

Cervical Mass. Experience and Management Protocol

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Abstract

Thorough history and physical examination combined with a fundamental knowledge of head and neck anatomy can arm the primary care provider with all tools necessary to work up and properly diagnose a neck mass. Not all neck masses are neoplasms; the location of the mass, details surrounding its appearance, and overall time course are important factors to help differentiate neoplastic disease from other possibilities in the long differential diagnosis. In-depth knowledge on the part of the health professional about the management of a cervical mass is crucial, especially those professionals whose field of action involves the head and neck area (oral and maxillofacial surgeons for example) at that, the objective of this investigation is to provide a review of the literature and relate our experience and management protocol for cervical masses in the Oral and Maxillofacial Surgery Unit of the Hospital Coromoto, Venezuela.

Keywords: Cervical Mass; Management Protocol

Introduction

The head and neck region has a rich network of lymphatic vessels; cervical lymph nodes comprise one-third of the body's lymphatic system and the drainage of the head and neck follows a predictable pattern with a final drainage into the right and left subclavian veins [1]. The drainage is mainly ipsilateral, but structures such as the soft palate, tonsils, base of the tongue, posterior pharyngeal wall and especially the nasopharynx have bilateral drainage [2]. Cervical lymphadenopathy is a significant clinical finding associated with acute infection, granulomatous disease, autoimmune disease and malignancy. The involvement of specific nodal

groups is an indicator of pathologically-affected organs and tissues, especially in the context of malignancy. As such, intimate knowledge of the anatomic relationships of the lymphatic nodal levels and the structures they drain is critical in the delivery of appropriate therapy in many patients with cancers of the head and neck [3].

These lymphadenopathies can be exhibited as a cervical mass and maybe the initial or only clinically apparent manifestation of head and neck cancer, such as squamous cell carcinoma [4]. A thorough history and physical examination combined with a fundamental knowledge of head and neck anatomy can arm the primary care provider with all tools necessary to work up and properly di-

agnose a neck mass. Not all neck masses are neoplasms [1]; the location of the mass, details surrounding its appearance and overall time course are important factors to help differentiate neoplastic disease from other possibilities in the long differential diagnosis. A persistent neck mass in an adult older than 40 years should raise a suspicion of malignancy. A neck mass in a young adult patient is more likely to be an inflammatory, congenital, or traumatic process [5].

Because of this, in-depth knowledge on the part of the health professional about the management of a cervical mass is crucial, especially those professionals whose field of action involves the head and neck area (oral and maxillofacial surgeons for example) at that, the objective of this investigation is to provide a review of the literature and relate our experience and management protocol for cervical masses in the Oral and Maxillofacial Surgery Unit of the Hospital Coromoto, Venezuela.

Neck masses

A new, persistent neck mass in an adult patient should be considered malignant until proven otherwise. Primary care providers and urgent care providers should keep malignancy at the top of their differential for an adult patient older than the age of 40 presenting with a neck mass, especially if that patient has particular risk factors [1]. It is therefore important for such surgeons to have a clear understanding of the etiology, pathogenesis, diagnostic evaluation, and treatment of cervical masses. One of the most important factors that help define a specific diagnosis is the patient’s age. In general, three age groups need to be considered: pediatric (< 15 years), young adults (16 to 40 years of age), and older adults (> 40 years of age) [6,7]. The majority of neck masses in the young pediatric population are more common inflammatory and congenital rather than neoplastic. In young adults, the rate of neoplasia begins to increase along with a relative decrease in congenital lesions. In patients older than 40 years, neoplasia is always the primary consideration in those in whom a neck mass of unknown origin develops [8].

To aid in the diagnosis of these cervical masses; there is the “rule of the 80s of Skandalankis”, in which patients over for 40 years old, 80% of non-thyroid neck masses in adults are neoplastic and that 80% of the neoplastic masses are malignant. Of these malignancies, 80% are metastatic. And of which 80% comes from anatomical regions above the clavicle [9]. Lymphadenopathy can be exhibited as a cervical mass; these lymph nodes comprise one-

third of the body’s lymphatic system and the drainage of the head and neck follows a predictable pattern. Cervical lymphadenopathy is the presence of abnormal, usually enlarged, lymph nodes in the neck that can represent the immune response of a transient pathologic process or worse: the progression of a malignant disease. The most common malignant neoplasm to present as a neck mass in an adult is metastatic squamous cell carcinoma with the primary site in the upper aerodigestive tract [1].

The latest proposed anatomic classification and the system most widely used among head and neck surgeons for describe the lymphatic system and the drainage is the Robbin’s Classification [10], which delineates the neck into 6 levels based on lymphatic drainage (Table 1). A basic understanding of neck levels will aid in localizing the primary site of malignant or infectious disease in the presence of cervical lymphadenopathy. An example of this would be a cancerous lesion on the anterior tongue; that due to lymphatic dissemination, according to the Robbins classification, it could cause lymphadenopathy at cervical Ib level.

