Review / Derleme

Imaging of cystic neck masses in adults

Erişkinlerde kistik boyun kitlelerinin görüntülenmesi

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ABSTRACT

Cystic lesions of the neck are usually diagnosed in infancy or childhood, but detection may be delayed until adulthood. The clinical manifestations combined with knowledge of the embryology and spatial anatomy of the head and neck often provide clues for a correct diagnosis. Ultrasound is frequently used initially to confirm the cystic nature of the lesion. Computed tomography and magnetic resonance imaging provide essential information on the cyst location that allows optimal preoperative planning.

Keywords: Cystic lesion; imaging; neck.

ÖZ

Boynun kistik lezyonlarına genellikle süt çocukluğunda veya çocuklukta tanı konulur, fakat tespit erişkinliğe kadar gecikebilir. Baş ve boynun embriyoloji ve uzamsal anatomi bilgisi ile beraber klinik belirtiler çoğu zaman doğru bir tanı için ipuçları sağlar. Lezyonun kistik yapısını doğrulamak için ilk olarak sıklıkla ultrason kullanılır. Bilgisayarlı tomografi ve manyetik rezonans görüntüleme kist konumu hakkında gerekli bilgiyi sağlayarak ideal bir ameliyat öncesi planlamaya olanak verir.

Anahtar Sözcükler: Kistik lezyon; görüntüleme; boyun.

Cystic lesions of the neck are usually diagnosed in infancy or childhood, but detection may be delayed until adulthood. They often manifest as slow-growing masses and cause symptoms only after enlarging sufficiently or after infection. The clinical manifestations combined with knowledge of the embryology and spatial anatomy of the head and neck often provide clues for a correct diagnosis.[1]

IMAGING MODALITY

Ultrasound is frequently used initially to confirm the cystic nature of the lesion.[2] Computed tomography (CT) and magnetic resonance imaging (MRI) provide essential information on the cyst location that allows optimal preoperative planning.[2] They are considered complementary, rather than competitive, modalities.[3] The advantages of MRI over CT in imaging other parts of body also apply to the neck, including better soft tissue resolution, lack of ionizing radiation and safer contrast agents.[3] By comparison CT examinations offer the advantages of superior assessment of osseous structures, shorter examination time, wider patient access and lower cost.[1]

Available online at
www.kbbihtisas.org
doi: 10.5606/kbbihtisas.2017.48303
QR (Quick Response) Code

Received / *Geliş tarihi:* August 06, 2015 Accepted / *Kabul tarihi:* January 17, 2016

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THYROGLOSSAL DUCT CYSTS

Thyroglossal duct cysts are the most common congenital cyst in the head and neck.[4] They arise from a remnant of the thyroglossal duct.This extends from the foramen caecum at the base of the tongue to the pyramidal lobe of the thyroid gland, and usually involutes by the eighth week of intrauterine life.[4]

Thyroglossal cysts are midline or just off midline in position, and can be found at any level from the base of the tongue to the isthmus of the thyroid gland. Most are infrahyoid. On ultrasonography (USG) they appear as a well-defined, thin-walled, anechoic lesion. On CT, the cyst contents usually have a mucoid attenuation (10 to 25HU); however, if there has been previous infection or hemorrhage, the attenuation of the cyst contents can approach that of muscle.[5] On MRI, the T_1-weighted signal intensity can vary from low to high, while the T_2-weighted signal intensity remains high (Figure 1a, b).[2,3]

BRANCHIAL CLEFT CYSTS

The failure of complete obliteration of an embryonic branchial cleft at the eighth to ninth week of fetal development results in a branchial cleft cyst.[6] Ninety-five percent of branchial cleft cysts derive from the remnant of the second branchial cleft.[4] A thin-walled, anechoic fluid-filled cyst is seen on USG. With CT, the center of the mass will have an attenuation value similar to water and if the cyst is infected, a thickened, enhancing wall will be present.[5]

Branchial anomalies have been classified as follows:[6]

