

## Original Research Article

# Etiopathological study of pediatric neck masses in a rural population

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### ABSTRACT

**Background:** Neck mass in pediatric age group is a common clinical condition encountered by an ENT Specialist. Detailed clinical examination and knowledge of the common neck masses in children, which differ from those in adults is vital in early diagnosis and treatment. Diagnostic modalities such as Ultrasonography, Computerised Tomography, Fine needle aspiration cytology (FNAC) and histopathological examination aids in the diagnosis of superficial neck masses. The majority of neck masses in the pediatric population are congenital or inflammatory in origin and some are neoplastic. This study was conducted to establish the various causes of neck masses and the site of origin of neck masses in pediatric patients attending ENT OPD.

**Methods:** 50 patients in the age group of 1 month to 18 years presenting with neck masses to the ENT OPD of Vinayaka Mission's Medical College and Hospital, Karaikal were included in the study. This was a prospective study conducted for a period of 2 years. All the cases underwent FNAC. Biopsy and histopathological examination was done in cases where the cytological diagnosis was inconclusive.

**Results:** Of the 50 cases clinically evaluated, 24 were lymph node swellings, 7 were thyroid swellings, 8 were salivary gland swellings, 10 were congenital neck swellings, with 1 swelling being due to other cause.

**Conclusions:** Inflammatory swelling arising from the Lymph nodes were the commonest cause of neck swelling in pediatric patients. Neck swellings were located most commonly in the Submandibular triangle in the study.

**Keywords:** Pediatric neck masses, Cervical Lymphadenopathy, Congenital neck masses, Neck swellings, Reactive non-suppurative cervical lymphadenitis

### INTRODUCTION

Patients in the pediatric age group, presenting with neck masses is common in clinical practice. Neck masses in the pediatric age group is a matter of concern for the parents and also poses a diagnostic challenge to the clinician. The neck masses in children vary to a certain extent in their etiology from those found in adults. As a matter of respite, majority of the neck masses in children are benign in nature and in their clinical course also. Because of the presence of a variety of structures in the neck, the causes of neck masses are also varied. Pathology of a variety of these structures found in the neck like lymph nodes, thyroid gland, salivary glands, nerves, blood vessels can present as neck mass. A proper

history, followed by detailed clinical examination, and the use of diagnostic imaging modalities such as ultrasonography, computerized tomography and other investigations such as fine needle aspiration cytology, Histopathological examination of the excised tissue can be utilized to arrive at a diagnosis.

The broad spectrum of etiology of neck masses that range from congenital benign to acquired neoplastic lesions is varied and related to multiple factors. Clinical, imaging and cytological evidences are enough to establish accurate diagnosis in pediatric neck masses except in cases of nonspecific clinical conditions as in inflammatory lymphadenopathy or lymphomas in which open biopsy is required.<sup>1</sup> The conspicuous location and

the frequently associated cosmetic problem create anxiety for both parents and family physicians, which often result in early presentation.<sup>1-6</sup> The aim of this study is to assess the etiology of neck masses in patients of the pediatric age group from rural population.

## METHODS

A cross-sectional study was conducted in the department of ENT of Vinayaka Mission's Medical College and Hospital, Karaikal, India, for a period of 2 years from January 2012 to December 2013. Only patients in the pediatric age group, ranging from 0 years to 16 years were included in the study. A total of 50 patients presenting to the ENT OPD with complaints of neck masses were included in the study. A detailed history was taken from the care-takers of the patients and a detailed clinical examination including examination of neck, ENT examination and Systemic examination was carried out. All the cases were subjected to ultrasonographic evaluation of neck masses, followed by fine needle aspiration cytology (FNAC). In cases where the diagnosis based on ultrasonography and cytology was inconclusive, excision biopsy was done and histopathological examination of the specimen was carried out using haematoxylin and Eosin staining. Routine blood examinations, including haemoglobin estimation, total leucocyte count, differential leucocyte count with peripheral blood smear study was carried out in all the cases. In cases of Thyroid enlargement, estimation of thyroid hormone level in blood was carried out. In cases where pus was aspirated from neck masses, gram staining and Ziehl-Neelsen staining of the aspirate was done along with culture and sensitivity.

