Atypical MRI and Histopathological Findings in Dermoid Cyst

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Abstract

On images, a dermoid cyst is often described as resembling a “sack of marbles” or “marbles in a bag”. Typically, it comprises an inhomogeneity filled with multiple nodules in a fluid matrix on both computed tomography and magnetic resonance imaging (MRI). How it appears, however, will vary depending on its histological contents, which may cause confusion in arriving at a diagnosis. This report describes a dermoid cyst in the floor of the mouth of a 55 year-old woman that showed an atypical internal appearance on MRI. Most of the lesion showed homogeneous high signal intensity on T1- and T2-weighted images, suggesting that it was derived from fat. A small area within the mass, however, showed moderate signal intensity almost equal to that of muscle on T1-weighted images and high signal intensity on fat-suppressed T2-weighted images. Given the location of the lesion, a dermoid cyst was one possible diagnosis. A lipoma or lipoma variants were also considered, however, based on signal intensity. Histopathological section of the excised specimen revealed a dermoid cyst with sebaceous glands in its walls and keratin in its cavity. Dermoid cysts show variation in their internal structures and contents. Since MRI can reflect such histological variation, signal intensity requires careful interpretation.

Key words: Dermoid cyst — Floor of the mouth — Magnetic resonance imaging (MRI) — Diffusion weighted imaging (DWI)
Introduction

The floor of the mouth is the most common location for a dermoid or epidermoid cyst arising in the oral cavity\(^9\). Such cysts occur predominantly in the midline, as they are derived from epithelial rests included during midline union of the first and second branchial arches\(^11\). Therefore, dermoid and epidermoid cysts are usually included as differential diagnoses for midline lesions located in the floor of the mouth.

On magnetic resonance imaging (MRI), dermoid cysts are usually either isointense or hyperintense to muscle on T1-weighted images, depending on the lipid content, and frequently have a heterogeneous internal appearance\(^22\). The multiple coalesced fat globules of a compound dermoid cyst are clearly visible on computed tomography (CT)\(^6\). This heterogeneous internal structure is useful in differentiating them from epidermoid cysts, which are characterized by a homogeneous one\(^22\).

A dermoid cyst may be more difficult to diagnose, however, if it shows atypical findings. This report describes a dermoid cyst that showed a somewhat atypical appearance on MR images.

Case Presentation

1. Clinical findings

The patient was a 55-year-old woman who presented at our hospital with the complaint of a swollen tongue. She had noticed an abnormal but painless bulge at the midline beneath the tongue for approximately 4 years. Noting that it had increased in size, her dentist referred her to our hospital for a more detailed examination. Clinical examination at our department revealed a large submucosal lesion beneath the tongue the size of the tip of the thumb (Fig. 1). The surface of the lesion was smooth and the color normal to slightly yellow. It was elastic and soft with fluctuation. The patient’s attending doctor suspected a dermoid cyst.

2. Diagnostic imaging

On MRI, the lesion was clearly delineated as a midline mass separating the right and left genioglossus and geniohyoid muscles above the mylohyoid muscle (Figs. 2–4). The margin was sharp and approximately 25 mm in diameter. Most of the mass showed high signal intensity equal to subcutaneous fat on both T1- (Fig. 2A) and T2-weighted (Fig. 2B) images and decreased signal intensity on a fat suppressed T2-weighted image (Fig. 2C). Fat suppression was clearly less uniform than that which would be expected with a lipoma. A small area within the mass showed low signal intensity almost equal to muscle on T1-weighted image (Fig. 3A) and high signal intensity on fat-suppressed T2-weighted image (Fig. 3B), suggesting a fluid-filled area within the mass. The low signal area had a teardrop shape and was located in the bottom part of the lesion on sagittal T1-weighted image (Fig. 4). Diffusion weighted imaging (DWI) was performed (Fig. 5A, B). The apparent diffusion coefficient (ADC) map (Fig. 5C) showed a low ADC value of \(0.73 \times 10^{-3} \text{mm}^2/\text{sec}\) for the whole lesion and \(1.76 \times 10^{-3} \text{mm}^2/\text{sec}\) for the small area of the lesion.

A dermoid cyst was one possible diagnosis based on the location of the lesion. A lipoma was also considered, however, as most of the...
lesion showed high signal intensity on T1-weighted images. The lesion showed less homogeneous signal intensity than a typical lipoma on the fat suppressed T2-weighted sequence (STIR), less homogeneous suppression of lesion than of subcutaneous fat was observed.

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MRI Appearance of Dermoid Cyst

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Fig. 2 Axial MR images
(A) Axial T1-weighted image (TR/TE 500/15 ms)
(B) T2-weighted image (TR/TE 3,500/100 ms)
(C) STIR image (TR/TE 4,600/90 ms) showed lesion in floor of mouth. Most of lesion showed high signal intensity approximating subcutaneous fat on both T1- and T2-weighted images. On fat suppressed sequence (STIR), less homogeneous suppression of lesion than of subcutaneous fat was observed.

