Benign paediatric head and neck lumps and bumps - A pictorial review from The Royal Liverpool Children Hospital, Alder Hey, Liverpool

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Learning objectives

The aim of this pictorial review is to expose radiologists, particularly radiologists in training, to a range of benign paediatric head and neck lesions. For each condition, a brief description of mode of presentation and typical characteristics on imaging on ultrasound and in some cases MRI is explained.
Background

In the paediatric age group the differential diagnosis for swellings in the head and neck includes a wide spectrum of conditions, ranging from benign/congenital to malignant lesions.

A benign or congenital swelling in the head and neck is a common paediatric presentation in primary, secondary and tertiary centres and is often a cause for parental concern. The differential diagnosis is wide and imaging plays an important role in narrowing the differential and guiding the clinician.
Branchial cleft anomalies are secondary to failure of involution of branchial clefts resulting in cysts/fistulæ or sinuses. The commonest is the second branchial cleft cyst, which usually presents as a swelling on the anteromedial border of the sternocleidomastoid muscle, lateral to the carotid and posterior to the submandibular gland. The cysts may enlarge after upper respiratory tract infections. Typical sonographic features (Fig 1, 2, 3) are of a compressible mass with internal debris and lack of internal flow. Ultrasound also helps in identifying the relationship with other adjacent structures.

Cystic hygromas, also called cystic lymphangiomas, are usually single or multiloculated fluid filled cavities most commonly in the lower portion of the face, but also seen at other sites such as the cranium, trunk and viscera. Typical ultrasound features (Fig 6, 7, 8 & 9) are of a thin walled fluid filled structure with layering of haemorrhagic component with no internal flow. MR features (Fig 4 & 5) are consistent with fluid: low signal intensity on T1W and high on T2W sequences. MR is also used to identify extension into the thorax or adjacent structures.

Fibromatosis coli is a benign form of infantile fibromatosis that occurs in the sternocleidomastoid muscle, more than 90% of such cases are associated with birth trauma. The usual location is in the lower one third of the sternocleidomastoid muscle. Typical sonographic features (Fig 10, 11 & 12) are of a homogenously enlarged muscle belly with no focal lesion. Echogenicity of the muscle depends on the duration of the disorder.

Dermoids are inclusion cysts with an epithelial lined cavity containing hair follicles, sebaceous and sweat glands. These can present in variable locations like head, neck, intracranial, spine, orbit, mediastinum. In our case the dermoid was present in the midline of the scalp (Fig 15 & 16); a solitary cystic structure with echogenic material with no internal flow was seen. MR (Fig 13 & 14) demonstrates low signal on T1W and high on T2W images with no intra cranial extension.

Cervical lymphadenopathy is one of the common head and neck swellings encountered. In the paediatric population, such lymphadenopathy can reach sizes of up to 15mm in maximum short axis diameter and are usually associated with an upper respiratory tract infection. Imaging is used to confirm the nature of the swelling and any associated complications such as secondary abscess formation. On ultrasound uncomplicated, enlarged lymph nodes (Fig 17, 18, 19, 20) are typically oval (the long axis is greater than the short axis), hypoechoic with or with out central linear echogenicity suggesting hilar fat, and show hilar flow on colour doppler.
A pilomatrixoma is a calcifying epithelioma; the lesion arises from hair matrix cells in the subcutaneous tissue. These lesions are typically slow growing and are found on the face, neck and upper extremities. Typical sonographic features (Fig 21 & 22) are of a well circumscribed lesion with multiple hyperechoic areas within the lesion which are described as sand-like calcifications. No internal flow is demonstrated on colour doppler.

Capillary haemangioma of the orbit is the most common vascular tumour of the orbit; the usual location is the anterior part of eye, occasionally posterior. Typical sonographic features (Fig 23 & 24) are of a heterogeneous mass of intermediate echogenicity with abundant internal flow that decreases with age. These lesions usually resolve spontaneously by 1-2 years of age.

Diffuse thyroid enlargement in children encompasses a wide variety of diseases and the clinical picture of hypo or hyperthyroidism with biochemical indicators may be sufficient to determine the diagnosis. The usual sonographic finding of a diffusely enlarged thyroid ranges from homogenous echotexture in endemic goitre to heterogeneous echotexture in autoimmune and multinodular variety which is less common in children. Our case describes sonographic features (Fig 25, 26 and 27) of a diffusely enlarged thyroid with heterogeneous echogenicity and hypoechoic areas giving an appearance of multinodular goitre. The colour flow doppler demonstrates no significant increase in flow.

