DISSERTATION ON

A PROSPECTIVE CLINICO PATHOLOGICAL STUDY ON CERVICAL LYMPHADENOPATHY AMONG PATIENTS IN A TERTIARY CARE CENTRE

Dissertation submitted to

THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY

In the partial fulfillment of the regulations for the award of the degree of

M.S. IN OTORHINOLARYNGOLOGY

BRANCH-IV

REGISTRATION NUMBER: 221914053

GOVERNMENT STANLEY MEDICAL COLLEGE

CHENNAI – 600001.

THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY

CHENNAI – 6000032.

MAY-2022

CERTIFICATE

This is to certify that the dissertation titled "**A PROSPECTIVE CLINICO PATHOLOGICAL STUDY ON CERVICAL LYMPHADENOPATHY AMONG PATIENTS IN A TERTIARY CARE CENTRE**" submitted by **DR.V.KANAGAVEL**, for the Degree of Master of Surgery (Otorhinolaryngology) in partial fulfillment of regulations of The Tamil Nadu Dr. M.G.R. Medical University, Chennai is the result of original research work undertaken by him during the academic year 2019-2022, in the Department of Otorhinolaryngology & Head and Neck Surgery, Government Stanley Medical College, Chennai.

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DECLARATION

I **Dr. V. KANAGAVEL** solemnly declare that the dissertation, titled "**A PROSPECTIVE CLINICO PATHOLOGICAL STUDY ON CERVICAL LYMPHADENOPATHY AMONG PATIENTS IN A TERTIARY CARE CENTRE"** a clinical study submitted by me is a result of the original work carried out by myself in Government Stanley Medical College Hospital, Chennai during the academic period of 2019 - 2022 under the guidance of **PROF**. **DR. M. GOWRISHANKAR., M.S., DNB., DLO.**, Head of the Department, Department of Otorhinolaryngology, Government Stanley Medical College and Hospital, Chennai. I further declare that the result of the research has not been submitted previously by myself or other persons in any conferences or journals.

This dissertation is submitted to The Tamil Nadu Dr. M.G.R Medical University in partial fulfillment of the rules and regulations for the M.S. Degree examination in Otorhinolaryngology to be held on May 2022.

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ACKNOWLEDGEMENT

First and foremost, I would like to express my sincere gratitude to **PROF. DR. P. BALAJI, MS., FRCS., PH.D., FCLS.,** The Dean, Stanley Medical College, for having permitted me to undertake this study.

I would like to express my immense gratitude to my Guide **PROF DR. M. GOWRISHANKAR M.S., DNB., D.L.O.** Head of the department and Professor of ENT, Department of ENT & Head and Neck Surgery, Government Stanley Medical College & Hospital, for his valuable guidance, suggestions, encouragement, constant motivation, supervision, and help in conducting and fulfillment of this study.

I am immensely grateful to my **PROF Dr. V. RAJARAJAN M.S ENT., DNB.**, Professor of ENT, Department of ENT & Head and Neck Surgery, Government Stanley Medical College and Hospital for his valuable support in conducting the study.

I wish to thank my Associate Professor **Dr. K. ATHIYAMAN M.S ENT.,** Department of ENT & Head and Neck Surgery, Government Stanley Medical College and Hospital for his valuable tips and guidance throughout the study.

I express my sincere thanks to **PROF Dr. P. ARUNALATHA MD.,** Head of Department and Professor of Pathology, Department of Pathology, Government Stanley Medical College and Hospital for her constant support in providing the necessary information throughout the study.

I express my sincere thanks to **THE SECRETARY AND CHAIRMAN, INSTITUTIONAL ETHICAL COMMITTEE,** Government Stanley Medical College and Hospital.

I am grateful to all the Other post-Graduates who most willingly helped me during this study period.

I also thank the Staff Nurse and Theatre personnel, Government Stanley Hospital for their co-operation and assistance in the conduct of this study.

I thank all my Colleagues and Friends for their constant encouragement and valuable criticism.

Last but not the least, I express my gratitude for the generosity shown by all the Patients who participated in the study.

I express my heartfelt thanks to my PG seniors & Juniors and other friends for their help during my study and preparation of this dissertation and also for their co-operation.

I am extremely thankful to My wife and Parents for their continuous support. Above all, I thank God almighty for his immense blessings.

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INTRODUCTION

INTRODUCTION

The Neck constitutes nearly 2/3rd of the total lymph nodes of the body. Cervical lymphadenopathy, the most typical presenting complaint in the Otolaryngology outpatient department. Enlargement of a lymph node is absolutely noteworthy which can result from multiple etiological agents and is an index spread of infections and malignancy.[1]

The commonest causes for cervical lymphadenopathy are tuberculous lymphadenitis which could be a common manifestation of extrapulmonary tuberculosis, secondaries within the cervical lymph nodes, lymphomas, and nonspecific lymphadenitis. In India tuberculosis remains widespread because of enormous social and economic constraints. In older ages, malignant deposits account for the search of primaries in the upper aerodigestive system, occult primaries in the nasopharynx, oropharynx, Hypopharynx, and thyroid, etc. Cervical lymphadenopathy infrequently presents as generalized lymphadenopathies like Hodgkin's lymphoma or non-Hodgkin's lymphoma or sarcoidosis etc.[2,3]

Persistent enlargement of the lymphatic tissue necessitates detailed investigation of underlying pathology. Although reasonably accurate diagnosis is often made clinically, full Histopathological examination are mandatory to ascertain and make sure the diagnosis. These is overwhelmed by doing Fine Needle Aspiration cytology because it is obtained easily and quickly which is straightforward cheap and reliable. The sensitivity and specificity of FNA for both pediatric and adult head and neck masses are reported to be approximately 95% when diagnostic material is adequate. FNA should be done before the consideration of any open procedures which might be used for both cytology and culture.[4]

In an exceedingly diverse of causes starting from an easy benign to a devastating malignant deposit, cervical lymphadenopathy cannot be considered as the condition to be pass over simply. The

current prospective study was undertaken to delineate the distribution of clinical and demographic profile of patients presenting with cervical lymphadenopathy in the Otorhinolaryngology out-patient department hospital and to correlate them with cytopathological diagnosis. This may help to gain more knowledge about the prevalence of different clinical profiles of cervical lymphadenopathy in various etiologies which help in easier case detection and better treatment outcome.

AIMS AND OBJECTIVES

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1. To study the distribution of cervical lymphadenopathy with respect to Demographic profile

2. To diagnose the various etiologies of cervical lymphadenopathy based on the cytopathological diagnosis

3. To discuss the different cytomorphological pattern of cervical lymphadenopathy with the Fine needle aspiration cytology.

4. To study the commonest secondary metastatic deposits and the occult primary in cervical lymph node.

REVIEW OF LITERATURE

REVIEW OF LITERATURE

Ancient Greeks Hippocrates and Aristotle described the lymph as white fluid. Gasparo aselli an Italian anatomist described lymphatic vessels in 1622. The word 'LYMPHATICS' was first described independently by Olaus Rudbeck & Thomas Bartholin during the 17th century. The anatomy and physiology of the lymphatic system was described by William Hunter in the late 18th century.

The first fundamental nomenclature of the neck nodes was found in the work of Rouviere (1932).

Henri Rouviere produced an influential classification of cervical lymph nodes in 1938. This system was based on anatomical landmarks noticed in dissection making it imperfectly suited to the needs of the clinicians which led to new terminology for the lymph nodes that could be palpated.[5]

Kun used the technique of aspiration cytology in 1847.[6] In 1905, Grieg and Gray published an article about the aspiration of lymph nodes for the diagnosis of motile Trypanosomes in the British journal memorandum.[7]

In 1921, **Guthrie** reported needle aspiration from lymph nodes of patients with tuberculosis and also examined cells from patients with lymphoma and carcinoma.[8]

In 1930, Fine needle aspiration cytology was introduced in the United States by **Martin and Ellis** and reported malignant tumours by introducing the needle aspiration technique.[10]

In 1988 **Smallman** published that fine needle aspiration cytology is a quick, simple, accurate and safe method for the investigation of masses in head and neck with overall sensitivity and specificity was 98.81% and 94.44% respectively.[11]

Jandu M et al, in 1999 did a study on 95 patients with a mass in the head and neck region, they got 100% accuracy where fine needle aspiration cytology was performed by consultant and 91%

when performed by a junior staff. They conclude that fine needle aspiration cytology is a useful diagnostic tool for head and neck masses.[12]

Robbins KT et al in their study about cervical node biopsy prior to definitive treatment on 1986 concluded that open cervical lymph node biopsy can alter pattern of lymphatic drainage for up to 1 year following surgery but does not signify a poor prognosis provided adequate and early treatment is simultaneously given.[13]

Andry G et al in 1983, revealed that fine needle aspiration biopsy is preferable to open biopsy of a cervical lymph node for the reasons that there is no tumor spread, no inconvenient scar to distort future surgical intervention, no delay between the diagnosis and treatment and its simplicity. Whenever a diagnosis of malignancy cannot be confirmed by needle biopsy, then an open biopsy can be suggested provided it can be followed by a frozen section and a concomitant definitive neck dissection if per operative positive histopathological diagnosis is obtained. [14]

Biswas et al did a cross sectional study on FNAC of 423 patients cervical lymph nodes over one-year duration in 2009 with respect to clinical and demographic profiles. The study analysis revealed that Tuberculous lymphadenitis was most prevalent with 45.4% common among 15-59 years age group frequently involving level II & level IB nodes followed by metastatic secondaries from different primary malignancy with 21.2% affecting most commonly >60yrs age group with more significantly involving level III and level VB. Whereas Nonspecific Reactive Lymphadenitis was more common in <14 years age group with 19.9%.[2]

Batni G et al conducted a study in 2015 on 64 patients with enlarged cervical lymph nodes. Fine needle aspiration biopsy was done for all cases to make diagnosis in which out of 64 cases 51.5% was non-specific reactive lymphadenitis, 28% Tuberculosis lymphadenitis, 17% malignant and

3.1% lymphoma. In their study author concluded that fine needle aspiration can be deemed as front-line investigation for early diagnosis and better management.[1]

Annam et al conducted a prospective study on a total of 336 consecutive children with age 1 month to 12 years with significant lymphadenopathy by subjected to fine needle aspiration cytology. The study results showed the cytomorphologic features observed were reactive lymphadenitis 58.02%, granulomatous lymphadenitis 30.55%, suppurative lymphadenitis 7.10% and malignancies 5.62%. The most common cause diagnosed was tuberculosis 29.01% followed by reactive lymphadenitis in 28.39%, suppurative lymphadenitis in 7.10%, human immune deficiency infection in 5.55% and malignancies in 4.32%. By this Fine needle aspiration cytology play a vital diagnostic modality in etiologic workup of significant lymphadenopathy with almost sensitive and specific as excisional biopsy when an adequate aspirate is examined by expert cytologist.[15]

Dasgupta et al in 1994 FNAB cytology of cervical lymphadenopathy with special reference to tuberculosis was done. In this study 188 cases of cervical lymphadenopathy were studied, and it was found that diagnostic accuracy was 84.4% for tuberculosis, 84.2% for caseous necrosis and 73.6% for epithelioid cells. Acid fast bacilli were observed in 45.6% of cases. Metastatic carcinoma also yielded high diagnostic accuracy of 98% showing the significance of FNAB cytology.[16]

Chamyal P.C et al in their study observed out of 110 cases of cervical lymph nodes 63(57.3) % representing benign nature with 37 of these were found to be due to reactive lymphadenitis and 26 due to tuberculosis. In other 45(40.9%) cases of malignancy 19 were squamous cell carcinoma, 6 anaplastic, 3 adenocarcinoma, 10 Hodgkin's lymphoma and 7 non-Hodgkin's lymphoma. Among which 86 cases underwent subsequent open biopsy. Accuracy, specificity and sensitivity of

aspiration cytology were 88.3%,97.6% and 93.6% respectively. The results of the study recommend aspiration cytology the first line investigation in evaluating cervical lymph enlargement needing open biopsy for certain specific indications.[3]

In Italy **Pilotti et al** in 1993 compared the efficacy of FNAB cytology of lymph nodes from suspicious or diagnosed cases of malignancy with excision biopsy. The diagnostic accuracy was 99.1%, while typing accuracy was 96.5%. It shows that FNAB cytology may be considered the first step in workup enlargement of superficial lymphadenopathy.[17]

Khiery and Ahmed et al study revealed that majority of lymph nodes were benign in origin and most common is tuberculous lymphadenitis followed by reactive lymphadenitis and granulomatous lymphadenitis.[18]

Study by Adhikari P, Sinha BK, Baskota DK et al.in 2001 did a comparative study on fine needle aspiration cytology with histopathology in diagnosing cervical lymphadenopathy on 55 patients. Among which Tuberculous Lymphadenopathies was the most common observed in 25 patients followed by Granulomatous Lymphadenopathies in 14 patients, Reactive Lymphadenopathies in 9 patients and Metastatic Lymphadenopathies in 7 patients. The sensitivity and specificity of FNAC of lymphadenopathy to diagnose tubercular lymphadenopathy were 80.0% and 100.0%. Similarly, false positive value, false negative value, positive predictive value and negative predictive value were 0.00%, 20.0%, 100.0% and 82.14% respectively.[19]

Jha BC et al conducted a study in 1997 about cervical tuberculous lymphadenopathy on 94 patients by Fine needle aspiration cytology observed that Tuberculosis was the most common etiology accounting for 60 patients. Other causes of cervical lymphadenopathy were metastatic secondaries in 18 patients, non-specific reactive lymphadenitis in 13 patients and lymphoma in 3 patients. [20]

Nidhi P et al from tertiary care center, Delhi reported among 175 tuberculous lymphadenitis 77% of males and 75% of females were in the second to fourth decades of life with male to female ratio of 1:1.2. Forty-eight patients had history of tuberculosis in the past. The cervical region was the most common site; involved in 90% cases, followed by axillary (6.4%) and inguinal (1.6%). Only three cases presented with generalized lymphadenopathy. Cytomorphology patterns were (Pattern A- epithelioid granulomas without necrosis in 14.3%, Pattern B- epithelioid granulomas with caseous necrosis in 16.4%, Pattern C- necrosis only without epithelioid granulomas in 39.2%, Pattern D- polymorphs with necrosis with or without epithelioid granulomas in 30.1%. AFB positivity seen in pattern A- 3.2%, Pattern B- 69.5%, Pattern C- 85.5%, Pattern D- 79.2%. Overall AFB positivity was seen in 71.0% cases.[21]

Bagwan I et al conducted a study in 2003 about cytologic evaluation of enlarged neck node in metastatic disease revealed the most common metastasis noticed in neck was squamous cell deposits from the oral cavity. The analysis revealed among 1978 specimen 36.81% had squamous carcinoma, 12.18% poorly differentiated carcinoma, 7.33% adenocarcinoma, 2.83% thyroid carcinoma, 1.82% undifferentiated carcinoma, 1.57% non-small cell carcinoma, 1.52% uncommon metastasis, 0.9% small cell carcinoma and 0.7% salivary gland tumor.[22]

Ghartimagar D et al in their 2005 study series on utility of fine needle aspiration cytology of metastatic lymph nodes observed 508 cases of lymph node revealed 93(18%) positive for metastasis and 10(2%) cases for hematolymphoid malignancies. Among 93 cases 67(67%) positive for adeno carcinomatous deposits, 14(15%) for squamous cell deposits, 3(3%) for breast ductal carcinoma, 8(9%) for non-small cell carcinoma and 2(2%) each for papillary carcinoma thyroid, small cell carcinoma and malignant melanoma respectively.[23]

Study by **Soni et al** in 2009 with 59 patients between 5 to 70 years. Of which 39 patients (66.15%) were females and 20 (33.89%) were males. In 44 patients, out of the 59, subsequent histopathology confirmed fine needle aspiration cytological diagnosis (sensitivity 83.01%) and in 15 cases HPE did not confirm cytological diagnosis (specificity 78.94%). Out of 59 patients, 28 (47.45%) were of neck nodes, 14 (23.72%) were of thyroid, 13 (22.03%) were of salivary gland masses and 4 (6.77%) were from other types of neck masses.[48]

ANATOMY

EMBRYOLOGY [24,25]

The Lymphatic tissues started to develop from the end of fifth week of embryonic life as 2 paired and 2 unpaired endothelial sacs which constitute the primordium. They arise from developing veins and are derived from mesoderm.

