

A Different Kind of Marble: Sublingual Epidermoid Cyst with the "Sack of Marbles" Sign

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AUTHORS' CONTRIBUTIONS

All authors contributed equally to the conception, design, data collection, and preparation of this manuscript. All authors have read and approved the last version of the manuscript.

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DISCLOSURES

The authors declare no conflict of interest, financial disclosures, or competing interests related to this manuscript.

CONSENT

Yes. Written informed consent was obtained from the patient for submission of this manuscript and accompanying images for publication.

HUMAN AND ANIMAL RIGHTS

This study was conducted in accordance with ethical standards and followed institutional guidelines. Written informed consent was obtained from the patient in compliance with the Helsinki Declaration of 1975, as revised in 2000. No animal subjects participated in this study.

ABSTRACT

Epidermoid cysts account for approximately 1.6% of oral cavity cysts, with 7% occurring in the head and neck region. The "sack of marbles" appearance on magnetic resonance imaging has traditionally been considered specific for dermoid cysts, where fat globules from sebaceous secretions appear bright on t1-weighted sequences. A 22-year-old male presented with a midline floor-of-mouth mass discovered incidentally after trauma. The lesion enlarged over 18 months, causing mild speech difficulty. Imaging showed a well-circumscribed cyst with multiple bright foci and restricted diffusion, representing free-floating keratin globules. The appearance strongly suggested a dermoid cyst, but histopathology confirmed an epidermoid cyst without dermal appendages. This case demonstrates that epidermoid cysts can exhibit the "sack of marbles" pattern, highlighting that histopathologic correlation is essential for accurate diagnosis.

CASE REPORT

BACKGROUND

Epidermoid cysts of the floor of the mouth are rare congenital lesions accounting for less than 0.01% of all oral cysts. They are typically slow-growing and asymptomatic. On MRI, the "sack of marbles" appearance has classically been described in dermoid cysts, reflecting fat globules from sebaceous secretions. However, this case illustrates that a similar appearance can occur in epidermoid cysts due to free-floating keratin globules, emphasizing the importance of histopathologic confirmation.

CASE REPORT

Clinical Presentation

A 22-year-old male was referred by an otolaryngologist for radiologic evaluation of a lesion in the floor of the mouth incidentally discovered on a computed tomography (CT) facial

bone study performed in November 2023 at another hospital. The initial CT scan had been obtained following head trauma sustained during a fall while intoxicated. A follow-up CT of the neck one month later was performed to further characterize the lesion. As the patient remained asymptomatic, the lesion was managed conservatively with imaging surveillance.

Over the subsequent 18 months, the patient remained asymptomatic. However, in May 2025, he noted enlargement of the lesion and began experiencing intermittent sensations of fullness in the floor of the mouth, accompanied by occasional difficulty with speech, particularly during prolonged oral presentations. The patient denied pain, erythema, drainage, or dysphagia. His medical history was significant for Human Immunodeficiency Virus (HIV) pre-exposure prophylaxis with Truvada 200 mg daily. His surgical history was notable

for tonsillectomy and wisdom tooth extractions. The patient was adopted, and family history was unavailable. Physical examination revealed a well-appearing male in no acute distress with clear, strong articulation. Neck examination demonstrated palpable submental fullness consistent with an underlying mass. Flexible laryngoscopy showed normal nasopharynx, oropharynx, hypopharynx, and larynx without evidence of mass or lesion.

Imaging Findings

CT Findings

The initial maxillofacial CT from November 2023 was not available. The follow-up contrast-enhanced CT scan of the neck, performed in December 2023, demonstrated a well-defined, expansile mass in the floor of the mouth with homogeneous hypoattenuation. The mass was positioned midline within the anterior sublingual space, bordered superiorly by the tongue and inferiorly by the mylohyoid muscle. The lesion measured $21 \times 40 \times 39$ mm (transverse \times anteroposterior \times craniocaudal) and exhibited no internal enhancement.

Ultrasound (US) Findings

Targeted ultrasound was performed concurrently with the CT and demonstrated an encapsulated solid mass in the sublingual space with homogeneous echotexture that was mildly hypoechoic relative to the adjacent mylohyoid muscle. The mass measured $26 \times 43 \times 34$ mm in the transverse, anteroposterior, and craniocaudal dimensions, respectively. No lymphadenopathy or other abnormal findings were identified.

Magnetic Resonance Imaging (MRI) Findings

Magnetic resonance imaging of the neck performed 20 months later, in August 2025, demonstrated enlargement of the mass, which now measured $44 \times 58 \times 62$ mm (transverse \times anteroposterior \times craniocaudal). The mass demonstrated marked T2 hyperintensity with a "sack of marbles" appearance consisting of numerous significantly hyperintense rounded foci. The "marbles" demonstrated significant diffusion restriction. The lesion was mildly hyperintense on T1-weighted sequences containing multiple hypointense foci. Post-contrast sequences showed no internal enhancement but moderate peripheral enhancement.

