Evaluation of various cystic lesions of neck using CT and MRI at a tertiary hospital in central Gujarat.

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ABSTRACT:
BACKGROUND: Various cystic lesions in the neck are enumerated and their imaging appearances have been described. Mainly, Cyst of developmental origin, Cyst of parasitic and infective origin, and Cyst of degenerative lesions that could be primary or metastatic. Aims: To enumerate and describe the various cystic lesions of neck in literature and to diagnose cysts by CT and MRI. MATERIAL AND METHODS: 100 patient visiting SSG hospitals, suspected to have intracranial sign and symptoms were studied for a period of 15 months. Patient age group range 5-85 years were subjected to CT scan and MRI scan using standard intracranial protocols. RESULTS AND CONCLUSION: Out of 100 cases, 58 were simple cysts, 42 were complex cysts. 24 complex cysts turned out to be malignant. True cysts were 27% of total and rest being cyst like appearing lesions. 70% cases were symptomatic and remaining 30% were incidentally detected cystic lesions.

INTRODUCTION
By definition, a true cyst is a an abnormal closed epithelium lined cavity in the body, containing liquid or semisolid material.1 It is also a stage in the life cycle of certain parasites, during which they are enveloped in a protective wall, such as in neurocysticercosis.1 A cyst is a closed sac, having a distinct membrane and division compared to the nearby tissue. Basically, a cyst is a cluster of cells that have grouped together to form a sac (not unlike the manner in which water molecules group together, forming a bubble); however, the distinguishing aspect of a cyst is the cells forming the "shell" of such a sac, are distinctly abnormal (in both appearance and behavior) when compared to all surrounding cells for that given location. It may contain air, fluids, or semi-solid material. A pseudo cyst is a cystic lesion that may appear as a cyst on scans, but lacks epithelial or endothelial cells. Pseudo cysts may form in a number of places, including the pancreas, abdomen, adrenal gland, and eye. An acute pancreatic pseudo cyst is made of pancreatic fluids with a wall of fibrous tissue or granulation.2 A simple cyst is a spherical space that is filled with liquid and the lining or wall of the cyst is very thin and has no irregularities in it. Inside the simple cyst there is nothing but fluid, which when removed is usually yellow or clear. It has no internal septae or solid components.4 Complex cysts have irregularities both in the wall and the internal components. The walls may be thick and irregular. Septae may be very fine and thin or quite thick and coarse and the cyst may also have tissue inside of it that enhances.4 On High Resolution Computed Tomography (HRCT), the term lung cyst is used to refer to a well-defined, round, and circumscribed lesion, with a wall that may be uniform or varied in thickness but which is usually thin (less than 2–3 mm thick). A cyst usually contains air but may also contain liquid, semisolid, or solid material. Lung cysts are also defined as having a wall composed of one of a variety of cellular elements, usually fibrous or epithelial in nature.5 Cysts form from a proliferation of epithelium, the tissue making up the skin and the linings of the blood vessels and body cavities, and may become detached from surrounding structures so that they...
move freely. The material inside can consist of natural body secretions, abnormal products from the breakdown of natural secretions and structural proteins, or, in case of infection, bacteria, larval parasites, and microbial products. Several organs, including the kidney, liver, and breast, are particularly susceptible to cyst formation and may become filled with numerous cysts of various sizes. In some cases, these cystic diseases are themselves dangerous, or they may obscure more serious, underlying diseases. Cysts are one of the most commonly detected lesions in radiology. Patients may present with a wide variety of clinical manifestations, and may even be asymptomatic. Importance of imaging lies in the characterization of these cysts to aid in further management. An asymptomatic small, simple cyst may be left alone where a large complex cyst with features of malignancy will require surgical removal and histopathological evaluation. This thesis enumerates the cystic lesions of the body, and describes the various imaging features.

1. CYSTIC MASSES OF THE NECK

2. 2.1.1 Necrotic Lymphadenopathy
It is the most common cause of a cystic neck mass, considering all ages at presentation. The cystic features are the result of necrosis. Etiologies for the necrotic node may be carcinoma or inflammation; lymphoma rarely produces cystic change. On US, a central cystic area with thick irregular walls or an eccentric solid component may be seen. These solid areas usually demonstrate increased peripheral & intralesional vascularity on Doppler. CT shows cystic nodal necrosis as a focal area of low attenuation with or without a surrounding rim of soft tissue enhancement. On MRI, it shows high SI on T2WI & low SI on T1WI

2.1.2 Abscesses
They are usually rapidly developing, painful & may be associated with fever. They frequently involve the nodal groups draining the primary site of infection. On US, they appear as thick walled anechoic or hypoechoic with internal echoes & perilesional vascularity. On CT & MRI, they are well defined fluid density collections with peripheral thick ring-configured enhancement & may be multiloculated with surrounding fat stranding.

