Original Article

Prevalence and Aetiology of Neck Masses among Patients Receiving Surgical Services at Muhimbili National Hospital, Tanzania

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ABSTRACT

Background: Neck masses are found in all age groups from many causes, ranging from congenital to acquired pathology. There is paucity of data on neck masses in Tanzania and at Muhimbili National Hospital, prevalence of neck masses is not yet known. The aim of this study was thus to address this gap.

Methods: Descriptive cross sectional study was done from July to December 2016 involving patients who were admitted in surgical wards. Structured questionnaires were filled after thorough head and neck evaluation of patients. Data analys is by SPSS version 20 and p-value<0.05 was considered to be statistically significant.

Results: The overall prevalence of neck masses was found to be 14.1% and proportion of neck masses was found to increase as the age increase. Anterior triangle was the commonest anatomical site (53.8%). Most of the neck masses (65.7%) were malignant and the age group most involved was >60 years (P-value 0.000). Among the malignant neck masses squamous cell carcinoma was the leading variant (54.1%) and most of themalignant neck masses were metastatic nodes from primary cancers in the upper aerodigestive tract (67.21%).

Conclusion: This study has unveiled neck masses at MNH to be prevalent and the proportion of neck masses increase age increase. Anterior triangle was the leading anatomical site. Most of the neck masses were malignant and majority of them were metastatic nodes from upper aerodigestive tract.

Any neck mass especially in adults needs thorough evaluation including upper aerodigestive assessment to rule out the possibility of malignancy.

INTRODUCTION

Neck masses can present in all age groups from many causes, ranging from congenital to acquired pathology. The occurrence of neck masses during childhood creates anxiety to both parents and family physicians because of fear for possibility of malignancy even though majority of paediatric neck masses are benign lesions. Despite this fact, special concern should be given for the possibility of malignancy. Regarding aetiology, neck masses can be classified into three main groups: inflammatory or infectious, congenital and neoplastic.[1,2,3]

One of the most important considerations in an adult presenting with a lump in the neck is that the mass may represent a metastatic deposit from a primary

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cancer, often but not always in the upper respiratory or alimentary tract. This is particularly so for middle aged or elderly patients, especially those who have smoked. In this group of patients, it's important that the primarytumor is found quickly so that correct management of the disease can be instituted. Neck node metastases from an unknown primary site are part of the "Cancer of Unknown Primary" origin, where the primary tumor may remain unknown for a patient's lifetime despite thorough diagnostic work-up. Over 90% of neck metastases comprise squamous cell carcinoma (SCC) whereas other malignancies are less common.[4,5,6]

Studies show that proportion of neck masses increase as the age increases and also the incidence of neoplastic cervicaladenopathy increases as the age of the patients increases. Anterior triangle has been found to be the leading anatomical site with neck masses in some studies while others show that posterior triangle is the leading site with neck masses.[3,4,7,8,9]

Inflammatory neck masses have been reported as most common, especially in paediatric population, while malignant neck masses are found more in adult population. Most malignant neck masses are metastatic nodes from primary cancers in the upper aerodigestive tract.[3,7,8,10,11,12,13,14,15,16]

Despite the significant number of patients referred lately to us at MNH and neck masses as the advanced manifestation of certain malignant neoplasms in the upper aerodigestivetract, their prevalence is not yet known thus the aim of the study was to address this available gap.

METHODS

Study design and participants

This was a hospital based descriptive cross-sectional study carried out from July to December 2016 at MNH involving patients admitted in surgical wards which were ENT, Oral and Maxillofacial Surgery, General surgery and Paediatric surgery.

Sampling method

Convenience sampling technique was utilized to patients who consented for the study.

Sample size estimation

Sample size was calculated using Fisher's formula for prevalence studies as follows:$n= (Z^{2)}p(1-p)/£^2$

Where

n = minimum sample size required, Z= statistic for the level of confidence (1.96)

p= expected prevalence. (50% was used since no prevalence found in previous studies)

£= maximum tolerable error, which is 4%

Thus the minimum sample size required was 600.

The adjusted for non-response (10%) was 60

Hence the adjusted minimum required sample size was 660

Data collection methods

Detailed clinical examination of the patients with neck masses including evaluation of nasopharynx, oropharynx, hypopharynx and larynx was done using indirect laryngoscopy or flexible laryngoscopy (fiber optic nasopharyngo laryngoscopy) and findings were filled in the questionnaires. Primary site of malignant neck masses was determined by collaboration with general surgeons and ENT specialists through fiber optic nasopharyngolaryngoscopy, oesophagoscopy, and OGD. FNAC of the neck masses wasdone by histopathologists. Open biopsy was done to neck masses which were ulcerated and in which FNAC had given inconclusive results.