While this appearance is classically associated with dermoid cysts—where "marbles" represent fat globules from sebaceous secretions demonstrating T1 hyperintensity—our case demonstrated this sign in an epidermoid cyst with keratin globules showing T2 hyperintensity and marked diffusion restriction.

Management and Follow-up

The patient received comprehensive counseling regarding potential surgical complications, including the risk of nerve injury that could affect salivary gland function and taste

sensation, the possibility of persistent fistula formation, and the risk of airway compromise secondary to postoperative edema. The patient was instructed to inform emergency providers about the floor-of-mouth cyst and to ensure that otolaryngology consultation was obtained promptly if he presented to the emergency department with respiratory distress.

Transcervical excision of the sublingual lesion was performed in October 2025, with intraoperative frozen-section microscopy revealing a squamous-lined cyst consistent with an epidermoid cyst. Final pathology confirmed a ruptured epidermal inclusion cyst measuring $5.5 \times 4 \times 4$ cm containing abundant keratin debris, with chronic inflammation and foreign-body giant-cell reaction. The absence of dermal appendages (hair follicles, sebaceous glands, sweat glands) on permanent sections confirmed epidermoid rather than dermoid pathology.

DISCUSSION

Etiology & Demographics

Epidermoid cysts (also termed epidermal inclusion cysts) and dermoid cysts are benign congenital lesions that may result from developmental anomalies during fetal development, with 1-2% occurring in the oral cavity [1]. The critical distinction is that epidermoid cysts are lined with epidermis containing only squamous epithelium and keratin debris, while dermoid cysts are additionally lined with dermal appendages including hair follicles, hair, sebaceous glands, and sweat glands on their fibrous wall [1]. Both lesions develop from multipotential cells undergoing ectodermal differentiation during embryonic development, with the congenital inclusion theory suggesting that trapped epithelial tissue becomes sequestered along the midline embryonic fusion of the first and second pharyngeal arches during the third and fourth weeks of gestation [1]. The entrapped ectodermal tissue continues to secrete material throughout life, leading to gradual cyst enlargement [1].

Floor of mouth cysts are uncommon [1]. Both lesion types are typically present during the second or third decade of life [1], as seen in our patient who was 22 years old. Floor of mouth cysts are classified based on their location relative to the geniohyoid and mylohyoid muscles: sublingual (above mylohyoid, most common), submental (between mylohyoid and geniohyoid), or mixed (extends through mylohyoid) [1]. Our patient had a sublingual epidermoid cyst located superior to the mylohyoid muscle.

Clinical & Imaging Findings

Most patients with floor of mouth cysts present with a slow-growing swelling [1]. These lesions are often asymptomatic initially but may progress to cause symptoms including difficulty with speech, swallowing, phonation, and breathing [1]. The cyst may remain asymptomatic for years [1], as demonstrated in our patient who was asymptomatic for 18 months after initial discovery. As the cyst enlarges, patients may develop significant functional impairment. When cysts occur in the floor of mouth,

they can enlarge to such an extent that they interfere with swallowing and potentially produce respiratory obstruction [1]. Imaging plays a crucial role in diagnosis. Specialized imaging examinations such as ultrasonography, computed tomography, and MRI should be performed to achieve accurate diagnosis and develop appropriate surgical strategy [1]. MRI provides superior soft tissue characterization.

The "sack of marbles" appearance has traditionally been described as pathognomonic for floor of mouth dermoid cysts. This appearance typically results from free-floating fat globules (from sebaceous secretions produced by dermal appendages) that demonstrate characteristic T1 hyperintensity on MRI. Interestingly, similar sonographic findings have been reported in epidermal cysts, where ultrasonography demonstrated multiple echogenic coalescent nodules within a cystic cavity—corresponding to spherical keratin formations that produced a "sack-of-marbles" appearance [2].

However, our case demonstrates an unusual and previously unreported variant: the "sack of marbles" appearance in a histologically confirmed epidermoid cyst. In our patient, MRI demonstrated multiple rounded hyperintense foci on T2-weighted sequences with marked diffusion restriction. Unlike the fat globules seen in classic dermoid presentations, these "marbles" represented keratin globules. Keratin demonstrates different signal characteristics than fat: hyperintense on T2 with marked diffusion restriction, rather than the T1 hyperintensity expected with fat.

