

# AN APPROACH TO THE NECK MASS

*Dealing with a mass in the neck may seem daunting, but a systematic approach is all that is needed.*



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The neck mass is often surrounded by mystique — in arriving at a diagnosis as well as in its management. There are many good approaches to a patient with a lump in the neck. In this article we suggest one method that unfortunately involves no mystique, but is thorough and practical, as well as providing a diagnosis in most cases.

The aim of this article is to give you, the GP:

- a systematic approach to a patient with a neck mass
- a guide to appropriate investigations
- recommendations for when to refer to a head and neck specialist.

Note that the treatment of each differential diagnosis is beyond the scope of this article and is therefore not discussed here.

Our approach involves an understanding of 2 basic factors that in combination will allow a diagnosis to be made. An understanding of these factors is critical. They are:

- anatomy — major structures of the neck and lymph nodes of the neck
- pathology that may arise in the above structures, i.e. the differential diagnosis.

If one can first identify the structure that is enlarged and second match that with the pathologies that may occur within that structure, then most of the problem is solved, and appropriate investigations can be performed.

## ANATOMICAL STRUCTURES OF THE NECK

A basic understanding of neck and surface anatomy is important. This may be divided into 2 parts, namely the major structures and the lymph nodes.

### Major structures

The major structures are located largely in the anterior triangles. The borders of the anterior triangles are the inferior border of the mandible, the sternocleidomastoid muscle and the midline. The borders of the posterior triangle are the sternocleidomastoid muscle, the trapezius muscle and the clavicle. The major structures that can be palpated in the midline, within the anterior triangles and from superior to inferior, are the hyoid bone, the thyroid cartilage with its notch (the 'Adam's apple'), the cricothyroid membrane, the cricoid cartilage and the trachea.

The isthmus of the thyroid gland may be palpated over the first 2 tracheal rings and its right and left lobes lie over the cricoid and thyroid cartilages laterally. A normal thyroid gland is not easily palpable.

The carotid bulb can be palpated near the anterior border of the sternocleidomastoid muscle at the level of the hyoid bone.

The parotid gland lies over the angle of the mandible, in front of and below the ear. It extends medially between the mastoid process and the posterior border of the mandible. Its borders are indistinct and difficult to delineate on palpation. As with the thyroid gland, a normal parotid gland is not prominent on palpation.

The submandibular salivary glands are located just below the body of the mandible. Normal glands are often palpable in thin individuals. The glands may be distinguished from submandibular lymph nodes in that the salivary glands are palpable bimanually via the floor of the mouth and the neck.

Several normal structures that are palpable are often confused with pathology, namely:

- the transverse process of C1, which is palpable between the mastoid process and the angle of the mandible
- the hyoid bone
- the carotid bulb, particularly if it is atherosclerotic
- the submandibular salivary glands.

## Lymph nodes

The location of cervical lymph nodes can be divided into six levels, as shown in Fig. 1. The level of the lymph nodes can be predictive as to the source of the problem. Level I includes submandibular and submental nodes. Levels II, III and IV encompass lymph nodes along the internal jugular vein, deep to the sternocleidomastoid muscle in the upper, middle and lower thirds of the neck respectively. Level V contains the nodes in the posterior triangle. These are commonly enlarged in viral infections, e.g. mononucleosis. Level VI lies between the carotid sheaths in the anterior triangle and contains the prelaryngeal and pretracheal nodes.

Note that lymphadenopathy due to inflammatory diseases usually resolves within 4 - 6 weeks. Therefore, any node which persists beyond 2 weeks requires further evaluation. Other suspicious features include lymph nodes more than 1.5 cm in diameter, firm, rubbery lymph nodes, matted lymph nodes and nodes that are fixed or have decreased mobility. Any node with these features definitely requires further evaluation.<sup>1,2</sup>

Once the anatomy is understood, the next step is to obtain a detailed history and perform a thorough examination.