## RESULTS

During the 2 years of study, 50 patients in the age group of 0 to 16 years presented with neck masses.

**Table 1: Anatomic sites of neck masses.**

Anatomic site	No. of patients	Percentage (%)
Submental triangle	5	10
Submandibular triangle	18	36
Upper jugular	3	6
Middle jugular	2	4
Lower jugular	3	6
Posterior triangle	4	8
Anterior part of neck/ midline swelling excluding submental triangle	15	30

Most common site of neck mass was in the submandibular triangle accounting for 36% of the cases. Submandibular neck swellings were due to submandibular lymph node and submandibular salivary gland pathology. Midline of the neck was the second

most common site of neck masses accounting for 30% of the cases. Goiter, thyroglossal cyst and dermoid cyst were the causes for mid-line neck swellings. 16% of the neck masses were found on the lateral aspect of neck and 8% of the neck masses were found in the posterior triangle of neck.

According to aetiology, the inflammatory category was the main group accounting for 32 cases (64%), followed by the congenital category 10 cases (20%), neoplastic 3 cases (6%) and then the noninflammatory non-neoplastic 5 cases (10%). The main cause of neck mass was reactive non-suppurative lymphadenitis which was seen in 11 patients (22%). Surgical interventions were carried out to get specimen for diagnosis or as a part of management of the neck mass.

**Table 2: Age and sex distribution in cases of neck masses according to the etiology.**

Etiology	Number (%)	Average age (years)	Male: female
Thyroid gland	7		1:6
Colloid goiter	3	13	1:2
Chronic lymphocytic thyroiditis	2	14	0:2
Hashimoto's thyroiditis	2	15	0:2
Salivary gland	8		6:2
Chronic sialadenitis	6	10	4:2
Ranula	2	11	2:0
Lymph nodes	24		14:10
Chronic lymphadenitis	7	11	5:2
Reactive non-suppurative lymphadenitis	11	8	6:5
TB lymphadenitis	2	12	1:1
Non-Hodgkin's lymphoma	2	7	2:0
Lymph node abscess	2	14	0:2
Congenital neck masses	10		6:4
Thyroglossal cyst	4	8	2:2
Branchial cyst	2	12	2:0
Dermoid cyst	4	4	2:2
Others	1		1:0
Lipoma	1	12	1:0
Total	50		28:22

Most common cause of neck masses in our study was due to lymph node swellings (24 cases; 48%). Lymph node swellings occurred more commonly due to lymphadenitis such as reactive non-suppurative lymphadenitis (11 cases; 22%), chronic lymphadenitis (14%) and TB

lymphadenitis (4%). Other cases which presented with lymph node swellings were lymphoma and lymph node abscess. 14 cases of lymph node swellings were found in male and 10 cases were found in female.

The second most common cause of neck mass was due to submandibular salivary gland swellings. There were 8 cases of submandibular salivary gland swellings which occurred due to chronic sialadenitis and ranula. 5 cases of salivary gland enlargement were seen in male and 3 cases were seen in female.

In 7 cases (14%), neck swellings were due to thyroid gland enlargement. 3 cases being result of colloid goiter. Chronic lymphocytic thyroiditis was the cause of thyroid enlargement in 2 cases and in the other 2 cases Hashimoto's thyroiditis was the cause for goiter. Goiter was seen in 6 female patients and in 1 male patient.

Congenital neck masses accounted for 10 cases of neck swellings. 4 patients had thyroglossal cyst, 4 patients had dermoid cyst and 2 patients had branchial cyst.

Lipoma accounted for 1 case of neck mass. Youngest patient in the study was a one year old child who presented with lymphadenitis.

Treatment was suggested depending on the diagnosis of the neck mass. Surgical management was done where needed like excision of the neck mass or incision and drainage. Excised tissue was sent for histopathological examination. Patients having reactive lymphadenitis were managed by medical means and those having tubercular lymphadenitis were treated with anti-tubercular therapy, those diagnosed as having non-Hodgkin's lymphoma were advised to undergo chemotherapy alone or in combination with radiotherapy.