While keratin pearls are well-described histologically in epidermoid cysts, their ability to create the classic "sack of marbles" appearance on MRI appears to be a novel observation. This finding suggests that the "sack of marbles" sign is not pathognomonic for dermoid cysts and can occur in epidermoid cysts when sufficient keratin globules accumulate.

Treatment & Prognosis

Potential surgical complications must be discussed with patients. Early diagnosis and treatment are essential for these cystic entities [1]. Complete excision is curative with low recurrence rates [1]. Definitive treatment consists of complete surgical excision [1]. Our patient underwent transcervical resection of the lesion. Pathology findings demonstrated a midline neck mass measuring 5.5 x 4 x 4 cm containing abundant keratin debris. Representative tissue was submitted for frozen and permanent sections. Final pathology confirmed a ruptured epidermal inclusion cyst with chronic inflammation and foreign body giant cell reaction. The presence of abundant keratin debris within the cyst cavity correlated directly with the MRI findings of multiple hyperintense foci, confirming that the "marbles" visualized on imaging represented free-floating keratin globules rather than the fat globules typically seen in dermoid cysts. Importantly, the absence of dermal appendages (hair follicles, sebaceous glands, sweat glands) on permanent histologic sections definitively established the diagnosis of

epidermoid cyst rather than dermoid cyst, despite the imaging appearance traditionally associated with dermoid pathology.

Differential Diagnoses

Dermoid Cyst

Dermoid cysts are benign developmental lesions arising from ectodermal differentiation of multipotential cells [3]. These cysts account for approximately 1.6% of lesions in the oral cavity [4]. Floor of mouth dermoid cysts typically present in the second or third decade of life [4]. Dermoid cysts classically present with the "sack of marbles" sign on MRI, where the "marbles" represent free-floating fat globules from sebaceous secretions produced by dermal appendages within the cyst wall. These fat globules typically demonstrate T1 hyperintensity. Our patient's midline location, early age, and "sack of marbles" appearance on MRI initially suggested dermoid cyst as the leading diagnosis. However, histopathologic examination revealed an epidermal inclusion cyst (epidermoid cyst) without dermal appendages. The "marbles" in our case represented keratin globules (T2 hyperintense with diffusion restriction) rather than fat globules (T1 hyperintense). This represents a diagnostic pitfall: the "sack of marbles" sign alone cannot definitively distinguish between dermoid and epidermoid cysts when keratin globules are present in sufficient quantity.

Ranula

Ranulas are mucoceles or retention cysts that form from extravasation of mucus from the sublingual gland [5]. They develop due to continued saliva production in the presence of ductal obstruction [5]. Ranulas are more common than dermoid cysts in the floor of mouth. On imaging, ranulas demonstrate simple fluid signal characteristics without the complex internal architecture seen in cysts with the "sack of marbles" appearance. The strict midline location in our patient was atypical for ranula.

Lymphatic Malformation (Lymphangioma)

Lymphatic malformations are congenital malformations of the lymphatic system with marked predilection for the head and neck [6]. These lesions most commonly occur on the dorsum of the tongue, followed by the lips, buccal mucosa, soft palate, and floor of mouth [6]. Lymphangiomas may present as a defined mass [6]. On imaging, lymphatic malformations typically show multi-septate appearance. They do not contain calcified corpuscles or keratin globules and do not demonstrate the "sack of marbles" appearance. Our patient's well-circumscribed, unilocular cyst with characteristic "sack of marbles" features on MRI excluded lymphatic malformation.

Thyroglossal Duct Cyst

The thyroglossal duct cyst develops from the midline migratory tract between the foramen cecum and the anatomic location of the thyroid gland [7]. This is the most prevalent congenital abnormality of the neck, accounting for approximately

70% of all cervical neck masses in children and 7% in adults [7]. However, thyroglossal duct cysts are typically located at or near the hyoid bone, higher in the neck than floor of mouth cysts [7]. The location of our patient's lesion in the sublingual space, well below the hyoid bone, excluded thyroglossal duct cyst. Additionally, the "sack of marbles" appearance is not a feature of thyroglossal duct cysts.

Nonspecific Infectious or Inflammatory Process

Infectious etiologies can cause floor of mouth swelling and may include dental abscess or deep neck space infections. Such infections would be expected to present acutely with pain, fever, and systemic symptoms. Imaging would typically show ill-defined inflammatory changes and surrounding soft tissue edema. The chronicity of our patient's symptoms (18 months from initial discovery) and the well-circumscribed cystic appearance with no surrounding inflammatory changes on imaging made acute infection unlikely. While our patient did experience an inflammatory episode in May 2025, the well-defined margins and characteristic "sack of marbles" appearance on MRI excluded active infection as the primary diagnosis.

