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FINE NEEDLE ASPIRATION CYTOLOGICAL FINDINGS IN PATIENTS PRESENTING WITH ACCESSIBLE HEAD AND NECK MASSES AT KENYATTA NATIONAL HOSPITAL

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**FINE NEEDLE ASPIRATION CYTOLOGICAL FINDINGS IN PATIENTS PRESENTING WITH ACCESSIBLE HEAD AND NECK MASSES AT KENYATTA NATIONAL HOSPITAL**

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**ABSTRACT**

*Background:* Clinical evaluation of solitary head and neck masses poses a challenge because of many differential diagnoses in this area. This study was done to narrow the differential diagnosis of head and neck lesions at Kenyatta National Hospital.

*Objectives:* To determine the cytomorphological patterns of head and neck lesions amenable to FNA at KNH and to determine the extent to which FNA can preclude the requirement for a diagnostic open surgical biopsy.

*Methods:* Following the FNA procedure, a small drop of the aspirated material was used to produce two thin smears. The smear for Papanicolaou staining was wet fixed using 95% alcohol while the one for Giemsa staining was air dried. Independent t- test was used to compare the mean age between patients with neoplastic and non-neoplastic lesions. A p-value <0.05 was regarded as statistically significant.

*Results:* A total of 92 patients were recruited. Patient age range was 2- 80 years with a mean (SD) age of 34.5 (17.7) years. Reactive lymphoid hyperplasia (18.5%) was the most common diagnosis followed by, colloid goitre (17.4%), granulomatous lymphadenitis (10.9%), metastatic carcinoma (7.6%) and pleomorphic adenoma (7.6%). The mean age of patients with non-neoplastic and neoplastic lesions were significantly different, p value < 0.001. FNA during this study potentially reduced the need for surgery of head and neck masses by 69.4%.

*Conclusions:* Non-neoplastic (inflammatory) and benign lesions are the most common types of lesions seen at KNH. FNA can minimize the need for surgery in close to 70% of head and neck masses.

## INTRODUCTION

Most head and neck masses are a result of reactive hyperplastic processes, followed by neoplastic lesions - both benign and malignant tumours. These masses require careful evaluation as many serious and malignant disorders can initially present as a cervical mass, thus a tissue biopsy for histopathological examination is usually requested (1).

However, fine needle aspiration (FNA) offers a good alternative since the majority of head and neck masses are usually superficial and are easily accessible to fine needle aspiration (2). Most studies done have confirmed that FNA is a safe, reliable, well tolerated and inexpensive method of making a diagnosis in patients presenting with cervical masses including thyroid and non-thyroidal masses (3). In addition, the availability of FNA provides the clinician with other options for morphologic diagnosis as some of the patients may not be suitable candidates for any surgical procedure even a small open biopsy due to their general condition (4).

It is estimated that head and neck cancers constitute about 5–8% of all malignancies world-wide and the trend appears to be increasing in the Third World (5). However, the incidence and pattern of occurrence of head and neck cancer vary greatly among races and geographic regions. While head and neck cancers are relatively uncommon in the West, constituting about 4% of all malignancies, in the Asian continent and Indian subcontinent, they form 40–50% of all malignancies (5).

Clinical evaluation of solitary head and neck masses poses a challenge and can be difficult because of many differential diagnoses in this area (1). The rationale behind this study was to describe the fine needle aspiration cytological findings of accessible head and neck masses in patients to narrow the

differential diagnosis of head and neck lesions at Kenyatta National Hospital.

It is reported in literature that the incidence and pattern of occurrence of head and neck cancer vary greatly among races and geographic regions (5). Furthermore, there is paucity of reliable data on the incidence and pattern of occurrence of head and neck cancers in the adult Kenyan population hence it was important to determine the pattern of head and neck masses at KNH.

## MATERIALS AND METHODS

**Study site:** Surgical outpatient's clinic (SOPC) (Clinic 24) and Cytology laboratory, Kenyatta National Hospital (KNH).