1. FIRST BRANCHIAL CLEFT ANOMALIES

Cysts of the first branchial cleft usually present as enlarging masses near the lower pole of the parotid gland and are more commonly seen in middle aged patients. The cyst appears as an oval or round cystic mass which has variable wall thickness and enhancement. The cyst may either be intra- or extraparotid in location.[6]

2. SECOND BRANCHIAL CLEFT ANOMALIES

Approximately 95% of all branchial anomalies are related to the second branchial apparatus. The most common location for this anomaly is the submandibular space; however they can occur anywhere from the oropharyngeal fossa to supraclavicular region of neck. Fistulas and sinuses are usually present before age of 10 years, whereas cysts are more common between 10 and 40 years. Second branchial cysts are classified into four subtypes based on location-

- Type I- cysts lie deep to the platysma muscle and the overlying cervical fascia and anterior to the sternocleidomastoid

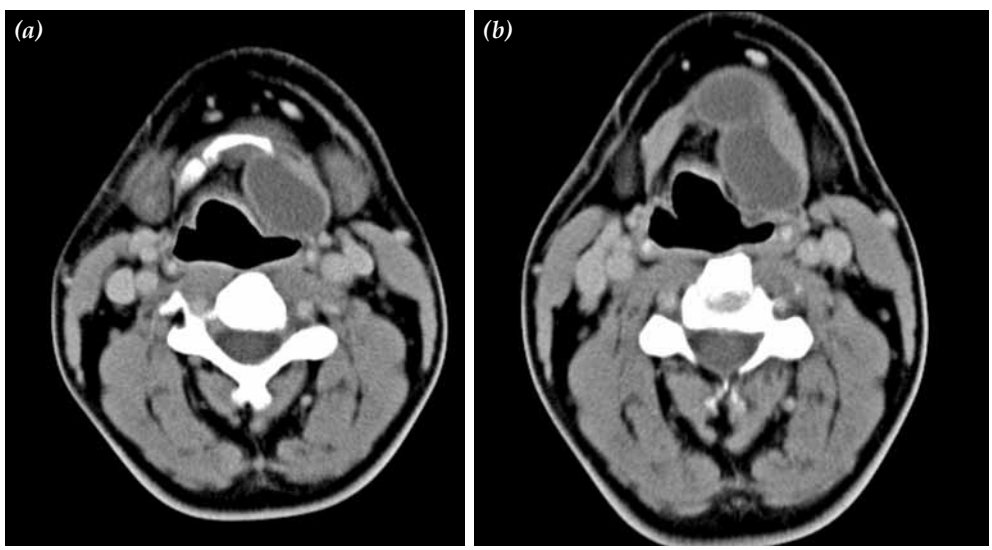

Figure 1. ***(a, b)*** *Thyroglossal cyst: an off midline cystic lesion is seen in relation to the hyoid extending in the infrahyoid location and entering the pre epiglottic fat space through the thyrohyoid membrane.*

