Follow a systematic approach to improve your assessment of patients with neck masses

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Neck masses require a systematic evaluation, including endoscopy, CT scans and fine-needle aspiration biopsy when indicated.

Most neck masses in adults are malignant, so direct your evaluation toward finding a possible aetiology as well as a source of the primary malignancy.

A careful evaluation supplemented by some recent diagnostic advances will enable you to make the diagnosis and choose the management option that best suits each case.

By following a systematic approach to assessing your patient's neck mass, you will avoid overlooking important details and usually be able to make your diagnosis without surgery.

While you are undoubtedly familiar with the procedure for evaluating a neck mass, remember than thoroughness counts. Making your evaluation in haste or in an effort to be more cost-effective may cause you to bypass certain steps. This can lead to disadvantages for both you and your patient, such as a longer and more costly series of tests and studies.

This article serves as a guide to making a thorough examination, explains the latest advances available to assist you in your diagnosis, and presents management options for the various types of masses you may encounter. In addition, we also look at typical examples of common presentations and alert you to potential pitfalls.

Malignancy is common

A few basic points merit review. First, more than 50% of neck masses in adults older than 45 represent a malignancy, most probably one that has metastasized there. Among patients older than 60, the incidence of malignancy for a mass in the lateral neck is 80%.

For the purposes of this article, we'll define a neck mass as a 2 cm mass lying beneath the platysma muscle. Most neck masses are found along the anterior border of the sternocleidomastoid muscle; they often also lie in the midline of the neck in the thyroid region.

Lumps in the upper two-thirds of the neck are more often associated with disease processes of the larynx, tongue, floor of the mouth, oropharynx, hypopharynx, and salivary glands. Lumps in the lower one-third, or supraclavicular region, are usually associated with the thyroid or with infraclavicular sources.

Masses that have been present for a long time without changing may or may not be malignant. On the other hand, firm, rapidly growing, non-tender masses suggest a malignancy. Tender masses that are associated with fever are likely to be of an infectious origin.

The basic principles in diagnosing a neck mass are a careful history, physical examination including endoscopy, and appropriate laboratory studies.

A history is important. Be sure you ask your patient whether or not he or she smokes, chews tobacco, or uses IV drugs. Also ask whether or not he or she has a cough, has had a recent change in voice, difficulty in swallowing, fever, chills, or night sweats, or has been exposed to an infectious disease such as tuberculosis.

Check the characteristics

Physical examination includes palpation of the neck. Pay attention to characteristics of the mass, such as whether it is soft or cystic, firm, matted, or bilateral.

Bimanual palpation, with one hand gently placed in the oral cavity, provides a better assessment of the parotid, submental, and submandibular regions. Be sure to palpate the intra-oral structures in the region of the tonsils and at the base of the tongue.

You can inhibit your patient's gag reflex by spraying a small amount of topical anaesthetic on the area. This can also help avert small spasms of the tongue muscles that may hide a small mass there.

Palpate the thyroid bimanually as the patient swallows. Check laryngeal crepitance by moving the larynx transversely across the vertebrae. If you hear or feel any 'clicking', you know there is no mass or oedema in the posterior hypopharynx.

Masses are characterized by four criteria:

- *location;*
- *mobility up and down or attachment to surrounding structures;*
- *whether they are well delineated or diffuse into the surrounding soft tissues; and*
- *whether they are soft or firm.*

It is important to note whether there are multiple small masses - such as a chain of lymph nodes - or a large, solitary lesion. The vast majority of neck masses in adults are lymph nodes presenting in the anterior cervical triangle.

Three advances

Three advances in the past five years have enhanced our ability to assess neck masses: improved endoscopic equipment (such as the flexible fibreoptic laryngoscope), high-resolution CT and MRI scans, and fine-needle aspiration.

Flexible and straight fibreoptic endoscopes allow for magnification and a bright light source. This makes the head and neck examination easier for the specialist and more practical for the non-specialist.

Before you use a laryngoscope, spray the area with a topical anaesthetic. Cocaine 4%, solutions of topical adrenaline with topical lignocaine, and topical solutions of 3% lignocaine and 0.25% phenylephrine are all good choices. Some patients tolerate the procedure without any anaesthetic. Use a decongestant if the nose is swollen.