2.2.1 Thyroglossal duct cysts
It is the most common midline congenital neck mass accounting for 70% of the congenital neck anomalies. The cyst occurs along the residual tract left by the thyroid gland after descent from the foramen cecum at the tongue base to its final position in the visceral space. It may be suprahypoid, at the level of the hyoid, or infrahyoid in location. On imaging, a typical thyroglossal duct cysts appears as a smooth, well circumscribed, thin walled fluid attenuation mass.

2.2.2 Lymphangiomas
Lymphangiomas arise from early sequestration of embryonic lymphatic channels. Four types of lymphangioma are described, cystic hygroma, cavernous, capillary, & vasculolymphatic malformation. Cystic hygromas are the most common form of lymphangioma; 75% of these occur in the neck, usually centered in the posterior triangle or the submandibular space. These lesions are characteristically infiltrative in nature & do not respect facial planes. They are multilocular cystic masses, with septations of variable thickness. Fluid levels may also be seen.

2.2.3 Branchial cleft cysts (BCC)
They are painless, lateral neck masses that arise from anomalous branchial arch development. These lesions usually present in young adults. The second branchial cleft accounts for almost 90% of cases. The rare first BCC is located near the pinna & parotid gland. Third & BCC are seldom encountered; the former may present in the posterior cervical space. A second BCC is classically seen as a well marginated cyst with a thin, well defined wall at the anteromedial border of the sternocleidomastoid muscle at the junction of its upper & middle third, lateral to the carotid space & at the posterior margin of the submandibular gland.
2.2.4 Ranulas
They are cystic lesions of the floor of the mouth, usually occurring secondary to obstruction of the sublingual duct. Therefore these are also called sublingual gland mucocele or mucous retention cyst. They may be either “simple” & confined to the sublingual space ,or “plunging/ diving,” which extend posteriorly into the submandibular space or through a mylohyoid defect. They are unilocular, well defined cystic lesions in the submental region deep to the mylohyoid muscle.

2.2.5 Bronchial cysts
They are derived from buds of the foregut that normally differentiate into the tracheobronchial tree. Trapped respiratory epithelium or possibly migrating primordial cells secrete mucus within the cyst & eventually enlarge the lesion. These cysts rarely can present in the low neck. Occasionally, these cysts may contain air.

2.2.6 Dermoid & epidermoid cysts
Dermoid & epidermoid cysts may occur anywhere in the body, with 7% presenting as head & neck lesions, most commonly lateral to the eyebrow. Dermoid cysts are lined by the epithelium, & differ from epidermoid cysts in that they contain skin appendages such as sebaceous glands & hair follicles within the cyst wall. Complex dermoid cysts contain mesodermal elements like cartilage, bone, & fat. Dermoid cysts usually manifest during the second & third decades of life as slow growing mass in the submandibular or sublingual space. Epidermoid cysts manifest earlier in life, with most lesions evident during infancy. These are usually seen as well defined masses with posterior enhancement in the midline of neck. These may show homogenous internal echoes. Heterogeneous appearance may be seen due to the presence of echogenic fat, osseous, or dental elements. On CT, dermoid cyst usually appears as a lowdensity, unilocular, well circumscribed mass. Fat, mixed density fluid, & calcification (<50%) may also be seen. There may be coalescence of fat into small nodules within the cystic lesion, giving a “sac of marbles” appearance. Epidermoid cysts usually show fluid density material.

2.2.7 Laryngeal mucocele
It is a fluid-filled laryngocele & can be seen with obstruction of the ostium of a laryngeal saccule. An enhancing wall usually indicates infection. Approximately 15% may be associated with cancer. External or mixed laryngeal mucoceles protrude through the thyrohyoid membrane.
2.3. Neurogenic tumors
These may involve the vagus, hypoglossal, or cervical roots. Schwannomas & neurofibromas are the two most commonly encountered nerve sheath tumors in clinical practice. Cystic areas develop within these, either due to mucinous degeneration, hemorrhage, or necrosis. The imaging features of these benign masses include non infiltrative smooth margins, long axis fusiform shape, bone remodeling, non homogeneous SI on MRI, & presence of fluid fluid levels. Neurogenic tumors around the carotid sheath are located posterior to the neck.

2.4.1 CYSTIC THYROID LESIONS

2.4.1.1 Colloid cyst
Pathologically, they are often referred to as hyperplastic, adenomatous, or colloid nodules. Many cystic thyroid lesions are hyperplastic nodules that have undergone extensive liquefactive degeneration. Purely anechoic areas are caused by serous or colloid fluid. Bright echogenic foci with comet-tail artifacts are likely caused by microcrystals or colloid. Thin, intracystic septations probably correspond to attenuated strands of thyroid tissue & are avascular on Doppler.