Vascular malformations or soft tissue haemangiomata are one of the most frequent benign tumours of infancy and childhood. These present as swellings, which may be painful, show intermittent changes in size and a typically bluish cutaneous discolouration. It is common in head, neck and also in extremities. Typical ultrasound features (Fig 28 & 29) are complex heterogeneous mass with hypoechoic areas which demonstrate flow on colour doppler. Sometimes phleboliths are seen with the vascular lesions. It is important to determine the extent of the lesion and to identify involvement of adjacent structures.

Thyroglossal duct cyst is the most common congenital neck mass and is the 2nd commonest after benign neck lymphadenopathy. It presents with an enlarging painless, midline neck mass that moves with protusion of the tongue. Typical sonographic features (Fig 30 & 31) are of a midline anechoic or hypoechoic cyst with fine to coarse internal echos (proteinaceous material). Complications include infection and sinus formation (Fig 32 & 33), which is seen on ultrasound as an anechoic tract leading to the skin surface following a history of previous infection or surgical intervention.
Fig. 1: Longitudinal section on ultrasound of Branchial cyst

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Fig. 2: Longitudinal section on ultrasound of Branchial cyst and its relation to adjacent structures

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Fig. 3: Longitudinal section on colour doppler ultrasound of Branchial cyst

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**Fig. 4:** Coronal T1 of the cystic hygroma

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Fig. 5: Coronal STIR of the cystic hydroma

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**Fig. 6:** Longitudinal section on colour doppler ultrasound of Cystic hygroma with relation to adjacent structures

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**Fig. 7:** Longitudinal section on colour doppler ultrasound of Cystic hygroma with internal echoes

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Fig. 8: Longitudinal section on ultrasound of Cystic hygroma with dependent debris

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Fig. 9: Longitudinal section on ultrasound of Cystic hygroma

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Fig. 10: Thickened mid portion of left sternocleidomastoid muscle

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Fig. 11: Normal left proximal attachment of sternocleidomastoid

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Fig. 12: Normal right sternocleidomastoid muscle for comparison

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**Fig. 13:** Saggital T1W images showing dermoid in the frontal region

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Fig. 14: Axial T2W images showing dermoid in the frontal region

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Fig. 15: Longitudinal section of dermoid in the frontal region on colour doppler ultrasound

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Fig. 16: Longitudinal section of dermoid in the frontal region on ultrasound

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**Fig. 17**: Enlarged cervical lymphnod on ultrasound demonstrating normal central fatty hilum

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Fig. 18: Longitudinal section of enlarged cervical lymphnode with preserved hilar flow on colour doppler

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**Fig. 19:** Multiple enlarged cervical lymphnodes on ultrasound

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**Fig. 20:** Longitudinal section of enlarged cervical lymphnode with preserved corticomedullary differentiation

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**Fig. 21:** Longitudinal section ultrasound image of the pilomatrixoma demonstrating typical internal speckled appearance

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Fig. 22: Longitudinal section colour doppler ultrasound image of the pilomatrixoma demonstrating absence of colour flow within the lesion

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**Fig. 23:** Transverse ultrasound image of a left lateral paraorbital extraconal haemangioma

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**Fig. 24:** Transverse colour doppler ultrasound image of a left lateral paraorbital extraconal haemangioma demonstrating intense colour flow

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Fig. 25: Transverse section on colour doppler ultrasound of the left thyroid lobe which shows diffuse enlargement and heterogenous echogenicity

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**Fig. 26:** Transverse section on ultrasound of the left thyroid lobe which shows diffuse enlargement and heterogenous echogenicity

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**Fig. 27**: Transverse section on ultrasound of diffusely enlarged thyroid with heterogeneous echotexture of multinodular goitre

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Fig. 28: Panoramic section on ultrasound examination of a subcutaneous vascular malformation

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Fig. 29: Longitudinal section on colour doppler ultrasound examination of a subcutaneous vascular malformation in the left neck

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**Fig. 30:** Transverse section on ultrasound of thyroid demonstrating a thyroglossal cyst

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**Fig. 31**: Transverse section on colour doppler ultrasound of thyroid demonstrating a thyroglossal cyst

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**Fig. 32:** Longitudinal section on ultrasound of the neck demonstrating thyroglossal sinus tract opening to the skin surface

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**Fig. 33:** Longitudinal section on ultrasound of the neck demonstrating thyroglossal sinus tract opening to the skin surface

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Conclusion

Benign head and neck swellings in the paediatric population are frequently encountered by radiologists.

It is important to make a prompt diagnosis in these cases in order to avoid significant complications.

A clearly defined management pathway is paramount, and should include clinical examination and the use of imaging, in particular ultrasound, which is an invaluable diagnostic tool due to the lack of ionising radiation and its easy availability compared to other modalities in managing these conditions.
Personal Information
References


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