

## Review Article

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## Cervical Adenopathy in Children: A Rational use of Investigations/ Resources

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### ABSTRACT

It is not unusual to see a child with enlarged neck nodes and such nodes are very common in otherwise normal children. While the majority are benign and self-limiting (in acute enlargement) there is often a lingering concern that this a symptom of an underlying serious condition and that referral, investigation and perhaps biopsy or FNAC (fine needle aspiration cytology) are warranted. This is especially the case when parental anxiety cannot be assuaged or there is worry over litigation. This paper aims to present a rational management plan for a child with cervical adenopathy and to suggest guidelines as to when to observe, when to investigate and or to refer such patients. It is useful to have a systematic and structured approach to this common problem, not only to provide diagnostic accuracy but also to recognize certain red flags that should prompt investigation, treatment and referral. In so doing this paper hopes to encourage rational use of resources in this clinical setting.

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Received: June 24, 2024; Accepted: June 27, 2024; Published: July 05, 2024

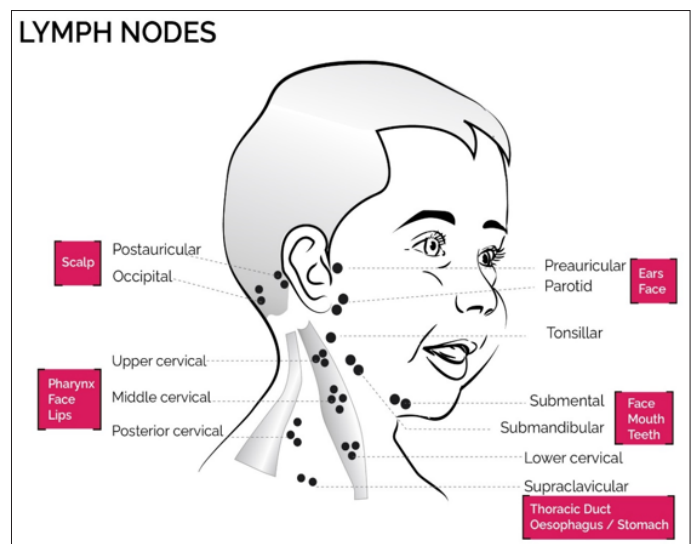
### What you Need to Know

- Cervical lymphadenopathy is usually defined as any cervical lymph node measuring more than 1 cm in largest diameter.
- There are multiple aetiologies for cervical swelling.
- It is prudent to have a systematic and structured approach to this common problem.

### How Important is Cervical lymphadenopathy in Children?

Cervical lymphadenopathy is a most important cause of palpable neck masses in the paediatrics age group. It is defined as the presence of one or more lymph nodes of more than 1 cm in diameter [1].

Cervical nodes are important sentinels to limit or prevent the spread of local infection e.g. from an infected scalp lesion or tonsillitis. They may also become enlarged (reactive) as part of a systemic infection (viral) and are typically arranged in a precise fashion in the anterior /posterior triangles of the neck, along the jugular vein and in a “ring” from the sub-occipital to the submental glands. These are shown graphically in Fig 1 along with their predictable drainage areas from the head and neck. Supraclavicular nodes are unusual in that they drain the oesophagus/stomach and abdomen (thoracic duct drainage).



**Figure 1:** Pictorial Representation of Cervical Lymph Nodes

It has been well reported that around 90% of school going children in the age group of 4-8 years have palpable lymphadenopathy [2, 3]. The majority of cases are of non specific benign aetiology and a minuscule of them (<5%) are secondary to a malignancy [4]. It is important to appreciate that there are many other possible causes (apart from lymphadenopathy) for swellings in the neck but they tend to occupy typical anatomical positions and are distinguishable

on history and examination.

So a primary care physician is commonly faced with a dilemma in management and whether to refer to specialist. Physicians familiarity with the causes of cervical lymphadenopathy and other causes of neck masses may reduce unnecessary diagnostic and radiological tests.

