Author/s:
King, SK

Title:
Lateral neck lumps: A systematic approach for the general paediatrician

Date:
2017-11-01

Citation:
King, S. K. (2017). Lateral neck lumps: A systematic approach for the general paediatrician. Journal of Paediatrics and Child Health, 53 (11), pp.1091-1095. https://doi.org/10.1111/jpc.13755.

Persistent Link:
https://hdl.handle.net/11343/293807

JPCH Surgical issue

An approach to lateral neck lumps for the general paediatrician

Sebastian K. King

(1) Department of Paediatric Surgery, The Royal Children's Hospital, 50 Flemington Road, Parkville, Victoria, Australia, 3052.
(2) Surgical Research, Murdoch Childrens Research Institute, 50 Flemington Road, Parkville, Victoria, Australia, 3052.
(3) Department of Paediatrics, The University of Melbourne, Melbourne, Victoria, Australia, 3052.
(4) Department of Gastroenterology and Clinical Nutrition, The Royal Children's Hospital, 50 Flemington Road, Parkville, Victoria, Australia, 3052.

Corresponding author:
Sebastian K. King PhD FRACS
Department of Paediatric Surgery,
The Royal Children's Hospital,
50 Flemington Road, Parkville,
Victoria, Australia, 3052.

(T) +61 3 9345 5801
(F) +61 3 9345 6668
(E) sebastian.king@rch.org.au

Acknowledgements

Sebastian King is the grateful recipient of a Career Development Award (Murdoch Children's Research Institute) and the Senior Lecturer Fellowship (Royal

Australasian College of Surgeons). His position as an Academic Paediatric Surgeon is possible due to a generous grant from The Royal Children's Hospital Foundation.

Abstract

Lateral neck lumps are very common in children, and are largely benign in nature. The majority of lumps may be diagnosed on history and clinical examination alone, and further investigations are often not required. The most common pathologies in young children include reactive lymphadenopathy, lymphadenitis, and atypical mycobacterial infections. A lateral neck lump is an uncommon presentation for malignancy and is largely restricted to older children and adolescents. The paediatric surgeon plays an important role in the assessment and management of lateral neck lumps, often in the form of reassurance to the patients and their carers.

Key words

abscess, cervical lymphadenitis, lymphoma, Mycobacterium avium intracellulare scrofulaceum, reactive hyperplasia

Introduction

Lateral neck lumps in children are common and typically benign, yet induce considerable anxiety for both parents and primary physicians. A systematic approach to these lesions, based upon anatomy, the age of the patient, as well as the history and clinical features, should lead to fewer (unnecessary) investigations and a reduction in parental anxiety.

What constitutes the 'lateral neck' and why is this distinction important?

The 'lateral neck' is largely synonymous with the region of the posterior triangle of the neck. The posterior triangle is defined anatomically as lying between the posterior border of the sternocleidomastoid, the anterior border of the trapezius and the clavicle [1]. The layers of the lateral neck are filled with multiple lymph nodes. Due to the anatomical distinction between the lateral neck (posterior triangle) and anterior (midline or medial) neck, the exact location of the lump in the neck makes it possible to exclude a number of differential diagnoses with confidence. For example, thyroglossal duct cysts, heterotopic or ectopic thyroid gland, and inflamed sub-mental lymph nodes are confined to the anterior neck, and need not be considered in the differential diagnosis of children who present with a lateral neck lump.

How should I approach the clinical assessment?

The predominant causes of lateral neck lumps may be classified into congenital, infectious and malignancy (Table 1). The key components to the clinical history (Table 2) and clinical examination (Table 3) are summarised below.

Does the age of the patient make a difference?

The age of the patient is often strongly indicative of the likely diagnoses. Patients under the age of 2 years are most likely to have reactive lymphadenopathy, which may occasionally progress to a cervical abscess when due to bacterial

infection. Viral aetiologies (adenovirus, rhinovirus, parainfluenza) are responsible for the majority of cases of cervical lymphadenitis, and may be seen with concomitant upper respiratory tract infections [2]. Viral lymphadenopathy is usually bilateral, with multiple small nodes involved. Bacterial causes include tonsillitis, pharyngitis and sinusitis, and usually affect one particular node or several adjacent nodes (Figure 1). Enlarged nodes may also be seen in children with cradle cap, eczema or skin infections affecting the scalp, as a consequence of regional lymphatic drainage.