Data analysis

Data analysis was done using the Statistical Package for Social Sciences (SPSS) version 20.Chi-square test was used to compare proportions. P value of <0.05 was considered statistically significant.

Ethical considerations

Patients were provided with an informed consent and then asked to provide written consent to participate in the study. For patients younger than 18 years, informed consent was obtained from their parents or guardians. Ethical approval was provided by Research and Publication Committee of the Muhimbili University of Health and Allied Sciences (MUHAS).

RESULTS

Demographic characteristics of the study population and overall prevalence of neck masses.

A total of 660 participants were recruited from July to December 2016 in which males were 48.6% and females were 51.4%. Most of the study participants were in the age group of ≤10 years (50.3%).

The overall prevalence of neck masses was found to be 14.1%, and the prevalence of neck masses among males was 15.9% while that among females was 12.4% (p-value was 0.197).

Moreover, the prevalence of neck masses was found to increase as the age increase where it was found to be higher in the age group of >60years (p-value 0.000) (table 1)

	NECK MASSES		
Age group (Years)	Yes (%)	No (%)	Total (%)
≤10	9 (2.7)	323 (97.3)	332 (50.3)
11-20	7 (10.9)	57 (89.1)	64 (9.70)
21-30	8 (13.3)	52 (86.7)	60 (9.1)
31-40	16 (23.5)	52 (76.5)	68 (10.30)
41-50	12 (24.0)	38 (76.0)	50 (7.57)
51-60	17 (38.6)	27 (61.4)	44 (6.67)
>60	24 (57.1)	18 (42.9)	42 (6.36)
TOTAL	93 (14.1)	567 (85.9)	660 (100)

Table 1: Prevalence of neck masses according to age

Anatomical sites for neck masses

Anterior triangle was the leading anatomical site with neck masses (53.8%) and 22.6% of the neck masses occupied more than 1 site. However, there was no statistically significant difference in anatomical sites forneck masses in relation to age and sex (Figure 1)

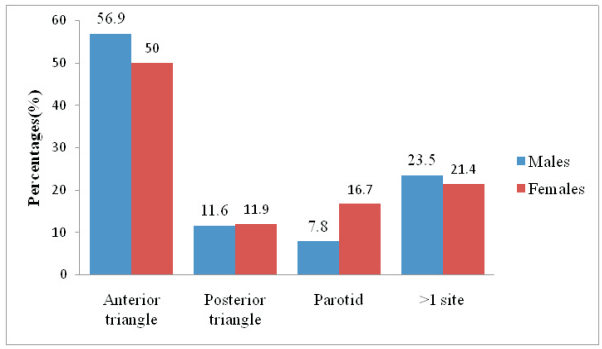

Figure 1: Anatomical site of neck masses in relation to sex

Histocytopathology of neck masses

Most of the neck masses (65.6%) were malignant and the leading age group was > 60 years (p-value of 0.000). Inflammatory neck masses were the least and accounted for 14% of all neck masses. (Table 2)

Table 2: Histocytopathology of neck masses

HISTOCYTOPATHOLOGY OF NECK MASSES				
Age group	Malignant N (%)	Benign N (%)	Inflammatory N (%)	Total N (%)
≤10	1 (11.1)	5 (55.6)	3 (33.3)	9 (9.68)
11-20	6 (85.7)	0 (0)	1 (14.3)	7 (7.53)
21-30	4 (50.0)	1 (12.5)	3 (37.5)	8 (8.60)
31-40	11(68.8)	3 (18.8)	2 (12.5)	16 (17.20)
41-50	6(50.0)	6 (50.0)	0 (0)	12 (12.90)
51-60	12(70.0)	2 (11.8)	3 (17.6)	17 (18.28)
>60	21(87.5)	2 (8.3)	1 (4.2)	24 (25.81)
Total	61(65.6)	19 (20.4)	13 (14.0)	93 (100)

Further analysis revealed reveled squamous cell carcinoma (SCC) to be the leading histocytopathological variant (54.1%) and was more

in the age group > 60 years (P-value < 0.01). The second leading variant was lymphoma. Goitre was the leading benign subtype and was more common in females than males (Table 3).