## DISCUSSION

The swellings in the neck merit a detailed clinicopathological evaluation because of two main reasons, one being the cosmetic aspect and the other being the possibility of the lesion being malignant. The lesions in the neck are visible to the patient and others and are a source of constant worry to the patient and parents. Some of the swellings can attain a large size and lead to cosmetic concern. For a clinician, a neck lesion could be a sign of deep seated pathology which nobody can afford to overlook.<sup>7</sup>

Meier and Grimmer (2014) categorized the pediatric neck masses into three categories: Developmental, inflammatory/reactive and neoplastic and mentioned that the common causes of inflammatory/reactive category are reactive lymphadenopathy, infectious lymphadenitis (viral, *Staphylococcal*, and mycobacterial infections; cat-scratch disease), or Kawasaki disease.<sup>8</sup>

In our study, the inflammatory category was the main group accounting for 32 cases (64%), similar to certain studies conducted in pediatric population.<sup>9,10</sup> It has been observed that most cases of cervical masses in children under 15 years of age are sourced from inflammatory and infectious diseases.<sup>11</sup> Inflammatory and infectious diseases are much more prevalent in the early years of life.<sup>12</sup> Lymph nodes were the most common structures which gave rise to neck masses in our study. This was similar to the studies conducted by several authors.<sup>2,3,13-17</sup>

There were 20 cases (40%) of cervical lymphadenitis out of which 18 responded to conservative management, which included antibiotics, anti-inflammatory medications and serratiopeptidase. Only 2 patients having chronic lymphadenitis needed surgical excision as the lesions persisted even after a course of antibiotic and observation for 1 month. High percentage of cure rates with conservative treatment can be attributed to serratiopeptidase which was given to these patients. Serratiopeptidase allows good penetration of antibiotics into the affected nodes.<sup>7</sup>

The main cause of neck mass was reactive (non-suppurative) lymphadenitis which was seen in 11 patients (22%), similar to the study conducted by Al-Mayoof and studies at other centres in developing countries.<sup>6,11,18</sup> The reason for this is the higher incidence of infections in developing countries like India, Kenya, Iraq. Tubercular cervical lymphadenitis constituted 2 cases (4%) of the total cervical masses. All patients were put on antitubercular drugs for a period of 9 months. No relapse occurred and no further surgery was required. Similar findings were noticed by Russel and Gregory.<sup>19</sup> The incidence of tubercular cervical lymphadenitis was higher in the studies conducted in the Indian sub-continent than those at centres in developed countries.<sup>7</sup>

Other causes for lymph node swellings were non-Hodgkin's lymphoma (4%) and lymph node abscess (4%). Lymphomas were the common malignant neck masses in studies conducted by several authors, in the pediatric age group.<sup>13</sup>

As seen in the present study, there were 6 cases (12%) of chronic sialadenitis, out of which excision was done in 2 cases and 4 were managed conservatively. These findings do not confer with most authors, who had a lower incidence of chronic sialadenitis.<sup>7,18,20,21</sup> The relatively high percentage of chronic sialadenitis in this study can be attributed to poor oro-dental hygiene amongst the patients as they are from rural areas.<sup>7</sup>

3 cases (6%) amongst the neck masses were neoplastic in nature in our study. This was similar to the study conducted by Prathima et al where neoplasms accounted for 5% of the cases.<sup>9</sup> In some of the studies, neoplasms accounted for 11- 15% of the cases.<sup>11,22</sup> Incidence of malignant lymph node swellings was similar to the study by Showkath et al. None of the cases in our study had

evidence of metastasis to lymph node as the incidence of primary head and neck malignancy is low in the pediatric age group.