Patients aged between 2 – 6 years also may present with reactive lymphadenopathy (44% of children under the age of five years presenting for a well-child check will have cervical lymphadenopathy), but this is less common than in the first two years of life [3]. A major cause of a lateral neck lump in this age range is atypical mycobacterial lymphadenitis (*Mycobacterium avium intracellulare scrofulaceum* complex – MAIS; also called MAC (*Mycobacterium avium* complex) or atypical mycobacterial infections; see below).

Once patients are older than 6 years of age, malignancy becomes a more common differential diagnosis. The most common malignancies to be associated with lateral neck lumps are Hodgkin disease, non-Hodgkin lymphoma and leukaemia. Hodgkin disease has a typical bimodal presentation, with adolescents accounting for 15% of cases [4]. It is uncommon in children under five years of age [5]. Cervical node enlargement is common in lymphomas, and the nodes appear as an enlarging, rubbery, non-tender, contiguous mass [5].

Non-Hodgkin lymphoma typically affects boys aged 7 – 11 years, with 10 – 15% of patients presenting with cervical involvement [3, 5]. Unlike Hodgkin disease, the presenting mass often arises in extra-nodal tissues, including Waldeyer's ring, the orbit, the mandible, and the sinuses. Leukaemia remains the most common childhood malignancy, for which a typical clinical finding at presentation is cervical lymphadenopathy. Usually the nodes are non-tender and greater than 2cm in diameter by the time of presentation. There may be associated hepatosplenomegaly.

A remnant of a branchial (or pharyngeal) cleft may also present in the older child. Whilst branchial clefts may give rise to sinuses and fistulae, these are in the

anterior triangle of the neck and present earlier in childhood. In contrast, branchial cleft cysts appear more laterally in the neck, usually during the second to fifth decades of life. They have no communication with the skin as the cyst is beneath the deep cervical fascia. The majority (95%) of cysts arise from the second branchial cleft.

What is a lesion that presents at, or shortly after, birth likely to be?

Vascular or lymphatic malformations often present early in life, and usually have been diagnosed on antenatal ultrasonography. The majority of lymphatic malformations in the lateral neck are diagnosed in the first year of life as a soft, flabby mass (Figure 2) [6]. Rarely, a lymphatic malformation may rapidly enlarge and become tender secondary to infection or bleeding within it. In this setting the malformation may enlarge so rapidly as to extend to the anterior neck and result in significant obstructive symptoms. The management of a lymphatic malformation is determined by its site, size and impingement upon surrounding structures, particularly the airway. Coordination between paediatric surgeon, plastic surgeon, ENT surgeon and interventional radiologist will determine the optimal approach.

The majority of vascular malformations are present at birth. They are usually easy to diagnose clinically, with changes in skin colour, an audible bruit, and an ability to empty the lesion upon compression. Rarely, the malformation may be associated with platelet trapping, cardiac failure and/or disseminated intravascular coagulopathy (Kasabach-Merritt phenomenon) [7]. Similar to lymphatic malformations, management requires a multi-disciplinary approach.

How may I distinguish atypical mycobacterial infections?

This condition typically affects children aged between 2 – 6 years. It is believed that one pathway of infection is via oral ingestion of infected bird droppings, transmitted by children putting their fingers in their mouths. It is usually seen in the

submandibular and parotid lymph nodes (Figure 3), but may manifest in the lateral neck nodes as well. Much less commonly, atypical mycobacterial infections may involve the axilla or groin. The affected node(s) increases in size over 3 – 6 weeks and is *non-tender*. Eventually the node and deep cervical fascia are breached to produce a collar-stud abscess, evident by the overlying skin becoming discoloured and purple-pink. As it erodes through the skin it produces a chronic sinus (in about 10% of untreated cases) [2]. The management involves complete removal of the affected node, as well as the more superficial component of the collar-stud abscess, either via formal excision or by curettage. Simple incision and drainage is contraindicated as it leads to chronic sinus formation.

Do I need to be worried about malignancy in children?

As discussed previously, malignancy is largely – but not exclusively – limited to children aged over 6 years of age. However, a cervical teratoma may present in the neonatal period. In addition, a lateral neck lump may be the presenting feature in a neuroblastoma or rhabdomyosarcoma, or the manifestation of metastatic disease.

What about the rarer conditions?

Sialadenitis (parotid gland inflammation) is a rare cause of an upper lateral neck lump, and may be a consequence of infection or sialectasis. The swelling of the gland may be both painful and episodic. It generally causes pain in anticipation of a meal or during a meal. It does not normally require surgery. The presentation differs from mumps, in which bilateral inflammation is expected.