**Study period:** December 2015 to April 2016

**Ethical approval:** Ethical approval was granted by KNH/UoN ERC (P764/12/2015).

**Study population:** Patients referred to KNH for FNA of head and neck lesions.

**Study design:** Cross sectional descriptive study

**Sampling methods:** Consecutive sampling method

**Sample processing:** Following the FNA procedure on the head and neck masses, a small drop of the aspirated material was used to produce two thin smears. The smear for Papanicolaou staining was wet fixed using 95% alcohol while the one for Giemsa staining was air dried. Aspirated fluids were well labelled and sent for cytopsining. The slides were stained by using the Papanicolaou staining protocol. The slides were interpreted by the principal investigator and Pathologists.

**Data analysis:** The data was collected, entered, cleaned, and analysed using Statistical Package for Social Science (SPSS) version 21. Independent t- test was used to compare the means between patients with neoplastic and non-neoplastic lesions. A p-value <0.05 was regarded statistically significant.

## RESULTS

**Socio-demographic characteristics:** Thirty (32.6%) were males and sixty-two (67.4%) were females, with an M: F ratio of 1:2.1. Children cases (<18 years of age) were fifteen (16.2%) of the total ninety-two cases. Patient age ranged from 2 - 80 years with a mean (SD) age of 34.5 (17.7) and a median age of 35 years.

**Organ and anatomic distribution of lesions:** Of the 92 FNAs, thirty- six (39.1%) were

from the lymph nodes, twenty (21.7%) were from salivary glands, nineteen (20.7%) were from thyroid, four (4.3%) from supraclavicular, four (4.3%) from the submental area and nine (9.8%) were from miscellaneous anatomic sites which included occipital, frontal, cheek, orbital, parietal, retropharyngeal, posterior neck and lower lip. Table 1 below shows the organ and anatomic distribution of lesions.

**Table 1:** Organ and anatomic distribution of lesions

Site	Total	Age range (mean)	Age SD
Lymph nodes	36	2-72 (29.4)	18.5
Salivary glands	20	3-80 (17.9)	35.6
Thyroid	19	31-72 (43.1)	10.9
Miscellaneous	9	3-76 (34.3)	20.5
Supraclavicular	4	41-58 (48.3)	7.8
Submental	4	5-48 (21.8)	18.8
<b>Total</b>	<b>92</b>	<b>2-80 (34.5)</b>	<b>17.7</b>

**Satisfactory rates of aspirates:** Satisfactory aspirates were obtained from eighty-three (90.2%) while unsatisfactory rates were obtained from nine (9.8%) cases. On individual lesion analysis, thyroid lesions had the highest unsatisfactory rate of 16% while all supraclavicular aspirates were satisfactory.

The diagnoses most commonly encountered were inflammatory lesions forty-four (48%), which comprised of lymphadenitis, sialadenitis, thyroiditis and other non-specific inflammatory lesions e.g. of the

cheek, followed by benign neoplasms twenty-four (26%), malignant neoplasms eight (9%), acquired and congenital cysts five (5%), indeterminate follicular neoplasms two (2%) and sialadenosis one (1%). The mean age between the two groups (inflammatory: mean (SD) age =27.4 (12.5) and neoplastic: mean (SD) age: 44.3 (18.3) were significantly different and were statistically significant, P value < 0.001. Figure 1 below shows the common cytodiagnosis of head and neck masses by relative frequency, among the 92 patients.