1st lymph sac - Paired Jugular lymph sacs at junction of internal jugular & subclavian veins which spreads lymphatic capillary plexuses to Head and neck, upper limbs and thorax.

2nd lymph sac - unpaired retro-peritoneal lymph from primitive vena cava & mesonephric veins which spreads lymphatic plexuses to abdominal viscera and diaphragm. The sac establishes connection with the cisterna chyli and loses all its connection sac with surrounding veins.

3rd lymph sac - unpaired cisterns chyli lies dorsal to mesentery develops inferior to diaphragm on posterior abdominal wall and give rise to inferior portion of thoracic duct and cisterna chyli of the thoracic duct.

Finally, the Paired posterior lymph sacs develop from Iliac veins which spreads lymphatic plexus to abdominal wall, pelvic region & lower limbs. The sac joins with cisterna chyli and lose their connection with neighboring veins.

By the end of 9th week of Gestation multiple endothelial channels connect these lymph sacs together form a complicated network of lymphatic vessels. The right and left thoracic duct connect the right and left jugular sacs with the cisterna chyli.

During the end of 9th week of embryonic life cervical lymph nodes starts appear and several other groups of lymph nodes forms later on. At about 12 weeks of embryonic life all those lymph sacs are transformed into groups of lymph nodes except for the upper portion of cisterna chyli.

In the early stage within the primordium of the lymph node Granulopoiesis and erythropoiesis begins to appear from the 12th to the 14th Gestation week. At later stage of lymph node at 17-20th weeks of embryonic life differentiation into cortex and medulla become obvious then granulopoiesis is replaced by lymphopoiesis. The lymphatic space surrounding the early node is transformed in to the subcapsular sinus.

The primitive cells in the yolk sac give rise to two types of lymphocytes: T Lymphocytes responsible for cellular immunity, and B Lymphocytes responsible for synthesis of antibodies.[21]

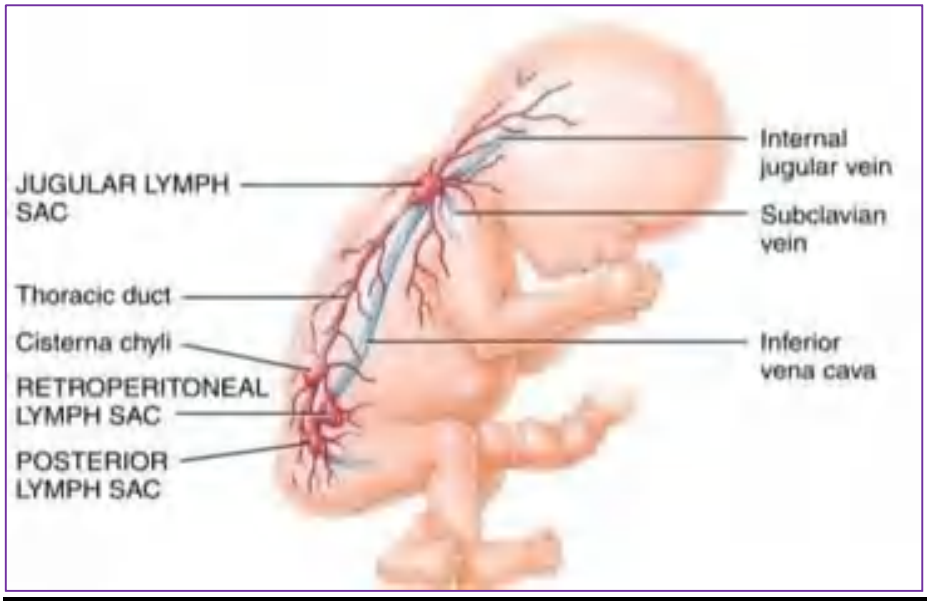

Figure -1 Showing development of Lymphatic system[25]

STRUCTURE OF LYMPH NODE [25]

There are about 800 lymph nodes in our body, that are scattered throughout the body, both superficially and deep and they usually occur in groups. Each lymph node has a slight indentation on one side, the hilum, through which the blood vessels, afferent and efferent lymphatic vessels enter and leave the lymph node. The lymph node is surrounded by a fibrous capsule which extends inside to form the trabeculae. The substance of the lymph node is divided into the outer cortex and the inner deep medulla.

Within the outer cortex there are egg shaped aggregates of B-cells called lymphatic nodules or follicles. A lymphatic nodule which chiefly contains B-cells, are called a primary lymphatic nodule. Most of the lymphatic nodules in the outer cortex are secondary lymphatic nodules, which are formed in response to antigenic stimulus and are sites of plasma cells and memory B-cells formation. The centre of a secondary lymphatic nodule contains a region of light staining cells called the germinal centre, in which the B-cells, follicular dendritic cells and macrophages are present.

The inner cortex, also termed as para cortex, does not contain lymphatic nodules. It mainly contains T-cells and dendritic cells that enter a lymph node from other tissues. The medulla of a lymph node contains B-cells, antibody producing plasma cells, which have migrated out of the cortex into the medulla, and macrophages.

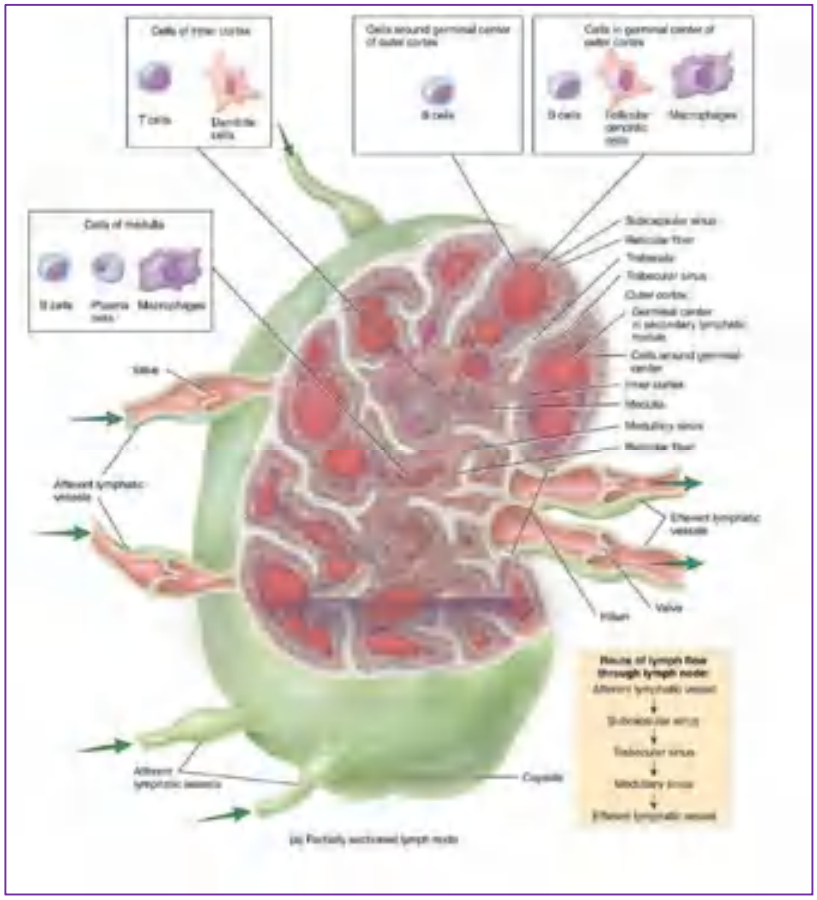

Figure –2 showing structure of lymph node[25]

ANATOMY OF CERVICAL LYMPH NODES

To understand the Distributions of cervical lymphatics it is necessary to know the muscular triangles of the neck.

TRIANGLES OF NECK [26]

The Anterior and posterior triangles of Neck are divided by the sternocleidomastoid muscle which itself is in neither triangle.

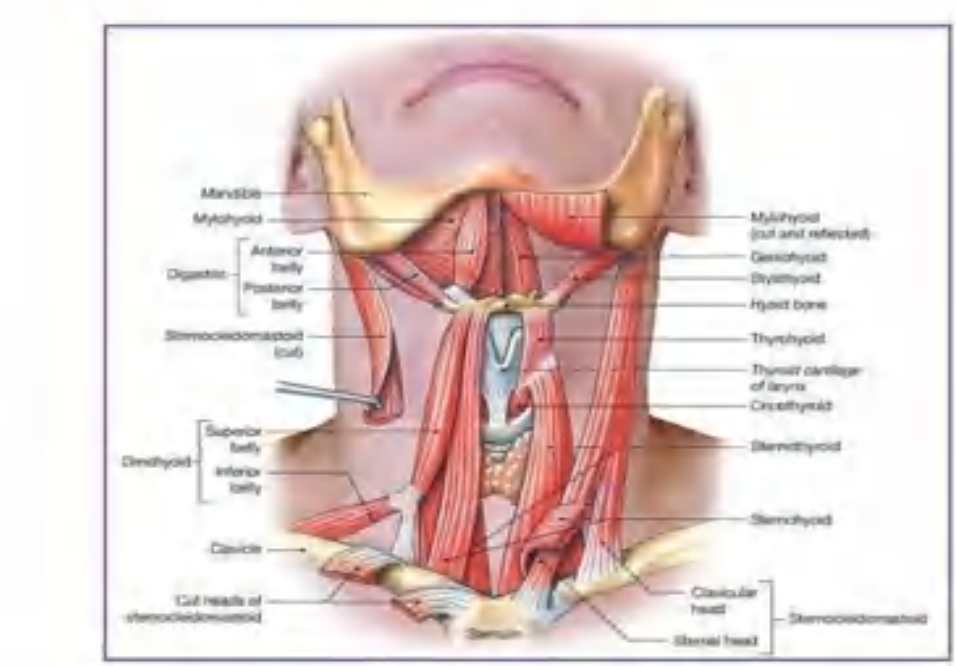

Figure -3: Anterior triangles of Neck

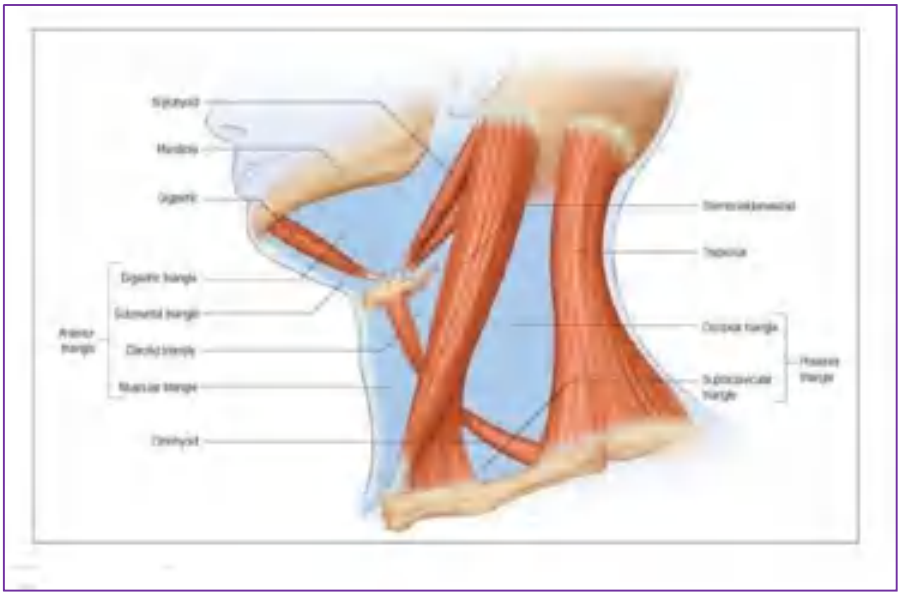

Figure- 4: Posterior triangle of Neck

Anterior triangle

The Boundaries of the anterior cervical triangle are superiorly by the inferior border of mandible, posteriorly by the posterior border of sternocleidomastoid and medially by anterior midline of the neck.

Table-1 Summary of the contents of Anterior Triangle

MUSCLES	VESSELS	NERVES	VISCERA	OTHERS
1.Digastric 2.Stylohyoid and Mylohyoid 3.Superior belly of omohyoid 4.Strap muscles	1.External Carotid Artery and branches (except posterior auricular) 2.Internal and Anterior jugular veins and tributaries	1.Internal and External laryngeal nerves 2.Nerve to mylohyoid 3.Hypoglossal nerve	1.Thyroid 2.Larynx 3.Submental & submandibular glands	1.Jugular chain of lymph nodes

Anterior triangle is further divided into Submental Triangle, Submandibular Triangle, Carotid Triangle and Muscular Triangle.

I Submental triangle**:**

Boundaries: The apex is toward the symphysis mentum and the base is formed by the hyoid bone. From both the sides the Anterior belly of digastric muscle and Floor is formed of two mylohyoid muscles which meet in a fibrous rather with contents of lymph nodes and submental salivary glands.