### How to Proceed in Such Cases?

As it is a commonly encountered problem and almost 40% of these palpable lymph nodes can be found in healthy children, it is prudent to consider a systematic approach for diagnosis and evaluation [5]. The easy accessibility of ultrasonography as a non-radiating modality and concerned parents there has been an increasing tendency for the physician to order tests either radiological or haematological which may not always be necessary.

### The Approach to a Child with a Neck Swelling Has Three Components

#### A. A Detailed History

1. Duration
  - Acute (less than 2/52 weeks)
  - Subacute (2-6/52 weeks)
  - Chronic (>6/52 weeks)
2. Associated Symptoms
  - Other illness e.g. Pharyngitis, ear ache, rash
  - Fever
  - Weight loss, failure to thrive, night sweats, pruritus
  - Easy bruising?
3. Has the Child Been Given Antibiotics?
4. Is there pain
5. Rapid or fluctuating size changes?
6. Ingestion of unpasteurised milk?
7. Pets at home?
8. Was it present since birth?

#### B. A Thorough Examination

1. Confirm the swelling is nodal!
2. Anterior neck masses are unlikely to be nodal.
3. Is it more than one node?
4. Is it unilateral or bilateral?
5. Is there generalised adenopathy (axillary, inguinal)?
6. Tenderness?
7. Cystic?

8. Are there overlying skin changes?
  - Erythema?
  - Tethering of the skin?
  - Induration
  - Is there a rash or infected skin lesion in the head or neck?
9. How big is the node (nodes)?
10. Are they distinct or matted together?
11. Is there restricted neck movement (range of motion)?
12. Is there any intra-oral, dental or scalp pathology?

### C. Investigations-Referral- Intervention

There are a myriad of possible investigations available from as simple as a C-Reactive Protein (CRP) to CT, excision and biopsy. However, these is no substitute for a thorough history and examination and perhaps the most important initial observation is to determine if the child is ill.

Before going to the causes of cervical lymphadenopathy, we should know the causes of neck masses.

**Table 1: Outlines the Causes of Neck Masses in Pediatric Age Group**

	Site	Congenital	Acquired
1	Midline-anterior	Dermoid cyst, Thyroglossal cyst Thymic cyst	Thyroid swelling
2	Anterior triangle	Branchial cyst/cleft Sternocleidomastoid tumor Cervical rib Hemangioma/ lymphangioma	Lymphadenopathy Sialadenitis/ sialolithiasis(submandibular gland) Epidermoid cyst
3	Posterior triangle	Cystic Hygroma	Lymphadenopathy Epidermoid cyst Malignant neoplasm
4	Other		Parotid enlargement

From the above table we can see that lymphadenopathy is one of the major causes of an acquired lesion in both the triangles of neck, it is important to further classify the causes of cervical lymphadenopathy. It can be broadly classified into two ways either based on the cause or duration. Based on causes it can be of four types :Infectious, Immunologic, Neoplastic and Miscellaneous or metabolic. Based on duration it can be Acute, sub-acute or chronic.

**Table 2: Gives a Brief Overview of the Causes of Cervical Lymphadenopathy**

Duration	Infectious	Immunologic	Malignancy	Miscellaneous
Acute (<2 weeks)	1. Viral – Respiratory viruses, EBV, CMV 2. Bacterial- Staphylococcus aureus/group A streptococcus	1 Kawasaki disease 2 Kikuchi-Fujimoto disease		1 Adverse drug reaction 2 Histiocytosis
Subacute (2-6 weeks)	1 Non tuberculous mycobacterium 2 EBV, CMV 3 Mycobacterium tuberculosis 4 Cat Scratch disease 5. HIV 6 Taxoplasmosis 7 Malaria	1 SLE 2 Juvenile idiopathic arthritis 3 Dermatomyositis		
Chronic (>6 weeks)		1 common variable immunodeficiency 2. Chronic granulomatous disease 3. Hyperimmunoglobulin E syndrome	1. Hodgkins Lymphoma 2. Non-Hodgkins Lymphoma 3. Acute Leukemia 4. Rhabdomyosarcoma 5. Neuroblastoma	1. Sarcoidosis 2. Storage disease (Gaucher/Niemann- Pick disease)

