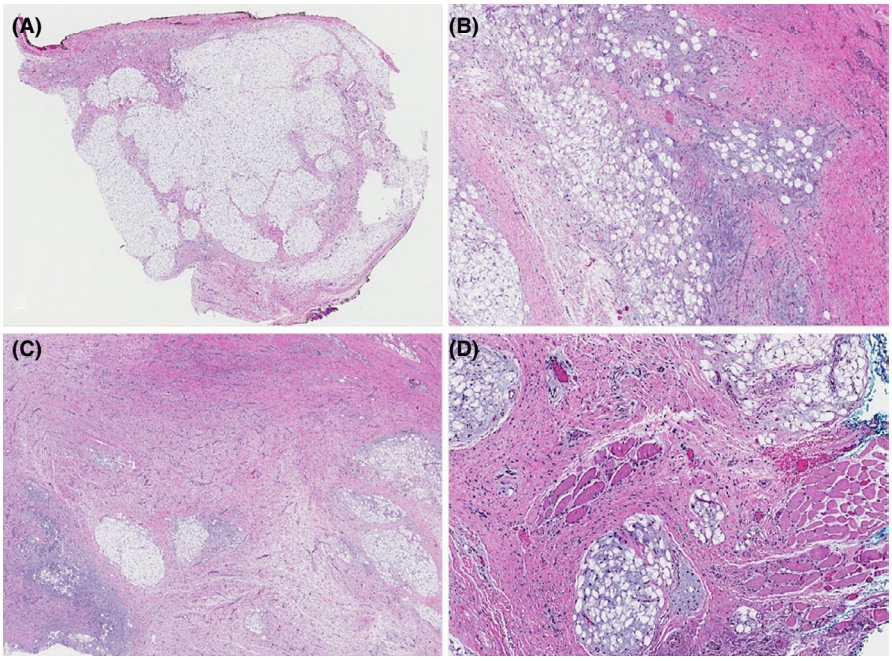


FIGURE 4 Histopathology with H&E staining. The floor of mouth mass consists of lobules of mature-appearing fat, with pseudo-capsule merging into non-lesional soft tissue (A, 4×). Closer inspection reveals a variably dense, vascularized collagenous to myxoid stroma and a paucity of lipoblasts (B, 10×). The tongue mass is generally, albeit irregularly, circumscribed (C, 4×), but in some areas is more infiltrative, seen here dividing skeletal muscle bundles at the periphery of the resection and appearing at the inked margin (D, 10×)

4 | CONCLUSION

We present the first case of concurrent lipoblastoma/lipoblastomatosis in the oral cavity of a single patient. This case report highlights the characteristics of lipoblastoma/lipoblastomatosis and implications for surgical resection, the limitations of MRI for diagnosing lipoblastoma/lipoblastomatosis, and the use of molecular testing for *PLAG1* gene rearrangement to confirm the diagnosis. In a subset of these tumors near critical structures, the morbidity resulting from complete excision must be weighed against the risk of tumor recurrence.

ETHICS AND PATIENT CONSENT

The Dartmouth-Hitchcock Health (D-HH) Institution Review Board (IRB) does not require ethical approval for reporting individual cases or case series. Written informed consent was obtained from a legally authorized representative (father of patient) for anonymized patient information to be published in this article.

ACKNOWLEDGMENTS

We would like to acknowledge the father of this patient who agreed to allow us to publish this challenging case. In addition, we would like to acknowledge Mason Hinchcliff MD and Christopher Harper MD, who were involved in the care of this patient.

CONFLICTS OF INTEREST

The authors have no conflicts of interest to report.

AUTHOR CONTRIBUTIONS

Allison L. Matous and Eunice Y. Chen have made substantial contributions to conception and design, acquisition of data, and analysis and interpretation of data; were involved in drafting the manuscript and revising it critically for important intellectual content; have given final approval of the version to be published and have agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. Michael L. Baker, Rihan Khan, and David A. Pastel have made substantial contributions to acquisition, analysis, and interpretation of data; were involved in revising the manuscript critically for important intellectual content; have given final approval of the version to be published and have agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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How to cite this article: Matous AL, Baker ML, Khan R, Pastel DA, Chen EY. Diagnosis and management of oral cavity lipoblastoma and lipoblastomatosis in an 8-month-old boy. *Clin Case Rep*. 2021;00:e04567. https://doi.org/10.1002/ccr3.4567