Cat-scratch disease results from infection with *Bartonella henselae* and most commonly affects nodes in the axilla (52%) and the neck (28%) [3]. Lymphadenopathy appears 1 – 8 weeks after a peripheral scratch or bite from a cat, though dogs may sometimes be responsible. The lymphadenopathy typically affects one node which is tender. Infection tends to be chronic, but eventually resolves.

Diagnosis relies upon history and examination, and positive serology. Management entails observation and analgesia, with an expectation of spontaneous resolution.

Which investigations are indicated, and when?

The vast majority of lateral neck lumps need no imaging, nor further investigation. Investigations will be directed by the clinical findings and the age of the patient, and are normally indicated where there is significant diagnostic doubt or where further information directs management. The following investigations may be considered:

(1) Bloods – full blood count, inflammatory markers (CRP, ESR) and serology (*Bartonella henselae*, CMV, EBV, toxoplasmosis, HIV) for a suspected infective cause. Where malignancy is suspected, tumour markers (e.g. lactate dehydrogenase LDH, alfa-fetoprotein αFP, beta-human chorionic gonadotrophin βhCG, ferritin, neuron specific enolase) may be indicated.

(2) Ultrasonography – the most common radiological investigation employed as it differentiates solid versus cystic lesions (e.g. lymph node/malignancy versus a branchial cleft cyst/lymphatic malformation). Moreover, it may characterise nodal size, shape, internal architecture, vascularity, and associated soft tissues. It aids in the diagnosis of abscess formation in nodes that are located beneath the deep cervical fascia (but may feel solid beneath the relatively tight fascia). [8]

(3) Chest radiograph – seldom required in acute cases (lymphadenitis) but may be more valuable for sub-acute or chronic lymphadenopathy.

(4) Contrast CT/MRI – superior anatomical localisation, improved enhancement characteristics, and evaluation of surrounding structures compared with ultrasonography. This means that it is indicated as an adjunct for lymphatic and vascular malformations, and non-haematological malignancies.

(5) Excisional biopsy – gold standard for histological investigation and is the definitive management for MAIS-infected node and its related subcutaneous abscess. Excisional biopsy requires pre-operative communication between the referring clinician, surgeon and pathologist (the node should be sent fresh for

investigation). A child in whom there is suspicion of a lymphoma may need a chest x-ray and/or echocardiogram pre-operatively to predict the risk of acute airway obstruction upon induction of anaesthesia.

The role of fine needle aspiration (FNA) in the investigation of neck lumps (both lateral and medial) in children remains controversial. It is rarely necessary. The procedure is poorly tolerated by children, and is unable to provide reliable tissue architecture. [5, 7] The sample may miss the critical histological tissue in bloody, fibrous and/or mixed solid/cystic lesions. However, tissue obtained at FNA may be used for culture, immunohistochemistry, flow cytometry, chromosomal analyses, PCR, and acid-fast bacteria staining. In short, it is used only in specific situations, and should not be a procedure requested by a primary medical practitioner.

When should I refer a child with a neck lump to my paediatric surgical colleague?

Referral is prudent where the condition is potentially surgical, even when an operation is not required immediately. This is particularly so in conditions such as MAIS, where the decision to operate and its timing may be nuanced. While some abscesses may be aspirated, it is wise to seek surgical advice as formal operative incision and drainage may be preferable. All congenital developmental lesions require surgical input, although in some situations this might be achieved as part of a multidisciplinary service. All children who present with suspected malignancy should be referred to the regional paediatric oncology service, which includes surgeons.

References

(1) Sinnatamby CS, ed. *Last's Anatomy 12th Edition*. Churchill Livingstone, Edinburgh, 2011.

(2) Gosche JR, Vick L. Acute, subacute, and chronic cervical lymphadenitis in children. *Sem Pediatr Surg* 2006;15(2):99-106.

(3) Oldham KT, Colombani PM, Foglia RP, Skinner MA, eds. *Principles and Practice of Pediatric Surgery 2nd Edition*. Lippincott Williams and Wilkins, Philadelphia, 2004.

(4) Tracy Jr TF, Muratore CS. Management of common head and neck masses. *Sem Pediatr Surg* 2007;16(1):3-13.

(5) Dickson PV, Davidoff AM. Malignant neoplasms of the head and neck. *Sem Pediatr Surg* 2006;15(2):92-8.

(6) Hutson JM, Beasley SW, eds *The Surgical Examination of Children 2nd Edition*. Springer, Heidelberg, 2014.

(7) Geddes G, Butterly MM, Patel SM *et al*. Pediatric neck masses. *Pediatr Rev* 2003;34(3):115-24.

(8) Ludwig BJ, Wang J, Nadgir RN *et al*. Imaging of cervical lymphadenopathy in children and young adults. *Am J Roentgenol* 2012;199(5):1105-13.