Head and neck lymphatic dissemination, according to the Robbins classification	
Robbins clasifications	Lymphatic drainage origination
Level I	Ia: Lips, chin, nasal tip, incisors/canines, mouth floor.
	Ib: Cheek, premolar and molar teeth, anterior tongue, hard palate, submandibular and sublingual gland.
Level II	Ila: Oropharynx, anterior and posterior tongue.
	Ilb: Oropharynx, parotid.
Level III	Oropharynx, larynx.
Level IV	Hypopharynx, Larynx, Thyroid, Cervical esophagus.
Level V	Skin of posterior scalp and neck.
Level VI	Thyroid gland, larynx, piriform sinus, esophagus.

Table 1: Classification of neck levels and cervical lymph nodes. Adapted from Robbins, Shaha AR, Medina JE, *et al.* Consensus statement on the classification and terminology of neck dissection. Arch Otolaryngol Head Neck Surg 2008; 134(5):536-538.

Diagnostic

The location of the mass, details surrounding its appearance and overall time course are important factors to help differentiate neoplastic disease from other possibilities in the long differential diagnosis. A persistent neck mass in an adult older than 40 years should raise a suspicion of malignancy. A neck mass in a young adult patient is more likely to be an inflammatory, congenital, or traumatic process. The clinical evaluation of a persistent neck mass may also require imaging studies or biopsy to establish the diagnosis [1].

The choice of diagnostic modalities is guided by a thorough history-taking and physical examination; during the anamnesis it is important collect data such as age, time of evolution of the mass, nocive habits, history of past illnesses, if the patient is surrounded by animals in the home and type of work to which he is dedicated. This produce the differential diagnosis of the mass and often allow the differentiation of lesions into inflammatory, congenital, traumatic, benign, or malignant [11]. Reasonable next steps may involve imaging studies like ultrasound, computed tomography with contrast, or MRI. Tissue biopsy is the gold standard for diagnosis of any neck mass [1]. The differential diagnosis is extensive and is easily remembered by employing the mnemonic "KITTENS" an acronym for K-congenital/developmental anomalies, I-infectious/inflammatory, T-Trauma, T-toxic, E-endocrine, N-neoplasms and S-systemic diseases [5,12].

Infectious/inflammatory neck masses

The great majority of inflammatory swellings of the head and neck have an infective cause [13]. Most infectious or inflammatory causes of neck masses will be acute in onset and have other concurrent identifiable signs and symptoms. Infectious or inflammatory is more likely to be bilateral [14]. Deep neck space infections and neck abscesses in adults are often caused by an odontogenic or salivary source. Important historical information encompasses symptoms of infection including pain, swelling, erythema, fever, odontalgia and/or history of recent dental procedure, spontaneous purulent drainage, accompanied by a progressively enlarging neck mass [5]. Physical examination reveals a tender swelling in the neck with possible overlying erythema, induration, and local fluctuance. The imaging study of choice is a CT scan of the face and neck with

contrast. Treatment involves appropriate antibiotics and surgical drainage depending on size and response to antibiotics [15].

Infectious causes that result in reactive cervical lymphadenopathy include numerous casually contracted viral upper respiratory illnesses such as rhinovirus, adenovirus, and influenza [14]. Other viral illnesses include Epstein-Barr virus and Human Immunodeficiency Virus, both of which require intimate contact for transmission. Bacterial infections such as *Staphylococcus aureus* and Group A *Streptococcus* are common causes of cellulitis, folliculitis, skin abscesses and suppurative lymphadenopathy of the head and neck. Management could include any combination of bacterial culture, incision and drainage, and antibiotic therapy [1]. Other less common infections include cat-scratch disease and tuberculosis. Management include serologic workup and further evaluation by infectious disease specialists [16]. One of noninfectious process that is localized to the head and neck is sialadenitis. Inflammation of the gland and obstruction of saliva flow can be caused by a sialolith or stenosis of the duct. To rule out a sialolith, a non-contrast CT is reasonable. Sialendoscopy, performed by oral and maxillofacial surgeons, is a minimally invasive technique of cannulating the affected duct in order to remove the culprit of salivary duct obstruction.

Congenital neck masses

Congenital masses are the most common non inflammatory neck mass in children. Each type has a typical location and presentation in the neck. Children with congenital malformation of the neck require comprehensive pediatric evaluation to ensure it is not a manifestation of a systemic syndrome [17].