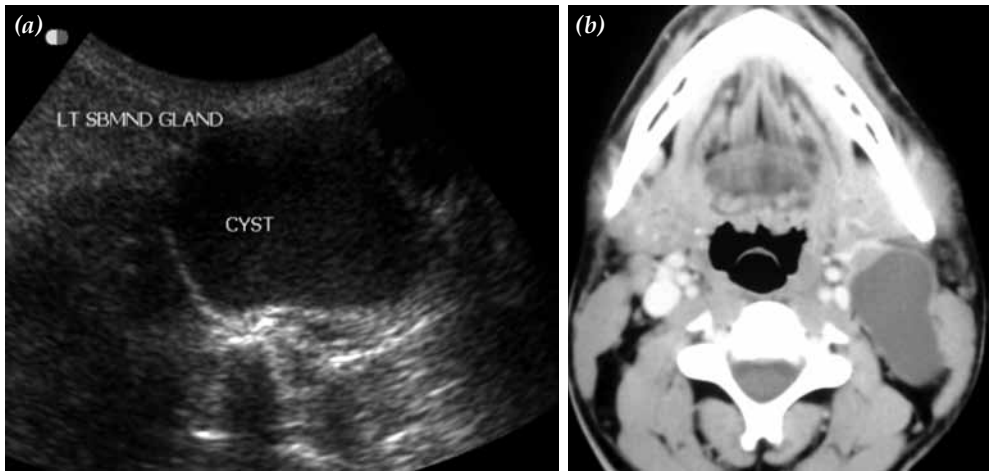

Figure 2. ***(a, b)*** *Infected type 2 second branchial cleft cyst: a cystic lesion with enhancing walls is seen posterior to the left submandibular gland, lateral to the carotid vessels and anteromedial to the sternocliedomastoid.*

muscle. They are remnant of the tract between the sinus of His and skin.

- Type II- result of persistence of sinus of His and is the most common variety. They are located posterior to the submandibular gland, anterior and medial to the sternocleidomastoid muscle and anterolateral to the carotid space (Figure 2a, b).
- Type III- cysts course medially, between the internal and external carotid arteries and may extend to the lateral wall of pharynx or base of skull. They arise from a dilated pharyngeal pouch.
- Type IV- cysts arise from remnant of pharyngeal pouch and lie in the mucosal space of pharynx.

LYMPHANGIOMA

Lymphatic malformations are congenital malformations resulting from blockage of lymphatic channels.[7] They can be divided into three types: (A) cystic hygroma, which has large lymphatic spaces; (B) cavernous lymphangioma, which has smaller spaces and develops from buds that would have formed terminal lymphatics; (C) capillary lymphangioma, which contains the smallest cystic spaces.[7]

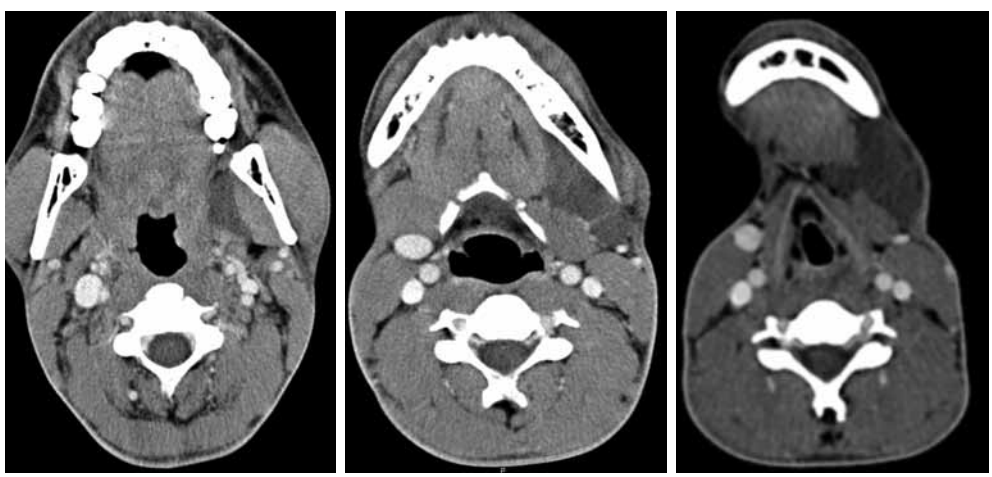

Figure 3. *Lymphangioma: multilocular cystic lesion in the left prestyloid parapharyngeal fat space and submandibular space.*

Cystic hygromas are the most common and usually present at birth as a painless swelling, and most lesions (90%) appear before the age of two years. Lymphangiomas occur exceedingly rarely in adults.[8]

They are situated posterior to the sternocleidomastoid muscle in the posterior triangle (Figure 3). They tend to insinuate themselves around normal structures and can extend caudally into the superior mediastinum. Most are slow growing; however, sudden enlargement can occur following infection of or hemorrhage into the lesion, and may result in airway compression.[7]