As there are multiple causes for enlarged cervical lymph nodes, the importance of a thorough history and physical examination cannot be overemphasised. The duration of illness is of paramount importance as the majority of these are reactive lymphadenitis due to viral or bacterial infection and generally subside after 2 weeks, whereas any chronic lymph node enlargement over 6 weeks in duration is more likely to have an opportunistic, metabolic, tuberculous or neoplastic aetiology. Subacute lymphadenitis (2-6 weeks) may have several causes and requires detailed examination and subsequent investigation.

Acute lymphadenitis, which comprise the majority of such presentations in our clinic, are usually viral in aetiology and often have a history of a viral prodrome. Generally, These lymph nodes (LNs) are tender on palpation and may be either unilateral or bilateral. They usually resolve over 2 weeks as do the viral symptoms, although there is a small risk of secondary bacterial lymphadenitis. This is the second most common cause after viral infections and are usually unilateral and commonly in the anterior part of the neck. They are generally associated with fever. On clinical examination the cervical swelling will be firm and tender with overlying skin erythema. There may be limitation in neck mobility. Staphylococcus aureus and group B streptococcus are the most common organisms involved.

Persistent lymphadenopathy, which is more than 2 weeks of duration can be subacute or chronic (>6 weeks). Viral infections are once again the predominant cause of subacute cervical lymphadenopathy. Chronic (>6 weeks) cervical lymphadenopathy requires work up.

### Investigation and Work Up

Our focus is on the rational use of investigations and resource utilization. As we all know, the majority of cases we encounter in practice are acute reactive lymphadenitis secondary to viral infection. Is it therefore necessary to order any radiological or haematological investigations? What is the best evidence-based practice? The need to follow a proper structured approach for work up will not only be cost effective, but will also reduce the workload of our already overburdened healthcare system and prevent unnecessary invasive testing on children.

Observation and reassurance of the parents without any investigation is generally an accepted and appropriate management for a well appearing child with acute cervical lymphadenopathy. If the child is unwell and febrile with clinical examination suggestive of suppuration, then basic blood investigations like complete blood count, CRP or erythrocyte sedimentation rate (ESR) along with US of the neck should be considered.

Whereas in persistent cervical lymphadenopathy (subacute and chronic) blood tests like FBC, blood smear, CRP, lactate dehydrogenase (LDH), and liver function tests (LFTs) should be done. Serology for Epstein Barr Virus (EBV), cytomegalovirus (CMV) and Human immunodeficiency virus (HIV) should be considered only when these causes are under consideration. Tuberculin test and quantiferon gold should be considered if there is a suspicion of tuberculosis. Based on the clinical examination and if the differential is towards malignancy, then excisional biopsy of the lymph node is the gold standard.

Most of the paediatric surgery clinic referrals are for lymph node biopsy. But when should a clinician consider doing LN biopsy? The following are few features, which should prompt a clinician to consider a child suitable for biopsy, these includes the following in Box 1 [6-10].

**Box 1: Red Flag for Lymph Node Biopsy**

1. Size of LN >2cm
2. Nodes increasing in size over 2 weeks
3. No decrease in size of LN after 4-6 weeks
4. Nodes not returned to baseline after 8-12 weeks
5. Abnormal chest x ray
6. Supraclavicular LN
7. Presence of systemic signs and symptoms of – fever, weight loss, night sweats and hepatosplenomegaly
8. Hard, fixed, matted and non tender lymphadenopathy.
9. Signs and symptoms of Kawasaki disease
10. Autoimmune disease with generalised lymphadenopathy

