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Case Report

Radiology Section

Neck Dermoid Cyst with Rare Imaging Appearance on Ultrasound, Elastography, and Computed Tomography

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ABSTRACT

Dermoid cyst is a type of inclusion cyst and a benign cystic teratoma containing two or more germ cell layers. It can show variable appearance on ultrasound and Computed Tomography (CT) as it is derived from squamous cell epithelium (ectoderm) and contains dermal-derived elements such as skin appendages, hair follicles, sebaceous and sweat glands. It is uncommon for a dermoid cyst to occur in the neck region during old age. The present case report highlights a rare imaging appearance of a dermoid cyst, presenting in a 65-year-old elderly male as a midline neck swelling, displaying a rare "coin in sack" appearance on ultrasound, "sack of marbles sign" on Contrast-Enhanced CT (CECT). On strain elastography, it showed characteristics of a hard mass. Diagnosing this type of large dermoid cyst with its radiological appearance is challenging. Multimodality imaging is often needed for early intervention, to prevent its rupture and transformation into malignancy. The dermoid cyst was surgically excised, and the patient was symptomatically normal on follow-up.

Keywords: Coin in sack, Inclusion cyst, Sack of marbles

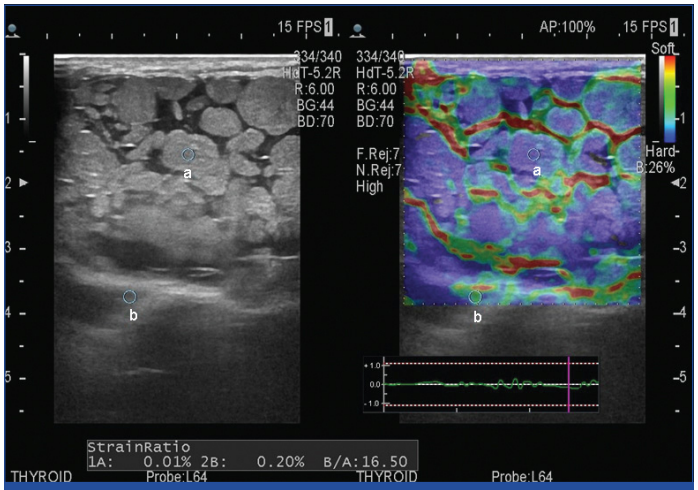
CASE REPORT

A 65-year-old male presented with complaints of swelling in the anterior aspect of the neck in the midline for three years which was insidious in onset and progressive in nature. It did not cause any local mass effect like difficulty in swallowing, speaking, or breathing. No significant medical, surgical, or personal history was present.

On local examination, the swelling was round to oval, firm, not freely mobile, non tender with well-defined margins, and skin over the swelling was normal with no cervical lymphadenopathy. It was seen extending from the lower border of the mandible to the upper border of the thyroid cartilage [Table/Fig-1]. The patient had no other systemic complaints or co-morbidities.

[Table/Fig-1]: Gross appearance of the neck mass.

Ultrasonography showed a large well-defined complex cystic mass seen above the level of the thyroid gland, measuring 5.7×5.2 mm, with multiple echogenic varied-sized nodules (representing fat globules) and few echogenic linear strands (representing hairs), giving the typical "coin in sac" appearance. No calcification or vascularity was seen on the colour doppler. On strain elastography, the lesion predominantly showed dark blue colour with a strain ratio of 16.5 (Tsukuba score IV) [1] and Elasticity score 3 (stiff) [2]. [Table/Fig-2].



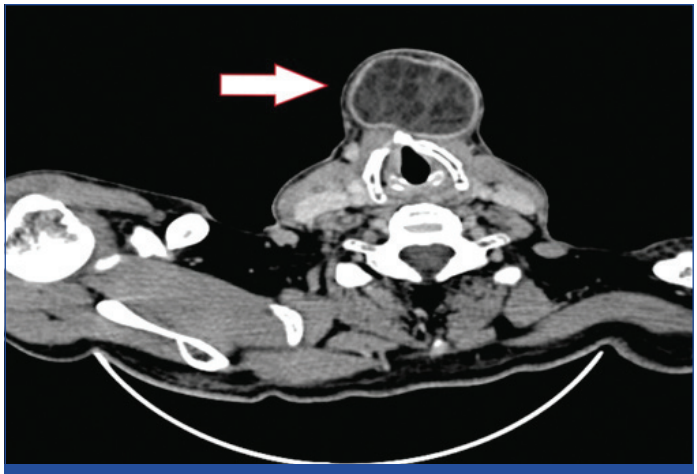
[Table/Fig-2]: Ultrasonography appearance-complex cystic mass measuring 5.7×5.2 mm, showing multiple echogenic varied-sized nodules (representing fat globules) and few echogenic linear strands (representing hairs), giving a typical "coin in sac" appearance. On strain elastography, the lesion (a) predominantly showed dark blue colour in comparison to adjacent normal tissue (b) with strain ratio of 16.5 and elasticity score of 3.