On USG an anechoic or mixed echogenicity mass with septae of variable thickness will be identified.[7] The margins of the mass and the presence of mediastinal extension are better delineated with CT or MRI.[7] Computed tomography will show a septated, low density, poorly circumscribed mass (Figure 4). Hemorrhage or infection causes an increase in attenuation.[8] Magnetic resonance imaging will demonstrate a septated, cystic mass usually of high signal on T_2 and low signal on T_1 weighted images.[8] Branchial cysts and cystic hygromas have similar soft tissue characteristics on CT and MRI. However, unlike branchial cleft cysts, cystic hygroma does not cause any displacement of structures in the neck.[9] Only 3-10% of cystic hygromas extend into the mediastinum.[9]

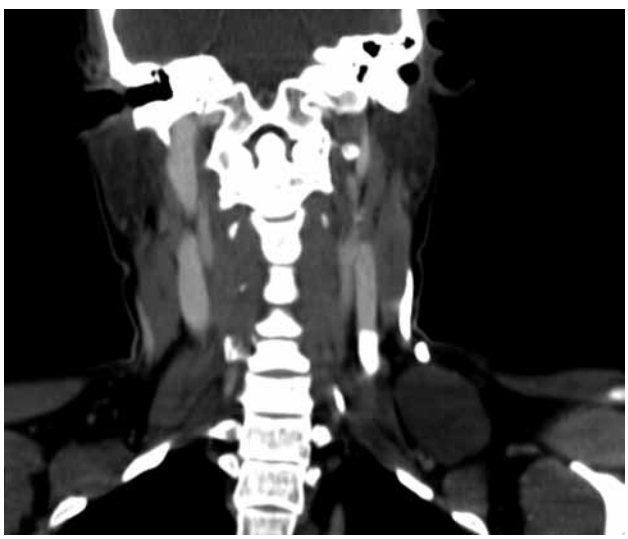

Figure 4. *Solitary cystic lymphangioma: unilocular cystic lesion in the left supraclavicular fossa.*

RANULA

A ranula is a mucous retention cyst resulting from obstruction of the sublingual gland or its duct, or rarely the minor salivary glands in the sublingual space. There are two forms:[9]

1. *"Simple ranula (true cyst), which is the most common form and invariably involves the sublingual gland. Anatomically it is confined within the floor of mouth deep to the level of mylohyoid muscle.*
2. *Diving ranula (pseudocyst), which forms from enlargement of a simple ranula with subsequent rupture that extends posteriorly around the posterior free margin of mylohyoid muscle."*

On ultrasound, a ranula appears as a unilocular, well-defined, cystic lesion in the submental region related to the sublingual gland. On CT, a simple ranula usually appears as an ovoid-shaped cyst with a homogeneous central attenuation region of 10-20 HU, which lies lateral to the genioglossal muscles and deep to the mylohyoid muscle (Figure 5). A diving ranula often infiltrates adjacent tissue planes, extending inferiorly and dorsally to the submandibular space. On MRI, a ranula usually shows low

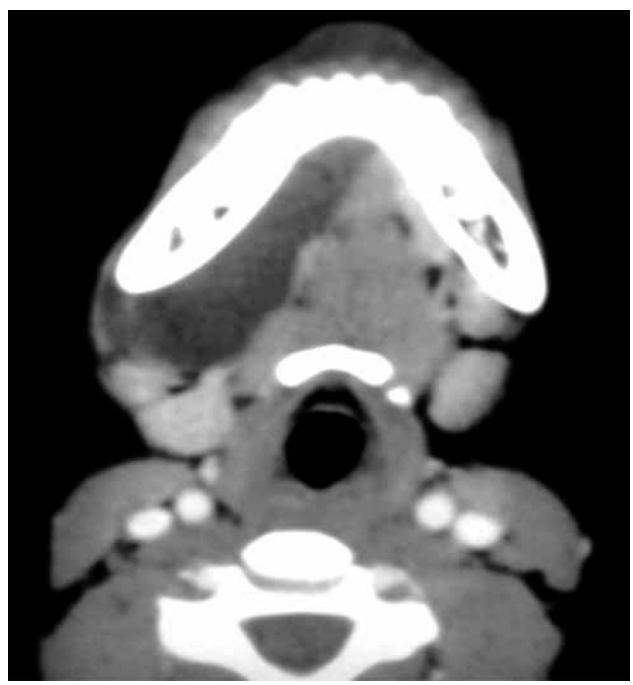

Figure 5. *Plunging ranula: cystic lesion in the submandibular and sublingual spaces crossing the mylohyoid muscle.*