II Submandibular triangle:

Boundaries: Inferior margin of the mandible and the anterior & posterior bellies of the digastric muscle. The floor is formed by mylohyoid, hyoglossal and middle pharyngeal constrictor muscles.

The contents are submandibular salivary gland, deep fascia, lymph nodes, anterior facial vein, facial artery and the marginal mandibular branch of the facial nerve.

III Carotid triangle:

Boundaries: Superior belly of omohyoid muscle, Anterior border of sternocleidomastoid muscle and posterior belly of the digastric muscle with contents containing upper carotid sheath and lymph nodes.

IV Muscular triangle:

Boundaries: Lower anterior border of sternocleidomastoid, Superior belly of omohyoid, the hyoid bone and the midline. This triangle contains Lower carotid sheath, the infrahyoid strap muscles, upper aerodigestive tract, the thyroid and parathyroid gland.

POSTERIOR TRIANGLE: The posterior triangle can be divided into two by the omohyoid, which forms the lateral (Occipital) triangle and the subclavian triangle.

I Lateral triangle (Occipital triangle):

Boundaries: The posterior border of the sternocleidomastoid, the anterior border of the trapezius and the superior border of the inferior belly of the omohyoid muscle. It contains the cervical plexus, fibro fatty tissue, Occipital lymph nodes and the spinal accessory nerve.

II Subclavian triangle:

Boundaries**:** The lower border of the inferior belly of omohyoid, the clavicle and the posterior border of sternocleidomastoid. This triangle contains brachial plexus and the subclavian vessels, including the thyrocervical trunk, fibrofatty tissue and the scalene muscles which includes Sibson's suprapleural fascia and the pleura. The trapezius muscle covers the cervico-occipital region and represents the posterior neck.

Table-2 Summary of the contents of posterior triangle

Muscles	Vessels	Nerves	Others
1.Omohyoid	1.Occipital, Transverse cervical, Supraclavicular and Subclavian arteries 2.Transverse cervical, Supraclavicular and External Jugular veins	1.Cervical and Brachial plexus	1.Lymph nodes

CERVICAL LYMPHATICS [27]

The cervical lymphatics are broadly divided into two groups circular chain and vertical chain

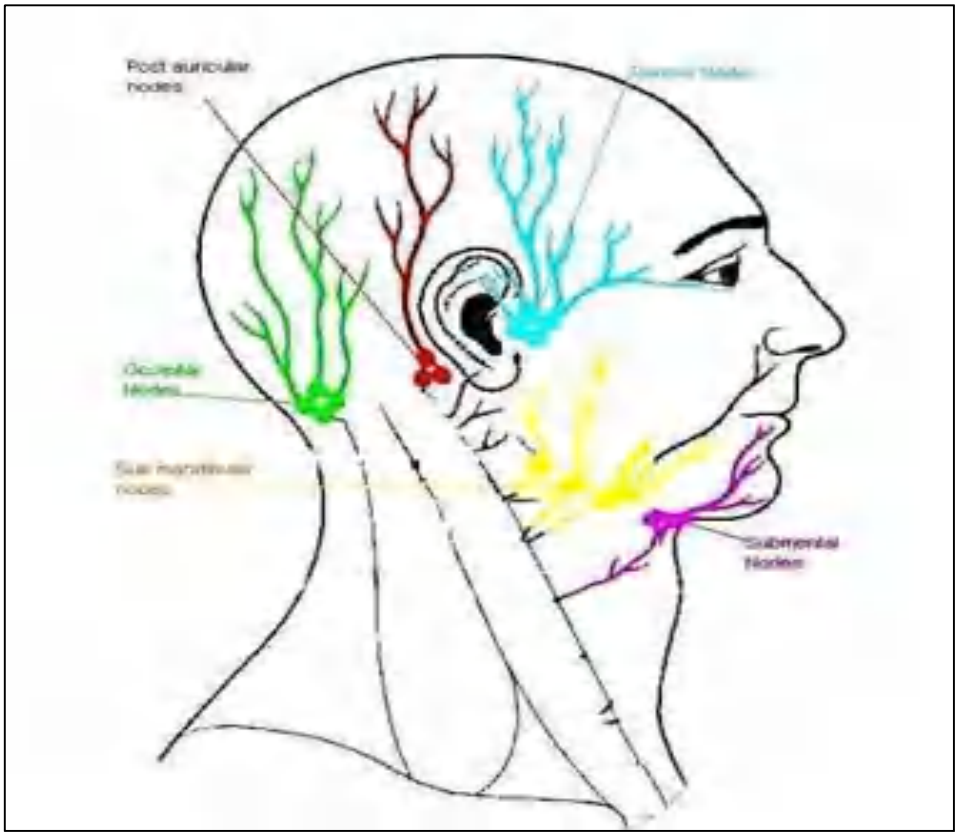

Figure- 5: Lymphatic distribution in the Neck

CIRCULAR CHAIN

A. Occipital: situated in the upper angle of posterior triangle between External Occipital protuberance and mastoid process

Draining area: back of the scalp

Efferent: Lower deep cervical

B. Postauricular: lies on the mastoid process behind the pinna, superficial to the attachment of sternocleidomastoid.

Draining area: temporal region of scalp, External auditory meats, part of pinna

Efferent: upper deep cervical

C. Preauricular: situated in front of Travis

Draining area: anterior surface of pinna, part of the eye lid, External auditory meats

Efferent: upper deep cervical

D. Parotid: They are situated superficial to the gland, within the substance of the gland and also deep to the gland deeper nodes situated between the gland and pharynx

Draining area: nasopharynx and back of nose, superficial node drains the eyelid, front of the scalp, External auditory meats and the tympanic cavity.

Efferent: upper deep cervical lymph nodes

E. Superficial buccal (Facial)

Infraorbital: lies just below the orbit

Supramandibular: lies around the facial artery

Buccinator: lateral to the angle of mouth on the buccinator muscle

Draining area: eyelids, conjunctiva, nose, and cheek

Efferent: upper deep cervical

F. Submental: situated in the midline, inferior to the mandible and between the anterior bellies of the digastric muscles

Draining area: central part of lower lip, incisors teeth, gums, tip of tongue with adjacent part of floor of the mouth.

Efferent: sub mandibular group and jugulo omohyoid group.

G. Submandibular group: lies in the submandibular triangle and are divided into preglandular, prevascular, retrovascular, retroglandular, intraglandular and deep nodes.

Draining area: They drain the parts of lip, teeth, gums, vestibule, anterior two third of tongue, floor of mouth and buccal cavity

Efferent: upper and lower deep cervical lymph nodes.

H. Superficial cervical nodes: situated along the course of the jugular vein on the external surface of the sternocleidomastoid.

Draining area: parotid region, lower part of the ear.

Efferent: upper and lower deep cervical.

I. Anterior cervical: consists of superficial group along the Anterior jugular vein and deep group along infrahyoid, pre-laryngeal and pre-tracheal position which drains the skin of neck.

VERTICAL CHAIN

These are further divided into superficial and deep cervical nodes. Superficial cervical nodes are divided into anterior cervical and posterior cervical groups.

Lymph nodes that are situated over and anterior to the sternocleidomastoid muscle are designated as anterior cervical nodes. Those deep and superficial cervical nodes that lie behind sternocleidomastoid muscle are designated as posterior cervical nodes. The deep cervical nodes located above the clavicle are termed as supraclavicular or transverse cervical nodes.

Deep cervical nodes are embedded in areolar tissue near along the Carotid sheath. They consist of superior deep cervical nodes and adjoin the Internal jugular vein. One subgroup that is of significant is the jugulodigastric nodes, concerned with drainage of palatine tonsil. The efferent from these nodes drain into inferior part of deep cervical nodes or either directly into jugular trunk. Inferior deep cervical nodes are related to lower Internal jugular vein, situated deep to the sternocleidomastoid. The node just above the intermediate tendon of omohyoid, the jugulo-omohyoid node is concerned with drainage of tongue. Efferent from these nodes converge into right and left jugular lymph trunk which drain on right into the subclavian vein and on left into the thoracic duct.

LEVELS OF CERVICAL LYMPH NODES [27]

The most widely accepted system for describing the lymph nodes in the neck originates from the Memorial Sloan Kettering Hospital, New York and was adopted by the American Academy of Otolaryngology Head and Neck Surgery (AAOHNS) in 1991.

It is a system developed by the Surgeons and Radiologists and divides the Neck into six levels, of which I to V are paired in the lateral neck, and level VI describes the midline neck nodes from hyoid to sternal notch.

The system has been further classified by the Head and Neck Cancer Committee of the American Academy of Otolaryngology Head and Neck Surgery to include subzones.

Table-3 Showing Levels of lymph nodes

LEVEL	SURGICAL LANDMARK
Level IA Submental Triangle	Anterior belly of the two digastric muscles and the hyoid bone.
Level IB Submandibular Triangle	Anterior and posterior bellies of the digastric muscles and the body of the mandible
Level IIA-Upper jugular group anteroinferior to spinal accessory nerve Level IIB-Upper jugular group posterosuperior to spinal accessory nerve	Superior- from the skull base, Inferior- inferior border of hyoid bone, Anterior- lateral border of stylohyoid and sternohyoid muscle, Posterior-posterior border of sternocleidomastoid
Level III-Middle jugular group of nodes	Superior- inferior border of hyoid bone, Inferior- lower border of cricoid cartilage, Anterior- lateral border of sternohyoid muscle, Posterior- posterior border of sternocleidomastoid muscle.
Level IV-Lower jugular group of nodes	Superiorly - inferior border of cricoid cartilage, Inferiorly- up to clavicle, Anteriorly- lateral border of sternohyoid muscle, Posteriorly- posterior border of the muscle
Level VA-Posterior triangle group of nodes superior to inferior belly of omohyoid Level VB-Posterior nodes lies inferior to omohyoid muscle	Superior- Apex is formed by sternocleidomastoid and trapezius muscle, Inferiorly- clavicle, Anteriorly- posterior border of sternocleidomastoid muscle Posteriorly- anterior border of trapezius muscle
Level VI-central group of nodes	Superior- Hyoid bone, Inferior- suprasternal notch, Laterally- on both sides by carotid arteries

CAUSES FOR LYMPH NODE ENLARGEMENT IN NECK: [28,29,30]

I. **Infection**

1. Acute lymphadenitis

a. Non specific

b. Specific- e.g., Streptococcus, staphylococcus

2. Chronic lymphadenitis

a. Nonspecific

b. Specific – e.g., Tuberculosis, Syphilis, Toxoplasmosis, Cat scratch fever, Infectious mononucleosis

II. **Neoplastic**

a. Primary tumours- Hodgkin's Lymphoma, Non-Hodgkin's Lymphoma and Leukemias

b. Metastatic Secondary Tumours – Squamous cell carcinoma from larynx, pharynx, upper 1/3rd of esophagus, cheek, scalp, tongue. Adenocarcinoma from gastrointestinal cancers, thyroid, Breast, Testis, Kidney, Malignant melanoma and from unknown origin.

III. Miscellaneous

1. Allergic lymphadenopathy as in serum sickness.

2. Secondary to ingestion of Anticonvulsant drugs: e.g., Phenytoin, Carbamazepine and from other Drugs such as Primidone, Gold, Sulfasalazine, Captopril, Atenolol, Allopurinol.

3. Post vaccinal

4. Sinus histiocytosis also called as Rosai -Dorfman disease

5. Chronic pseudo lymphomatous lymphadenopathy

6. Dermatopathy lymphadenopathy

7. Juvenile Rheumatoid arthritis

8. Amyloidosis

9. Lipid storage disease

10. Glycogen storage disease

11. Sarcoidosis

12. Histiocytic necrotizing lymphadenitis, also called as Kikuchi's disease

13. Connective tissue disorders or autoimmune diseases: rheumatoid arthritis, juvenile rheumatoid arthritis, systemic lupus erythematosus, dermatomyositis, mixed connective tissue disease, Sjogren's syndrome.

14. Immunodeficiency states

15. Kawasaki's disease

ACUTE LYMPHADENITIS: -

Due to acute inflammation of the drainage area, the regional lymph nodes become acute inflamed and the condition is known as acute lymphadenitis commonly occurs due to direct invasion of micro-organisms. The affected lymph nodes become enlarged, painful and tender. The overlying skin becomes warm, red and brawny edematous with high grade pyrexia. Earliest microscopical feature is sinus dilatation followed by accumulation of neutrophils, vascular dilatation and capsule edema.

Pathogenesis:

a) Suppuration of the nodes in the area of infection caused by the pyogenic organism.

b) Diffuse reticuloendothelial hyperplasia, oedema and leukocyte infiltration. Organisms that are commonly associated with acute cervical lymphadenitis: Pyogenic e.g., Streptococci, Staphylococci and Non pyogenic organisms e.g., Viruses, Spirochetes, Rickettsia organisms

Cytology: Frank pus may be obtained during aspiration. Microscopic examination may reveal necrotic areas as well as sheets of polymorphs, histiocytes & phagocytes. Anaerobes, aerobes, or fungi may be isolated from affected nodes.[32]

Histology: Histopathological examination reveals reactive follicles with histiocytes that contain debris. If the causative organism is pyogenic, necrosis and dense neutrophilic infiltration may also be seen.

Treatment: Initiated to the primary focus of infection for example tonsillitis or a dental abscess. If despite antibiotic therapy the pain continues or abscess formation occurs in the lymph nodes, parapharyngeal or retropharyngeal space then surgical drainage may be required.

CHRONIC LYMPHADENITIS: -

NON-SPECIFIC: Chronic lymphadenitis is also common. Sometimes, it is called reactive hyperplasia of the lymph nodes. If the cause is not apparent, it is called non-specific lymphadenitis. The drainage area most carefully is examined. In the cervical group oral sepsis, recur bouts of tonsillitis and lesions of the scalp are usually the common causes.[31]

The lymph nodes are usually enlarged, often firm and easily palpated. They are non-tender unless acute lymphadenitis is added to the chronic changes. The general microscopic features of chronic Nonspecific lymphadenitis are follicular hyperplasia, prominence of post capillary venules, increased number of immunoblast, plasma cells and histiocytes and fibrosis.

Cytology: A mixed polymorphic population of lymphoid cells composed predominantly of small lymphocytes associated with follicle center cells of centroblasts, centrocytes, immunoblasts and plasma cells associated with scattered histiocytes and intra cytoplasmic nuclear debris (tingible body macrophages).[32]

Treatment: Appropriate antibiotics must be given.

TUBERCULOUS LYMPHADENITIS:

TB lymphadenitis may occur due to: [33]

1.Reactivation of healed focus involved during primary Infection.

2.Progressive primary tuberculosis i.e., spread from lung into mediastinal lymph node.