The congenital neck masses accounted for 10 cases (20% of the patients), which was similar to the studies by other authors.<sup>6,18</sup> The various congenital neck swellings that we came across in our study are the dermoid cyst, thyroglossal cyst, branchial cyst. Some of the other congenital neck masses found in the pediatric population are vascular malformations, cystic hygroma, sebaceous cyst and hemangiomas. Congenital neck masses are excised to prevent potential growth and secondary infection of the lesion.

8% of the patients in the present study had thyroglossal cyst and were treated with (Sistrunk's operation). Male to female ratio being 1:1 is similar to the studies conducted by Showkat et al.<sup>7</sup> Although rare, thyroglossal duct cysts are the most common clinically significant congenital thyroid lesion and the most common congenital cause of anterior neck swellings in children. The congenital thyroid lesions are said to have neither sex predilection nor hereditary predisposition.<sup>23,24</sup>

There were 4 cases (8%) of dermoid cysts, two females and two males, in our study, in both the cases, lesions were excised surgically. Rajesh et al reported 4% of cervicofacial masses in children as dermoids<sup>18</sup> whereas Connelly and Mackenzie reported 9% of cervicofacial masses as dermoids.<sup>18,20</sup> In the present study branchial cyst lesions constituted 4% of neck masses and was managed surgically. In a study by Rajesh, the incidence of branchial cyst was 4% and 9% in the study by Connelly and Meckenzie.<sup>18,20</sup>

Most common site of neck mass was in the submandibular triangle accounting for 36% of the cases which was similar to the study conducted by Showkat et al where 34% of the cases had neck masses in the submandibular region.<sup>7</sup> Submandibular neck swellings occurred as a result of lymph node and submandibular salivary gland enlargement.

Mid-line of the neck with the exception of submental region was the second most common site for neck masses accounting for 30% of the cases. This included thyroglossal cysts, the most common location of which is the mid-line. Thyroglossal duct cyst is the most common congenital anomaly of the neck in childhood and the most common cause of midline congenital cyst formation in the neck.<sup>25</sup> Thyroid gland being a mid-line structure, its enlargement causes mid-line neck mass. Dermoid cysts are lined by the epithelium and differ from epidermoid cysts in that they contain skin appendages such as sebaceous glands and hair follicles within the cyst wall. These are usually seen in the midline of neck.<sup>26</sup>

96% of the neck masses were found in the anterior triangle of neck. In most of the studies neck masses were more commonly found in the anterior triangle of neck.<sup>7</sup> Anterior triangle of neck is a larger area than the posterior triangle of neck. Most of the structures and the organs in the neck which cause neck masses like thyroid gland, salivary glands, several groups of lymph nodes are found in the anterior triangle of the neck.

Male: female ratio was 1.27:1 in our study, which is similar to certain studies.<sup>7,13</sup>

The dangers of injury to vital structures in the neck, especially in those with recurrent masses, and cosmetic consideration influenced carrying out only palliative treatment, less-invasive biopsy such as incisional biopsy and fine needle aspiration biopsy in some cases, which were similar to the experiences of other authors.<sup>3,15,17</sup>

Fine-needle aspiration may provide critical diagnostic information and avoid the need for an open biopsy. Sensitivity of fine-needle aspiration in children is usually greater than 90% and specificity is approximately 85%.<sup>27-29</sup>

The diagnosis should be based on clinical history and physical examination, avoiding excess complementary examinations, often not tolerated in this age group.<sup>30,31</sup> A biopsy is essential for definitive diagnosis and should be sought in cases of persistent and suspicious lesions, preferring to Fine-needle aspiration. Recent studies highlight the importance of this technique in the early diagnosis of pediatric neck masses due to high accuracy, safety, easy access, low complication rate and tolerability.<sup>7,32,33</sup>

Infectious and inflammatory diseases are the leading causes of neck masses in the pediatric age group. However, the presence of neoplastic disease in the pediatric population, especially lymphoma, can mimic benign diseases, which should draw attention to the warning signs. Cervical masses in the pediatric age group present a challenge both to the clinician as well as the surgeon. The masses range from simple lymphadenitis to dreadful malignant lesions. An orderly and sequential approach is all that is needed to manage these lesions.

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