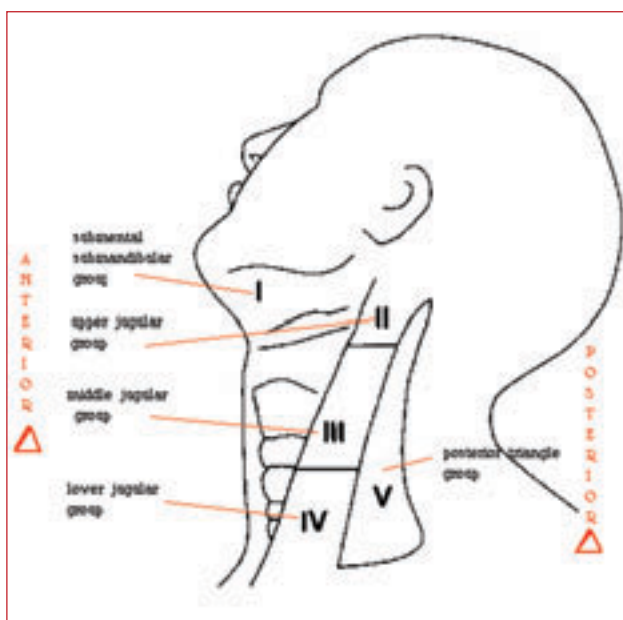


Fig. 1. Lymph node levels of the neck.

## HISTORY

A careful history can provide important clues to the diagnosis of a neck mass. Duration of symptoms is one of the most important points in the history.<sup>1,2</sup> Inflammatory neck masses are usually acute in onset and resolve within several weeks.<sup>1</sup> Cervical lymphadenitis, the most common cause of neck masses, is

often associated with upper respiratory tract infections.<sup>1</sup> A history of coughs, fever, sore throat, recent travel, dental problems, and insect bites should be sought.<sup>2</sup> Congenital neck masses are often present from an extended duration — sometimes, but not always, since birth. For example branchial cysts usually present in young adults in their twenties. Furthermore, rapid enlargement of a small congenital mass may occur following an upper respiratory tract infection.<sup>1</sup> Malignant neck masses, as in metastatic carcinoma to cervical lymph nodes, tend to have a history of progressive enlargement. The most common origin of these metastases is squamous cell carcinoma of the upper aerodigestive tract. More than 80% of these tumours are associated with tobacco and alcohol use in persons over 40 years of age. These features should be identified in the history. Further features of malignancy include voice change, odynophagia, dysphagia, haemoptysis and previous radiation, especially with thyroid tumours.<sup>2</sup> Additional important features are: oral lesions, recent trauma, globus sensation, referred ear pain, muffled or decreased hearing and constitutional symptoms (e.g. night sweats, anorexia, weight loss),<sup>1</sup> exposure to bites from animals,<sup>2</sup> unilateral nasal discharge or epistaxis,<sup>1</sup> family history of cancer and previous tumours.<sup>1</sup>

## EXAMINATION

Examination should include the mass itself, the rest of the neck, the skin of the head and neck and the ENT system (ears, oral cavity, nasal cavity, nasopharynx, oropharynx, hypopharynx and the larynx). In cases where pathology is suspected in an area that is difficult to examine without specialised equipment, for example the nasopharynx, hypopharynx and larynx, patients should be referred to an otolaryngologist.

The first question to ask is whether the mass is a lymph node or part of another neck structure. This brings us back to the lesson in anatomy — the location and identification of lymph nodes and of the major neck structures. To

recap, the major neck structures are the hyoid bone, thyroid cartilage, cricoid cartilage, trachea, thyroid gland, parotid gland, submandibular salivary gland and carotid bulb. One also needs to be aware of the palpable transverse process of C1, which may be mistaken for an abnormal mass.<sup>1</sup>

The size, consistency, tenderness and mobility of the mass provide diagnostic clues. Acute inflammatory masses tend to be soft, tender and mobile. Chronic inflammatory masses are often non-tender and rubbery and either mobile or matted. Congenital masses are usually soft, mobile and non-tender unless infected.<sup>1</sup> Vascular masses may be pulsatile or have a bruit. Malignant masses may be hard, non-tender and fixed.<sup>1</sup>

The scalp and skin of the head and neck should be examined for primary cutaneous tumours. Recent bite marks/scratches may indicate cat-scratch disease.<sup>1</sup> The ear may reveal serous otitis media associated with a nasopharyngeal carcinoma or a fistula in the external auditory canal associated with some branchial cleft abnormalities. Cranial nerve examination is also necessary.

Nasal examination may reveal a unilateral nasal mass or discharge suspicious of a neoplasm. The mucosa of the oral cavity/oropharynx may reveal a primary malignancy. In particular, examine the lateral border of the tongue, floor of mouth, soft palate/tonsil complex, because the great majority of oral cancers arise from these areas. Furthermore, palpate the base of the tongue to exclude occult lesions.