2.4.1.2 Cystic changes in thyroid nodule
Although a mainly cystic nodule is rare in thyroid carcinoma, a cystic component is found in 13-26% of all thyroid carcinomas. Approximately 5% of all partially cystic nodules have been reported to be malignant in a recent study. The presence of a solid component with vascularity, an eccentric location of the solid portion or microcalcification may suggest malignant nodule & especially papillary thyroid carcinoma. A nodule with multiple microcystic spaces separated by thin septae or intervening isoechoic parenchyma (a 'spongiform' appearance) is regarded as a benign nodule.

2.4.2 Parathyroid cysts
Over 60% involve the inferior parathyroid glands. The imaging appearance of parathyroid cysts is nonspecific. Cysts are usually thin walled & lateral to the thyroid gland.

2.5 Thymic cyst
They are uncommon lesions that arise from persistence of the thymopharyngeal duct. These occur adjacent to the carotid sheath anywhere from the hyoid bone to the anterior mediastinum. They may appear similar to third & fourth BCCs, being differentiated only by the presence of thymic tissue within thymic cysts. The cysts usually present as a unilocular cystic mass extending inferiorly within the neck, paralleling the sternocleidomastoid muscle, or as a dumbbell shaped left cervicothoracic cystic mass.

2.6 Cystic Salivary lesions
Warthin tumors are usually found in older men & may be bilateral, multifocal, & cystic. Pleomorphic adenomas characteristically present as solitary lesions, & also may be cystic. Mucus-filled retention cysts derived from obstructed or traumatized salivary ducts may become quite large. Lymphoepithelial lesions of the parotid glands are seen in patients with AIDS & are frequently multicentric & bilateral.
Case 47. US thyroid: Well defined anechoic cystic lesion with internal echoes and internal septations (avascular) in thyroid gland.

Case 43. US thyroid shows a well defined echogenic nodule with multiple small anechoic cysts within, giving spongiform appearance. Also note a central calcific focus with distal acoustic shadowing.

REFERENCES
1. Dorlands pocket medical dictionary, 23rd edition
4. Melissa Heuer and Dr. Jaime Landman, Kidney Cyst(Simple and Complex), Kidney cancer institute, 2006
6. Encyclopedia Brittanica Online, Pathology, Cyst
12. Carol M. Rumack, Stephanie R. Wilson, J. William Charboneau, Deborah Levine, DIAGNOSTIC ULTRASOUND FOURTH EDITION, Chapter 14 The thyroid gland
16. Carol M. Rumack, Stephanie R. Wilson, J. William Charboneau, Deborah Levine, Diagnostic ultrasound fourth edition, Chapter 6 The biliary tree and gall bladder
20. A. Adam, A.A. Dixon, Grainger & Allison's Diagnostic Radiology, 5th ed. chapter 40-Renal masses
Evaluation of cystic lesions of neck

22. Retroperitoneal Cystic Masses: CT, Clinical, and Pathologic Findings and Literature


25. Carol M. Rumack, Stephanie R. Wilson, J. William Charboneau, Deborah Levine, Diagnostic ultrasound fourth edition, Chapter 21 The scrotum


31. CT and MR Imaging of Ovarian Tumors with Emphasis on Differential Diagnosis,


33. Magnetic Resonance Imaging of Adnexal Masses Kavita Rajkotia, Top Magnetic Resonance Imaging & Volume 17, Number 6, December 2006

34. A. Adam, A.A.Dixon, Grainger & Allison's Diagnostic Radiology, 5th ed,

35. Carol M. Rumack, Stephanie R. Wilson, J. William Charboneau, Deborah Levine, Diagnostic ultrasound fourth edition, Chapter 51- The pediatric spinal canal

36. Sonographic Differentiation of Benign and Malignant Cystic Lesions of the Breast


38. María Cristina Hernández Rodríguez et al, Intracystic Papillary Carcinoma of the


40. A. Adam, A.A.Dixon, Grainger & Allison's Diagnostic Radiology, 5th ed,

41. A. Adam, A.A.Dixon, Grainger & Allison's Diagnostic Radiology, 5th ed,

42. Cysts and cyst like lesions of the mandible, Robert J. Scholl, Radiographics 1999; 19; 1107-1124

43. A. Adam, A.A.Dixon, Grainger & Allison's Diagnostic Radiology, 5th ed,

44. A. Adam, A.A.Dixon, Grainger & Allison's Diagnostic Radiology, 5th ed,

45. Umbilical cord cysts in the second and third trimesters: significance and prenatal approach

46. R. ZANGEN et al, Ultrasound Obstet Gynecol 2010; 36; 296–301


49. Carol M. Rumack, Stephanie R. Wilson, J. William Charboneau, Deborah Levine, Diagnostic ultrasound fourth edition, Chapter 51- The pediatric spinal canal