Most vascular anomalies are recognized in childhood, particularly hemangiomas and arteriovenous fistulas, which are "high-flow" vascular lesions that can have significant consequences. However, some adults present with "low-flow" vascular anomalies, including venous malformations and lymphatic malformations. Vascular anomalies usually present as a soft, painless, lobulated and possibly hyperpigmented (if venous) mass within the soft tissue of the neck or oral cavity. Sclerotherapy (to scar down and shrink the lesion) is the treatment of choice [1]. Other congenital neck masses include thyroglossal duct cysts (frequently identified as the most common congenital mass in the neck), and branchial cleft cysts [18].

Trauma

Neck masses caused by trauma have a history and physical examination consistent with the type of trauma. A recent hematoma may reveal ecchymosis overlying a neck swelling and is often tender to palpation and soft. In contrast, if the hematoma is well organized, it may become firm due to fibrosis. History and examination are diagnostic and small hematomas usually resolve gradually without intervention [5]. Pseudoaneurysm or arteriovenous fistula may occur after shearing or penetrating trauma to the neck; Laryngocele may be caused by repeated use of musical instruments such as a trumpet [19].

Neoplastic neck masses

Neoplasms can arise from the adjacent structures and soft tissues within the neck; these lesions can be benign or malignant. The cervical mass may be the initial or only clinically apparent manifestation of head and neck cancer, such as squamous cell carcinoma, lymphoma, thyroid or salivary gland cancer [4]. Using knowledge of nodal drainage patterns, will aid in localizing the primary site of malignant disease in the presence of cervical masses.

Benign neoplasms: The neck can harbor neoplastic lesions that are benign yet not entirely innocuous. Benign neoplastic lesions have an indolent time course and will increase in size to varying degrees over many years. They may cause mass effect on critical structures of the neck, become cosmetically bothersome or rarely cause systemic effects. Approximately 6% of the general population has palpable thyroid nodules (benign follicular adenomas or benign thyroid cysts). The most common benign neoplasm of salivary glands is a pleomorphic adenoma arising from the parotid gland. These tumors are benign but will grow over time and have the potential for malignant transformation. Lipomas can arise anywhere on the body and their characteristics are the same in the neck as elsewhere, although the neck location may be more cosmetically bothersome [18].

Malignant neoplasms: Head and neck cancer accounts for 5% of all neoplasms of the body and 2% of oral cavity [20]. Oral cancer can be present in diverse anatomic zone; include lips, tongue, buccal mucosa, floor of the mouth, gums, retromolar zone, and palate [21]. Squamous cell carcinoma is prone to regional progression (usually neck) through the lymphatic stream [22]. The most com-

mon malignant neoplasm to present as a neck mass in an adult is metastatic squamous cell carcinoma with the primary site in the upper aerodigestive tract. Cervical lymphadenopathy may represent metastatic disease from another primary cancer of the head and neck, such as thyroid cancer, cutaneous carcinoma, or melanoma. Malignant neoplasms can also arise directly from the lymphatics or viscera of the neck. Lymphoma commonly presents with cervical lymphadenopathy and should be high on the differential of older adults or patients with constitutional symptoms, such as fever, weight loss, night sweats, or pruritus [23].

Management of a neck mass

At the time of starting the approach of these entities, the literature refers that if an inflammatory origin is suspected/infectious, it will require an expectant attitude and symptomatic treatment as well as antibiotic treatment empirical in cases where infection is suspected not viral. In the case of responding to antibiotherapy, the period recommended observation is 2 to 4 weeks after improvement. Cases that do not respond to antibiotic treatment require complementary tests: study analytical, serological and radiographic. A mass whose etiology remains undefined after all the previous procedures it has to be considered malignant. Regarding congenital malformations and tumors benign, treatment should in principle be as conservative as possible [24].

Pérez Cachafeiro., *et al.* [24] proposed for the approach of a cervical mass a management algorithm in which, according to the suspicion that the anamnesis and the physical examination cast; In the case of inflammatory/infectious masses, symptomatic and antibiotic treatment is started. In case of improvement, proceed to observation and if not applicable, run additional tests. In the case of suspicions of masses of traumatic, endocrine, congenital origin or benign tumor, these authors refer them to the relevant services. And finally, in the case of malignant tumors, likewise referred to the oncology service.

In our Oral and Maxillofacial Surgery Unit of the Hospital Coromoto, Venezuela; the management protocol for cervical masses is as follows (Figure 1).