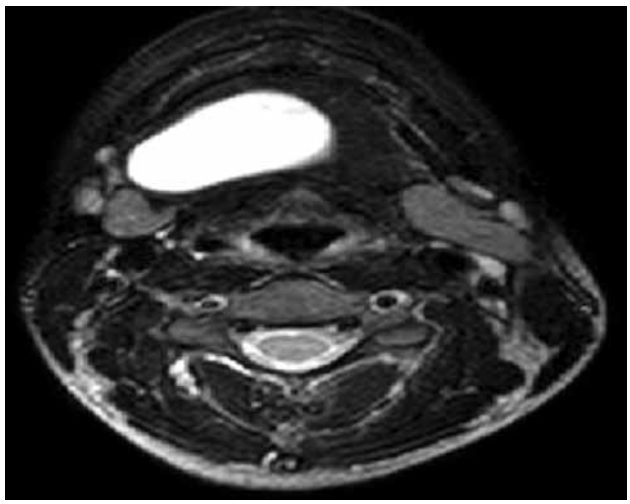

Figure 6. *Plunging ranula: axial T_2WI showing a cystic lesion in the submandibular and sublingual spaces crossing the mylohyoid muscle.*

signal intensity on the T_1-sequence and high signal on T_2-weighted images.[10] Occasionally when the protein content the lesion will appear hyperintense on the T_1-weighted sequence. (Figure 6).[10]

EPIDERMOID CYSTS, DERMOID CYSTS AND TERATOMAS

Epidermoid cysts, dermoid cysts and teratomas are developmental anomalies which involve pluripotential embryonal cells.[11] Dermoid cysts are the most common type, composed only of ectoderm and mesoderm. They are rare in the neck but may account for up to 22% of midline or near midline neck lesions. They are usually suprahyoid in contrast to thyroglossal neck cysts.[11] The imaging appearance is of a uniformly thin walled cystic mass filled with water density material and often contain fat. They may have fat-fluid and fluid-fluid levels. There may have an appearance of intracystic rounded lesions, relating to coalescence of fat nodules within the fluid matrix, giving the appearance of a "sac of marbles" (Figure 7a, b).[11]

Teratomas are composed of all three germ layers. The CT appearance is of an inhomogeneous mass, located in the midline.[12] The presence of calcification and adipose tissue enables the specific diagnosis to be established.[12]

WARTHIN'S TUMOR

Warthin's tumor is the second most common salivary gland tumor after pleomorphic salivary adenoma.[13] It is thought to be more common in males and smokers, and is bilateral in approximately 10% at presentation, with multifocal lesions presenting occasionally. (Figure 8).[13]

On CT and MRI, Warthin's tumor appears as a well-circumscribed, homogeneous cystic or solid lesion, often located in the tail of the parotid gland.[14]