3.Spread from Tonsil

4. Hematogenous spread due to Miliary TB.

In 1962 Jones and Campbell described stages of TB lymphadenitis: [34]

1. Enlarged, firm, mobile, discrete nodes. (Stage I)

2. Large rubbery nodes fixed to surrounding tissue. (stage II)

3. Central softening abscess. (Stage III)

4. Collar stud formation. (Stage IV)

5. Sinus tract formation. (Stage V)

This is commonly found in children and young adults. It may occur at any age. The incidence in the young has diminished since the introduction of BCG vaccination.[31]

Microscopically the tubercles will be seen which consist of the epithelioid cells and giant cells having peripherally arranged nuclei in the early stage. After one week, lymphocyte with darkly stained nuclei and scanty cytoplasm make their appearance.

By the end of second week caseation appears in the centre of the tubercle follicle. So, in the centre of tubercle follicle lies eosin-stained caseation surrounded by giant cells and epithelioid cells around which remains a zone of chronic inflammatory cells e.g., lymphocyte and plasma cells, around which fibroblasts are present.

Treatment [35]

Medical therapy:

The recent RNTCP and WHO updates recommend a fixed dose weight based daily regimen with isoniazid (H), rifampicin (R), pyrazinamide (Z), ethambutol (E) for 2 months followed by isoniazid (H), rifampicin (R), ethambutol (E) for 4 months for drug susceptible TB (WHO/RNTCP2017). The 6-month recommendation is supported by studies that showed no difference between 6 and 9 months of treatment in cure rates (89–94%) or relapse rates (3%).

Surgical Management:

The indications for surgical management of TB lymphadenitis are:

1) Treatment failure: Surgical treatment is beneficial to establish the diagnosis and management of drug-resistant organisms.

2)Adjuvant treatment for drug sensitive cases: For patients who have discomfort from tense, fluctuant lymph nodes surgical treatment is beneficial.

3)Paradoxical reaction: In a retrospective review, aspiration, incision, and drainage or excision were associated with a trend toward a shorter duration of paradoxical reactions.

4)Nontuberculous mycobacteria: In children with non-tuberculous mycobacterium lymph node removal has been associated with better outcomes.

SYPHILIS:

Syphilis is caused by Treponema pallidum, a spirochaete that exists naturally only in human hosts. Infection transmitted during sexual intercourse. The organism may also get transmitted in utero from mother to child. Specific findings are seen in the lymph nodes in both HIV positive and HIV negative patients who are affected by the disease.

Syphilitic lymphadenopathy:

T. pallidum is known to penetrate mucous membranes and then invades the perivascular lymphatic spaces where it multiplies. Subsequently, it enters the regional lymphatics and blood vessels. Lymph node involvement may occur in all three stages (primary, secondary, tertiary) but lymphadenopathy most commonly occurs in secondary syphilis, presenting as generalized lymphadenopathy. The most commonly involved lymph nodes in cervical region is occipital nodes. Clinically the lymph nodes are painless, nontender, rubbery and shotty. In later stages, they soften and form sinuses[31].

Cytology: Mononuclear cells, plasma cells and lymphocytes with abundant spirochetes are seen.[32]

Treatment: It is a manifestation of secondary syphilis and is treated with penicillin in either of the two forms: -

1. Procaine Penicillin: Given Intramuscular injection with total dose of 6 mega unit in the dose of 6,00,000 units daily for 10 consecutive days.

2. Penicillin G in Aluminum monostearate suspension (PAM) is also given. Total dose is 6 mega units. First dose of 2.4 mega unit deep Intramuscular followed by 1.2 mega units at each of two subsequent injections three days apart and another one injection of 1.2 mega units after 9 days.

Other drugs used are: 1. Tetracycline 2. Erythromycin Both the drugs are much inferior to penicillin, given in the dose of 1gm. Orally for 15 days.

BRUCELLOSIS:

This is a disease which results from infection with species of bacteria Brucella abortus. These are small, Gram-negative, non-motile coccobacilli.

The onset is gradual with early symptoms of mild fever, malaise, headache, generalized muscular pain and mild gastrointestinal disturbances. After some weeks or months, a pyrexial attack occur

lasting for few days to weeks. With every single attack there is an enlargement and tenderness of the spleen and to a lesser extent the liver. In few, lymph node enlargement is a distinct feature. There is usually an accompanying hypochromic anemia and leukopaenia.[31]

Microscopically, there may be nonspecific follicular hyperplasia and clusters of epithelioid histiocytes, sometimes forming large noncaseating granulomas. This is accompanied by a polymorphic infiltrate containing eosinophils, plasma cells and immunoblasts.[32]

Treatment: The presently favored world Health Organization Recommendation is a combination of doxycycline 200 mg and Rifampicin up to 900 mg daily for 6 Weeks. Prevention is by reducing the incidence of brucellosis in animal population by timely vaccination.

CAT - SCRATCH DISEASE:

There is usually an initial skin lesion, which is often ignored. Enlargement of the regional lymph nodes becomes the striking feature of this disease. Axillary and cervical lymph nodes are more often affected leads to tiny abscess formation with suppuration. The primary skin lesion is a red papule in the skin at the site of inoculation usually appearing between 7 to 12 days following contacts. It may become pustular or crusted.

The agent of cat scratch disease is a Coccobacillary pleomorphic intracellular bacterium that can be identified with Warthin-Starry silver stain, particularly in those cases exhibiting extensive necrosis. This was originally designated as Rochalimea henselae and has been renamed Bartonella henselae.[32]

The changes in the node vary with time. Early lesions have histiocytic proliferation and follicular hyperplasia, intermediate lesions have granulomatous change and late lesions have abscess of various sizes. The condition is self- limiting and resolves without treatment.[31]

SARCOIDOSIS

In this disease there are granulomatous lesions which may be found in any organ or tissue. The most commonly affected are, in order of frequency, the lungs, the lymph nodes, the skin, the eyes, the liver, the spleen, the salivary glands, the heart, the skeleton and the nervous system. The characteristic lesion of sarcoidosis is an epithelioid cell granuloma or tubercle. But there is never caseation. Probably this is the only criterion which differentiates this condition microscopically from tuberculous lymphadenitis.

Lymph nodes seldom reach very large size, average diameter being 2 to 3 cm. enlarged nodes show no tenderness or peri adenitis. The diagnosis is most secure when compatible clinical and radiological findings are supported by the demonstration of microorganism negative, non-necrotizing granulomas in a biopsy specimen accompanied by biopsy evidence or strong clinical evidence of multisystem involvement, and negative cultures for bacteria, mycobacteria, and fungi. A positive Kveim-Siltzbach test provides strong support for the diagnosis of sarcoidosis. (The kveim test – This is an intradermal injection of 0.15 to 0.2 ml of 10% saline suspension of sarcoid lymph node. The positive result is show in 4- 6 weeks by the appearance at site of injection of a nodule with the histological pattern of sarcoid. This test is positive in 60 to 85% of patients with sarcoidosis).

Treatment: Sarcoidosis usually respond rapidly to Prednisolone 20- 40 mg daily for 4 weeks; thereafter the disease is usually suppressed by maintenance dose of 7.50 to 10 mg daily, or 20 mg daily on alternate days.[39]

CERVICAL LYMPHADENOPATHY IN HIV

Persistent generalized lymphadenopathy (PGL) is a syndrome of diffuse lymphadenopathy involving two or more extra inguinal sites for greater than three months. It may be an early sign of

HIV infection with up to 70 percent of patients infected developing diffuse lymphadenopathy within the first few months after seroconversion.

Fine needle aspiration cytology will usually show a reactive picture, so excision biopsy of a node or pan endoscopy is usually not indicated. Histology, if the excision is undertaken, will usually show a reactive follicular hyperplasia. A lymphocyte depletion pattern may be seen in patients with acquired immunodeficiency syndrome (AIDS) or a poor prognosis. [37]

KIKUCHI'S DISEASE

Kikuchi's disease is a histiocytic necrotizing lymphadenitis without granular cell infiltration, mainly affecting young women. It presents with myalgia, mild fever and painless posterior triangle cervical lymphadenopathy which shows benign course and resolves in weeks or months. Histology, shows areas of patchy necrosis and a paucity of neutrophils.[31]

LYMPHOMAS:[36]

Tumours of lymphoreticular tissue are designated as lymphomas. This is a group of disease characterized by wide spread tumours like enlargement of lymphoid tissue.

Etiology: Two specific etiologies for certain types of lymphomas are Epstein Barr Virus infection and Immunodeficiency.

There are two types of lymphomas

1. Hodgkin's disease

2. Non-Hodgkin's Lymphomas (NHL), they may be B-cell or T-cell type.

Important differences between Hodgkin's and Non-Hodgkin's Lymphomas include the following:

- Hodgkin's disease spreads by the contiguity, whereas in the non-Hodgkin lymphomas shows the non-contiguous spread occurs through pathways of lymphoreticular circulation

- Central or axial lymph node groups are commonly involved in Hodgkin's disease whereas in NHLs the peripheral lymph nodes are commonly involved.
- Extra nodal presentation is rare in Hodgkin's disease. Extra nodal involvement is common in non-Hodgkin lymphoma and Waldeyer's ring, enteric lymph nodes and skin are often involved.

Most Non-Hodgkin's lymphoma are tumors of B-cells. Some arise from T-cells and a few originate from the macrophages in the lymph nodes. It is five times more frequent than Hodgkin's lymphoma in the head and neck region. It is the second most common malignancy in the head and neck region.

Age and Sex Incidence: It is predominantly the disease of older individuals with peak incidence in the 5th and 6th decade of life with slight male preponderance.

Etiology:

Genetic: A number of familial cases of NHL have been reported with autosomal recessive mode of inheritance

Infection: Epstein Barr virus and HLLV-1 have a pathogenic role in B and T cell lymphoid neoplasia.

Clinical presentation:

Most of the patients who are usually diagnosed to have a Lymphoma present with undiagnosed cervical lymphadenopathy. The history gives useful clues. Clinical examination should include not only the neck but also the draining cutaneous sites and the upper aero digestive tract, and other superficial lymph node sites.

Fine needle aspiration cytology may point towards lymphoma, but lymph node biopsy will usually be necessary to get a definitive diagnosis.

Treatment:

• Radiotherapy involved field treatment or total body irradiation (TBI)

•For localized disease Field Treatment is encouraged.

• Total body irradiation (TBI) is Where the body is bathed in very small doses body irradiation over 5 weeks to a total dose of 150 CGY. It is useful for low-grade disease.

• Chemotherapy can be given as a single drug regime with chlorambucil or as a combination therapy with multiple drugs.

HODGKIN'S DISEASE

Hodgkin's disease is a histologic diagnosis, the essential feature being the presence of the multinucleated Reed- Sternberg giant cell. It is a malignant neoplasm of cells of lymphoid tissue and is the commonest of malignant lymphomas. Thomas Hodgkin (1932) elaborated the clinical and autopsy findings in few patients who died from disease with lymph node enlargement. Greenfield was the first person to observe the presence of large multinucleate cells in the lymph nodes of patients with Hodgkin's disease.

Types of Hodgkin's disease:

1. Lymphocyte predominant type
2. Mixed cellularity type
3. Lymphocyte depleted type
4. Nodular sclerosis type

1. **Lymphocyte predominant type:**

This is characterized by a large number of mature looking lymphocytes admixed with a variable number of benign histiocytes. Typical Reed- Sternberg Cells are difficult to find. More commonly

seen are variant cells that have a multilobed puffy nucleus (Popcorn cell). This subgroup is not common. It is associated with good prognosis.

2. **Mixed cellularity type:**

This is a common form of Hodgkin's disease. Typical Reed- Sternberg Cells are plentiful and fewer lymphocytes are noticed. Small areas of necrosis or fibrosis are present

.3. **Lymphocyte depleted type:**

This is the least common form of Hodgkin's disease. There are two morphologic types:

a) Diffuse fibrosis

b) Reticular variant

In the diffuse fibrosis type, the node is hypo cellular and it is replaced by proteinaceous fibro cellular material.

In the Reticular variant is more cellular and composed of large anaplastic cells that resemble Reed-Sternberg cells.

4. Nodular sclerosis type:

This is the most common histological form of Hodgkin's disease. It is distinct form the other three both clinically and histologically. It has two characteristic morphological features:

a. The presence of a particular variant of the Reed- Sternberg Cell, the lacunar cells.

b. The presence of collagen bands that divide the lymphoid tissue into circumscribed nodules.

ANN ARBOR STAGING FOR HODGKIN'S DISEASE:[43]

Stage I: Involvement of single lymph node or lymphoid organ (spleen, thymus, Waldeyer's ring)

Stage II: Involvement of two or more lymph node regions on the same the side of the diaphragm

Stage III: Involvement of the lymphoid structures on both sides of the diaphragm.

Stage IIIA: Sub diaphragmatic involvement limited to spleen, splenic hilar nodes, coeliac nodes, or portal nodes.

Stage IIIB: Sub diaphragmatic involvement includes paraaortic, iliac, or mesenteric nodes plus structures in stage IIIA.

Stage IV: Involvement of extra nodal site(s) beyond that designated as "E"

A: No symptoms

B: Unexplained weight loss of >10% of the body weight during the 6months before staging investigation.

Unexplained, persistent, or recurrent fever with temperatures >38°Cduring the previous month.

Recurrent drenching night sweats during the previous month

E: Localized, solitary involvement of extra lymphatic tissue, excluding liver and bone marrow

CLINICAL PRESENTATION**:**

Initial symptoms may be non-specific and may include pruritus, fever, weakness, malaise, weight loss and night sweats. Among them majority of patients present with painless enlarged lymph nodes, most commonly in the neck.

Approximate frequency of lymph node involvement in Hodgkin's disease.

1. Cervical (70%)
2. Mediastinal nodes (50%)
3. Axillary nodes (30%)
4. Para aortic (30%)
5. Inguinal nodes (10%)

The most commonly affected extra nodal tissue is the spleen. Systemic symptoms are reported in one thirds of patients. These include symptoms weight loss, fever and night sweats, called as B symptoms.

TREATMENT:

Radiotherapy: Megavoltage radiotherapy to a dose of 3500-4000 cGy is given over a period of 4 weeks. Indications for radiotherapy includes patients with Stage I disease, Stage IIA disease with 3 or less areas of involvement, after chemotherapy to a site where there was originally bulk disease and to lesions causing serious pressure problems.

Chemotherapy: Combination chemotherapy has been shown to be highly effective. The regimens commonly used are given below.

CHL VPP Chlorambucil, Vinblastine, Procarbazine, prednisolone

MOPP Nitrogen Mustard, Vincristine(oncovin), Procarbazine, Prednisolone.

