Original Article

Paediatric Neck Masses in Zaria: A Review of Clinical Profile and Treatment Outcome

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Abstract

Background: A neck mass is any abnormal lesion in the neck that can be seen, palpated, or identified on imaging. It is one of the most common reasons for presentation to the surgical clinics. **Aim:** the aim is to analyse the clinical presentation and treatment outcome in children who were diagnosed and managed for neck masses in a tertiary centre in Northwestern Nigeria. **Materials and Methods:** The records of patients managed for neck masses over 7 years between January 2013 and December 2019 were reviewed. Demographic and clinical data were retrieved and analysed using Statistical Product and Service Solution version 23.0 software (SPSS Inc., Chicago, Illinois, USA). **Results:** A total of 99 cases were reviewed and there were 52 (52.5%) males and 47 (47.5%) females with male-to-female ratio of 1.1:1, and mean age ± standard deviation of 4.4 ± 3.9 years, the primary complaints of all the patients were neck swellings. The anterior triangle was the most common region involved in 86 (86.9%) patients. The majority of the neck masses were congenital, accounting for 71 (71.8%) patients. Ultrasound scanning was the most commonly requested radiological investigation done in 87 (87.8%) patients**.** Thyroglossal duct cyst was the most common paediatric neck mass seen in 41 (41.4%) patients. The majority of the patients 68 (68.7%) had an excisional biopsy of the lesion. Surgical site infection was the most common complication noted in 7.1% of the study population. **Conclusion:** Most of the neck masses were congenital and were managed surgically. Prompt diagnosis with appropriate treatment may result in a good outcome.

Keywords: Children, neck masses, Nigeria, thyroglossal duct cyst

Introduction

A neck mass is any abnormal lesion in the neck that can be seen, palpated, or identified on imaging.[1] Children with neck masses commonly present to the surgical clinics and parents may often have serious concern and anxiety due to perceived uncertainty about the child's survival and future.[2] Neck masses are generally classified as congenital or acquired. Congenital neck masses are by far more common in paediatric age groups than the acquired. Embryologically, structures in the head and neck are derivatives of branchial arches. The arches are separated externally by pharyngeal cleft and internally by pharyngeal pouches.[3] When there is an incomplete or aberrant fusion of 2 adjacent arches, branchial cleft anomalies including cysts, internal sinuses, external sinuses, and fistulas may occur.[3]

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Thyroglossal duct cyst, branchial cleft cysts, and dermoid cyst are the most common cystic lesion of the neck.[4,5] Acquired neck masses may be due to inflammation, trauma, or rarely neoplasm which may be vascular or non-vascular. Inflammatory masses are the most common acquired neck masses and are mostly due to lymphadenopathy.[2] It has been reported that up to 38%–42% of lymphadenopathy may occur in normal children.[6]

Neck masses are usually located in the anterior or posterior triangles of the neck. Most cases are found in the anterior triangle, for example, lymphadenopathy (inflammatory or neoplastic), thyroglossal duct cysts, branchial cleft cysts, dermoid,

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lipomas and thyroid masses.[7] Common neck masses found in the posterior triangle include: lymphadenopathy, vascular malformations (lymphatic), fibromatosis Colli (pseudotumor of infancy) and glandular lesions (parotid).[7]

Radiologic investigation plays a vital role in the pre-operative diagnosis of paediatric neck masses. The use of plain radiographs, ultrasonography, computed tomography (CT) scan and magnetic resonance imaging in establishing the diagnosis of neck masses in children have been described in the literature.[8] In most cases, ultrasonography is the initial and very useful modality in paediatric patients presenting with neck masses. It can provide useful information like the size, consistency (solid vs. cystic), shape, vascularity, location of the mass and determining the presence or absence of normal thyroid tissue.[8] It can also help in guiding the pathologist during fine-needle aspiration cytology.[8]

Treatment of neck masses in the paediatric age group may range from non-operative to complete surgical excision of the mass. For most of congenital cases, surgical excision is recommended as it may help in confirming the diagnosis, prevent recurrent infection, and possible malignant transformation.[5,9]

There is a dearth of literature on the clinical profile and treatment outcome of paediatric neck masses in Northwestern Nigeria. This study aims to analyse the clinical presentation and treatment outcome in children who were diagnosed and managed for neck masses in Ahmadu Bello University Teaching Hospital (ABUTH) Zaria, Northwestern Nigeria.