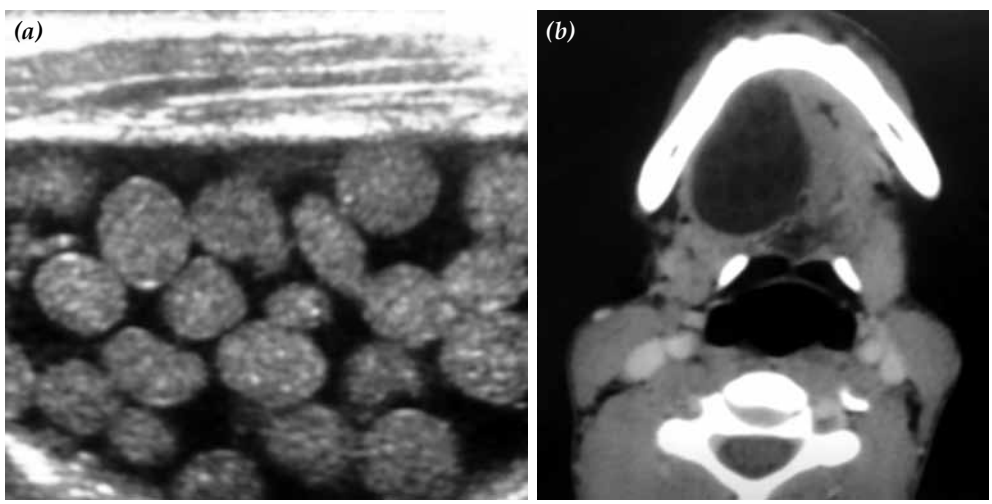

Figure 7. ***(a, b)*** *Epidermoid cyst: thin-walled lesion located in the submandibular and sublingual space with a 'Sac of marbles' due to the coalescence of fat into small nodules within the fluid matrix.*

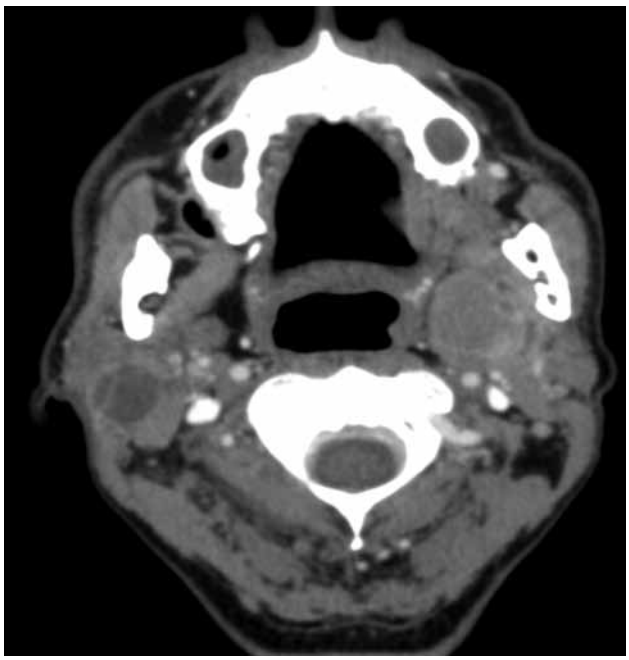

Figure 8. *Cystic warthins tumors in bilateral parotid glands.*

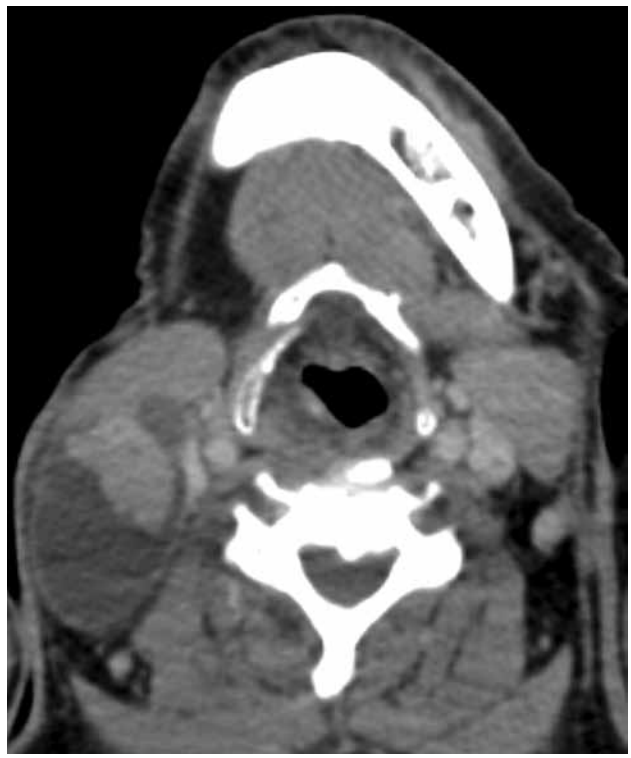

Figure 9. *Cystic nodal metastases: predominantly cystic level V lymph node with enhancing solid component; nodal metastases from papillary adenocarcinoma of the thyroid. Most common cause of cystic mass in adults.*