TEACHING POINT

The "sack of marbles" appearance on MRI has traditionally been considered pathognomonic for floor of mouth dermoid cyst. However, this sign can also occur in epidermoid cysts when free-floating keratin globules are present. In dermoid cysts, the "marbles" represent fat globules (T1 hyperintense), while in epidermoid cysts they represent keratin globules (T2 hyperintense with diffusion restriction). Histopathologic correlation is essential for definitive diagnosis when this sign is present.

QUESTIONS

Question 1: What is the key histopathological difference between epidermoid and dermoid cysts?

Answer choice 1: Dermoid cysts contain dermal appendages (hair follicles, sebaceous glands, sweat glands) (applies)

Answer choice 2: Epidermoid cysts are always malignant.

Answer choice 3: Dermoid cysts never occur in the floor of mouth.

Answer choice 4: Both contain identical tissue components.

Answer choice 5: Epidermoid cysts contain fat globules from sebaceous secretions.

Explanation for question 1:

[Epidermoid cysts are lined with epidermis containing only squamous epithelium and keratin debris, while dermoid cysts are additionally lined with dermal appendages including hair follicles, hair, sebaceous glands, and sweat glands on their fibrous wall]. [The absence of dermal appendages (hair follicles, sebaceous glands, sweat glands) on permanent histologic sections definitively established the diagnosis of epidermoid cyst rather than dermoid cyst].

Both epidermoid and dermoid cysts are benign lesions. [Epidermoid cysts (also termed epidermal inclusion cysts) and

dermoid cysts are benign congenital lesions].

[Approximately 7% of all dermoid cysts occur in the head and neck region. Of these head and neck dermoid cysts, about 25% are located in the floor of mouth].

The tissue composition differs between the two cyst types as explained in choice 1.

[In classic dermoid presentations, the "marbles" represent fat globules from sebaceous secretions (demonstrating T1 hyperintensity), produced by dermal appendages within the cyst wall]. Epidermoid cysts lack these dermal appendages.

Question 2: What MRI signal characteristics differentiate keratin globules from fat globules in floor of mouth cysts?

Answer choice 1: Keratin globules show T1 hyperintensity.

Answer choice 2: Fat globules show T2 hyperintensity with diffusion restriction.

Answer choice 3: Keratin globules show T2 hyperintensity with marked diffusion restriction (applies)

Answer choice 4: Fat globules show T1 hyperintensity (applies)

Answer choice 5: Both demonstrate identical signal characteristics.

Explanation for question 2:

[Keratin demonstrates different signal characteristics than fat: hyperintense on T2 with marked diffusion restriction, rather than the T1 hyperintensity expected with fat].

[In classic dermoid presentations, the "marbles" represent fat globules from sebaceous secretions (demonstrating T1 hyperintensity)].

[In our patient, MRI demonstrated multiple hyperintense foci on T2-weighted sequences with marked diffusion restriction. Unlike the fat globules seen in classic dermoid presentations, these "marbles" represented free-floating keratin globules.

[This appearance typically results from free-floating fat globules (from sebaceous secretions produced by dermal appendages) that demonstrate characteristic T1 hyperintensity on MRI].

The signal characteristics differ significantly between keratin and fat as explained above.

Question 3: Which anatomical location classification applies to floor of mouth cysts positioned superior to the mylohyoid muscle?

Answer choice 1: Submental

Answer choice 2: Sublingual (applies)

Answer choice 3: Mixed

Answer choice 4: Suprahyoid

Answer choice 5: Infrahyoid

Explanation for question 3:

[Floor of mouth cysts are classified based on their location relative to the geniohyoid and mylohyoid muscles: sublingual (above mylohyoid, most common), submental (between mylohyoid and geniohyoid), or mixed (extends through mylohyoid)].

[Our patient had a sublingual epidermoid cyst located superior to the mylohyoid muscle]. [The mass is positioned midline within the anterior sublingual space, bordered superiorly

by the tongue and inferiorly by the mylohyoid muscle].

[Floor of mouth cysts are classified based on their location relative to the geniohyoid and mylohyoid muscles: sublingual (above mylohyoid, most common), submental (between mylohyoid and geniohyoid), or mixed (extends through mylohyoid)].

Suprahyoid is not a classification used for floor of mouth cysts in the literature.

Infrahyoid is not a classification used for floor of mouth cysts in the literature.

Question 4: Which differential diagnoses were considered for this midline floor of mouth cystic lesion based on initial CT imaging?

Answer choice 1: Ranula (applies)

Answer choice 2: Dermoid cyst (applies)

Answer choice 3: Thyroglossal duct cyst (applies)

Answer choice 4: Pleomorphic adenoma

Answer choice 5: Lymphangioma

Explanation for question 4:

[Given the midline location and homogeneous density, differential considerations included ranula, dermoid cyst and less likely thyroglossal duct cyst]. However, [ranulas typically present with lateral or posterolateral location rather than the strict midline location seen in our case].