Materials and Methods

This was a retrospective review of children managed for neck masses at the divisions of Paediatric Surgery and Otorhinolaryngology of the Department of Surgery, ABUTH, Zaria, Nigeria, over 7 years between January 2013 and December 2019.

Study population

This study included all paediatric patients with neck masses managed at the divisions of paediatric Surgery and otorhinolaryngology of the Department of Surgery, ABUTH, during the period under review.

Study design

The records of patients managed for neck masses over 7 years between January 2013 and December 2019 were reviewed.

Data obtained for this study included demographic characteristics such as age, sex, main presenting complaints, aetiology, symptoms, and signs at presentation, location of the mass and the triangle of the neck involved. Other information retrieved included investigations offered, type of treatment, presence or absence of complication (s) and histologic findings. Excluded from the study were patients whose case records were either not found or did not have complete information. Ethical approval was sought and obtained from the institutional ethical review committee of ABUTH.

Statistical analysis

The data were analysed using the Statistical Product and Service Solution version 23.0 software (SPSS Inc., Chicago, Illinois, USA). The mean, standard deviation (SD), median and ranges were calculated for continuous variables, and proportions and frequency tables were used to summarise categorical variables. A Chi-squared test was used to determine *P* value and to test statistical significance, which was set at a $P < 0.05$.

Results

A total of 99 cases that fulfilled the inclusion criteria, having complete clinical records were included in this study. There were 52 (52.5%) males and 47 (47.5%) females with male-to-female ratio of 1.1:1. The age ranged from 2 months to 14 years, with a mean age of 4.4 years and a SD of ± 3.9 years, and a median age of 4 years. The peak age of occurrence was in the age group 0–4 years [Table 1].

The primary complaints of all the patients were neck swellings. However, 5 patients (5.1%) presented with difficulty in breathing in addition to neck swelling. The most common examination finding was the presence of neck mass in all the patients with only 5 patients (5.1%) having associated fistulous tract. Most of the neck masses were situated at the midline 56 (56.6%) with the remaining 43 (44.4%) having lateral neck mass. The anterior triangle was the most common region 86 (86.9%) involved followed by the posterior triangle 13 (13.1%) [Table 1].

The majority of the neck masses were congenital, accounting for 71 (71.8%) patients. Neoplastic conditions were the second-most

Table 1: Demographics and clinical characteristics

Variable	*n* (%)
Age group	
0-4	54 (54.5)
5-9	32 (32.3)
10-14	13 (13.1)
Total	99 (100)
Sex	
Male	52 (52.5)
Female	47 (47.5)
Total	99 (100)
Main presenting symptoms	
Neck swelling	99 (100)
Difficulty in breathing	5 (5.1)
Main signs	
Mass	99 (100)
Fistula	5 (5.1)
Location of the mass	
Midline	56 (56.6)
Lateral	43 (44.4)
Total	99 (100)
Triangle of the neck	
Anterior	86 (86.9)
Posterior	13 (13.1)
Total	99 (100)

Mean age=4.4 years, SD=± 3.9 years. SD: Standard deviation

common aetiology seen in 16 (16.7%) patients. Trauma was the least common aetiology noted in this series 1 (1.0%) [Figure 1].

Ultrasound scanning was the most commonly requested radiological investigation done in 87 (87.8%) of our patients, followed by plain soft-tissue neck radiograph 28 (28.7%) [Figure 2].