**Treatment**

Our focus in the management is to first classify the child with cervical lymphadenopathy as localised to the cervical region or part of a generalised lymphadenopathy. Management of generalised lymphadenopathy will be based on a detailed work up as directed by the history, clinical signs and symptoms. Most of the time lymph node biopsy is done and targeted therapy will be considered as per the diagnosis. Our objective in this article is to focus on localised cervical lymphadenopathy, as these are a more common entity compared to generalised adenopathy yet lead to unnecessary investigation and treatment for benign and self-limiting conditions. So as per our algorithm(below), if the localised cervical lymphadenopathy is acute and presents with significant signs of inflammation then we need to examine the child and see if there are signs of suppuration. For any suppurative bacterial lymphadenopathy the appropriate treatment is antibiotics initially followed by incision and drainage (under general anaesthesia) if pus is confirmed on ultrasound (US). Admission work up includes our FBC and CRP, culture and sensitivity on any pus sample. Augmentin, dosage based on weight, is the most common initial antibiotic. Antibiotics may be changed to oral after 24-48 hours and on the basis of sensitivity. Most respond and can be followed up after 2 weeks in an outpatient clinic. For acutely inflamed but non suppurative cervical lymphadenopathy a trial of 2 weeks of oral antibiotics is prudent, though the child should be reassessed in the clinic after 48 hours of antibiotics to ensure there has been no deterioration or development of suppuration. If this has occurred, then the suppurative pathway should be followed. If the response is good, then antibiotics should be continued for 2 weeks in total and a final reassessment arranged in the clinic after 6 weeks. If there is no response after 2 weeks of oral antibiotics, then the persistent pathway should be followed.

For persistent lymphadenopathy which includes subacute and chronic lymphadenopathy a 2 weeks course of oral antibiotics should be considered (if not already given) as most of the subacute presentations are secondary to recent infection. A detailed work up, including FBC, CRP, chest xray (CXR) and other investigation as indicated based on the history and clinical examination, should be done. Most of these resolve after 2 weeks of therapy and they should be further followed up at 4-6 weeks. When the lymph node shows no response and if they meet the criteria as described by King et al then consideration should be given for lymph node excision biopsy.

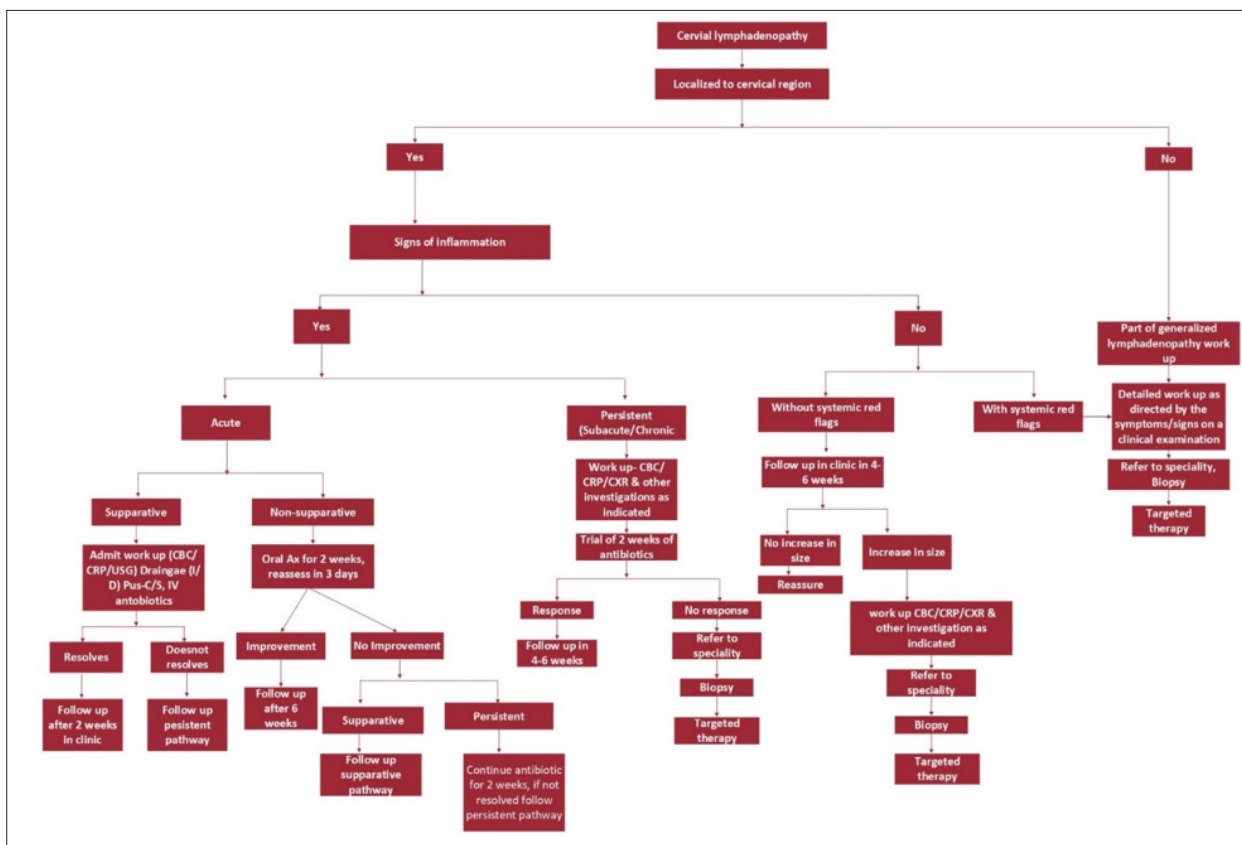
Children with cervical lymphadenopathy and no signs of inflammation should be further divided in two groups based on