[Given the midline location and homogeneous density, differential considerations included ranula, dermoid cyst and less likely thyroglossal duct cyst]. [Our patient's midline location, early age, and "sack of marbles" appearance on MRI initially suggested dermoid cyst as the leading diagnosis].

[Given the midline location and homogeneous density, differential considerations included ranula, dermoid cyst and less likely thyroglossal duct cyst]. [The location of our patient's lesion in the sublingual space, well below the hyoid bone, excluded thyroglossal duct cyst].

Pleomorphic adenoma was not mentioned as part of the differential diagnosis for this cystic lesion.

[Lymphatic malformations are congenital malformations of the lymphatic system with marked predilection for the head and neck]. However, [our patient's well-circumscribed, unilocular cyst with characteristic "sack of marbles" features on MRI excluded lymphatic malformation].

Question 5: What is the clinical significance of the "sack of marbles" appearance on MRI in floor of mouth masses?

Answer choice 1: It is absolutely pathognomonic for dermoid cysts.

Answer choice 2: It can occur in epidermoid cysts when keratin globules are present (applies)

Answer choice 3: Histopathologic correlation is required for definitive diagnosis (applies)

Answer choice 4: It eliminates the need for surgical excision.

Answer choice 5: It indicates malignant transformation.

Explanation for question 5:

[The "sack of marbles" appearance on MRI has traditionally

been considered pathognomonic for floor of mouth dermoid cyst]. However, [this case demonstrates that epidermoid cysts can exhibit an identical appearance when keratin globules (rather than the typical fat globules seen in dermoid cysts) are present].

[This case demonstrates an unusual and previously unreported variant: the "sack of marbles" appearance in a histologically confirmed epidermoid cyst]. [This finding suggests that the "sack of marbles" sign is not absolutely specific for dermoid cysts and can occur in epidermoid cysts when sufficient keratin globules accumulate].

[This case emphasizes that definitive differentiation between dermoid and epidermoid cysts requires histopathological examination, particularly when the "sack of marbles" appearance is present]. [Recognition of this phenomenon is important for accurate preoperative diagnosis and demonstrates the critical role of histopathologic correlation in floor of mouth masses].

[Complete surgical excision provides excellent outcomes with low recurrence rates for both lesion types]. [Definitive treatment consists of complete surgical excision].

Both epidermoid and dermoid cysts are benign lesions. [Epidermoid cysts (also termed epidermal inclusion cysts) and dermoid cysts are benign congenital lesions].

