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Retrospective audit of Ultrasound guided fine needle aspiration cytology and core biopsy in the assessment of head and neck lumps excluding thyroid nodules at South Warwickshire NHS Foundation Trust

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Abstract

Objectives

Compare rates of diagnostic versus non diagnostic outcomes for fine needle aspiration (FNA) and core biopsy for non-thyroid head and neck lumps.

Methods

Audit on biopsy technique used for ultra sound guided biopsies of non-thyroid neck lumps was performed over a 12-month period in South Warwickshire NHS Foundation trust (SWFT) in the year 2022. Data was collected from records in the Histopathology laboratory and electronic patient records.

Results

A total of 72 lumps underwent biopsy during this period at SWFT and amongst them were 38 parotid lumps, 3 submandibular lumps, 29 lymph nodes and 2 other head and neck lumps. There were 34 fine needle aspirations were done for parotid lumps and 8 of them were non diagnostic. 4 of them went on to have core biopsies and all of them were diagnostic. There were 21 ultra sound guide core biopsies performed and only 2 of them were non diagnostic and required excision biopsy. There were 8 patients who underwent FNA and only 4 of them were diagnostic. The sensitivity of FNA for lymph nodes and salivary glands was 50% and 77% respectively. Core biopsy showed a 100% sensitivity for salivary gland and a 90.5% sensitivity to lymph nodes.

Conclusion

FNAC yields good results with salivary gland lumps. Core needle biopsy has better sensitivity for investigation of enlarged cervical lymph nodes and has added advantage of immunohistochemistry and molecular testing.

Key words: Salivary gland, lymphadenopathy, fine needle aspiration cytology, Core needle biopsy

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Introduction

Historically, fine needle aspiration cytology (FNAC) has been the first line investigation for head and neck lumps. With increasing evidence for improved sensitivity, core biopsy (CNB) has superseded needle aspiration cytology as it gives details on architecture and enough tissues for immunohistochemistry and genetic testing. However, FNA has some advantages including ease of operation, less damage to surrounding tissue and is safer on smaller lymph nodes especially if in close proximity to large blood vessels and being less costly[1]. However, the ideal technique needs to be carefully selected as non-diagnostic tests increase the time to diagnosis and treatment and the cost involved. The European Society of medical Oncology recommends either an excisional biopsy or a sufficiently large core biopsy for the diagnosis of Hodgkin's Lymphoma[2]. Therefore, this limited study aims to compare the different types of ultrasound-guided biopsy to determine the best technique.

Objectives

Compare rates of diagnostic versus non diagnostic outcomes for fine needle aspiration (FNA) and core biopsy for non-thyroid head and neck lumps.

Methods

Audit on biopsy technique used for ultra sound guided biopsies of non-thyroid neck lumps was performed over a 12-month period in South Warwickshire NHS Foundation trust (SWFT).

Results

A total of 72 lumps underwent biopsy during this period at SWFT and among them were 38 parotid lumps, 3 submandibular lumps, 29 lymph nodes and 2 other head and neck lumps. The mean age of patients for parotid lumps were 60.9 (29-84) with a 17:21 male: female ratio. The mean age for lymph node biopsy patients was 63.6 (15-105) and the results for other lumps are given in table 1.

Table 1: Origin of the head and neck masses

Biopsy site	Total	Mean age (range)	Sex M:F
Parotid gland	38	60.9 (29-84)	17:21
Neck (LN)	29	63.6 (15-101)	14:15
Neck (other)	2	79 (76- 82)	1:1
Submandibular gland	3	74.3 (47-75)	1:2
Total	**72**		

The technique and diagnosis for parotid, submandibular lumps and lymph nodes were further analysed. The results are given on table 2.

Table 2: Biopsy technique and diagnosis.