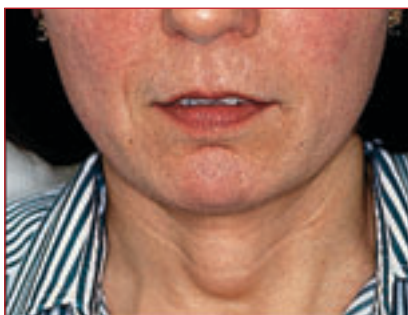


Fig. 2. A midline neck mass — a thyroglossal cyst.



Fig. 3. A lateral neck mass — a branchial cyst.

A unilateral, asymmetrically enlarged tonsil may suggest a neoplasm. Alternatively, a normal sized tonsil pushed across towards the midline by a parapharyngeal mass may cause a similar appearance. A parapharyngeal space mass may also present as a neck mass.

Dentition should be examined as an infective cause of cervical lymphadenitis.<sup>1</sup>

The neck should be examined carefully including all the major structures and lymph node levels as mentioned above. Examination of the submandibular area is assisted by bimanual palpation.<sup>1</sup> Assessment of the mass with swallowing is important as movement from swallowing suggests a lesion in the thyroid gland or a thyroglossal cyst (Fig. 2). The latter also elevates with tongue protrusion and is located in the midline around the level of the hyoid bone and may be associated with a cutaneous fistula as well.<sup>3</sup> Branchial cysts (Fig. 3) are located anywhere along the anterior border of the sternocleidomastoid muscle,<sup>3</sup> most commonly at the junction of the upper and middle thirds. Note the presence of normal crepitus on moving the larynx from side-to-side against the cervical vertebrae. Absence of this crepitus is abnormal.

**PATHOLOGY/AETIOLOGY/DIFFERENTIAL DIAGNOSIS**

The above three headings are used together because in practical terms they are one and the same. Is the

mass single or multiple? Is it in the anterior or posterior triangle? Does it move with swallowing? Is it solid, cystic or pulsatile? Is it midline or lateral? These are all important factors referred to in Fig. 4.<sup>4</sup>

It is however preferable to use a combination of an anatomical and pathological approach in diagnosis, always being guided by the history and examination with the aim of distinguishing the structure involved, i.e. lymph node or other major neck structure, and the most likely diagnosis based on the list that follows. This list is by no means exhaustive but includes the more common and well-recognised pathologies.

- **Infective and inflammatory masses** — it is important to note that by far the most common cause of a neck lump is inflammatory/infective lymphadenopathy, and this is most commonly a result of inflammation caused by a self-limited bacterial or viral infection that resolves within weeks.<sup>1</sup>

Lymphadenitis may have many aetiologies:<sup>1,2,5,6</sup>

- bacterial — streptococcal and staphylococcal infections; mycobacterial infections — tuberculosis and atypical mycobacteria; lymphadenitis secondary to dental infection and tonsillitis;<sup>5</sup> unusual disorders — cat-scratch disease, actinomycetes, tularaemia
- viral — Epstein-Barr virus (EBV), cytomegalovirus (CMV), herpes simplex virus (HSV), other viruses causing URTIs, HIV
- parasitic — toxoplasmosis
- fungal — coccidiomycosis
- sialadenitis (parotid, submandibular and sublingual) due to obstruction, e.g. calculus, or infections, e.g. mumps
- thyroiditis.

Other inflammatory conditions (e.g. sarcoidosis) and neck abscesses are also common causes of neck masses.

- **Neoplastic masses** that are benign include lipoma, fibroma, neuroma and schwannoma.