Pas the scope through the nasal cavity and examine it. Then look at the nasopharynx, eustachian tube orifice, and downward to the base of the tongue, epiglottis, lateral pharyngeal walls, larynx, and hypopharynx.

Ask your patient to make an *eeee* sound during the procedure. This lets you evaluate cord mobility, which is important in staging laryngeal cancer. Also, as your patient makes this *eeee* sound, the pyriform sinus opens, which permits you to examine it. Look for ulceration and pooling of secretions.

The flexible scope helps identify areas that need a biopsy. Sinus endoscopes are helpful in examining the nose, nasal cavity, ethmoids, and particularly the nasopharynx.

Be way of the unexpected abscess

Occasionally, what you originally thought was a mass turns out to be an abscess. In this situation, aspirate the fluid and send it for culture and cytology. Always obtain a portion of the wall of the cyst or mass to send for pathological examination, because a metastatic necrotic tumour can appear like an abscess deep in the neck.

You can usually treat deep neck abscesses that do not compromise the airway with intravenous antibiotics for 48 hours before incision and drainage, during which time the abscess will become more localized and a cellulitis may resolve.

Moving on to the CT scan

The most important development in the examination of neck masses has been the CT scan. Move from laryngoscopy to a CT when the aetiology of the mass is not apparent or when you want to gauge the size and extent of the mass more accurately. CT is especially valuable when you suspect a malignancy and the primary tumour is not apparent.

CT can also be useful in determining whether there is a mass in the base of the tongue, in the hypopharynx, or in the pharynx. CT may direct the endoscopist to an area where a biopsy will be required and it will help ascertain if there is more than one mass. The information is useful in clinical staging as well as in assessing the extent of surgery that may be required.

CT also picks up the thyroid gland and upper mediastinal nodes so that you can check them for any possible sources of malignancy.

Fine-needle aspiration biopsy

When a surgery evaluation and basic laboratory findings fail to reveal an explanation for a neck mass, the fine-needle aspiration biopsy can be extremely useful.

Inject a local anaesthetic (such as 2% lignocaine with 1:100.000 adrenaline). Then insert a 23- to 25-gauge needle into the mass. Take at least three samples on slides and send them out for examination.

If you encounter frank pus, send it in for a Gram's stain, fungus, tuberculosis, and routine aerobe and anaerobe studies. Give special consideration to atypical tuberculosis. Send purulent material out for cytological evaluation because it may represent a necrotic tumour. Grey, watery secretions with flecks of material should make you highly suspicious of necrotic tumour.

Aspiration biopsies are helpful when they are positive because they focus the remainder of the work-up. For example, if the tissue recovered is characteristic of a lymphoma, a different assessment will be necessary with bone marrow biopsy, CT and haematological consultation.

But a negative biopsy does not rule out malignancy, so always follow one with either a repeat fine-needle aspiration or surgical resection of the mass.

If there is an adenocarcinoma in the neck, assess it for possible sources, such as the GI tract, prostate, and kidney. Most often the diagnosis will be squamous cell carcinoma, in which case your next step is endoscopy under anaesthesia.

How to manage benign masses

The vast majority of benign neck masses turn out to be enlarged lymph nodes. A benign mass should be removed in its entirety. If it is of congenital origin, its associated tract should also be removed.

Midline masses are often associated with the thyroid gland, or descent of the thyroid gland, as in a thyroglossal duct cyst. In the immediate submental area, you may find epidermoid cysts and ranulas. The characteristics of a thyroglossal duct cyst include an up-and-down motion with swallowing and a fixation on, or close adherence to, the hyoid bone. The thyroid will feel normal on palpation.

Both thyroglossal duct and branchial cleft masses are most easily removed when they are not infected. When they are infected, aspirate for culture and prescribe antibiotic treatment for a few weeks. This will allow the infection to resolve and will make for a much easier dissection.

Branchial cleft cysts usually occur laterally, with a possible fistula opening along the anterior border of the sternocleidomastoid muscle. Most such cysts arise from a combination of the second and third arches that form the cervical sinus.