A patient who presents with a cervical mass should undergo an exhaustive clinical history, looking for the possible etiological fac-

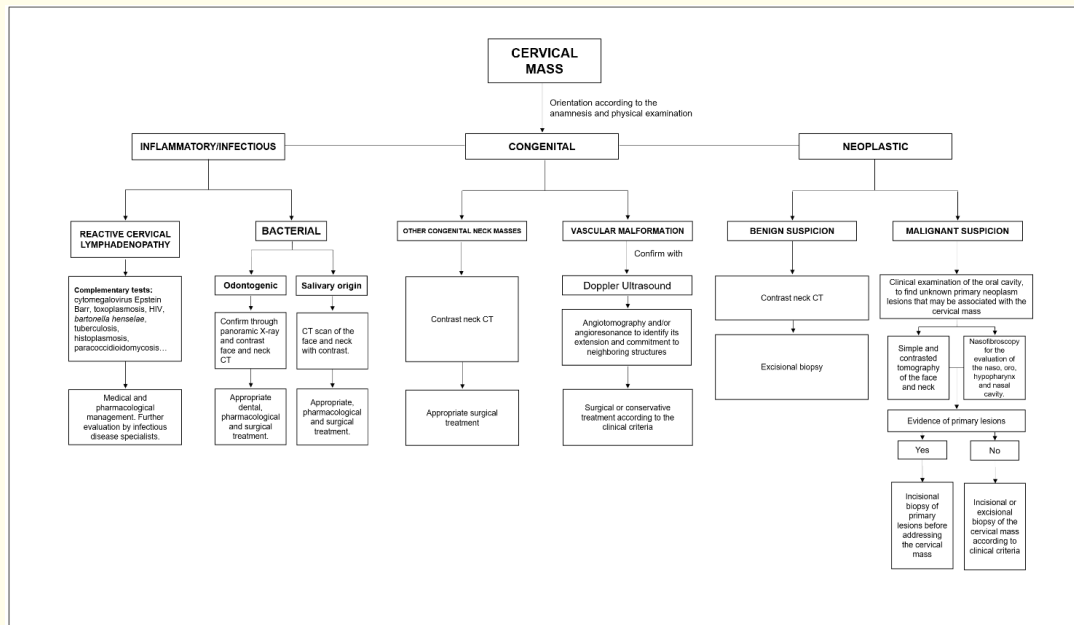


Figure 1: Management algorithm of a Neck Mass in Adults. Oral and Maxillofacial Surgery Unit of the Hospital Coromoto.

tor and nature of the mass; during the anamnesis it is important collect data such as age, time of evolution of the mass, nocive habits, history of past illnesses, if the patient is surrounded by animals in the home, and type of work to which he is dedicated.

If it is suspected to be inflammatory it could be viral, fungal or bacterial (odontogenic and no odontogenic). In the case of odontogenic, this must be confirmed through imaging studies (panoramic X-ray and contrast face and neck CT), and upon confirming, the appropriate dental, pharmacological and surgical treatment must be performed. The no-odontogenic bacterial infections, like those of salivary origin, imaging study of choice is a CT scan of the face and neck with contrast. Treatment involves appropriate pharmacological and surgical approach depending on size and response to antibiotics.

Infectious causes that result in reactive cervical lymphadenopathy include numerous entities, such as *Bartonella henselae*, tuberculosis, histoplasmosis, paracoccidioidomycosis, among other. Other infectious illnesses include cytomegalovirus, Epstein-Barr virus, toxoplasmosis, and Human Immunodeficiency Virus. Management

include serologic workup, and further evaluation by infectious disease specialists.

When thinking about congenital masses; for example, a vascular malformation, the consistency of the lesion is very important (present as a soft and painless lesion), in these cases we should proceed to perform doppler ultrasound to rule out lesions of vascular origin. In case of confirmation, it is necessary to practice angiotomography and/or angioresonance to identify its extension and commitment to neighboring structures; helping to define the treatment where it is included surgical or conservative treatment according to the type of vascular malformation presented. Other congenital neck masses include thyroglossal duct cysts and branchial cleft cysts; A contrasted neck CT should be performed, and subsequently the appropriate surgical treatment.

On the other hand, if there are indications that the mass is of neoplastic origin, a simple and contrasted tomography of the face and neck is requested, in addition to a thorough clinical examination of the oral cavity, to find primary lesions that may be associated with the cervical mass. We also practiced nasofibroscopy, for the

evaluation of the nasal cavity, nasopharynx, oropharynx and hypopharynx. An incisional biopsy is performed if lesions are found in these areas before addressing the cervical mass. And if there is no evidence of any alteration in these areas, perform an incisional or excisional biopsy of the cervical mass according to clinical criteria. Benign neoplasms include lipomas, adenomas, benign thyroid cysts, lymphoepithelial cyst among others; and its approach must include pertinent imaging studies (contrast neck CT), and excisional biopsy.

Summary

The best diagnostic method begins with a careful and systematic review of the patient, including a successful physical examination and deep anamnesis. The neck mass should be carefully examined by inspection and palpation, with the support of the relevant complementary tests and taking into account the different differential diagnoses. The delineation of the location of a mass within the neck and its position concerning neighboring structures and organs should be evaluated at the beginning of the physical examination, understanding the levels of cervical drainage will lead to detecting the primary location of malignant or infectious diseases in the presence of a cervical mass.

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Authors' Contributions

All the authors participated equally in the development of this research.

Competing Interests

The authors declare that they have non competing interests.

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