MVVPP Nitrogen Mustard, Vinblastine, Procarbazine, Prednisolone.

ABVD Doxorubicin (Adriamycin), Bleomycin, Vinblastine, Dacarbazine.

BEACOPP Bleomycin Etoposide, Adriamycin, Cyclophosphamide, vincristine(oncovin) Procarbazine, Prednisone

These regimens are given on a 28-day cycle for a minimum of 6 pulses and up to 9 if necessary. Indication for chemotherapy includes all patients with B symptoms, Stage II disease with more than 3 areas of involvement, Stage III and stage IV disease.

Combined modality treatment**:** Chemotherapy is given first and radiotherapy subsequently to the original sites of bulky disease which have been shrunk by chemotherapy.

METASTATIC MALIGNANCY OF CERVICAL LYMPH NODES [40]

The cervical lymph nodes are involved in a variety of malignant conditions of the body either by lymphatic permeation or by embolism. Cervical lymph node metastasis can be the first manifestation of carcinoma.

Lindberg in 1972 was able to establish the possibility of predicting the site of a primary tumor in the head and neck based on the distribution of cervical metastasis.46 In 1981, Memorial Sloan-Kettering hospital published VII levels or regions in the neck which contain groups of lymph nodes that represent the first echelon sites for metastasis from head and neck primary tumors. Squamous cell carcinoma is the most common malignant tumor in the head and neck region. The rate of metastasis to cervical lymph nodes probably reflects the aggressiveness of the primary tumor.

Clinical features:

a. General symptoms anorexia, weight loss or weakness.

b. Painless swelling is the usual presentation associated with pain due to involvement of nerves and surrounding structures

c. Patient may have other complaints such as ulcer in tongue, hoarseness of voice and difficulty in Swallowing.

d. If the primary is in the abdomen patient may present with dyspepsia and abdominal pain.

The precise location of nodes may give clue to the site of primary tumours

1) Upper deep cervical group - Head and face, interior of oral cavity.

2) Middle and lower deep cervical - larynx, pharynx, thyroid and the draining nodes.

3) Supraclavicular-thoracic, abdominal disease and breast.

The nodes are usually hard, irregular, discrete and of varying size, mobile early may be fixed later on. They are usually painless and not tender.

Assessment of cervical lymphadenopathy in this context begins with a detailed history and thorough clinical and pan endoscopy examination. Further assessment requires necessary radiological with appropriate FNAC and biopsy that help to confirm the diagnosis.

There is now a joint International Union Against Cancer (UICC)/American Journal of Cancer (AJC) joint classification for regional cervical lymphadenopathy.

This is based not only on the presence or absence of cervical lymphadenopathy but also on the size of the lymph node and the number of lymph nodes but, as yet, not the level. It applies to all head and neck tumours apart from the nasopharynx and thyroid.

Table-4 TNM classification of regional lymph nodes [40]

N x	Lymph nodes cannot be assessed
No	No Metastasis
N1	Metastasis in single node < 3cm
N2	Metastasis in a single ipsilateral lymph node > 3 cm but not more than 6 cm in greatest dimension; or in multiple ipsilateral lymph nodes, none > 6 cm in greatest dimension; or in bilateral or contralateral lymph nodes, none > 6 cm in greatest dimension
N2a	Metastasis in a single ipsilateral lymph node > 3 cm but not more than 6 cm in greatest dimension
N2b	Metastasis in multiple ipsilateral lymph nodes, none > 6 cm in greatest dimension
N2c	Metastasis in bilateral or contralateral lymph nodes, none > 6 cm in greatest dimension
N3	Metastasis in a lymph node > 6 cm in greatest dimension

OCCULT PRIMARY [40]

Primary sites in order of frequency are tonsil, nasopharynx, along with retromolar trigone, base of the tongue and piriform sinus, followed by other head and neck sites and then breast, bronchus, and stomach. Commonly, the patient presents with a single node in the upper neck which is thought to be a metastatic malignancy from an occult primary. Most carcinomas in the central head and neck region are metastasize to the deep cervical chain

Treatment: The management of the involved cervical lymph nodes depends on the overall treatment regime given to the patient.

- If surgery is being used to treat the primary disease and the cervical nodes are palpable, and in excess of 3 cm, they may be excised enblock with the primary lesion.
- If radiotherapy is used initially, as is always the case in carcinoma of the nasopharynx, then radiotherapy may also be given to the neck nodes whatever their stage. In the case of tongue, pharynx or larynx, however, if the node exceeds 3 cm in diameter, then surgery may be necessary for the neck nodes even if the primary is treated by radiotherapy.
- If radiotherapy is used initially, as is always the case in carcinoma of the nasopharynx, then radiotherapy may also be given to the neck nodes, whatever their stage. In case of the tongues, pharynx or larynx whenever the node exceeds 3 cm in diameter then surgery may be necessary for the neck nodes, even if the primary is treated by radiotherapy. If radiotherapy is used initially with resolution of the primary but there is subsequent or recurrent nodal disease then this situation will require cervical lymph node dissection.

TYPES OF NECK DISSECTION [27]

• Classical Radical Neck Dissection (CRILE) – the classic operation involves resection of the cervical lymphatics, the lymph nodes and those structures closely associated such as the internal jugular vein, the accessory nerve, the submandibular gland the sternomastoid muscle. These structures are all removed en bloc and in continuity with the primary disease if possible. The main disability that follows the operation is the drooping of the shoulder due to paralysis of the trapezius muscle as a consequence of excision of the accessory nerve.

• Modified Radical Neck Dissection – in selected cases one or more of the three following structures are preserved the accessory nerve, the sternocleidomastoid muscle or the internal jugular vein, but otherwise all major lymph node groups and lymphatics are excised. Whichever structures are preserved at this dissection should be clearly noted.

• Selective Neck Dissection – in this type of dissection one or more of the major lymph node groups is preserved along with sternomastoid muscle, accessory nerve and internal jugular vein. Under these circumstances the exact groups of nodes excised must be documented.

FINE NEEDLE ASPIRATION CYTOLOGY (FNAC)[11]

It is the study of cells obtained by small gauge needle, usually with vaccum system provided by air tight syringe. Fine needle aspiration cytology (FNAC) is widely accepted as the accurate, sensitive, specific and cost-effective procedure in the diagnosis of lymphadenopathy. FNAC may be a helpful procedure in the diagnosis of both neoplastic and non- neoplastic lesion of lymph nodes.

Advantages of aspiration cytology:

1. It is a day care procedure.

2. Eliminates the lengthy periods of watchful waiting.

3. Safe procedure

4. Cost effective and less painful procedure.

Contraindications: Only a few contraindications, marked hemorrhagic diathesis increase the risk of serious hemorrhage

Materials required

- 22gauge needle
- 10ml disposable syringe
- Albuminised labelled glass slides
- Fixative ether – alcohol bottle technique

After getting informed consent, local disinfectant is applied over the skin and syringe with needle is passed through the skin into target tissue. Once, the lesion entered, the syringe plunger is withdrawn at least 2/3rd to apply the negative pressure and the needle advanced back and forth along the same track with in the lesion in several times. The needle is withdrawn and the contents expelled on slides. It can be repeated 2-3 times.

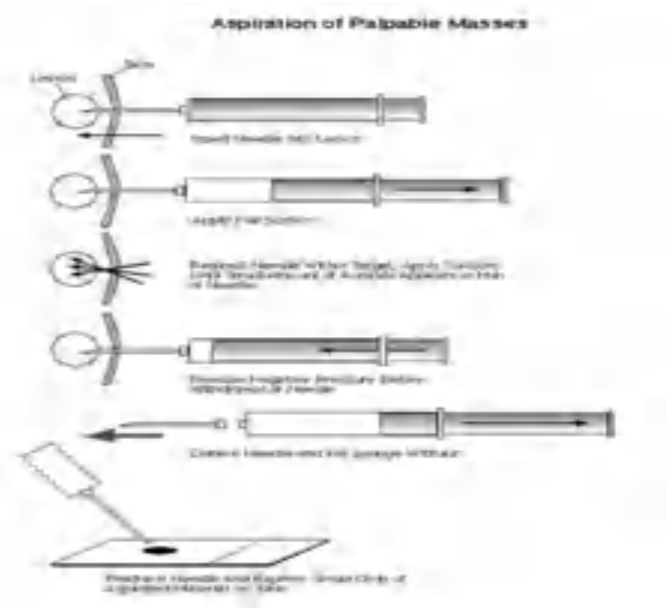

Figure –5

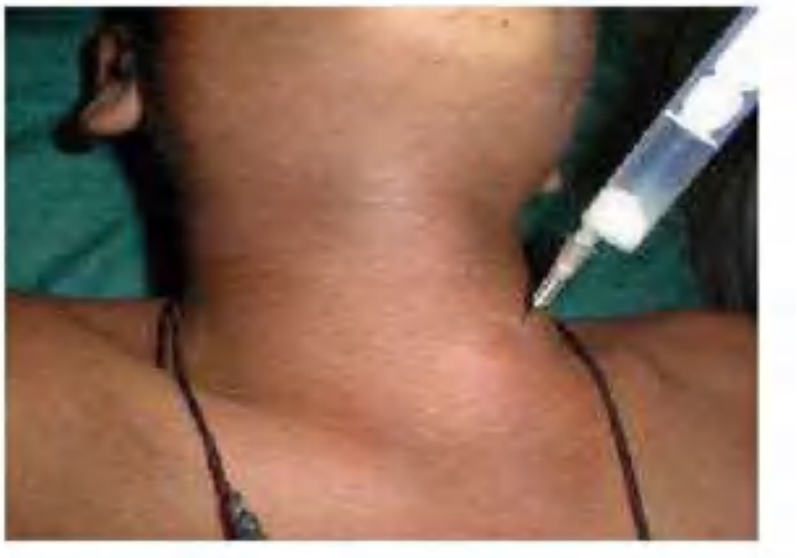

Figure -6 FNA of Enlarged Cervical Lymph Node

EXCISION BIOPSY OF CERVICAL LYMPH NODE

In general, excision biopsy is the procedure of choice, because it yields much more tissue for diagnostic studies, and facilitating multiple histologic section preparations for routine and special stains, histologic diagnosis depends on the changes in overall architectural pattern of the node as well as identification of individual cells, and sections from the excisional biopsy. Preference is given to the largest palpable node when available. More than one node should be removed if possible, and irradiated areas should be avoided.

Complications of lymph node biopsy

- Primary haemorrhage due to injury to a neighbouring blood vessel.
- Reactionary haemorrhage due to slippage of ligature.
- Infection of the biopsied site.
- Injury to the neighbouring structures namely nerves, pleura and thoracic duct in cervical node biopsies.

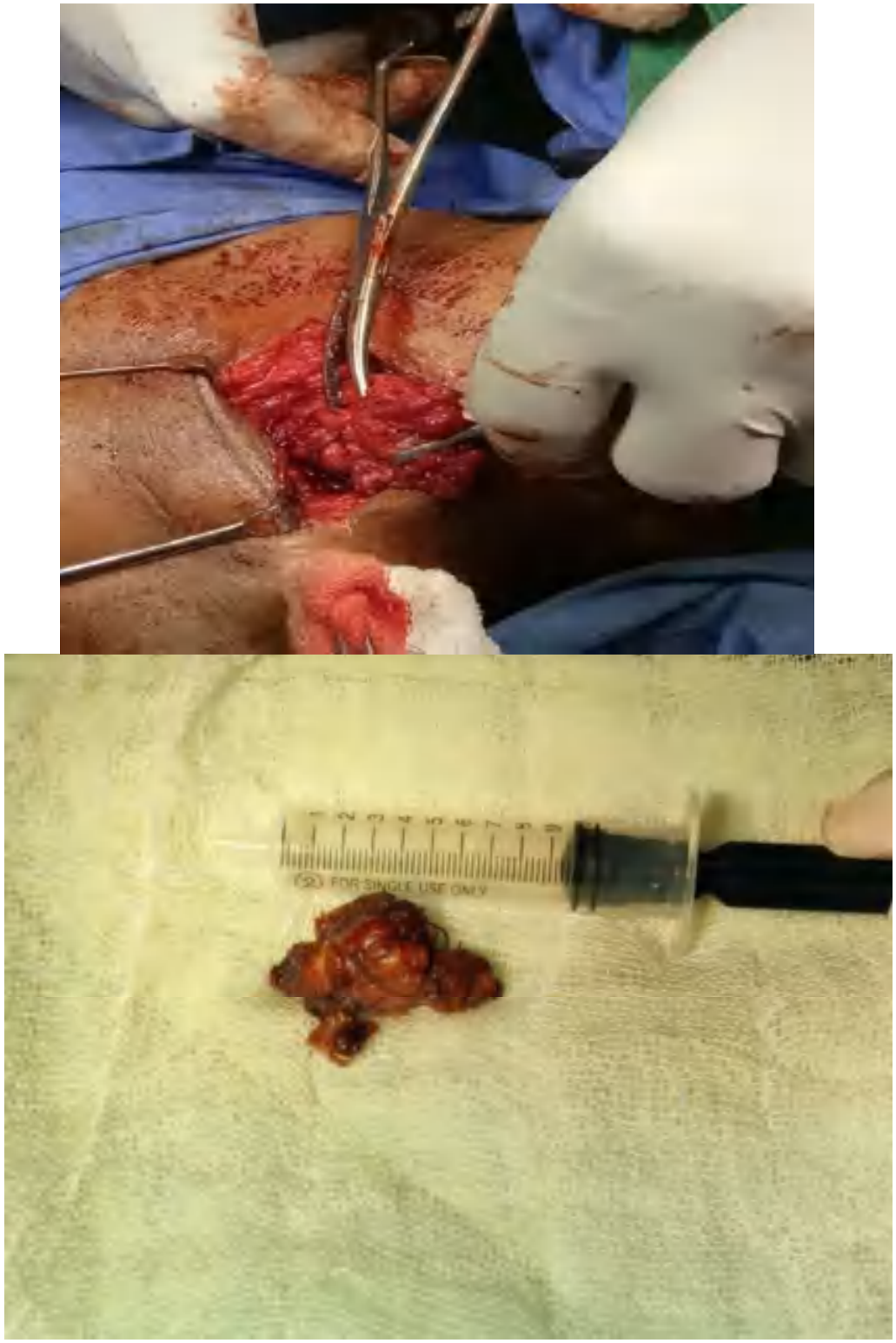

Figure -7 Excision biopsy from Level-II Cervical Lymph node

MATERIALS

AND

METHODS

MATERIALS AND METHODS

STUDY SETTING:

The present study was conducted in the Department of ENT & Head and Neck surgery, Govt Stanley Medical College Hospital, Chennai.