Biopsy site	CNB	CNB Non-diagnostic	FNAC	FNAC Non-diagnostic
Parotid gland	4	0	34	8
Neck (Lymph Node)	21	2	8	4
Neck (other)	1	0	1	1
Submandibular gland	2	0	1	0

Analysis of salivary glands

There were 34 fine needle aspirations were done for parotid lumps and 8 of them were non diagnostic. 4 of them went on to have core biopsies and all of them were diagnostic. Table 3 gives the diagnosis obtained through core biopsy. The sensitivity of FNA and core biopsy for salivary glands was 77% and 100% respectively.

Table 3: Results of parotid USS and core biopsy.

Parotid lump	US Reports	Histology
1	US-multiple focal masses with appearance of lymph nodes, largest solid mass biopsied. *(Hx of parotid nodules, previous FNAC-unclear ?Warthin's, ?oncocytic neoplasm. Episode of parotitis, nodules re-investigated as PMH of Hodgkin's lymphoma.)*	Warthin's tumour
2	In view of irregular, lobulated outline and infiltrative appearance, proceeded to core biopsy.	Mucoepidermoid carcinoma
3	Previous US: multiple lesions in parotid consistent with inflamed cysts and lymph nodes, FNAC inconclusive. Current US: No interval change in cystic lesions, benign appearing lymph nodes noted, two biopsied.	No suspicious features, normal lymphoid tissue.
4	Two soft tissue masses within parotid, USS appearance suggestive of pathological lymph nodes.	T cell lymphoma

There were 1 core biopsy and 2 FNA performed for submandibular lesions and all of them were diagnostic.

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Analysis of Lymph node biopsy

There were 21 ultra sound guide core biopsies performed and only 2 of them were non diagnostic and required excision biopsy. There were 8 patients who underwent FNA and only 4 of them were diagnostic. The outcome of the FNA are given in table 4 and 5. The sensitivity of FNA and core biopsy for lymph nodes was 50% and 90.5% respectively.

Table 4: Outcome of diagnostic FNA for lymph nodes.

Lymph Node Biopsy	US Report	Cytology
1	There are several enlarged lymph nodes in the right upper/mid neck with pathological appearances. As requested, FNA of the largest 2.5cm LN in the right upper neck has been performed for cytology. No cervical lymphadenopathy. Essentially normal appearance of thyroid and salivary glands.	Malignant aspirate Sent to referral centre for further analysis
2	Multiple enlarged discrete hypoechoic lymph nodes are seen in the left anterior and posterior cervical region, largest measuring 2.8 x2.0 cm in size in right anterior cervical region. Thyroid and submandibular gland appears unremarkable.	Metastatic SCC
3	There is a 4.2.cm, partly necrotic pathological lymph node in the right upper neck at level II. There is a further enlarged lymph node measuring 1.5cm just below the large mass. Overall appearances are suggestive of metastatic lymph nodes from a primary oropharyngeal cancer.	Metastatic carcinoma (confirmed as SCC following tonsil biopsy)
4	Several enlarged pathological LNs in the right neck most likely representing nodal metastases from the recently identified right retromolar trigone carcinoma.	Malignant aspirate (Retromolar biopsy-SCC)

Table 5: Outcome for non-diagnostic FNA for lymph nodes

Lymph Node Biopsy	US Report	Cytology	Outcome
5	Suspect benign rather than malignant lymph node, history of ca breast so FNA performed	Aspirate suggestive of metastatic carcinoma, as cells are bland advice core biopsy for definitive diagnosis	Core biopsy: metastatic breast carcinoma
6	Tongue base tumour noted. Enlarged LNs, suspected metastatic SCC.	Cytology predominantly blood and lymphocytes, no squamous cells/ high grade malignant cells seen.	Core biopsy of tongue base tumour: polymorphous adenocarcinoma
7	Large necrotic/cystic mass lesion and further enlarged partially necrotic LN. FNA sent from both.	No evidence of metastasis or high-grade lymphoma. Low grade lymphoma cannot be assessed on cytology.	Core biopsy: Metastatic poorly differentiated SCC into possibly a LN. (Further investigation: right tonsil SCC primary).
8	Extensive cervical lymphadenopathy. Largest submental LN targeted for FNA. Note history of melanoma.	Mixed population of lymphoid cells, no evidence of metastasis or high grade lymphoma. Low grade lymphoma cannot be excluded.	Core biopsy: mantle cell lymphoma