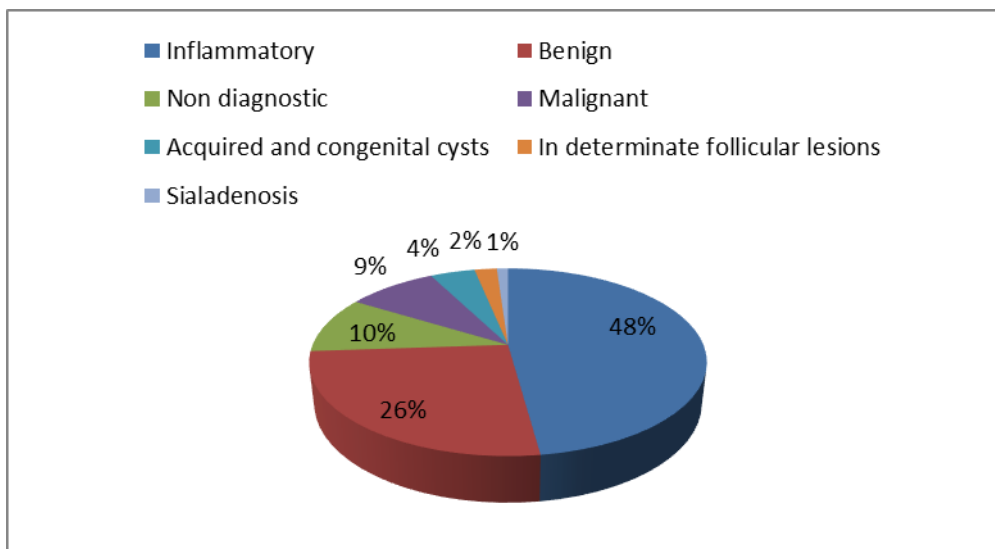


Figure 1: Common cytodiagnosis by relative frequency.

**Cytodiagnosis of lymph node aspirates:** Aspirates from lymph nodes revealed reactive lymphadenopathy in majority of the cases: seventeen (47.2%), followed by chronic granulomatous lymphadenitis: ten cases (27.8%), metastatic: five cases (13.9%), non-specific necrotizing lymphadenitis: two cases (5.6%) and suspicious for lymphoma: one case (2.8%). The overall ZN positivity

rate in all lymph nodes was (2/36) 5.6%, but it was (2/12) 16.6% in aspirates suspicious for tuberculosis (granulomatous and necrotizing lymphadenitis). Outright tuberculosis diagnosis was done in two cases aged 25 and 50 years because of ZN positivity. Figure 2 below shows the lymph node diagnosis.

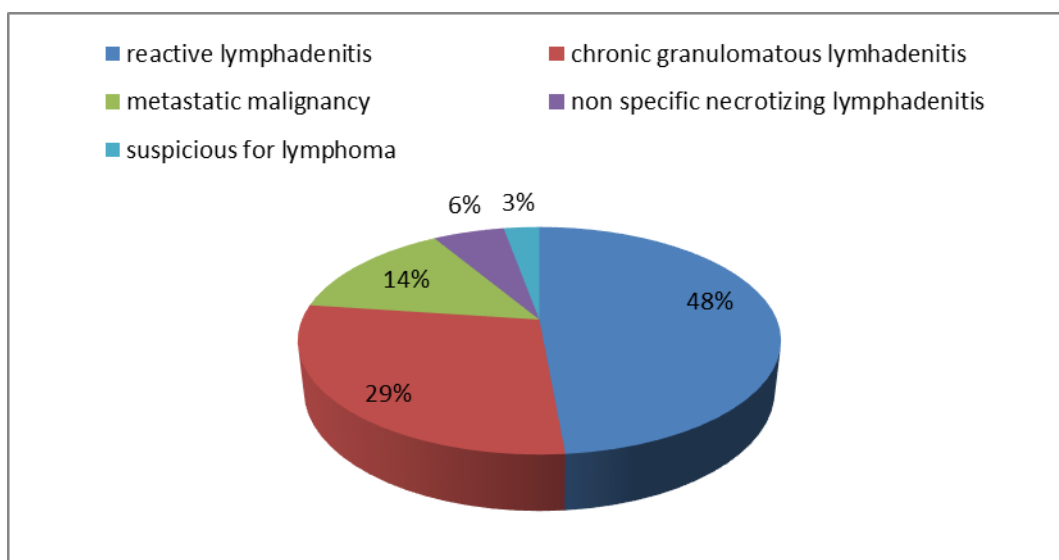


Figure 2: Lymph node diagnosis

**Cytodiagnosis of salivary gland lesions:** Salivary gland aspirates were from the parotid in fourteen cases (70%) and six cases (30%) were from the submandibular gland. Of these, Pleomorphic adenoma was reported in seven cases (35%), sialadenitis:

four cases (25%), epidermoid cyst: two cases (10%), simple cyst: one case (5%), sialadenosis: one case (5%) and lipoma: one case (5%) of the cases. Non-diagnostic results were three cases (15%). Figure 3 below shows the salivary gland diagnosis.

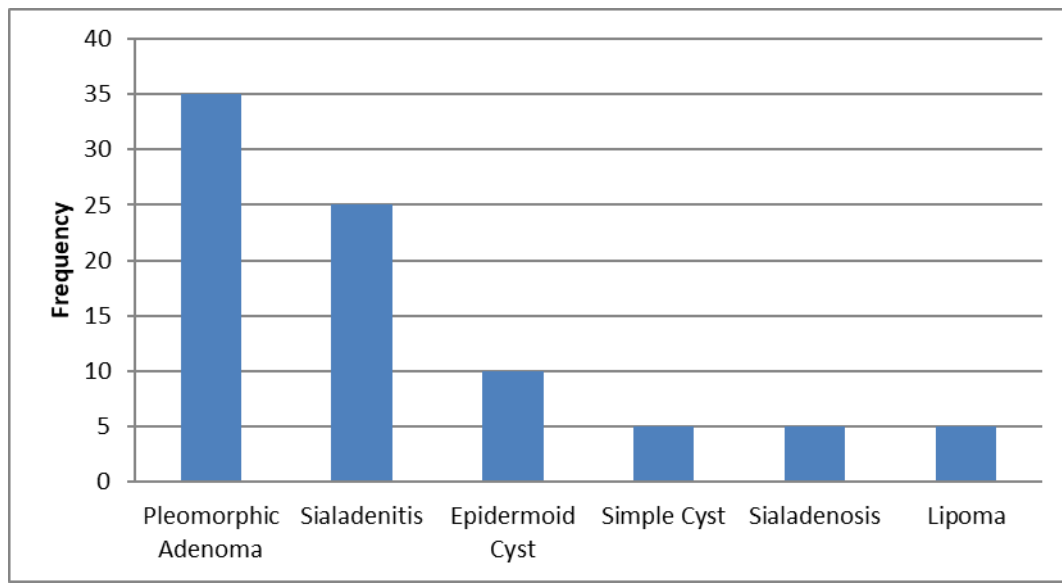
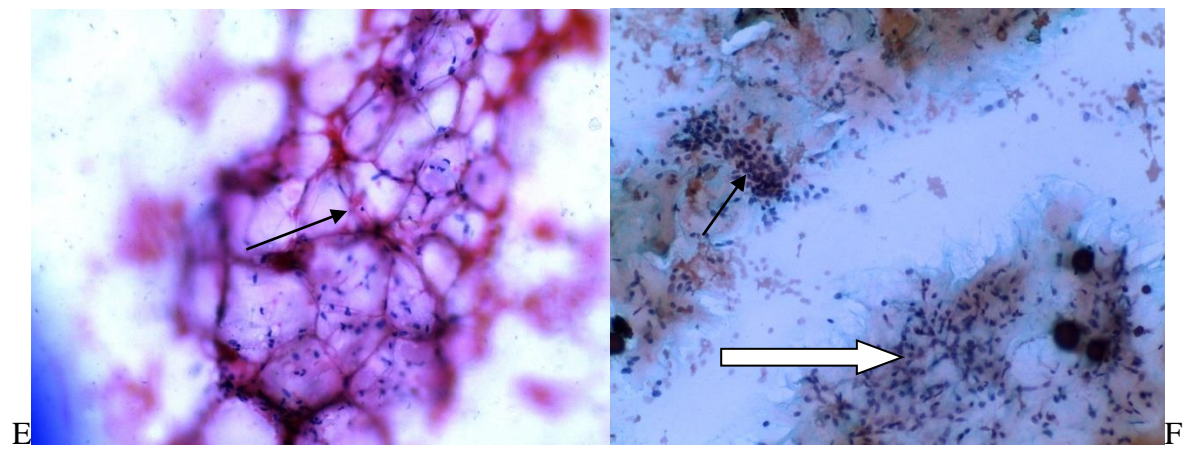
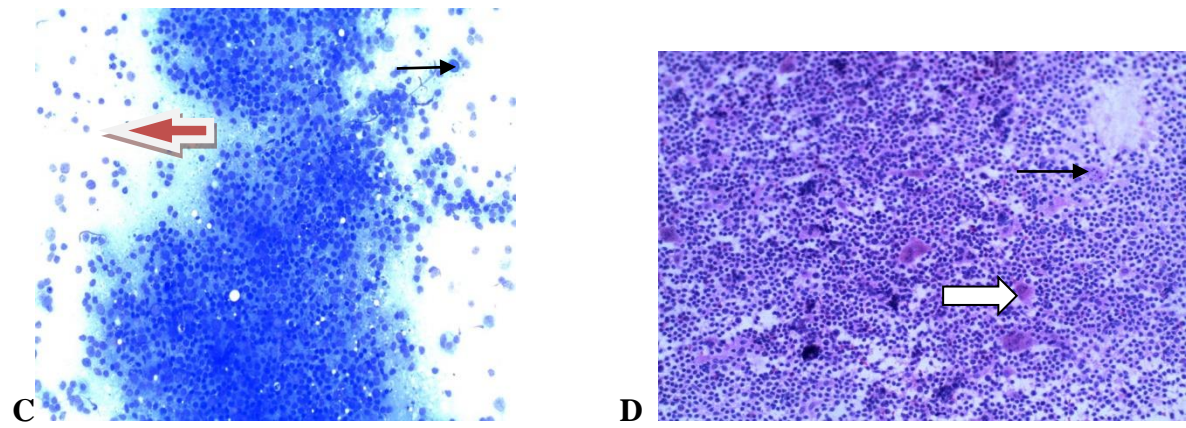
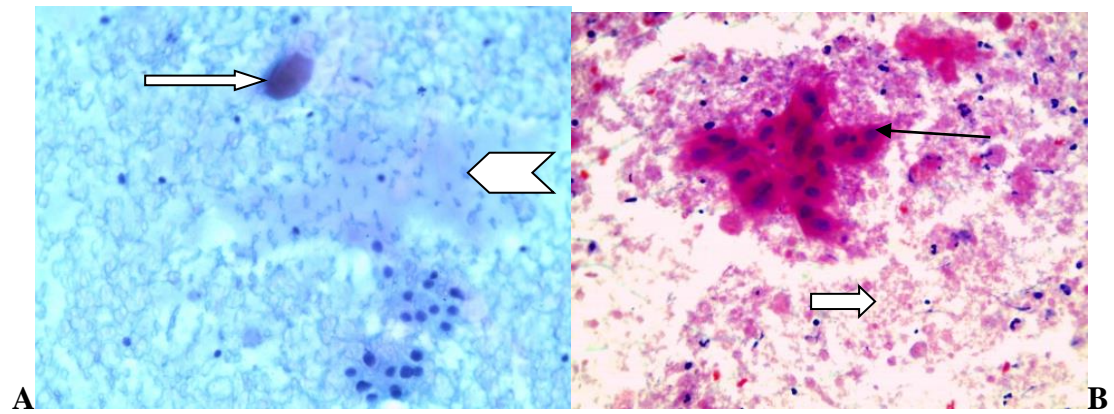


Figure 3: Salivary gland diagnosis

**Cytodiagnosis of thyroid lesions:** Most thyroid aspirates were obtained from females sixteen (84.2%) while only three (15.8%) were from males. Colloid goitre was the commonest diagnosis, in thirteen cases (68.4%) while three cases (15.8%) were non diagnostic, and indeterminate follicular lesions was reported in two cases (10.5%) and granulomatous thyroiditis constituted one case (5.3%).