STUDY DESIGN:

Prospective observational study, as per good clinical practice (GCP) guidelines by WHO.

SAMPLE SIZE:

Total of 110 consecutive patients aged > 12 years were chosen based on the inclusion and exclusion criteria mentioned below.

STUDY PARTICIPANTS:

Patients selected from the inpatient and outpatient, Department of ENT and Head & Neck Surgery in Government Stanley Medical College Hospital, Chennai from October 2020 to September 2021.

INCLUSION CRITERIA:

Patients of age more than 12 years and both genders presenting to the otorhinolaryngology clinic with neck swelling for more than 2 weeks and ≥1.5cm in size were included.

EXCLUSION CRITERIA:

Terminally Ill patients and Patients with non-lymphoid neck masses (thyroid swelling, parotid swelling, thyroglossal cyst) were excluded.

STUDY PROCEDURE:

A Detailed history including patient age, gender, duration, site of lymph node involvement and presenting symptoms was obtained. Then complete general physical examination and clinical findings were noted in all cases. ENT examination, pan endoscopy, routine baseline blood

investigations was done according to the proforma. All the patients were subjected to FNAC and open biopsy was done in selected cases.

Patient was explained about the study. After obtaining informed written consent, FNAC was done throughout the procedure standard protocol was followed. Patient was shifted to the minor procedure room; strict Aseptic precautions were taken and aspiration of the selected lymph nodes was done. After the overlying skin was stretched, the lymph node was grasped between the index finger and thumb of the left hand; a sterile 22- or 25-gauge needle fitted to a 10 ml syringe was pierced obliquely into the lymph node

The plunger was then withdrawn to create negative pressure. With the negative pressure intact, the needle was moved to and fro within the node several times to aspirate adequate material. The negative pressure was released and the needle was removed from the mass. Pressure was applied to that area with a cotton swab after withdrawing the needle. The needle containing the aspired was detached and air was drawn into the syringe, needle was reattached and the material was dispensed onto clean dry and Grease free glass slides. Smears were prepared by spreading using another glass slide applying minimal pressure.

Smears were immediately fixed with 95% ethyl alcohol in a coplin jar and these smears were stained by Hematoxylin and Eosin stain. Ziehl Neelsen stain for Acid fast bacilli and CBNAAT was done for all cases where tuberculosis suspected. Gram staining and culture sensitivity was done in relevant cases to identify the specific etiology. All Smears were examined microscopically and cytological diagnosis was made.

Lymph node open biopsy was done in relevant cases which was fixed in 10% formalin and then subjected to grossing procedure. Bits were taken from entire node for routine processing. After the processing and paraffin embedding, sections of 3 to 6 microns were taken. Clearing of the slides

was done, followed by Hematoxylin & Eosin staining. Special stains like ziehl Neelson and PAS were done wherever indicated.

Results and Observations

The collected data were analysed with IBM SPSS Statistics for Windows, Version 23.0.(Armonk, NY: IBM Corp). To describe about the data descriptive statistics frequency analysis, percentage analysis were used for categorical variables and the mean & S.D were used for continuous variables. To find the significant difference in the multivariate analysis the Kruskal Walli's test was used. To find the significance in categorical data Chi-Square test was used. In all the above statistical tools the probability value .05 is considered as significant level.

STATISTICAL ANALYSIS

The total number of patients enrolled during study period were 110 patients. The details of study population were as follows:

I- DEMOGRAPHIC ANALYSIS

1.ANALYSIS OF AGE DISTRIBUTION

Age distribution		
	Frequency	Percent
12 - 20 years	24	22
21 - 40 years	40	36
41 - 60 years	31	28
> 60 years	15	14
Total	110	100.0

Table-5

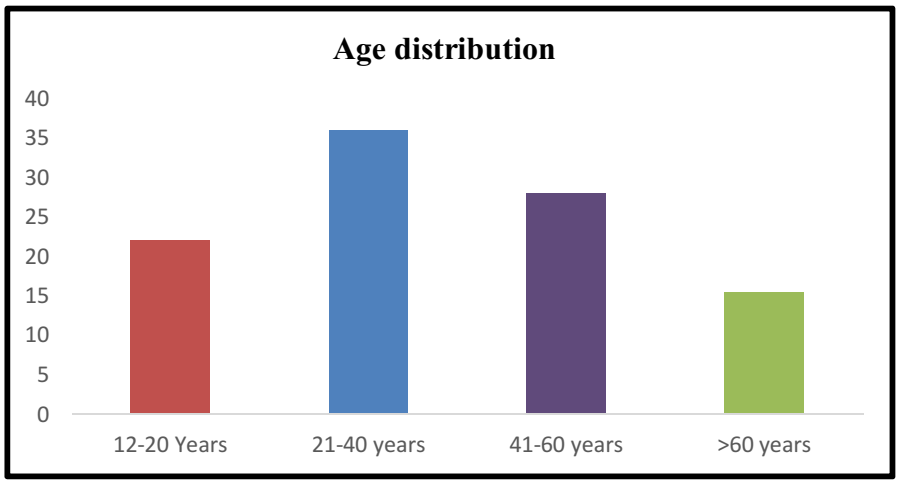

Figure- 8

The mean age (± standard deviation) of the patients enrolled in our study (n = 110) was 40.5 ± (17.1) years and range between 13 to 72 years. Out of 110 patients in our study, based on the age distribution the patients were categorized into following groups. Among which it was observed that maximum patients belonged to the age group 21-40 years (36%) followed by age group 41-

60 years age group (28%). Patients with age group 12-20 years and >60 years accounting for (22%) and (14%) respectively. (Table 5, figure 8)

2.ANALYSIS OF GENDER DISTRIBUTION

Gender distribution		
	Frequency	Percent
Female	47	42.7
Male	63	57.3
Total	110	100.0

Table

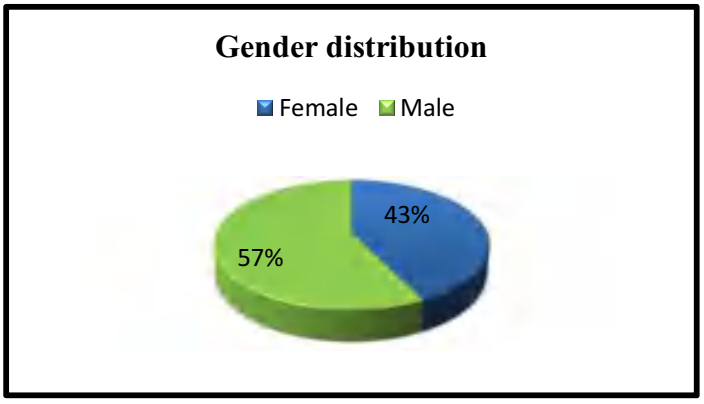

Figure-9

In our study analysis among 110 patients 63 patients belonged to male gender 57% and 47 patients belonged to female gender 43% respectively. The male to female ratio was approximately 1.3:1 with male preponderance. (table 6, figure 9)

3.ANALYSIS OF SOCIO-ECONOMIC STATUS

Socio Economic Status		
	Frequency	Percent
UM	5	4.5
LM	20	18.2
UL	54	49.1
L	31	28.2
Total	110	100.0

Table -7

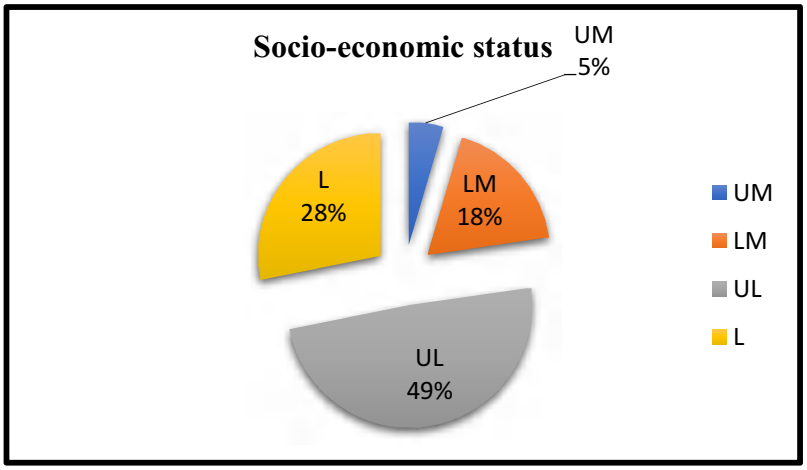

Figure-10

In our study of 110 study subjects, the socio-economic status of patients were divided into the following classes. Among which 54 patients were belonged to Upper lower (UL)49% followed by 31 patients 28.2% who belonged to Lower class(L). Lower middle (LM), Upper middle (UM) patients were 20(18.2%) and 5(4.5%) patients respectively. There were no patients who belonged to the upper class. (Table 7, figure 10).

II-CLINICAL ANALYSIS

4.ANALYSIS OF SIDE DISTRIBUTION

Side distribution		
	Frequency	Percent
Bilateral	20	18.2
Left	40	36.4
Right	50	45.5
Total	110	100.0

Table-8

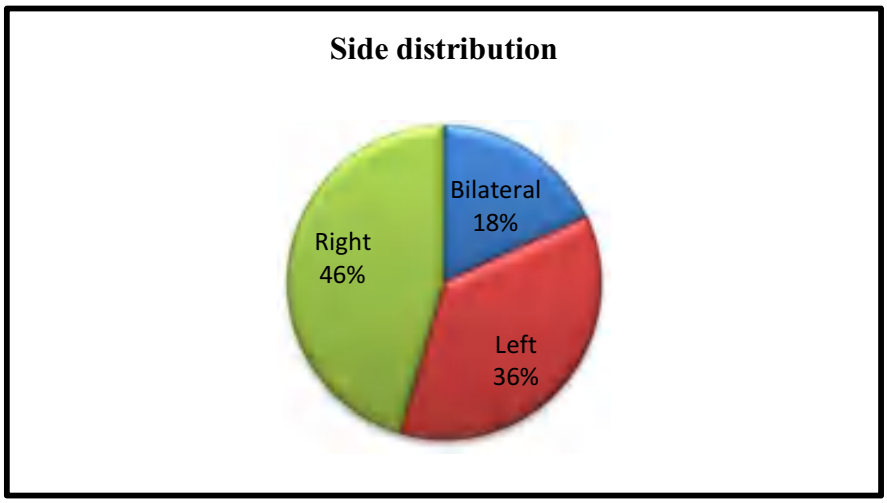

Figure- 11

In our study among 110 study subjects, maximum patients 50/110 (46%) had right side lymphadenopathy followed by 40/110 (36%) had left side and 20 (18%) had bilateral involvement of lymphadenopathy. (Table 8, figure 11)

5. ANALYSIS OF NUMBER OF LYMPH NODES

No. of lymph nodes		
	Frequency	Percent
Single	69	63
Multiple	41	37
Total	110	100.0

Table-9

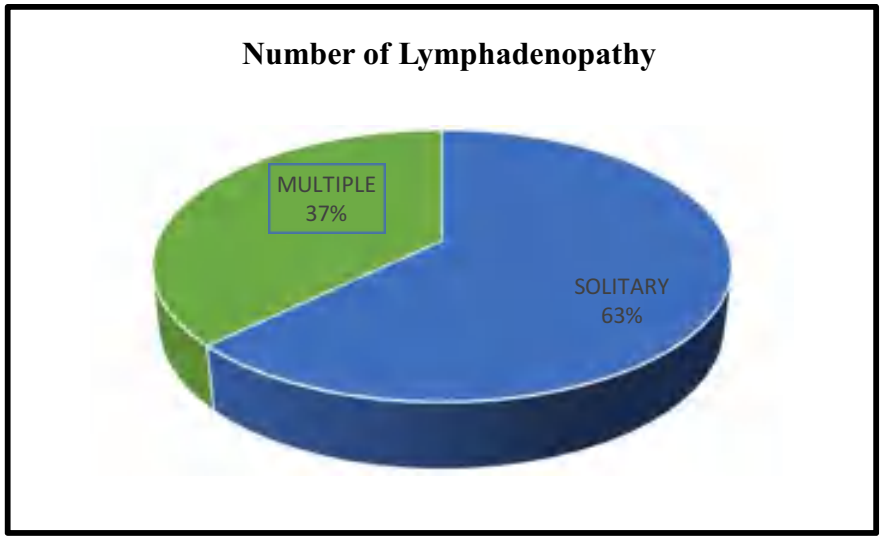

Figure- 12

Out of 110 study subjects, based on the number of lymph nodes on clinical examination the following findings were observed. Among which 69/110 (63%) patients had involvement of single group of lymph nodes. While 41/110 (37%) patients had involvement of multiple groups of lymph nodes. (Table 9, Figure 12)

6. ANALYSIS OF CONDITION OF CERVICAL LYMPH NODES

Condition of Lymph Nodes		
	Frequency	Percent
Matted	20	18.2
Discrete	72	65.4
Fixed	18	16.3
Total	110	100.0

Table-10

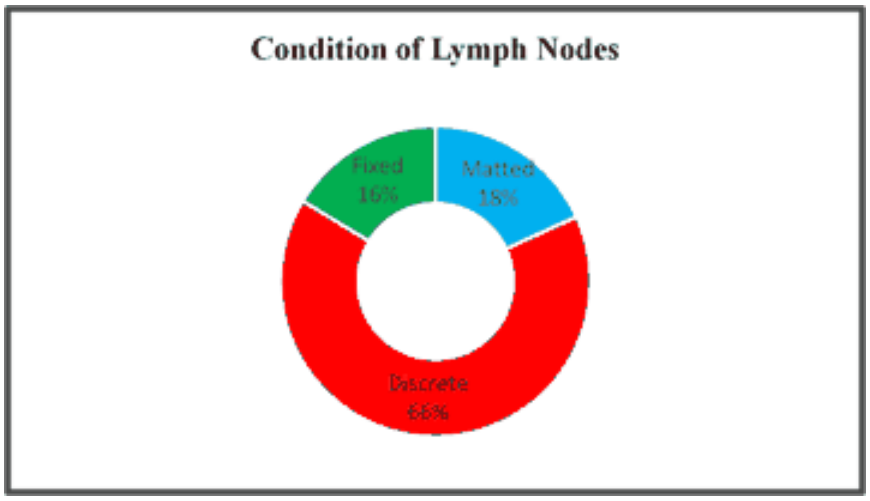

Figure- 13

Out of 110 study subjects, according to condition of enlarged lymph node on palpation the patients were categorized. Among which 72/110(81.8%) patients had Discrete mobile nodes whereas 20/110(18.2%) had matted nodes and the remaining 18/110(16.3%) had fixed nodes. (Table 10, figure 13)