The lesion picked a predominantly stiff colour (blue) and showed a high strain ratio which gave the appearance of a malignant cyst due to its highly organised fat content. On CECT, it appeared as a well-defined round to oval peripherally enhancing midline cystic lesion with multiple locules of hypodense fat nodules (-40 to -80 HU) in the subcutaneous plane above the level of the thyroid cartilage, giving typical "sack of marbles" sign [Table/Fig-3].The lesion had no invasion or mass effect on adjacent structures.

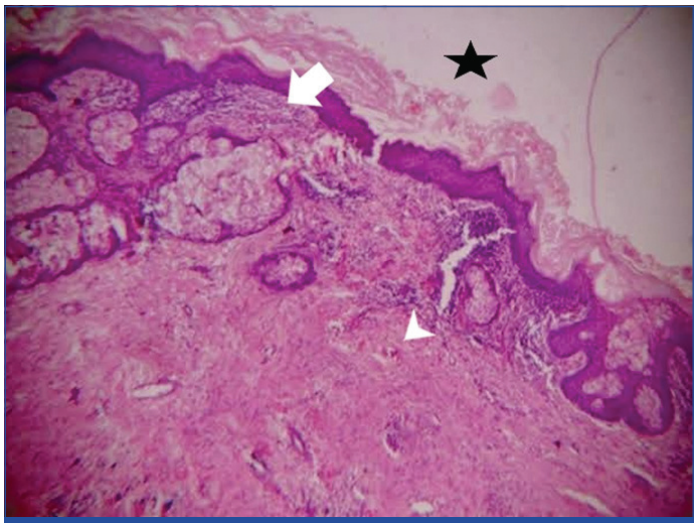
Surgical excision was performed. The postoperative histopathological specimen on the cut section revealed fibrofatty, chalky, yellowish-white tissue with hair. It was diagnosed as a dermoid cyst [Table/Fig-4a,b] with extensive chronic non specific inflammation. The patient was monthly followed-up for six months, during which he showed no postoperative complications or any new symptoms.

DISCUSSION

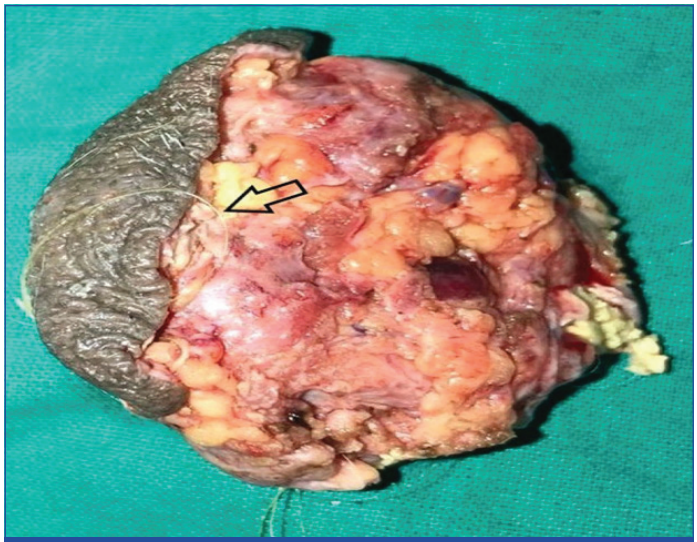
The dermoid cyst contains elements from all three germ cell layers (ectoderm, mesoderm and endoderm). Congenital occurrence



[Table/Fig-3]: CECT neck showing well-defined round to oval peripherally enhancing midline cystic lesion with multiple locules of hypodense fat nodules (-40 to -80 HU) in the subcutaneous plane above the level of the thyroid cartilage, giving a typical "sack of marbles" sign.



[Table/Fig-4a]: Dermoid cyst lined by stratified squamous epithelium with stroma showing sebaceous glands (arrow), the hair follicle (arrowhead) and adipose tissue (asterisk) (H&E,50X).