The majority of the patients 68 (68.7%) had an excisional biopsy of the lesion. Biopsy to establish diagnosis was the only surgical procedure offered to 16 (16.2%) patients. The use of chemotherapeutic agents was the most common non-surgical treatment observed in 7 (7.1%) patients followed by ultrasound-guided sclerotherapy in 6 (6.1%) patients [Table 2]. The most common complications noted in this series were surgical site infection and recurrence observed in 7 (7.1%) and 2 (2%) of the study population, respectively.

Thyroglossal duct cyst was the most common paediatric neck mass seen in 41 (41.4%) patients. It was followed by cystic lymphangioma seen in 15 (15.2%) patients. Lymphoma and tuberculous adenitis were observed in 11 (11.1%) and 9 (9.1%) patients, respectively, and were the most common acquired neck masses. Sternomastoid tumour (1,1.0%), lipoma (1,1.0%) and pleomorphic adenoma (1,1.0%) were among the rare cases in this study [Table 3].

We did not find any statistically significant relationship between the development of complications and other variables such as age, sex, aetiology, the triangle of the neck involved, type of treatment, and histological type [Table 4].

Discussion

A neck mass is one of the most common reasons for presentation to the otorhinolaryngology and paediatric clinics. We found male preponderance in this study, consistent with the findings of several other studies.[10-12] However, Al-Khateeb and Al Zoubi[13] reported female preponderance with a male-to-female ratio of 1:1.2. Another study by Ayugi *et al*.[14] found an equal ratio between males and females.

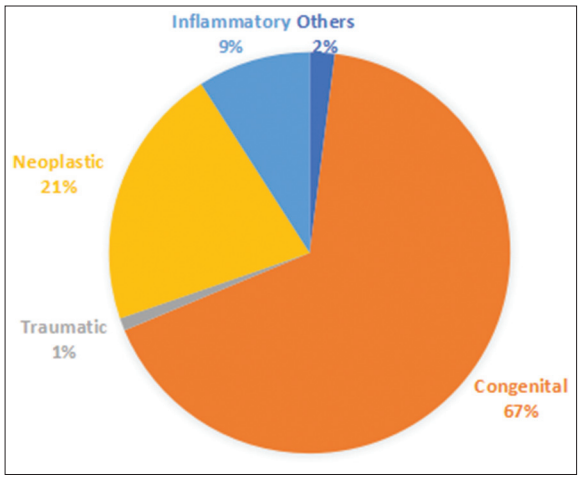

Figure 1: Etiology of neck masses

Thorough history and examination play a vital role in the diagnosis of neck masses. All our patients presented with obvious neck swelling with very few having difficulty breathing also. Neck swelling was also the most common symptom in several other studies.[14-16]

Most of the neck masses in this study were found in the midline and this corroborates the findings of Ayugi *et al*.[14] A contrary finding was reported by Showkat *et al*.[17] where the submandibular region was the most common site. The midline neck masses in this study were thyroglossal duct cyst, dermoid cyst and multinodular Goitre. Thyroglossal duct cyst usually presents as a midline painless mass that moves with swallowing and protrusion of the tongue.

The majority of the neck masses in this study were located in the anterior triangle of the neck and this is consistent with the finding of Abraham *et al*.[2] and Osifo and Ugiagbe[18] where 53.85 and 40% of the masses, respectively, were located in the anterior triangle. Conversely, Lucumay *et al*.[19] reported 79.7% of the masses were located in the posterior triangle of the neck.

Neck masses may result from congenital, inflammatory, traumatic or neoplastic lesions.[20] The finding of this study showed that congenital masses are the most common masses. This is in agreement with the report of Gov-Ari and Hopewell[20] and Xia *et al*.[21] in which the congenital masses constituted 38.8% and 62% of their patients, respectively. However, Ragesh *et al*.[16] and Lucumay *et al*.[19] both found inflammatory masses to be the most common in their series. Another study by Osifo and Ugiagbe[18] from Western, Nigeria reported malignant neck masses as the most common constituting 57.1% of their cases.