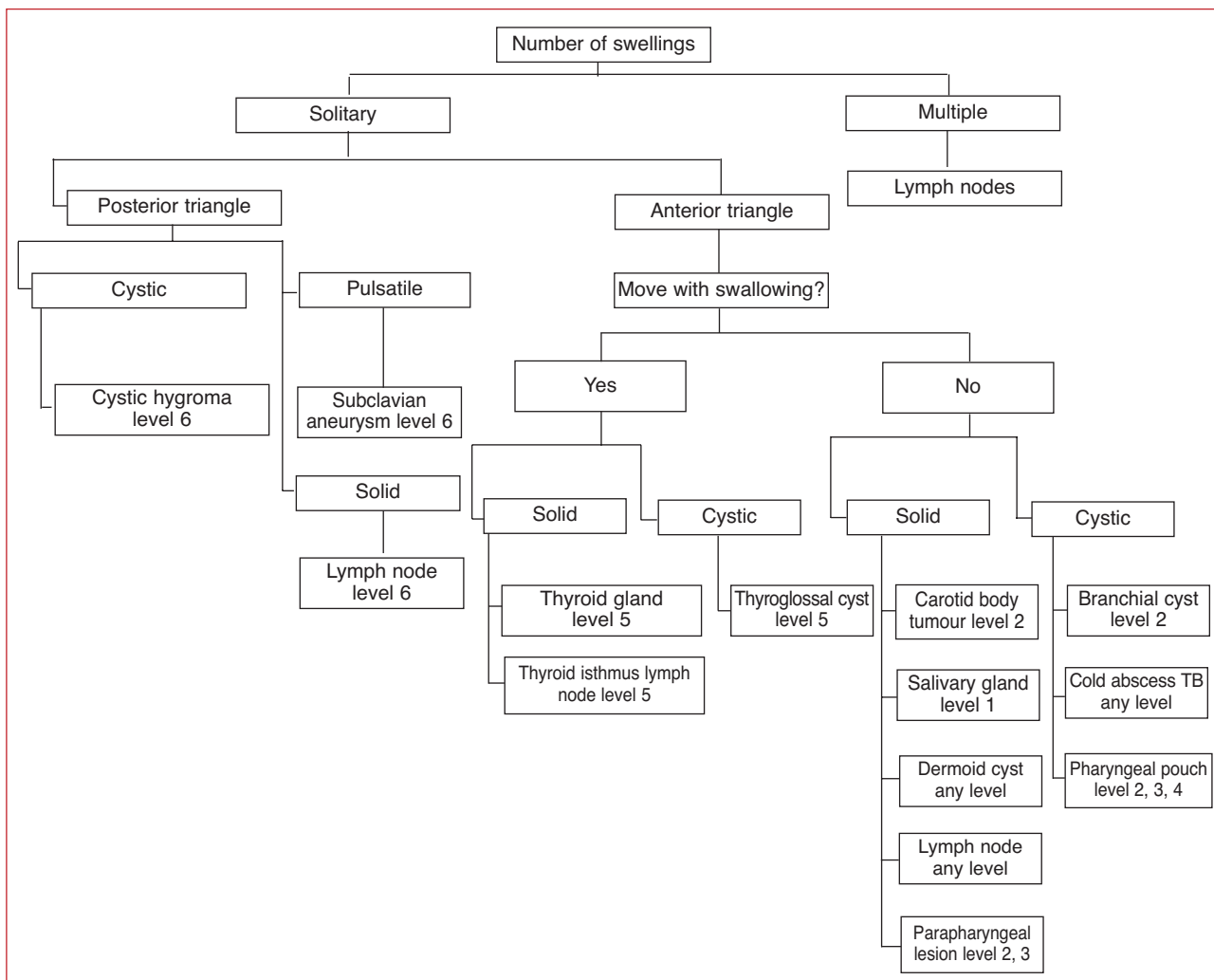


Fig. 4. One approach to a differential diagnosis of a neck mass.

The following neoplastic masses are malignant:

- primary neck tumours — sarcoma, salivary gland tumours, thyroid gland tumours, parathyroid gland tumours
- lymphoma
- metastases from supraclavicular primary tumours, e.g. upper aerodigestive tract squamous cell carcinoma (SCC), skin SCC, melanoma, thyroid or salivary gland metastases
- metastases from infraclavicular primary tumour — lung, oesophagus, stomach.
- **Congenital masses** — branchial cleft cysts and fistulas (Figs 3 and 5), thyroglossal duct cysts (Fig. 2), dermoid cysts, lymphangiomas (cystic hygromas) (Fig.6), congenital

torticollis, teratomas and thymic masses.<sup>1,2,6</sup>

- **Vascular masses** include paragangliomas and vascular malformations, such as haemangioma, AV malformation, aneurysm.
- **Traumatic masses:** haematoma, false aneurysm, AV fistula.
- **Metabolic, idiopathic and auto-immune conditions**<sup>2</sup> are rare, e.g. inflammatory pseudotumours.
- **Thyroid gland masses** include multinodular goitre, colloid goitre, thyroiditis, etc.
- **Salivary gland masses**, e.g. prominence with ageing, sialadeni-

tis, sialolithiasis, salivary cysts (HIV) and Sjögren's syndrome, etc.