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FIGURES

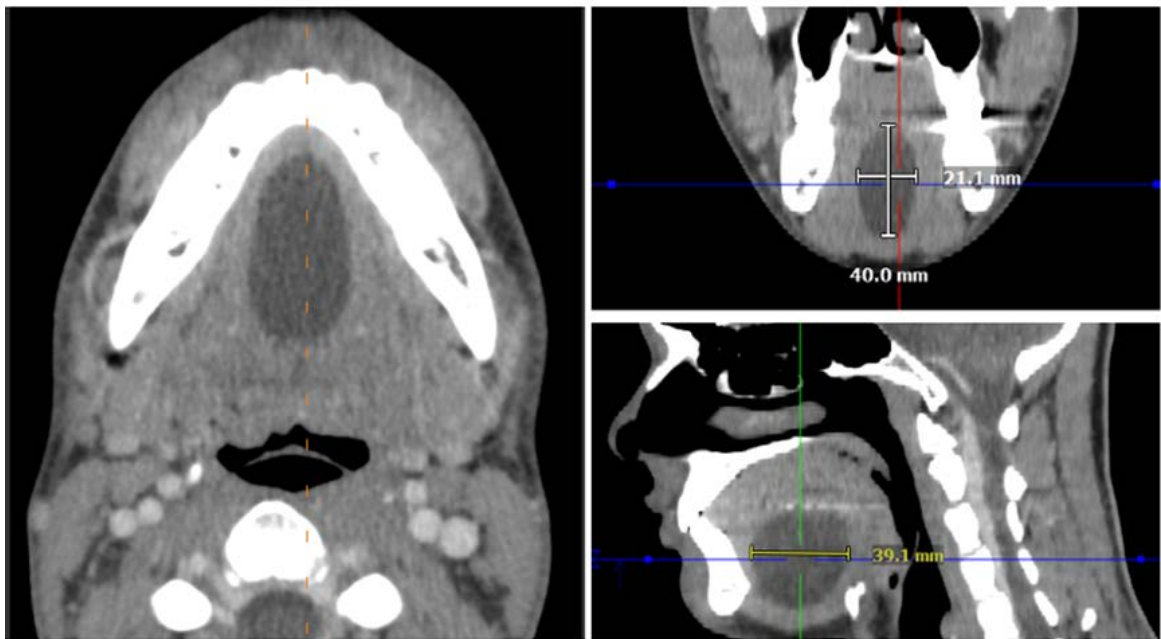


Figure 1: 22-year-old male with epidermoid inclusion cyst in the sublingual space. FINDINGS: CT images in all 3 planes demonstrated a well-defined, homogeneously hypoattenuating, non-enhancing mass measuring 21 × 40 × 39 mm, centered in the midline anterior sublingual space between the tongue and the mylohyoid muscle. TECHNIQUE: CT neck with contrast; 146 mAs,

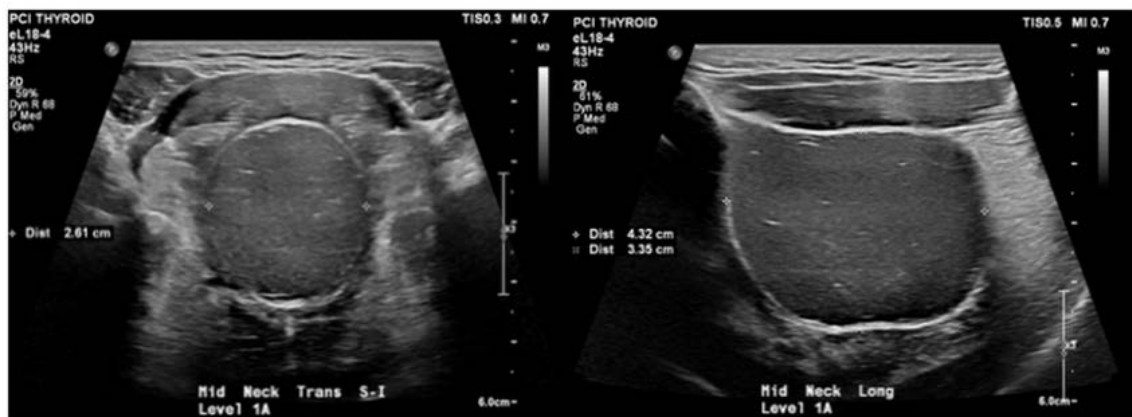


Figure 2: 22-year-old male with epidermoid inclusion cyst in the sublingual space. FINDINGS: Transverse and long views of ultrasound showed a 26 × 43 × 34 mm encapsulated solid mass in the sublingual space, displaying homogeneous echotexture and mild hypo echogenicity relative to the mylohyoid muscle. No regional lymphadenopathy or other abnormalities were identified. TECHNIQUE: Planar ultrasound images; linear array 7Hz probe with thyroid preset.

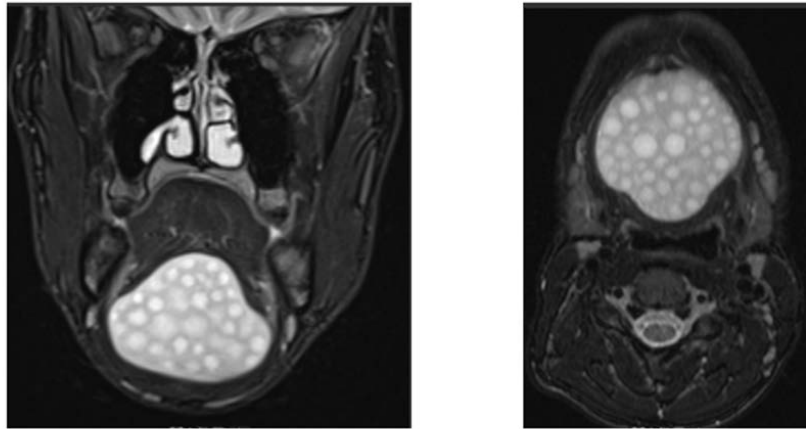


Figure 3: 24-year-old male with epidermoid inclusion cyst in the sublingual space. FINDINGS: After 20 months of observation, T2 fat saturated images showed interval enlargement of the lesion to 44 × 58 × 62 mm (transverse, anteroposterior, craniocaudal). The mass was markedly hyperintense on T2, displaying the classic “sack-of-marbles” pattern composed of numerous, discrete, brightly hyperintense globules. TECHNIQUE: Axial and coronal T2 images with Dixon technique, water-only series; TE 80, TR 6850. 4 mm slice thickness. 1.5 Tesla magnet.