**Cytodiagnosis of miscellaneous lesions:** The miscellaneous group was a heterogeneous group of lesions from diverse anatomic sites which includes occipital, frontal, cheek, orbital, parietal, retropharyngeal, post neck and lower lip. The commonest diagnoses were that of inflammatory conditions: six cases (66.7%), benign (lipoma) two cases (22.2%) and one case (11.1%) was non diagnostic.

The following photomicrographs were taken during microscopy of the aspirates:



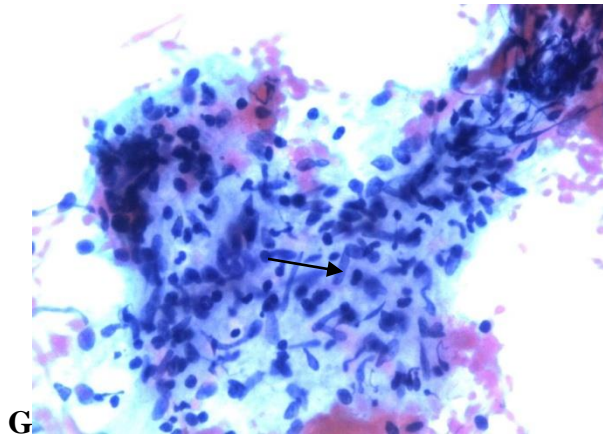


Figure 5 shows photomicrographs of the lesion diagnosed during the study

A: Cytomorphological features of colloid goitre. Cohesive cluster of follicular cells (black arrow) and dense colloid (white arrow). Watery colloid in background (white arrow). (Leica) (X40, Pap stain).

B: Cytomorphological features of metastatic squamous cell carcinoma. A cluster of squamous cells with abundant dense cytoplasm and distinct cytoplasmic boarder (black arrow) is a diagnostic feature in a lymph node. The background is necrotic (white arrow). (Leica) (X40, H&E stain).

C: Cytomorphological features of reactive lymphoid hyperplasia. Note the small lymphocytes (red arrow) and large immature (black arrow). (Leica) (X40, Pap stain)

D: Cytomorphological features of reactive lymphoid hyperplasia. Note the tangible body macrophages (black arrow) and macrophages (white arrow). (Leica) (X40, MGG stain).

E: Cytomorphological features of a lipoma. Note mature adipocytes (black arrow). (Leica) (x40, H&E).

F: Cytomorphological features of a pleomorphic adenoma. Note the cluster of ductal cells (black arrow), tyrosine crystals (double head arrows) and chondromyxoid matrix (white arrow). (Leica) (X40, Pap stain).

G: Cytomorphological features of chronic granulomatous lymphadenitis. Note the epithelioid histiocytes (black arrow). (Leica) (X40, Pap stain).

## DISCUSSION

The ratio of males to females with head and neck masses in this study was 1:2. These results show that more females are referred for FNA for head and neck masses at KNH as compared to males. This is in total contrast to a study done by El Hag et al in Saudi Arabia which showed an even gender distribution of 1:1(6). This difference could be due to the exclusion of patients with thyroidal masses in that study unlike in our study where there was predominance of women with thyroid masses (84 %).