7.ANALYSIS OF CERVICAL LYMPHADENOPATHY DURATION

Lymphadenopathy duration		
	Frequency	Percent
≤ 1 month	26	23.6
>1 to ≤2 months	42	38.1
>2 to ≤3 months	30	27.2
>3 to ≤6 months	10	9
>6 months	2	1.8

Table-11

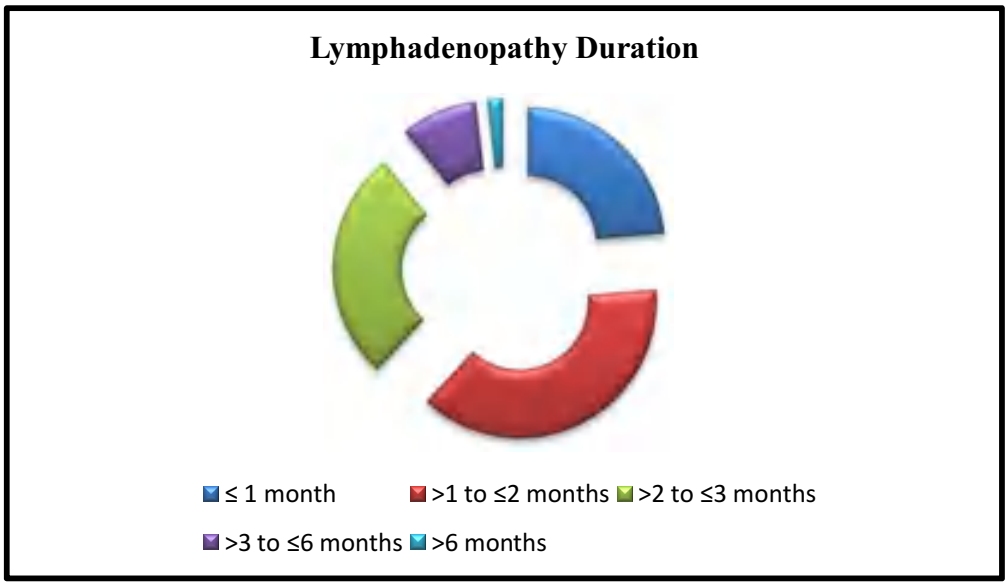

Figure- 14

Among the 110 study subjects, depend on the duration of presentation cervical lymphadenopathy divided the patients into following groups. Among which the maximum number of patients 42/110(38.1%) had lymphadenopathy duration of 1-2 months followed by 2 -3 months were 30/110(27.2%) patients and 26/110(23.6%) had ≤1 months, 10/110(9%) had 3-6 months and 2/110(1.8%) had >6 months duration of lymphadenopathy. (Table 11, Figure 14)

8.ANALYSIS OF SIZE DISTRIBUTION

Size Distribution		
	Frequency	Percent
>1.5 to ≤2cm	62	56.3
>2 to ≤ 3cm	27	24.5
>3 to ≤ 6 cm	19	17.2
>6 cm	2	1.8

Table-12

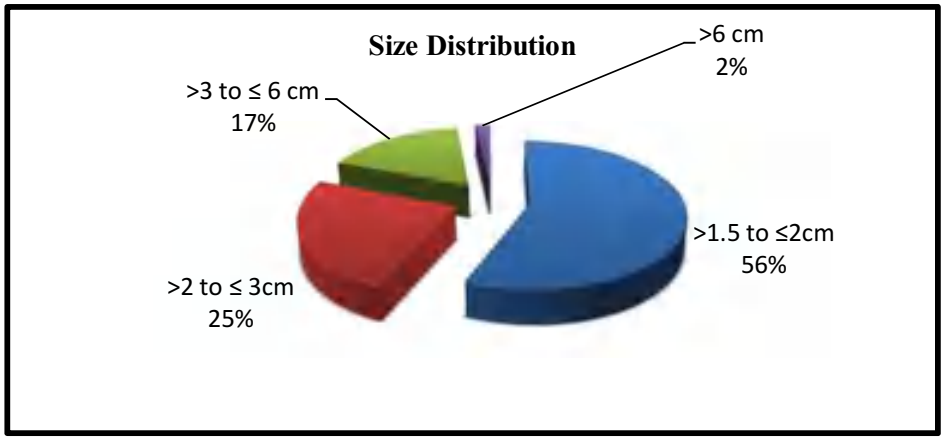

Figure-15

Out of 110 study subjects, based on the size distribution cervical lymphadenopathy categorised the patients into following groups. Among which the maximum patients 62/110(56%) had lymph node size of >1.5-2cm followed by 27/110(24.5%) patients were >1.5-2cm in size. The remaining 19/110(17.2%) cases and 2/110(1.8%) cases had >3-6cm and >6cm in size respectively. (Table 12, Figure 15)

9. ANALYSIS OF LEVEL SPECIFIC DISTRIBUTION

Levels specific distribution		
	Frequency	Percent
Level I (Smand,Sment)	20	18.2
Level II (upper jugular)	41	37.2
Level III (middle jugular)	2	1.8
Level IV (lower jugular)	1	0.9
Level V (post triangle)	31	28.2
Multiple	15	13.6
Total	110	100

Table-13

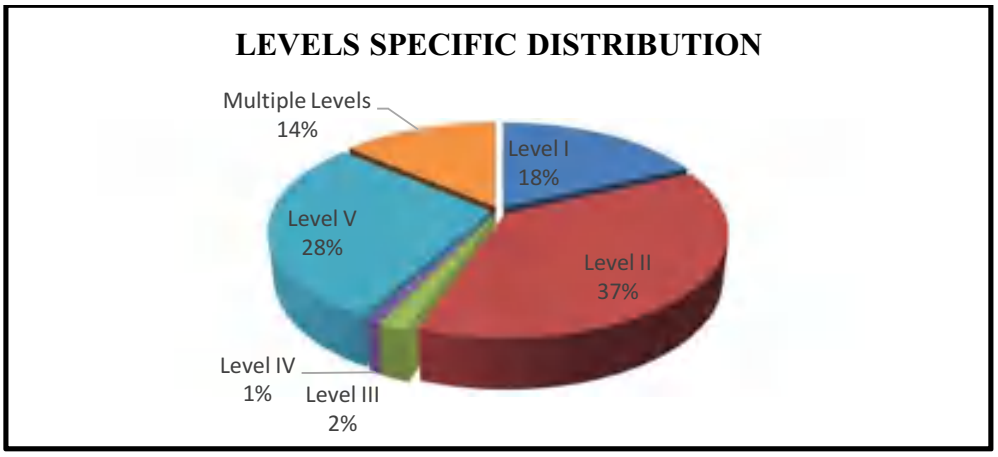

Figure-16

In our study among 110 patients, according to the distribution of various levels the greater number of cases had presented with Level-II lymph node involvement accounting for 41/110(37.2%), followed by Level-V lymph node had 31/110(28.2%) cases while in Level-I, Level-III & Level-IV lymph node had 20/110(18.1%), 2/110(1.8%) and1/110(0.9%) cases respectively. Remaining 15/110(13.6%) patients had multiple level site nodal involvement. (Table 13, Figure 16)

10.ANALYSIS OF SYMPTOMATOLOGY

symptomatology of cervical lymphadenopathy		
	Frequency	Percent
Neck swelling	110	100
Fever	26	23.6
Pain	19	17.3
Cough	18	16.4
Weight loss	12	10.9
Dysphagia	6	5.5
Voice change	4	3.6
Ulcers in oral cavity	3	2.7

Table-14

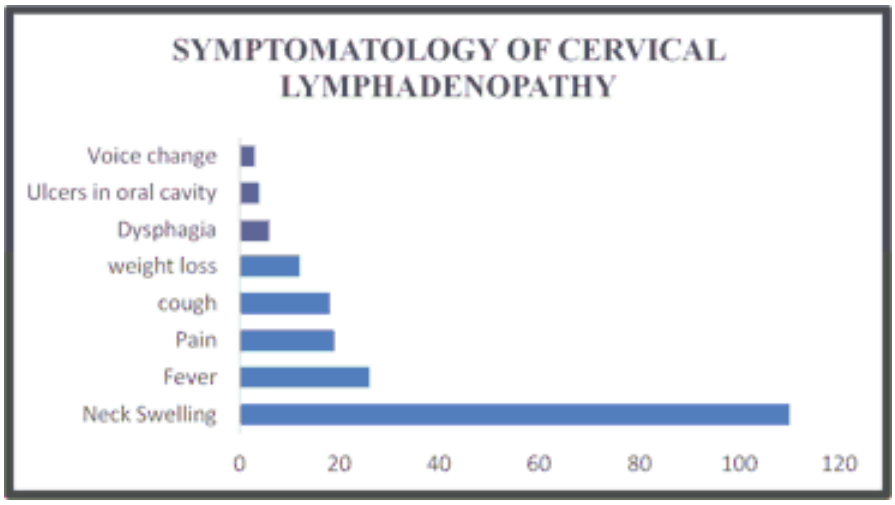

Figure-17

In our study analysis, all 110 cases were presented with cervical lymphadenopathy along with other presenting symptoms such as fever 23.6%, pain 17.3%, cough 16.4%, weight loss 10.9%, difficulty in swallowing 5.5%, voice change 3.6% and ulcers in oral cavity 3.6%. (Table 14 , figure-17)

III – PATHOLOGICAL ANALYSIS

11. ANALYSIS OF VARIOUS ETIOLOGIES CAUSING CERVICAL LYMPHADENOPATHY WITH CYTOPATHOLOGY

Cytopathological diagnosis		No. of cases	Percentage
Non-Neoplastic	Tuberculous lymphadenitis (TBL)	52	47
	Nonspecific reactive lymphadenitis (NSRL)	36	33
Neoplastic	Malignant Secondaries(S)	19	17
	Lymphoma(L)	03	3
Total		110	100

Table-15

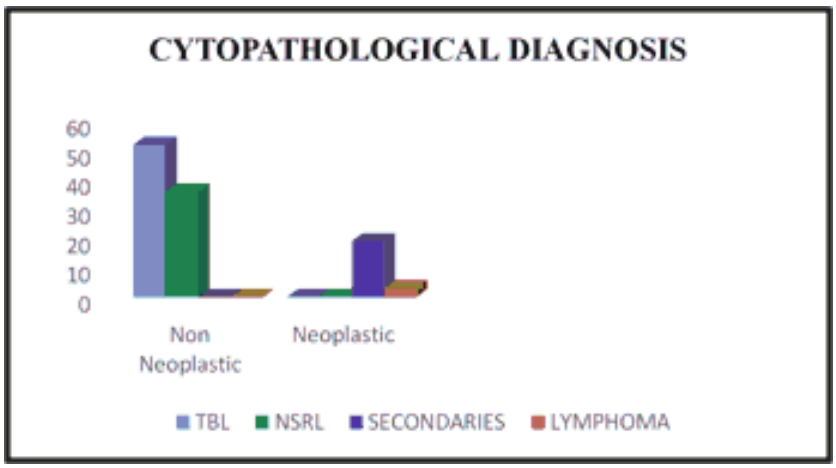

Figure-18

In our study analysis among 110 cases of cervical lymphadenopathy all cases were subjected to Fine needle aspiration cytology. Based on the result of aspiration cytology etiological factors of cervical lymphadenopathy were categorized into Non-Neoplastic and Neoplastic lesions accounted for 88(80%) and 22(20%) respectively. Out of 88 Non- neoplastic lesions greater number of cases were reported with Tuberculous lymphadenitis (TBL) 52(47%) followed by Nonspecific reactive lymphadenitis (NSRL) 36(33%). Whereas in 22 Neoplastic lesions

Malignant secondaries (S) 19(17%) constitute a greater number of cases followed by lymphoma (L) with 3(3%). (Table 15, figure 18)

12.ANALYSIS OF CYTOMORPH PATTERN OF TB LYMPHADENITIS

Cytomorphological pattern of TB Lymph node		
	Frequency	Percentage
Caseating with epithelioid cells (A3)	20	38
Non caseating with epithelioid cells(A4)	8	15
Purulent with Caseation (A1)	6	12
Only caseation (A2)	18	35

Table-16

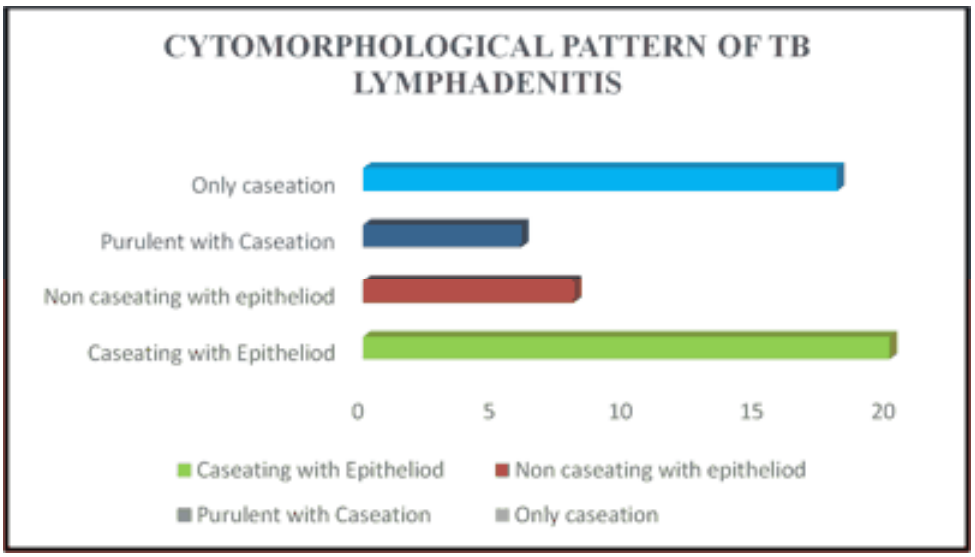

Figure-19

In our study based on the cytomorphological features 52 Tuberculous lymph nodes divided into following four categories. Among which 20(38%) cases were presented with Caseating epithelioid granuloma (A3) followed by 18(35%) with only caseation (A2). The remaining 8(15%) and 6(12%) accounting for Non caseating with epithelioid cells (A4), and purulent with caseation(A1) respectively. (Table 16, figure 19).