Figure legends

Figure 1: Lymphadenitis localised to the left posterior triangle. The overlying erythema is focused upon the central portion of the painful lymph node mass.

Figure 2: Lymphatic malformation in a neonate. These malformations are now typically diagnosed on antenatal ultrasonography. An acute infection or bleed into the malformation may lead to life-threatening respiratory compromise.

Figure 3: Mycobacterium avium intracellulare scrofulaceum (MAIS) affecting two left submandibular lymph nodes. Infection in the posterior node had erupted through the skin and created a “collar-stud” abscess. The node was subsequently excised via an inferior approach to protect the left marginal mandibular node (sutures remain *in situ*).

Tables

Table 1: Causes of lateral neck lumps

Congenital	Infectious	Malignancy
Lymphatic malformation	Lymphadenopathy (reactive)	Hodgkin disease
Vascular malformation	Lymphadenitis	Non-Hodgkin lymphoma
Branchial cleft cyst	Atypical mycobacterial	Leukaemia
Teratoma	lymphadenitis (MAIS*)	Neuroblastoma
	Cat-scratch disease	Rhabdomyosarcoma
	Sialectasis/Sialadenitis	Metastases

* MAIS – Mycobacterium avium intracellulare scrofulaceum, also known as MAC (Mycobacterium avium complex)

Table 2: Key features of the clinical history

Feature	Comment/Significance
Age	0 – 2 years (lymphadenitis)
	2 – 6 years (MAIS)
	5 – 18 years (malignancy)
Duration of symptoms	0 – 2 weeks (lymphadenitis/inflammatory)
	Greater than 2 weeks (MAIS*, malignancy)
	Variable over weeks – months (reactive hyperplasia)
Location	Unilateral (lymphadenitis, malignancy)
	Bilateral (systemic, reactive lymphadenopathy)
	Confined to lateral neck (lymph node, cleft cyst)
	Diffuse in neck (lymphatic/vascular malformation)
Progression of swelling	Increasing (lymphadenitis, malignancy)
	Stable (MAIS)
	Decreasing/variable (lymphadenopathy, lymphatic/vascular malformation, branchial cleft cyst)
Tenderness	Tender (lymphadenitis, sialadenitis, infected lymphatic malformation)
	Non-tender (lymphatic/vascular malformation, MAIS, malignancy)
Local signs/symptoms	Sore throat, earache, tooth pain (lymphadenopathy)
	Bites/scratches (cat-scratch disease)
Systemic signs/symptoms	Fever (lymphadenitis, malignancy)
	Night sweats, malaise, weight loss, anorexia (malignancy)
Recent travel	Consider rare infective causes

* MAIS – Mycobacterium avium intracellulare scrofulaceum, also known as MAC (Mycobacterium avium complex)

Table 3: Key features of the clinical assessment

Feature	Comment/Significance
Location	Unilateral (examine all nodal areas in the head and neck)
	Bilateral (comparison of left versus right)
	Confined to lateral neck (lymph node, cleft cyst)
	Diffuse in neck (lymphatic/vascular malformation)
Size	Less than 10mm (normal)
	10 – 20mm (reactive lymphadenopathy, lymphadenitis)
	Greater than 20mm (lymphadenitis, malignancy, lymphatic/vascular malformation, branchial cleft cyst)
Number of lesions	Single (MAIS*, cat-scratch disease, pilomatrixoma, branchial cleft cyst, lymphatic/vascular malformation, metastasis, sialedenitis)
	Multiple (lymphadenopathy, malignancy)
Tenderness	Tender (lymphadenitis, sialadenitis, infected lymphatic malformation)
	Non-tender (lymphatic/vascular malformation, MAIS, malignancy)
Overlying skin	Tethered skin (pilomatrixoma, MAIS prior to drainage)
	Erythema (lymphadenitis, infected lymphatic malformation)
	Colour (purple – MAIS)
Mobility	Mobile (cat-scratch disease, metastasis, teratoma, lymphatic/vascular malformation, branchial cleft cyst)
	Immobile (lymphadenitis, malignancy, MAIS)
Transillumination	Yes (lymphatic/vascular malformation, branchial cleft cyst)
	Oral cavity and auditory canals (lymphadenopathy)
	Chest and axillae (malignancy, cat-scratch disease)
General examination	Abdomen (malignancy)

	Inguinal regions and genitalia (malignancy) Peripheries (cat-scratch disease)

* MAIS – Mycobacterium avium intracellulare scrofulaceum, also known as MAC (Mycobacterium avium complex)