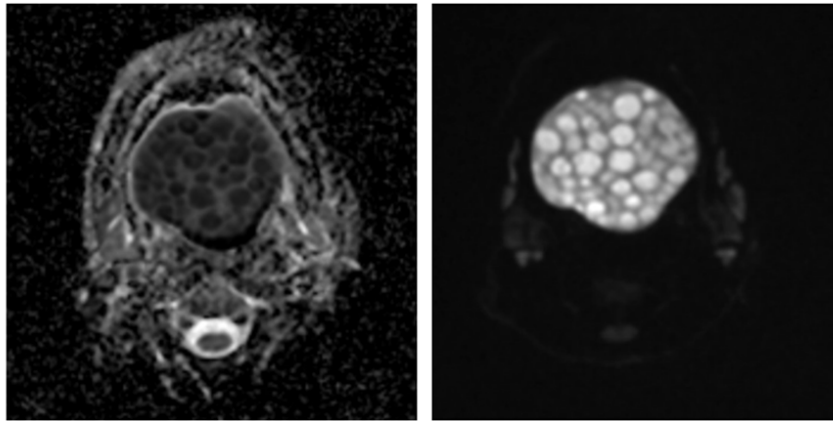


Figure 4: 24-year-old male with epidermoid inclusion cyst in the sublingual space. FINDINGS: The lesions display the classic “sack-of-marbles” pattern - multiple, rounded foci of marked hyperintensity on DWI that correspond to low-signal areas on the ADC map, confirming true diffusion restriction. TECHNIQUE: Diffusion weighted images (DWI) and apparent diffusion coefficient (ADC) map in transverse planes. b=0,1000; TE 106, TR 10800; 4 mm slice thickness; 1.5 Tesla magnet.

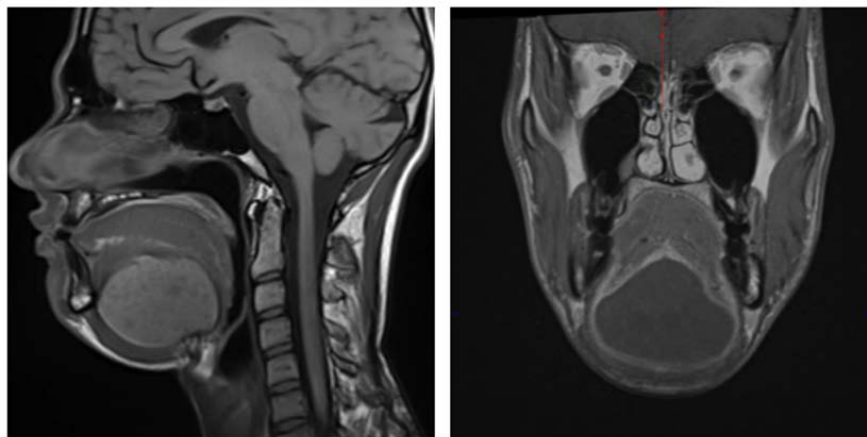


Figure 5: 22-year-old male with epidermoid inclusion cyst in the sublingual space. FINDINGS: Axial T1-weighted images demonstrated a mildly increased signal relative to skeletal muscle, interspersed with foci of low signal intensity. Post-contrast sequences revealed no internal enhancement but showed a moderate peripheral rim of enhancement. TECHNIQUE: T1 SPACE images; TE 25, TR 500; 2mm thickness; 1.5 Tesla magnet. Post contrast T1 images with Dixon technique, water-only sequence; TE 10, TR 783; Gadavist 10 mL; 1.5 Tesla magnet



Figure 6: 24-year-old male with sublingual epidermoid cyst.

FINDINGS: Gross examination revealed a 5.5 × 4 × 4 cm midline neck cyst containing abundant keratinous debris. Frozen section during surgery demonstrated a squamous-lined cyst consistent with an epidermoid cyst. Final pathology confirmed a ruptured epidermal inclusion cyst with chronic inflammation and foreign-body giant-cell reaction.

TECHNIQUE: Intraoperative gross specimen photograph obtained under standard operating-room lighting with surgical ruler for scale.

Summary table

Table 1: Summary of clinical, imaging, and management features of a sublingual epidermoid cyst.

DETAILS: This table outlines key epidemiologic, clinical, and imaging characteristics of the reported epidermoid cyst, including etiology, incidence, demographic distribution, risk factors, and multimodality findings (CT, MRI, and ultrasound).