This ectoderm-lined cyst, while of congenital origin, may not cause problems until the individual is in his or her 20's or 30's. It may be first noted following an upper respiratory infection. Depending on whether it is a second or third arch cyst, the tract can be followed toward the tonsil (second arch), or the pyriform sinus (third arch). You must be careful not to injure the hypoglossal nerve, which runs directly through this area.

Carotid body tumours, or paragangliomas, present in the area of the carotid bifurcation. They differ from other masses in that they can move back and forth, but not up and down. The vast majority do not have an associated murmur.

The patient's family history is important, because 10% of paragangliomas have a familial predilection. In familial cases, some 30% develop bilateral disease, while in nonfamilial cases, only 5% do so.

The history is one of a very gradual increase in size. A CT with contrast is very helpful.

Carotid angiography delineates the mass' extent and its vascular supply. It also determines whether a mass is present on the opposite side. Among elderly individuals who have slowly growing tumours, resection may not be indicated. Carotid artery injury and possible stroke are potential complications of this surgery.

Malignant tumours

Both Hodgkin's and non-Hodgkin's lymphomas may present with cervical adenopathy, but they can also present as a mass, which may be either ulcerated or smooth. Approximately 10% of lymphomas are found in Waldeyer's ring - that is, the pharyngeal tonsil, nasopharynx, or lingual tonsil area.

The surgeon will often encounter a series of matted lymph nodes. Be aware that several lymph nodes - in their entirety and, we hope, with uninjured capsules - should be sent out for pathological assessment. Also obtain some additional tissue for culture. In most cases, a Penrose drain or closed-suction drain system is necessary for 24 hours.

The most common concern here is the question of a poorly differentiated carcinoma versus a lymphoma. If the pathologist is unable to provide a definitive diagnosis on frozen section obtained in the operating room, it is preferable for the surgeon to close the wound and

await permanent section. This has not been shown to be harmful if the more definitive procedure follows within a few days.

The unknown primary

When you diagnose squamous cell carcinoma, malignant melanoma, or adenocarcinoma in the upper two-thirds of the neck at the time of the neck node biopsy, you can assume that the primary is somewhere in the upper head and neck. The vast majority of unknown primary neck metastases are in the mid-jugular and upper jugular cervical lymph nodes; most represent metastatic squamous cell carcinoma.

A pre-operative CT is helpful in determining the source when the origin is not apparent on clinical or surgery endoscopic examinations. Always order a chest X-ray and, when there is evidence of a mass or hilar adenopathy, move on to a chest CT.

When the pathologist confirms the diagnosis of squamous cell carcinoma, melanoma, or anaplastic carcinoma, refer the patient for a standard or modified radical neck dissection. The primary tumour may become evident in the follow-up period years later.

The treatment of choice in about 80% of neck disease patients is surgery combined with radiation therapy, although some cases may be handled by surgery alone (such as when the patient has a single node that is limited to the submandibular or submaxillary triangle).

Extensive disease, such as when the patient's nodes are larger than 3 to 4 cm or when the patient has multiple nodes, are best treated with surgery followed by radiation directed to both the neck and to the likely source of the primary malignancy.

When you encounter a node in the lower one-third of the neck, be aware that the role of surgery is less clear, because these patients have a poor prognosis.

When you diagnose adenocarcinoma as an unknown primary in the upper two-thirds of the patient's neck, consider a submandibular or parotid gland malignancy. Modified neck dissection that includes these areas is called for when you suspect that the origin is in the salivary gland.

When there is an adenocarcinoma in the lower one-third of the neck, it is best for the surgeon to simply close while you continue to investigate for the primary source. When a patient has malignant melanoma in the upper two-thirds or in the posterior triangle of the neck, the recommendation remains neck dissection.

The limits of treatment

In those cases where your patient has extensive disease, you, your patient, and the surgeon must understand that treatment may be limited to simply controlling the neck disease, and that it will be unlikely to influence survival.

However, control of disease in the neck is warranted in order to reduce pain and to prevent, or at least delay, adverse effects on vital regions, such as the carotid artery, airway, and pharynx.