Table 3: Malignant neck masses in relation to age

	MALIGNANT NECK MASSES				
Age (Years)	SCC N (%)	Lymphoma N (%)	Mucoepidermoid carcinoma N (%)	Others N (%)	Total N (%)
≤10	0 (0)	1(100)	0(0)	0 (0)	1 (1.64)
11-20	3(50.0)	1 (16.67)	0(0)	2 (33.33)	6 (9.84)
21-30	0(0)	1(25.0)	1(25)	2(50.0)	4 (6.56)
31-40	7 (63.63)	3 (27.27)	1 (9.1)	0 (0)	11(18.03)
41-50	2 (33.33)	3 (50.0)	0(0)	1(16.67)	6 (9.84)
51-60	7 (58.33)	1(8.33)	2 (16.67)	2(16.67)	12(19.67)
>60	**14 (66.67)**	3(14.29)	1(4.76)	3(14.28)	21(34.4)
Total	**33 (54.1)**	**13(21.31)**	5(8.20)	10 (16.39)	61 (100)

Primary site of malignant neck masses

67.21% of the malignant neck masses had primaries in the upper aerodigestive tract. (21.31% from nasopharynx, 21.31% oropharynx, 13.2% hypopharynx, 9.8% larynx and 1.6% mid esophagus). The rest were from neck itself(11.1%), thyroid gland (6.6%), parotid (9.8%) and submandibular gland (4.9%).Nasopharynx was the leading primary site for malignant neck masses in age groups 11-20, 31-40 and 4-50 years, while hypopharynx was the leading site in the age group >60 years (Table 4)

Table 4: Primary site of malignant neck masses in relation to age

	PRIMARY SITE FOR NECK MASSES									
Age	Neck N (%)	Prtd N (%)	Thyrd N (%)	Nsphrx N (%)	Ophyrx N (%)	Hphyrx N (%)	Lyrnx N (%)	Esphg N (%)	Sbmnd N (%)	Total N (%)
≤10	1 (100)	0	0	0	0	0	0	0	0	1(1.6)
11-20	1(16.7)	0(0)	0(0)	**3(50)**	2(33.3)	0(0)	0(0)	0(0)	0(0)	6(9.8)
21-30	1(25)	1(25)	0(0)	0(0)	1(25)	0(0)	0(0)	0(0)	1(25)	4(6.6)
31-40	1(9.1)	1(9.1)	0(0)	**5(45.4)**	1(9.1)	2(18.2)	0(0)	0(0)	1(9.1)	11(18.1)
41-50	1(16.7)	0(0)	1(16.7)	**2(33.2)**	1(16.7)	0(0)	1(16.7)	0(0)	0(0)	6(9.8)
51-60	1(8.3)	3(25)	1(8.3)	2(16.7)	0(0)	2(16.7)	2(16.7)	1(8.3)	0(0)	12(19.7)
>60	1(4.8)	1(4.8)	2(9.5)	1(4.8)	**8(38.1)**	4(19)	3(14.2)	0(0)	1(4.8)	21(34.4)
Total	7(11.5)	6(9.8)	4(6.6)	13(21.3)	13(21.3)	8(13.2)	6(9.8)	1(1.6)	3(4.9)	61(100)

Key: Prtd: Parotid gland Thyrd: Thyroid gland Nsphrx: Nasopharynx
Ophyrx: OropharynxHphyrx: HypopharynxLyrnx: Larynx
Esphg: Esophagus Sbmnd: Submandibular gland

DISCUSSION

Neck masses are common worldwide and constitute a major indication for surgical consultation in many centres. The current study enrolled 660 participants with ages ranging from 7 months to 90 years. The male to female ratio was 1:1.06. Most of the study participants were at the age group ≤10 years (50.3%).

The overall prevalence of neck masses was found to be 14.1% and there was no statistical significant difference between males and females in which prevalence among males was 15.9% and among females was 12.4% (p-value of 0.197). The prevalence of neck masses was found to increase as the age increases ((p-value0.000). The study done by Soussau *et.al* in Iran also showed that the proportion of neck masses to increase as the age increases where it was 2.7% in paediatric group, 38.6% in young adults and 58.7% in adults.[18] The incidence of neoplastic cervical adenopathy continues to increase with age. This was documented by Gleeson *et.al* in London following review of a large series of 8500 patients with head and neck neoplasms diagnosed over a 10 year period.[4]

In this study, most of the neck masses were found in anterior triangle (53.8%) and 22.6% of the neck masses occupied > 1 site. The anatomical location of neck masses did not differ significantly between the age groups or sex (p-value 0.065 and 0.123 respectively). Other studies also revealed anterior triangle to be the leading anatomical site with neck masses while others show the posterior triangle to be the more leading anatomical site with neck masses.[7,9,3,8] These differences can be attributed to differences in methodologies used in the studies.