Imaging is a very important tool for establishing the diagnosis of neck masses in children. American college of radiology recommends ultrasonography as the preferred initial imaging for children presenting with neck masses.[22] In this study, ultrasonography was the most commonly requested radiological investigation followed by plain soft-tissue neck radiograph. This is comparable to the findings of Batikhe and Harb[15] and Ragesh *et al*.[16] where the ultrasound scan was requested in 55.1% and 90.8%, respectively, in their cases. CT scan with contrast can be very useful in cases of suspected malignancy and deep neck abscesses for proper diagnosis and intervention planning.[22] CT scan was the least requested radiologic investigation in this study as in most of our cases the information obtained from the ultrasound scan was adequate.

Cystic lesions consisting of the thyroglossal cyst and cystic lymphangiomas were the most common histologic findings in this study. Workers from China reported thyroglossal cyst (31%) and plunging ranula (17%) as the most common.[21] Another study by Batikhe and Harb[15] from Egypt also reported thyroglossal cyst as the most common in their series. On the other hand, Osifo and Ugiagbe[18] from Nigeria found Hodgkin's lymphoma and thyroglossal cyst as the predominant histological varieties in their study.

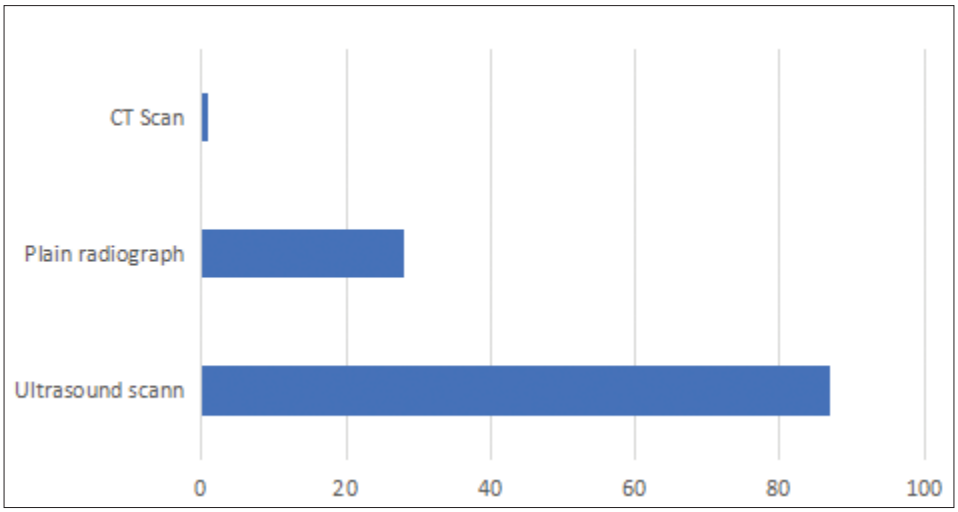

Figure 2: Radiological investigation among the study population

Table 2: Management of children with neck masses

Variable	*n* (%)
Surgical procedure	
Surgical excision	68 (68.7)
Biopsy	16 (16.2)
Incision and drainage	1 (1.0)
Non-surgical treatment	
Drugs	7 (7.1)
Ultrasound-guided sclerotherapy	6 (6.1)
Stretching exercise	1 (1.0)
Complication	
No	90 (90.9)
Yes	9 (9.1)
Total	99 (100)
Type of complication	
No complication	90 (90.9)
Recurrence	2 (2.0)
Infection	7 (7.1)
Total	99 (100)

Neoplastic neck masses constituted 21.2% of all cases in this study and the majority of them were malignant. Ragesh *et al*.[16] also reported more cases of malignant lesions (5.1%) than the benign (3.1%) in their series. The contrary finding was reported by other researchers, in which benign and malignant tumours were 3% and 1% of the total cases studied.[21] Furthermore, Showkat *et al*.[17] found 5% and 2% of cases of benign and malignant lesions, respectively. The high cases of neoplastic lesions in our series compared to others may be due to the relatively small sample size.