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Fig. 3 Coronal MR images
(A) Coronal T1-weighted image (TR/TE 500/15 ms)
(B) STIR image (TR/TE 4,600/90 ms) showed small area with moderate signal intensity almost equal to muscle on T1-weighted image and extra-high signal intensity on fat-suppressed T2-weighted image, suggesting fluid within lesion.

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Fig. 4 Sagittal MR image
Sagittal T1-weighted image (TR/TE 500/15 ms) showed teardrop shaped area with low signal intensity at bottom of lesion.

* Patient was scanned in supine position in MRI scanner.
images, however, and a small area in the bottom part of the lesion showed a different signal intensity. Therefore, lipoma variants were also considered.

**Histopathological Findings and Diagnosis**

The lesion was excised and a histopathological specimen analyzed. A pathological image showed the wall and cavity of the cyst (Fig. 6A). Sebaceous glands were observed in the wall of the cyst and keratin in the cavity (Fig. 6B). Adipose tissue and small cysts were also observed in the cyst wall (Fig. 6C, D). Thickened fibrous connective tissue was observed under the lining epithelium in part of the cyst wall (Fig. 6E). Based on these histopathological findings, the lesion was diagnosed as a dermoid cyst.

**Discussion**

Dermoid cysts in the floor of the mouth are unusual, and account for only between 1 and 2% of all such cysts\(^\text{[13]}\), as well as only 7% of congenital neck lesions\(^\text{[15]}\). The floor of the mouth is the most common location when they occur in the oral cavity\(^\text{[9,10,21]}\). A midline mass of the neck and face is usually suspected to be a congenital lesion. In the present case, a dermoid cyst was suspected based on MRI findings of a mass between the right and left genioglossus/geniohyoid muscle complex in the midline. The internal signal intensity on the MR images of the lesion was not typical, however.

Most of the mass showed high signal intensity on both T1- and T2-weighted images, so a lipoma or lipoma variant was also considered. Although most lipomas develop in the subcutaneous tissues, oral lipomas can appear in various anatomic sites, including the major salivary glands, buccal mucosa, lip, tongue, palate, vestibule, and floor of the mouth\(^\text{[2,4,8]}\). On MRI, a lipoma shows as a well-defined mass with a markedly high signal intensity, which is isointense compared to subcutane-
ous fat, on both T1- and T2-weighted images\(^1\). A lipoma may partly present its margin as a line of low signal intensity\(^{12,18}\). A typical lipoma usually shows a homogeneous MR signal intensity and slightly heterogeneous internal appearance, which made us consider a lipoma variant, such as a fibrolipoma, angiolipoma, or liposarcoma\(^{5,7,14}\). The fat suppressed image also showed a less homogeneous appearance than might be expected of a typical lipoma.

On MRI, a dermoid cyst appears as either isointense or hyperintense to muscle on T1-weighted images and is typically hyperintense on T2-weighted images\(^{16}\). The range of the signal intensity depends on the lipid content. Fat-saturated images are very helpful for confirmation. The presence of fat globules within the lesion suggests a dermoid cyst\(^3\).

The multiple coalesced fat globules of a compound dermoid are clearly visible on MRI\(^3\). In the present case, no such fat globules were apparent, however, and most of the cyst showed high signal intensity on MRI (Figs. 2–4). A small area at the bottom of the lesion which showed moderate signal intensity on the T1-weighted image and high signal intensity on the T2-weighted image may have included fluid (Figs. 3 and 4). The low ADC value of the entire lesion, \(0.73 \times 10^{-3} \text{ mm}^2/\text{sec}\), was comparable with that reported in previous studies of dermoid cysts\(^{16,17,20}\).

In conclusion, we encountered a case of a dermoid cyst in the mouth with fat signal intensity in most the lesion. Dermoid cysts vary in terms of their internal structures and contents. Since MRI can reflect such histo-

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**Fig. 6** Histopathological findings

(A) Pathological image of entire lesion with cyst wall and cavity (scale bar: 3.0 mm). Other magnified images are mapped on pathological section of entire cyst.
(B) Typical appearance of dermoid cyst with sebaceous glands (arrow) was observed in wall of cyst and keratin in cavity (scale bar: 100 \(\mu\)m).
(C) Adipose tissue (arrows) and small cysts (arrowheads) were observed in cyst wall (scale bar: 400 \(\mu\)m).
(D) Adipose tissue was located outside of cyst wall (scale bar: 100 \(\mu\)m).
(E) Thickened fibrous connective tissue was observed in part of cyst wall (scale bar: 600 \(\mu\)m).
logical variation, the interpretation of signal intensity requires care.

References

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