the presence or absence of systemic red flags. Those with systemic red flags should follow the same approach as the generalised lymphadenopathy group with a detailed work up, lymph node biopsy and further targeted therapy. Children without systemic red flags and no signs of inflammation should not be over investigated. They should be followed up in clinic after 4-6 weeks and if there is no increase in size then the parents can be reassured and no further investigation or treatment is warranted. In cases where there is an increase in size after 6 weeks then consideration should be given for a basic work up and lymph node biopsy. This is the only group of children (localised cervical lymphadenopathy with no signs of inflammation and without any systemic red flags but with increase in size after 6 weeks of follow up) where there may be some conflict about work up and lymph node biopsy. But we feel such nodes should be sent for HPE, not only to provide a definitive histological diagnosis but also to relieve the anxiety.

**Table 1: Summary**

Localised Cervical Lymphadenopathy	Acute	Subacute	Chronic
Duration	< 2weeks	2-6 weeks	>6 weeks
Clinical Findings	Usually reactive, May be painful, suppurative	Mostly asymptomatic.	Mostly asymptomatic
Aetiology	Infectious- viral or bacterial	Infectious- Recent viral or bacterial	Infectious Metabolic Immunologic Neoplastic
Investigation	Not indicated Reassurance	Only if increasing in size or becomes symptomatic	Based on history/ symptoms/ signs and examination. Possible biopsy
Treatment	1.Observation 2. Trial of antibiotics if non suppurative 3.If suppurative- incision and drainage with iv antibiotics	1. Trial of 2 weeks of oral antibiotics	Targeted therapy
Follow up	After 2 weeks.	6 weeks	Based on response of therapy and diagnosis

## Management Algorithm



FBC: Complete Blood Count; CRP: C reactive protein; CXR: Chest X-Ray; US: Ultrasonogram; I/D: Incision and drainage; Ax: Antibiotics; C/S: Culture sensitivity

### Contributorship and the Guarantor

MC and ID conceived the article and are guarantors. PR and MC wrote the article, created the boxes. All the authors reviewed the article, and helped with the figures.

### Conflicts of Interest

“Competing Interest: None declared”

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