Most of the neck masses (65.6%) were malignant and age group most involved was >60 years (p-value 0.000). Inflammatory neck masses were the least (14%). Among the malignant neck masses, squamous cell carcinoma was the most malignant subtype found in the neck masses (54.1%) followed

by lymphoma (21.31%). The findings are similar to the findings obtained by Atiqur *et al* in which lymph nodes with metastatic carcinoma were the most common malignant (61.9%) followed by lymphoma (26.2%).[11] In the current study, other malignant subtypes were adenocarcinoma, sarcoma, adenoid cystic carcinoma and papillary carcinoma which all together accounted for 16.39% of all malignant neck masses. Mucoepidermoid carcinoma accounted for 8.20%. SCC was more common in males while lymphoma was more common in females. The benign neck masses constituted of pleomorphic adenoma, goiter and congenital neck masses which were 3 cystic hygromas and 2 thyroglossal cysts. The benign thyroid neck masses were more common in females. These findings differ with other studies since most of the neck masses were found to be inflammatory and benign.[3,18,19,14] The reason for these differences can be due to different study populations in which most of them were children in these studies while in the current study few children were found to have neck masses. The short study duration and different methodologies can also contribute to these differences. For example, this study enrolled only inpatients who could be more ill due to some malignant conditions compared to outpatients in other studies who might have benign or inflammatory conditions.

The majority of malignant neck masses, 67.21%,were metastatic lymph nodes from primary cancers in the upper aerodigestive tract, (21.31% from nasopharynx, 21.31% oropharynx, 13.11% hypopharynx, 9.84% larynx and 1.64% mid-oesophagus). The rest of the neck masses had neck itself as the primary site while others were from thyroid and salivary glands (parotid and submandibular glands). Most of the metastatic nodes were squamous cell carcinoma. This resemble the study done by Bagwan*et.al* in India, where the most common tumor metastasizing to the neck nodes had the primary somewhere else. In that study, the primary cancers were from the tongue, alveolus, buccal mucosa and palate.[16]

Gleeson. *et.al* documented the management of lateral neck masses in adults and concluded that the lateral neck mass in adults should be considered malignant unless proven otherwise.[4]This study also found that most of the neck masses in adults to be malignant and they were predominantly metastatic nodes from upper aerodigestive tract.

CONCLUSION

Neck masses are common worldwide affecting children as well as adults. In this study, neck masses were found to be prevalent among patients receiving surgical services at MNH. The proportion of neck masses was found to increase as the age increased. The most common anatomical site involved with the neck masses was anterior triangle and there was no statistically significant difference in terms of age or sex. Most of the neck masses were found to be malignant and SCC was the leading histological variant followed by lymphoma. Majority of the neck masses were metastatic lymph nodes from primary cancers in the upper aerodigestive tract. Hence neck masses should be taken seriously. Early assessment including upper aerodigestive evaluation and biopsy is important to rule out possibilities of malignancies and hence early intervention.

LIST OF ABBREVIATIONS

ENT - Ear, Nose and Throat
FNAC- Fine Needle Aspiration Cytology
MD - Doctor of Medicine
MNH - Muhimbili National Hospital
MUHAS- Muhimbili University of Health and Allied Sciences
OGD - Oesophagogastroduodenoscopy
OMFS- Oral Maxillofacial Surgery
SCC - Squamous Cell Carcinoma
SPSS - Statistical Package of Social Science

DECLARATIONS

Ethics approval and consent to participate

The approval to conduct the study was granted by Ethics and Research Committee for Muhimbili University of Health and Allied Sciences

Availability of data and material

The detailed reported information can be obtained from the corresponding authors when needed and from archives of the department of Otorhinolaryngology-MUHAS

Competing interests

The authors declare that they have no competing interests

Authors' contributions

MM participated in study design, data collection and analysis. ZSA Participated in study design and preparation of manuscript. ERM Participated in design of the study and data analysis. KBM participated in data analysis andpreparation of the manuscript. AAK participated in study design and data analysis. DNparticipated in study design and data analysis

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