- **Parapharyngeal masses** should be considered, especially with a high neck mass and a medially displaced tonsil.

The most important distinction to make in an adult is between an **infectious/inflammatory** cause versus a **neoplastic cause**. In a child or young adult maintain a high index of suspicion of a **congenital cause**. These distinctions have been alluded to in the section on history and examination. However, because of their importance they deserve further mention.

#### Infectious/inflammatory masses

Cervical lymphadenitis is most com-



Fig. 5. A branchial fistula.



Fig. 6. A cystic hygroma.

mon in children and adolescents.<sup>1</sup> Viral and bacterial pharyngitis produce acutely swollen and tender lymph nodes, which usually return to normal within several weeks. This presentation does not usually cause diagnostic confusion. The most common organism is group A beta-haemolytic streptococcus. Cervical adenitis caused by infectious mononucleosis may present as enlarged nodes in the posterior triangle of the neck (level V).<sup>1</sup> This lymphadenopathy may persist for 4 - 6 weeks.<sup>2</sup> The presence of heterophil antibodies confirms the diagnosis (Monospot test). A similar picture may occur with CMV infection but with a negative Monospot. Mycobacterial infections are usually chronic in nature. Tuberculous adenitis is usually, but not always, accompanied by pulmonary pathology.<sup>1</sup> Generalised lymphadenopathy including cervical nodes is a well-documented phenomenon in the early stages of HIV infection. HIV should be considered in any adult with cervical lymphadenopathy.

Salivary gland inflammation may appear as a neck mass. For example, acute sialadenitis caused by a calculus obstructing the duct can result in a tender, inflamed, swollen gland. This is most common in the submandibular

gland. Another example is acute parotitis due to mumps. Chronic sialadenitis may be difficult to distinguish from a neoplastic disease because it causes a hard mass within the gland. Different forms of thyroiditis can cause anterior neck swellings and tenderness of varying severity.<sup>1</sup>

**Neoplastic masses**

These can arise from any of the tissues in the neck and can be benign or malignant.

**Benign**

A lipoma is the most common benign soft-tissue tumour in the neck. Its soft consistency and chronicity usually allows diagnosis by clinical examination alone. Other benign soft-tissue neoplasms are less common. Eighty per cent of parotid gland neoplasms are benign. These are usually pleomorphic adenomas. Only about 50% of submandibular salivary gland neoplasms are benign. Thyroid nodules are very common, and inflammatory conditions and benign and malignant tumours may all co-exist in the thyroid gland.<sup>1</sup> Therefore, all thyroid masses should be investigated.<sup>2</sup>

**Malignant**

Malignant neck masses are classified into primary tumours and metastatic tumours. Malignant primary tumours arise most commonly from the thyroid gland, salivary gland and lymphoid tissue.<sup>1,2</sup> Metastatic neck masses almost always arise from squamous cell carcinoma of the upper aerodigestive tract.<sup>1</sup> However, the location of the node is important. Level IV/lower level V nodes should alert one to the possibility of primary tumours below the clavicle, e.g. lung and oesophagus. The presence of a metastatic lymph node mass in the neck necessitates the search for the primary cancer.

**Congenital masses**

Although these are usually seen in infants and young children, they can present in early adulthood and beyond.<sup>1</sup> The most common is the thyroglossal duct cyst that usually presents in the midline and elevates with swallowing or tongue protrusion. This latter factor distinguishes it from a congenital dermoid cyst. Branchial cysts, which usually present in early adulthood, occur anywhere along the anterior border of the sternocleidomastoid muscle and often seem to appear rapidly following an upper respiratory