[Table/Fig-4b]: Cut section of the specimen showing fibrofatty, chalky, yellowish white tissue with hair (black arrow) suggestive of dermoid cyst.

of dermoid is given by two theories: a-Due to failure of surface ectoderm to separate from underlying structures, sequestration of surface ectoderm and implantation of surface ectoderm, b-Due to abnormal sequestration and invagination of surface ectoderm along the embryologic sites of dermal fusion that form the eyes, ears, and face [3]. Dermoid cysts are common in the second and third decades of life with no gender predilection. It is usually located in the midline of the body [4]. It is most commonly congenital in origin. The developmental dermoid cyst can occur secondary to trauma or iatrogenic cause [3]. A dermoid cyst in the neck usually presents as a slow-growing, soft, mobile, midline mass free from overlying skin and showing no local symptoms [5]. Rapid enlargement of a dermoid cyst is seen with an increase in desquamation, pregnancy, or an associated sinus tract. Squamous cell carcinoma develops in near 5% of dermoid cysts, the cause is unknown, but it is probably due to persistent chronic inflammation [4].

It presents as well-defined encapsulated unilocular cystic lesion with one or more dermal components-sebum, keratin, tooth, hair, cartilage, sweat or sebaceous glands. The size of the dermoid cyst is variable and depends on its location, duration, and presence of infection [6]. Sebaceous secretions, rather than mesodermal (adipose) fat, provide the lipid content for the dermoid [3]. Most commonly, it occurs in the midline area of the neck due to entrapment of epithelial elements in the thyroglossal duct during its development and is primarily located in submandibular and sublingual space [6].

On ultrasound, it is usually superficial, round to oval, well-defined unilocular, homogeneous hypoechoic mass with internal echoes and posterior acoustic enhancement. Colour doppler shows no vascularity [7]. "Coin in sac appearance", as described above, is the classic sign of dermoid cyst on the ultrasound. Ultrasound imaging has a sensitivity and specificity of 80.0% in diagnosing dermoid cysts [8].

Strain elastography helps to know the stiffness of the lesion. Compared to benign lesions, malignant lesions are stiff to hard due to increased adherence, calcification, and tissue fibrosis. The benignity of the tissue is based on the colour it depicts on strain wave elastography -red (soft) to blue (hard) areas in the lesion and is graded based on the Tsukuba scoring system of (I to V) recommended by Itoh A et al., [1]. Another elastography grading used for non nodal neck masses is elastography score 0 to 3 by Bhatia KS et al., [2], in which ES0 is softer than surrounding tissues, ES1 is soft as surrounding tissues, ES2 is mild stiffness, and ES3 is stiff lesion. The strain ratio is calculated using the average value between the lesion and the adjacent normal area. A higher strain ratio value suggests the malignant nature of the lesion [9]. On CT, the dermoid cyst usually appears as a peripherally enhancing, unilocular, thin-walled cystic lesion, giving a varied heterogeneous appearance due to contents from multiple germ cell layers. It sometimes demonstrates a characteristic "sac of marbles" sign due to multiple varied-sized fat nodules [5]. On MRI, the lesion shows hyperintensity on T1-WI, hypo to hyperintense signals on T2-WI and fat gets suppressed on STIR sequence [7].

To prevent a recurrence, complete surgical removal is the choice of treatment with a good prognosis [6]. The most common differential diagnosis is an epidermoid cyst. It presents early in life, is less common in the head and neck region, and is predominantly cystic in nature with no dermal elements. Thyroglossal duct cysts can occasionally appear as cystic lesions with an ill-defined margin, an irregular shape, or variable internal echogenicity. They also frequently border the hyoid bone, exhibit multilocularity, show longitudinal extension towards the base of the tongue, and are intramuscularly situated [6]. The next possibility of lipoma or lipomatous tumour is to be considered [4].

A case report by Chung BM et al., has described a rare subcutaneous dermoid cyst in the back, which on the ultrasound showed a hyperechoic mass with scattered hyperechoic linear foci and suspected nodularity at the proximal wall. The distal portion was slightly more heterogeneous echoic without internal vascularity. Chest CT revealed a fat density in the subcutaneous fat layer with a nodular component with soft tissue density (5 HU) at the peripheral portion of the lesion, mainly at the distal portion of the mass [7].

Another study by Bhatia KS et al., on dermoid cyst evaluation on grey scale ultrasound and strain elastography revealed that they show typical location, smooth, thin wall, heterogeneous contents with posterior enhancement and no flow on colour doppler. Elastography

had a higher stiffness with a score 3, which may be explained by the fact that these comprise predominantly solid tissue [2].

Malignant transformation of a subcutaneous dermoid cyst is a rare complication of around 2% [10]. The malignant change shows ill-defined margins, heterogenous, solid in nature, with increased vascularity and enhancement [7].

CONCLUSION(S)

Midline large dermoid cyst of the neck in an older adult with its rare and distinctive ultrasound and CT appearance, as described in the present case report helps in its diagnosis. There is less literature on elastography and strain ratio findings in a dermoid cyst, which also helps to distinguish, if it is either benign or malignant in nature.

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