Category	Details
Etiology	Congenital developmental anomaly; trapped epithelial tissue along midline embryonic fusion of first and second pharyngeal arches (third-fourth week gestation)
Incidence	Only 1.6% of head and neck and less than 0.01% of all oral cysts
Gender ratio	No significant difference reported in most of the literature.
Age Predilection	Second to third decade of life.
Risk Factors	Most cases are sporadic. Reported risk factors include genetic syndromes (Gardner and Gorlin), prior local trauma with epithelial implantation, and medication use such as BRAF inhibitors or imiquimod.
Treatment	Complete surgical excision.
Prognosis	Excellent; Complete excision is curative with low recurrence rates.
CT findings:	Well-defined, homogeneous hypoattenuating mass; No internal enhancement.
MRI Findings	T1: Mildly hyperintense; T2: Marked hyperintensity; can show "sack of marbles" appearance (keratin globules); DWI: Marked diffusion restriction.
Ultrasound findings:	Encapsulated solid mass, mildly hypoechoic mass with homogeneous echotexture.

Differential table

Table 2: Differential diagnosis of midline floor-of-mouth cystic lesions.

DETAILS: This table compares imaging findings of common cystic entities in the floor of mouth—including epidermoid, dermoid, ranula, lymphatic malformation, and thyroglossal duct cyst—across ultrasound, CT, and MRI modalities.

Diagnosis	Ultrasound	CT findings	MRI T1	MRI T2
Epidermoid Cyst	Well-defined, encapsulated, round-to-oval hypoechoic mass in the sublingual space with homogeneous or mildly speckled internal echotexture.	Well-defined, thin-walled midline cystic mass; homogeneously hypodense with keratin debris or low-attenuation nodules ("sack-of-marbles"); no internal enhancement, thin rim post-contrast.	Isointense to slightly hypointense relative to surrounding soft tissues; signal intensity may vary with cyst content.	Well-circumscribed, oval cyst with intermediate to high T2 signal; may contain internal low-signal foci from keratin debris.
Dermoid Cyst	Well-defined, unilocular cyst with heterogeneous echotexture, showing "sack-of-marbles" or "dermoid mesh" sign, and posterior acoustic enhancement.	Well-circumscribed cystic mass with low attenuation from fat; shows "sack-of-marbles" sign with small hypodense nodules, calcifications, and no or thin rim enhancement post-contrast.	Well-circumscribed floor-of-mouth mass, hyperintense or variable on T1; may show nodules or mesh-like pattern. Signal drops on fat-suppressed images.	Well-defined cyst, hyperintense on T2 with heterogeneous signal from fat or hair; may show "sack-of-marbles" sign with mixed bright and dark nodules.
Ranula	Well-defined, thin-walled unilocular cyst (anechoic or with fine echoes); no vascularity on Doppler. Plunging ranulas may show a "tail sign" through the mylohyoid.	Well-circumscribed, low-attenuation cyst in sublingual space or extending through mylohyoid ("plunging" type). May show "tail sign," no enhancement, thin rim if infected.	Well-defined low-signal cystic lesion, homogeneous and non-enhancing unless infected (mild rim enhancement possible). "Tail sign" may appear in plunging ranulas.	Well-defined, homogeneous, fluid-filled cyst with bright T2 signal. Plunging ranulas may extend beyond the sublingual space with a thin "tail sign" connection.
Lymphatic Malformation	Multiloculated cystic mass with anechoic spaces and thin septa; no Doppler flow. Internal echoes may appear with hemorrhage or infection	Multiloculated low-attenuation cystic mass with clear borders; may displace structures. Minimal wall/septal enhancement; density varies with protein, fat, or blood content	Low to intermediate signal from fluid; brighter if protein or blood present. Septations may enhance post-contrast, outlining multiloculated structure.	Bright multilocular cystic lesion with thin septations; signal becomes heterogeneous with hemorrhage or infection (dimmer on T2, brighter on T1)
Thyroglossal Duct Cyst	Well-defined midline cyst near the hyoid, anechoic or pseudo solid with posterior enhancement. Infected cysts may show thick walls or internal debris.	Well-defined, thin-walled midline cyst with low attenuation near or below the hyoid. Thick rim enhancement or septations suggest infection; may displace nearby muscles	Low T1 signal in simple cysts; higher if protein, blood, or infection present. Well-defined cystic lesion with variable T1 signal depending on content.	Well-defined, homogeneous, high-signal cystic mass, usually unilocular and midline or near the tongue base or suprahyoid region.

KEYWORDS

Epidermoid Cyst, Epidermal Inclusion Cyst, Dermoid Cyst, Floor of Mouth, Sack Of Marbles, MRI, Keratin Globules, Differential Diagnosis

ABBREVIATIONS

CT = Computed Tomography
DWI = Diffusion Weighted Imaging
ENT = Ear, Nose, and Throat (OTOLARYNGOLOGY)
HIV = Human Immunodeficiency Virus
MRI = Magnetic Resonance Imaging
PREP = Pre-Exposure Prophylaxis

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