Patients with neoplastic lesions (mean age 44.3, SD 12.5) were older than those with non-neoplastic lesions (mean age 27.4, SD 18.3). The increased frequency of neoplastic

lesions in the older can, possibly be explained by the accumulation of somatic mutations coupled by, the decrease in immunocompetency in the adults. The mean age between the two groups were significantly different and were statistically significant, p value = 0.000 ( $P < 0.001$ ). The higher standard deviation in non-neoplastic lesions (mainly inflammatory) shows a wider age distribution of the lesion but was predominantly in the young whereas, the lower standard deviation in neoplastic shows that they were mainly confined to older patients within a narrow age range. These findings were consistent with a study by Kieran S et al(7).

The proportion of non-diagnostic aspirates in this study was 9.8% of all procedures (92

cases) which is very comparable to a study by El Had et al which had a non-diagnostic rate of 8.9% (10). Furthermore, Mehrotra et al reviewed the literature and reported a 5.0-43.1% unsatisfactory rate in the assessment of FNA. These were consistent with values in this study(8).

The major causes of unsatisfactory results in this study were haemodilution of cells, insufficient cellularity, cystic fluid and suboptimal preservation; however continuous training is necessary to further lower these rates for the benefit of patients. The unsatisfactory rate was higher in children compared to adults; this is due to difficulties in aspirating in non-cooperative children.

The cytomorphological criteria for the diagnosis of tuberculous lymphadenitis are well established. The diagnosis of suspicious was made in the presence of epithelioid histiocytes and nonspecific extensive necrosis(9). The diagnosis of tuberculosis was made when Acid/Alcohol Fast Bacilli (AAFBs) were demonstrated by ZN stain. Using this criteria tuberculosis was diagnosed in 5.5%, however, suspicious results (chronic granulomatous inflammation with or without necrosis) with no demonstrable AAFBs were rendered in 27.8% of the cases.

AAFBs were detected in 2 of the 12 suspicious cases giving a positive rate of 17%. The positivity rate was lower than that of studies done by Gupta A et al and Shariff S et al whose positivity rate ranged from 25-77%(10,11). This may probably be due by the fact a certain proportion was already on anti-TB therapy by the time they came for an FNA. Moreover, the lower sensitivity of ZN staining (40-60%) could have resulted in false positives, thus more sensitive staining protocols such as Modified bleach method can be adopted. In a study done by Chandrasekhar B et al, routine ZN staining detected AAFBs in 12.5% of the cases whereas the modified bleach method

detected 60.7% of the cases(12). Furthermore, the addition of PCR methods such as Gene Xpert as a routine test in the evaluation of lymph nodes and all clinically suspicious TB cases would greatly enhance the accuracy of the cytodiagnosis. Most patients with TB diagnosis can wholly benefit from FNA as the further management may not include a surgical biopsy.

FNA has the highest accuracy in the diagnosis of metastatic malignancies (17). In this study metastatic malignancy was diagnosed in 7 (7.6%) cases which is much lower than the 22.7% reported by Tatomirovic Z et al in Serbia(13). The differences can be attributed to differences in incidence of primary malignancies in the different populations.

The role of FNA in the cytodiagnosis of lymphoma is controversial(9). In our study a single case suspicious for lymphoma was diagnosed. A tissue biopsy was recommended for a conclusive diagnosis. Thus, the role of FNA was been limited to the identification of cases for referral for further management as promptly as possible, thus it was screening test. The limitation of cytomorphologic diagnosis and classification of lymphoma can be overcome by the use of various ancillary techniques such as Immunocytochemistry and flow cytometry which can be done on cell blocks and aspirates respectively(9). Basing on management guidelines surgery can be avoided in inflammatory and metastatic lesions, thus in this study, FNA of lymph nodes can probably help avoid surgery in 94% of the cases.