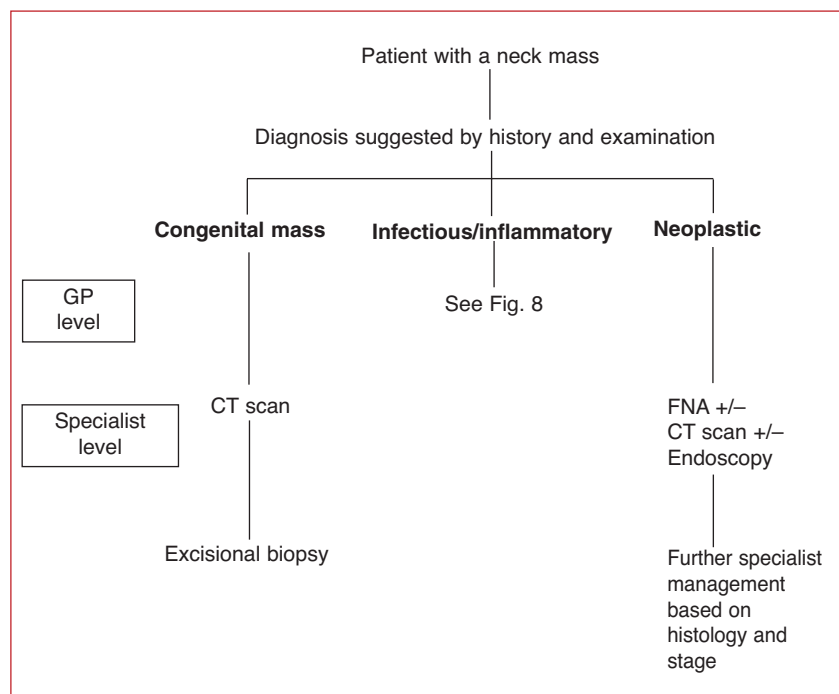


Fig. 7. Flow diagram of the general approach to a neck mass.