CYSTIC NODAL METASTASES OF PAPILLARY CARCINOMA

Cystic nodal metastases are the most common cause of cystic mass in adults.[12] Approximately 40% of all lymph node metastases from papillary thyroid carcinomas have the tendency to completely cavitate and thus may mimic an apparently benign cervical cyst.[15] Internal septations, nodules, and a thick outer wall favor a nodal metastases (Figure 9).[15] Therefore, metastatic disease should be considered as a potential differential diagnosis in the adult patient with a cystic neck lesion.

Conclusion

Cystic neck lesions challenge the radiologist because the imaging features are often quite striking and offer multiple clues for diagnosis. Of the several cardinal features considered in the evaluation of the cystic neck mass, location is of prime importance.[16]

Declaration of conflicting interests

The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

Funding

The authors received no financial support for the research and/or authorship of this article.

REFERENCES

1. Som PM, Curtin HD, editors. Head and Neck Imaging. 4th ed. St. Louis: Mosby; 2003.
2. Vazquez E, Enriquez G, Castellote A, Lucaya J, Creixell S, Aso C, et al. US, CT, and MR imaging of neck lesions in children. Radiographics 1995;15:105-22.
3. Miller MB, Rao VM, Tom BM. Cystic masses of the head and neck: pitfalls in CT and MR interpretation. AJR Am J Roentgenol 1992;159:601-7.
4. Ahuja AT, Wong KT, King AD, Yuen EH. Imaging for thyroglossal duct cyst: the bare essentials. Clin Radiol 2005;60:141-8.
5. Blandino A, Salvi L, Scribano E, Chirico G, Longo M, Pandolfo I. MR findings in thyroglossal duct cysts: report of two cases. Eur J Radiol 1990;11:207-11.
6. Bailey H. Branchial cysts and other essays on surgical subjects in the facio-cervical region. London: H. K. Lewis & Company; 1929.
7. Kraus J, Plzák J, Bruschini R, Renne G, Andrle J, Ansarin M, et al. Cystic lymphangioma of the neck in adults: a report of three cases. Wien Klin Wochenschr 2008;120:242-5.
8. Som PM, Sacher M, Lanzieri CF, Solodnik P, Cohen BA, Reede DL, et al. Parenchymal cysts of the lower neck. Radiology 1985;157:399-406.
9. Lev S, Lev MH. Imaging of cystic lesions. Radiol Clin North Am 2000;38:1013-27.

10. Salivary Glands: Anatomy and Pathology. In: Som PM, Curtin HD, editors. Head and Neck Imaging. 4th ed. St. Louis: Mosby; 2003. p. 2005-13.
11. Som PM, Sacher M, Lanzieri CF, Solodnik P, Cohen BA, Reede DL, et al. Parenchymal cysts of the lower neck. Radiology 1985;157:399-406.
12. Siegel MJ, editor. Paediatric Body CT. New York: Churchill Livingstone; 1988.
13. Bryan RN, Miller RH, Ferreyro RI, Sessions RB. Computed tomography of the major salivary glands. AJR Am J Roentgenol 1982;139:547-54.
14. Taylor TR, Cozens NJ, Robinson I. Warthin's tumour: a retrospective case series. Br J Radiol 2009;82:916-9.
15. Som PM, Brandwein M, Lidov M, Lawson W, Biller HF. The varied presentations of papillary thyroid carcinoma cervical nodal disease: CT and MR findings. AJNR Am J Neuroradiol 1994;15:1123-8.
16. Mittal MK, Malik A, Sureka B, Thukral BB. Cystic masses of neck: A pictorial review. Indian J Radiol Imaging 2012 ;22:334-43.