Discussion

It is very important to arrive at the correct diagnosis as efficiently as possible to reduce time to treatment and to prevent the patient from having repeat or multiple procedures performed which could lead to increases cost as well as pain and inconvenience to patient. Traditionally the first line investigation for any head and neck lump has been FNAC and the sensitivity of this investigation has been increased drastically with the use of ultra sound guidance. Currently FNAC remains the first line investigation in Sri Lanka although further audits are needed to identify the current practice.

The main aim of this audit is to evaluate if the current practice at SWFT follows the current guidelines and to prompt the adherence to this guidance in Sri Lanka. The study confirmed that head and neck biopsies performed at SWFT follow convention, which is FNAC usual first-line investigation for parotid masses. The National Comprehensive Cancer Network (NCCN) and UK Head and neck guidelines recommend Ultra sound guided FNAC as the preferred technique for salivary gland lumps[3,4].

This also showed that core needle biopsy is the usual first line investigation for lymphadenopathy performed at SWFT. This is also in keeping with European Society of medical Oncology Clinical practice guidelines for Hodgkin's lymphoma[2]. The UK Head and neck guidelines recommends core biopsy over FNAC in context of carcinoma of unknown primary. They have elaborated the advantage of core over FNAC in finding the origin by way of cell architecture, immunohistochemistry techniques, viral and genetic testing[4].

Core biopsy yielded a greater number of diagnostic results in neck lymphadenopathy than FNAC In our study: CNB 90.5% and 50% for FNAC. A similar study undertaken in Korea in 2016 has shown sensitivity of 91.6% sensitivity of core needle gun biopsy in differentiating malignant from benign disease versus 50% for ultra sound guided FNAC. These statistics are in keeping with the current study[5].

A study performed in Korea in 2007 on sonographically guided core biopsy of cervical lymphadenopathy in a patient cohort without known malignancy has shown a sensitivity rate of 97% for ultra sound guided core biopsy[6]. Another similar study in UK has shown a 98.1% sensitivity in differentiating between benign from malignant cervical lymphadenopathy and 98.5% sensitivity of differentiating between reactive lymphadenopathy from lymphoma. This study also has not noted any increased morbidity associated with core biopsy[7].

Another study performed in Pakistan shows sensitivity rates of 92% for chronic cervical lymphadenopathy and they have concluded that FNAC is safe and reliable with a high diagnostic accuracy[8]. In contrast a study done in UK in 2011 has shown a 68% sensitivity for diagnosis of lymphoma. However, they have managed to increase the sensitivity to 95.5% by incorporating flow cytometry and immunocytochemistry[9].

Therefor it can be concluded that while ultra sound guided FNAC is a valuable technique with lesser cost, technically easier and safer on high-risk locations, the application should take in to consideration the site of lump and the tentative diagnosis. FNAC should be the first line investigation for salivary glands where it has shown a relatively higher sensitivity than lymph nodes. The need for adjuncts such as immunohistochemistry in deciding treatment for the patients as in the case of lymphomas or for deciding the intensity of treatment and prognosis as in the case of p16 status in oropharyngeal carcinoma or to aid in finding the primary in nodal metastasis with occult primary would favour a core needle biopsy over FNAC[10,11]. Many studies have shown ultra sound guided core biopsy to be a safe and efficient investigation and has a very low risk of tumour seeding or damage to surrounding structures[12]. As FNAC yields only a very small sample, it is often inadequate for immunocytology which again is not as sensitive as immunohistochemistry and up to 37% patients would often need further FNAC or core biopsy following FNAC[5].

Key message

FNAC yields good results with salivary gland lumps. Core needle biopsy has better sensitivity for cervical lymph nodes and has added advantage of immunohistochemistry and molecular testing and should be preferred over FNAC when investigating for lymphadenopathy.

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