Tuberculous adenitis was the only inflammatory condition observed in this study accounting for 9.1% of the total subjects. Studies by other workers also showed that tuberculous adenitis was the most common inflammatory masses among their study population.[16]

In the management of our patients, surgical excision of the mass was the most common treatment modality offered to our patients. In a similar study by other researchers, surgery was also the most common modality of treatment.[19,21,23] Majority of our patients with thyroglossal duct cyst had Sistrunk operation while complete excision was offered to children with suprahyoid thyroglossal duct cyst, cystic lymphangioma, branchial and dermoid cysts. Lymph node biopsy was the only surgical procedure performed on 16.2% of the patients suspected to have lymphoma and tuberculous adenitis. On the other hand, the use of chemotherapeutic agents was the most common non-surgical treatment (7.1%). Chemotherapy and antituberculosis drugs were used in the treatment of malignant and inflammatory lesions respectively. Other workers also reported using chemotherapy/radiotherapy in their series.[18] The use of ultrasound-guided sclerotherapy using bleomycin was the second most common non-surgical treatment in this study particularly in the management of cystic lymphangioma. Currently, ultrasound-guided sclerotherapy has been recommended as the less invasive method of treating non-thyroid cystic lesions of the neck.[24]

The most common complications noted in this series were surgical site infection and recurrence observed in 7.1% and 2% of the study population, respectively. In a study by Lucumay *et al*.,[19] higher rates of complications were reported with surgical site infection and recurrence occurring in 37.5% and 18.7%, respectively. In a similar study with a larger study population, Connolly *et al*.[9] found hypertrophic scar, recurrence, haematoma and infection as the most common complications.

Conclusion

Paediatric neck masses are common among children <5 years. The majority of the masses were congenital in origin, mostly located in the anterior triangle of the neck. The neck ultrasound scan was the most requested investigation. Thyroglossal duct

Table 3: Histological diagnosis of the neck masses

Variable	Number of patients, *n* (%)
Congenital	
Thyroglossal cyst	41 (41.4)
Cystic lymphangioma	15 (15.2)
Branchial cyst	7 (7.1)
Dermoid cyst	3 (3.0)
Inflammatory	
Tuberculous adenitis	9 (9.1)
Neoplastic	
Malignant	
Lymphoma	11 (11.1)
Nasopharyngeal cancer	1 (1.0)
Benign	
Teratoma	5 (5.1)
Dermatofibroma	1 (1.0)
Fibroma	1 (1.0)
Lipoma	1 (1.0)
Pleomorphic adenoma	1 (1.0)
Others	
Simple multinodular goiter	2 (2.0)
Traumatic	
Sternomastoid tumor	1 (1.0)
Total	99 (100)

Table 4: Factors affecting the outcome

Variable	Absence of complication	Presence of complication	χ^2	*P*
Age (years)				
<5	50	4	0.407	0.523
≥5	40	5		
Sex				
Male	46	6	0.794	0.373
Female	44	3		
Triangle				
Anterior	79	7	0.717	0.397
Posterior	11	2		
Etiology				
Congenital	62	8	1.580	0.209
Acquired	28	1		
Treatment type				
Surgical	71	7	0.006	0.938
Non-surgical	19	2		
Histological type				
Non-neoplastic	70	9	2.506	0.113
Neoplastic	20	0		

cyst, cystic lymphangioma and lymphoma were the most prevalent masses noted. Surgical excision was offered to the majority of them, with very few of them having complications. Prompt diagnosis with appropriate treatment of children with neck masses may result in good outcome.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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