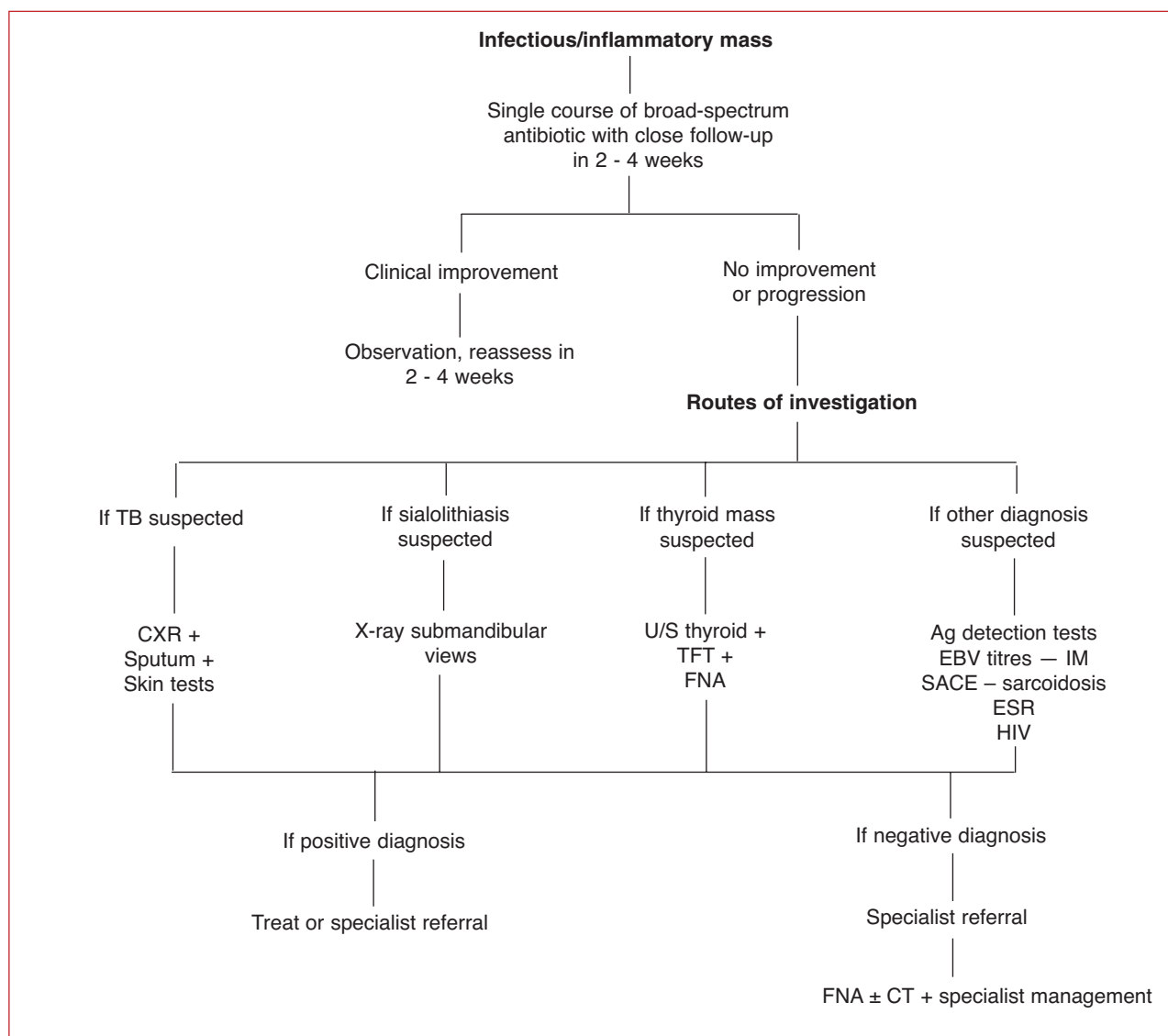


Fig. 8. Flow diagram of the approach to an infectious/inflammatory neck mass (CXR = chest X-ray; U/S = ultrasound; TFT = thyroid function tests; FNA = fine-needle aspiration; EBV = Epstein-Barr virus; CT = computed tomography).

tract infection.<sup>1</sup> Lymphangiomas present in early infancy and can often be transilluminated.<sup>1</sup>

### MANAGEMENT: INVESTIGATION AND TREATMENT

Investigation is tailored to the clinical impression obtained from the history and examination, as well as the age of the patient. For example, in children, incisional or excisional biopsy is preferred to fine-needle aspiration.<sup>3</sup> The suggested appropriate management at general practitioner and specialist level is outlined in Figs 7 and 8.

As mentioned above, many inflammatory lymph nodes resolve with no treat-

ment, although close observation is required.<sup>2</sup> A single course of a broad-spectrum antibiotic and reassessment in 1 - 2 weeks is a reasonable treatment choice when the symptoms and signs are suggestive of any inflammatory process (short duration, fever, pain, erythema), or a history of recent infection.

All thyroid and salivary gland masses need investigation as does any mass persistent beyond 4 - 6 weeks.<sup>1,2</sup>

Blood investigations can often exclude metabolic and any other uncommon causes of neck masses.<sup>2</sup> Contrast-enhanced CT scanning is the best imaging technique for evaluating a

neck mass (Fig. 9).<sup>3</sup> Fine-needle aspiration is a simple office procedure that is safe and is the optimal initial method for obtaining tissue samples for diagnostic evaluation.<sup>1,3</sup> It may be performed by anyone competent in the technique (GP/specialist). It has a high sensitivity and specificity and low complication rate.<sup>1,3</sup> The most important complications are tumour seeding and haematoma. Tumour seeding is very rare and is minimised even further by using a 21-gauge needle.<sup>3</sup> Haematomas, if they occur, are small and localised and contained with direct pressure.

Incisional/excisional biopsy is rarely needed for diagnosis in adults, but it

is often necessary for the classification of lymphoma.

**INDICATIONS FOR REFERRAL**

Most of the neck masses seen by a primary care physician are caused by inflammatory disorders that are either self-limiting or resolve following a course of antibiotics within a few weeks. In patients who fail to improve after treatment with antibiotics, referral to an appropriate specialist is indicated. Furthermore, when a malignancy is suspected, immediate referral is recommended. Several indications for referral are listed below:<sup>1</sup>

- if the mass does not resolve within 2 - 3 weeks following an antibiotic trial



*Fig. 9. An axial contrast-enhanced CT scan showing a left second branchial cleft cyst (m) deep to the sternocleidomastoid muscle (s).*

- malignant tumour suspected
- mass is rapidly enlarging with or without inflammation
- mass is in the thyroid gland
- mass is in the parotid gland
- mass is fixed.

*References available on request.*

**IN A NUTSHELL**

Neck masses are common and most often due to lymphadenopathy secondary to a self-limited infection or inflammation.

A basic knowledge of neck anatomy and structures is required.

Thorough history and examination usually suggests a diagnosis.

In the differential diagnosis the three most important categories to distinguish are: infective/inflammatory, congenital and neoplastic masses.

Appropriate investigations may be performed at GP or specialist level.

A reasonable first-line management for a suspected infective/inflammatory mass is a course of a broad-spectrum antibiotic with referral to a specialist if the mass does not resolve within 2 - 4 weeks.

All suspected neoplastic and congenital masses should be referred for specialist attention.