The second most common masses were from the salivary glands. The procedure was valuable and reliable in separating sialadenitis which is treated conservatively from benign and malignant neoplasms which are managed by surgery. Our findings confirm that FNA is helpful for the diagnosis and treatment planning of salivary



gland lesions e.g. the diagnosis of sialadenitis requires antimicrobial treatment while the diagnosis of pleomorphic adenoma requires surgery with wide margins to avoid recurrence. Basing on management guidelines, surgery can be avoided in inflammatory conditions while benign and cystic lesions require surgical excision. Sialadenosis recedes with appropriate management e.g. better nutrition. Thus, in this study, FNA can preclude the need for surgery in 25% of the cases.

The third most common aspirates were from the thyroid. The non-diagnostic rate for thyroid FNAs in this study was 15.8% which is comparable to 11% reported by Goellner G et al(14). The major reasons for unsatisfactory results in the thyroid were cystic fluid, bloody smears and suboptimal preservation hence continuous in service training for doctors and technologist is essential to further reduce these unsatisfactory rates. Benign results were found in 63% of the cases which was similar to those reported by Singer PA et al (60-70%)(15). The other diagnostic category reported in this study was that of indeterminate follicular neoplasm (whose differentials are follicular adenoma and follicular carcinoma). The study reported follicular neoplasm in 10.5% of thyroid aspirates, which is again similar to those reported in other studies by Caruso D et al (10-20%)(16). Having similar rates at KNH as those of other studies attest to the high level of proficiency in interpreting thyroid Cytopathology at KNH. Management guidelines recommend follow up in benign conditions, treatment for inflammatory conditions, lobectomy in neoplastic lesions and thyroidectomy in malignant conditions. Thus, in this study FNA can preclude the requirement of surgery in 73.7%.

Cystic lesions were reported in 5% of the total 92 aspirates. Fine needle aspirations of such lesions in this study were able to

differentiate benign cysts from cystic degeneration in metastatic carcinoma. The management of the former involves surgery. Thus, by differentiating the two, FNA played a major role in determining the surgical procedure to follow. Most of the cysts diagnosed in this study were of the congenital epidermoid cyst type (75%), whose management involves surgical excision.

Of all the sites analysed, the supraclavicular area was the commonest site of metastatic malignancy (50%). This can partly be explained by the fact that supraclavicular nodes drain the intramammary nodes which are a common site for breast carcinoma metastasis(9). In addition, cancers of the gastrointestinal tract and prostate often metastasize to the left supraclavicular nodes (Virchow's node) as well.

One of the objectives of this study was to determine the extent to which FNA can preclude the requirement for a diagnostic biopsy. Management guidelines for different lesions were adopted in the determination of the proportion of surgical biopsies that can probably be avoided by FNA(9). FNA helps to avoid surgical interventions in inflammatory conditions such as reactive/non-specific lymphadenopathy, TB lymphadenopathy, thyroiditis, sialadenitis, metastatic malignancy and benign thyroid lesions. If guidelines were followed in the management of patients, FNA of head and neck lesions possibly helped to avoid surgery in 64 of the 92 cases (69.6%). Of the 64, 44 were inflammatory conditions, 12 benign thyroid conditions, 7 metastatic malignancies and a single case of sialadenosis. A study done by El Hagg reported a decrease in surgical biopsies of 90%(6). Thus, this study provides crucial evidence for consideration of FNA services for health care centres not providing any.

The results of this study demonstrate enormous value of FNA as a useful, atraumatic and minimally invasive

technique in the management of head and neck masses. Moghandam et al also reported that FNA is effective for staging malignant disease and preventing unnecessary, costly surgical investigations in patients with head and neck masses(17).

### CONCLUSIONS

FNA of head and neck lesions showed that non-neoplastic (inflammatory) and benign neoplastic lesions are the most common types of lesions seen at KNH. Most of the few malignancies identified were metastatic carcinomas. FNA is a useful and atraumatic useful technique for diagnosis as it probably minimised the need for surgical in close to 70% of head and neck masses. Continuous skill training is critical to reduce unsatisfactory results in head and neck aspirates especially in thyroid aspirates which had an unsatisfactory rate of 16%.

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