13.ANALYSIS OF CYTOMORPHIC PATTERN OF NEOPLASTIC LESIONS

Cytomorphological features of Neoplastic lesions			
		Frequency	Percentage
Malignant secondaries(S)	Squamous cell deposits (M1)	17	77.2
	Neuroendocrine (M2)	1	4.5
	MTC (M3)	1	4.5
Lymphoma(L)	HL (L2)	1	4.5
	NHL(L1)	2	9

Table-17

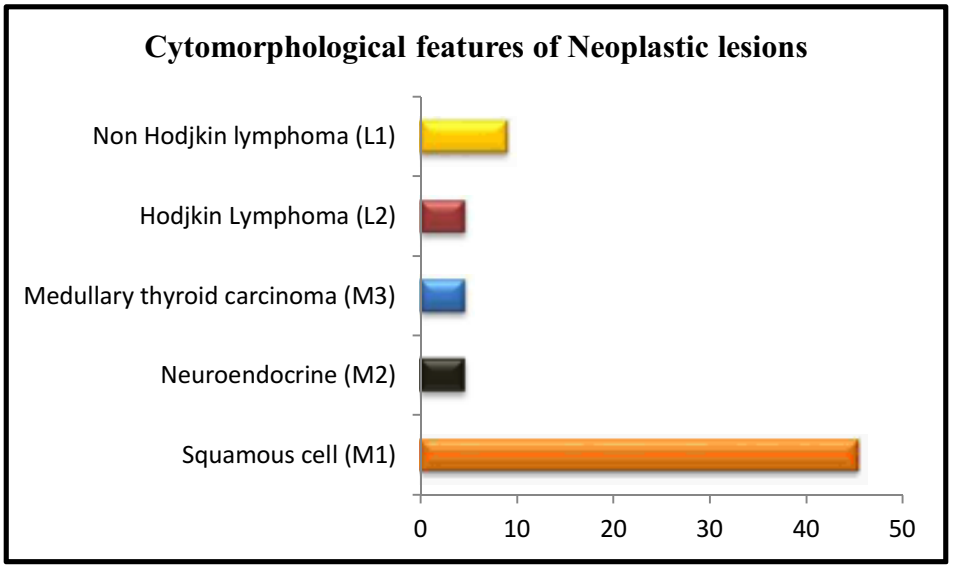

Figure-20

Based on the result of fine needle aspiration cytology the 21 Neoplastic lesions were categorized with cytomorphologic features. Among which 17(77.2%) patients were presented with malignant metastatic squamous secondary deposits(M1) followed by 2(9%) cases belonged to non-Hodgkin lymphoma(L1), and the remaining 1(4.5%) each for Hodgkin lymphoma(L2), neuroendocrine(M2) and medullary thyroid carcinoma(M3) respectively. (Table 17, Figure 20)

14. ANALYSIS OF PRIMARIES IN METASTATIC SECONDARIES

PRIMARIES		FREQUENCY	PERCENTAGE
1.	Nasopharynx (NP)	2	11
2.	Oral cavity (OC)	4	21
3.	Oropharynx (OP)	3	16
4.	Pyriform fossa (PF)	5	26
5.	Post cricoid growth (PCG)	1	5
6.	Supraglottic growth (SGL)	3	16
7.	Thyroid	1	5

Table-18

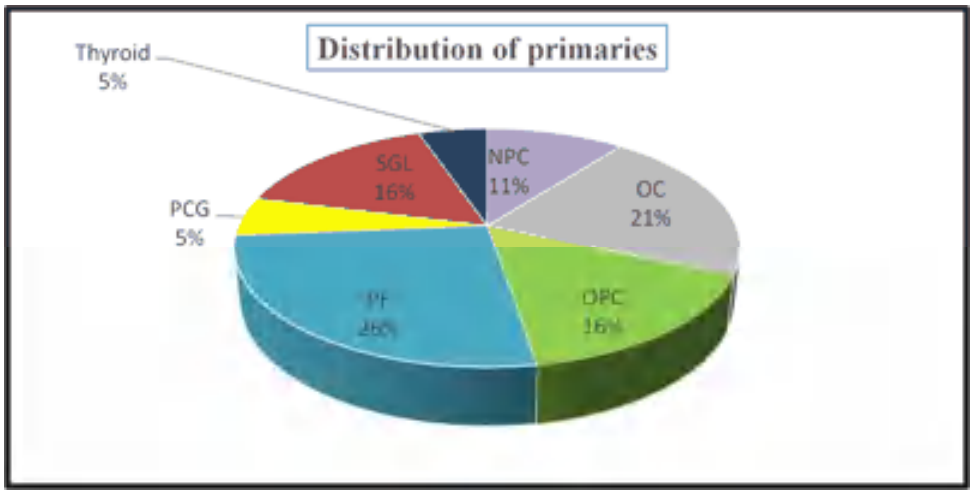

Figure-21

Out of 19 malignant secondaries primaries were located with the help of complete endoscopic evaluation of head and neck region. Among which 5(26%) had pyriform fossa, 4(21%) had oral cavity, 3(16%) each had oropharynx and supraglottic region, 2(11%) in nasopharynx and 1 (11%) each in post cricoid growth and thyroid. (Table 18, Figure 21)

IV- COMPARATIVE ANALYSIS

15. AGE AND GENDER WITH ETIOLOGY

	Lymphoma		Malignant secondaries		Nonspecific Reactive lymphadenitis		Tuberculous Lymphadenitis		Total
	Female	Male	Female	Male	Female	Male	Female	Male	
12-20 years	0	1	0	0	10	6	3	4	24
21 - 40 years	1	0	0	1	5	4	17	12	40
41 - 60 years	1	0	1	8	2	6	7	6	31
> 60 years	0	0	2	7	0	3	0	3	15
Total	2	1	3	16	17	19	27	25	110

Table-19

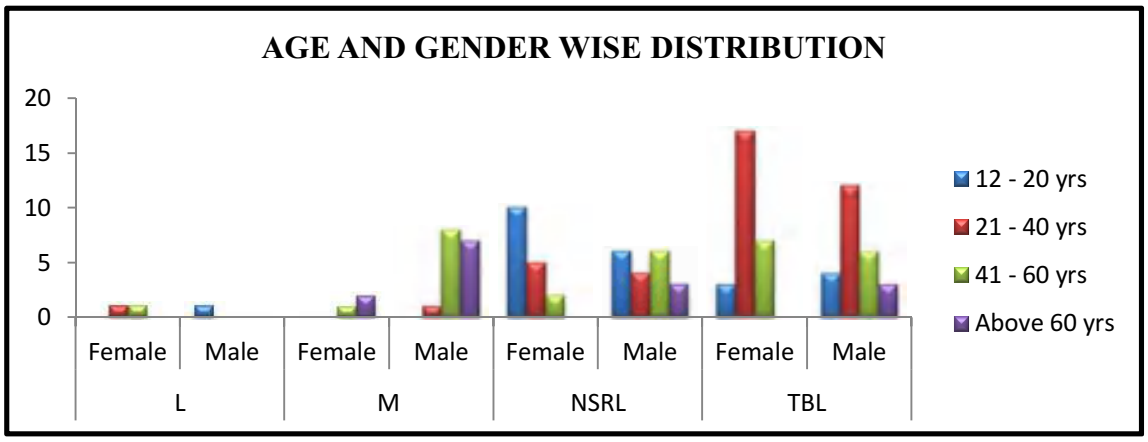

Figure-22

In this study out of 110 patients, the most common diagnosis observed was Tuberculous lymphadenitis presented in all age groups with clustering of cases among 21-40 years with female predominance whereas Nonspecific reactive lymphadenitis was observed more among 12-20years age group with slight female preponderance. Malignant secondaries were clustered in patients above 60 years age group with increased prevalence in male gender whereas Lymphoma shows

equal prevalence among all age group with slightly increased female preponderance. (Table 19, figure 22)

The above table shows comparison between Age and gender specific distribution of aetiologies with cytopathological diagnosis were χ^2=71.085, p=0.0005<0.01 which shows **highly statistically significant** association between Cytopathology and Demography.

16. LEVEL SPECIFIC DISTRIBUTION ACCORDING TO ETIOLOGY

			Lymph node Diseases				Total
			Lymphoma (L)	Malignant secondaries (M)	Nonspecific Reactive Lymphadenitis (RL)	Tuberculous Lymphadenitis (TBL)	
Levels	Level 1	Count	0	2	12	6	20
		%	0.0%	1.8%	10.9%	5.5%	18.2%
	Level 2	Count	0	3	16	22	41
		%	0.0%	2.7%	14.5%	20.0%	37.2%
	Level 3	Count	0	0	0	2	2
		%	0.0%	0.0%	0.0%	1.8%	1.8%
	Level 4	Count	0	0	1	0	1
		%	0.0%	0.0%	.9%	0.0%	.9%
	Level 5	Count	0	2	7	22	31
		%	0.0%	1.8%	6.4%	20.0%	28.2%
	Multiple	Count	3	12	0	0	15
		%	2.7%	10.9%	0.0%	0.0%	13.6%
Total		Count	3	19	36	52	110
		%	2.7%	17.3%	32.7%	47.3%	100.0%

Table-20

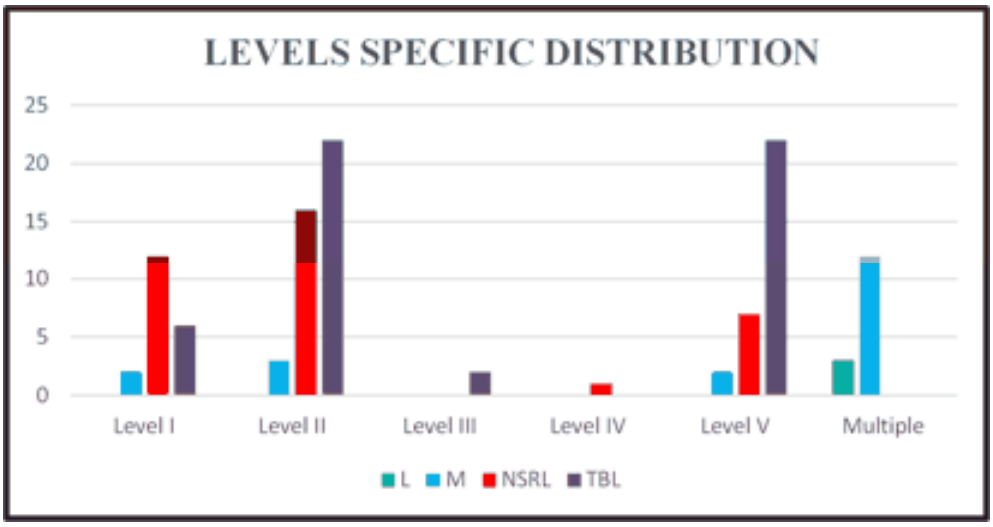

Figure- 23

In our study among 110 cases, 41/110(37.2%) patients had Level II involvement followed by 31(28.2%) patients had Level V presentation and15/110(13.6%) patients had multiple level lymph node involvement. Level III and Level IV lymph nodes accounting for 2/110(1.8%) and 1/110(0.9%) cases respectively. 22(20%) out of 41 cases in Level II and 22(20%) out of 31 cases in Level V were presented with TB lymphadenitis. Similarly, 12(10.9%) out of 20 cases in Level I were presented with Nonspecific reactive lymphadenitis. Meanwhile 12(10.9%) out of 13 cases of multiple nodal level involvement were presented with malignant secondaries.

The above table shows comparison between Levels specific distribution of etiologies with cytopathological diagnosis were χ^2=71.085, p=0.0005<0.01 which shows **highly statistically significant** association between Cytopathology and Levels. (Table 20, figure 23).

17.COMPARATIVE ANALYSIS OF DURATION WITH ETIOLOGY.

	Disease	N	Mean	SD	KW χ 2 – Value	p-value
Swelling duration	Lymphoma(L)	3	4.0	3.5	36.351	0.0005 **
	Malignant secondaries(M)	19	2.8	1.2		
	Reactive Lymphadenitis (RL)	36	1.5	0.6		
	Tuberculous Lymphadenitis (TBL)	52	2.9	2.1		

Table-21

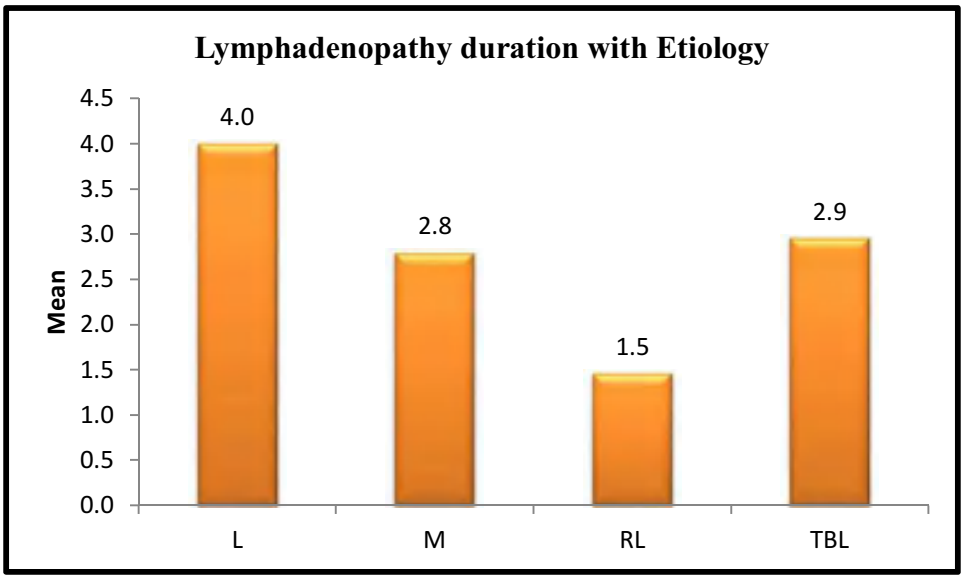

Figure-24

In our study among 110 study subjects, statistical descriptive analysis showed the mean distribution of duration with various etiologies of cervical lymphadenopathy. The mean duration

of presentation in Lymphoma and malignant secondaries is 4-3months. In reactive lymphadenitis and tuberculous lymphadenitis, the mean duration of presentation is 1.5 months and 2.9 months. The above table shows comparison of different mode of cervical lymphadenopathy presentation with different aetiology were KW-χ^2Value =36.351, p=0.0005<0.01 which shows **highly statistically** significant difference between duration of presentation and various etiological factors. (Table 21, figure 24)

18.COMPARATIVE ANALYSIS OF SIZE WITH ETIOLOGY

	Disease	N	Mean	SD	KW χ 2 - Value	p-value
Size cm	Lymphoma(L)	3	5.0	1.0	51.293	0.0005 **
	Malignant secondaries(S)	19	4.5	1.6		
	Nonspecific reactive lymphadenitis (NSRL)	36	2.0	0.4		
	Tuberculous lymphadenitis (TBL)	52	2.6	0.9		

Table-22

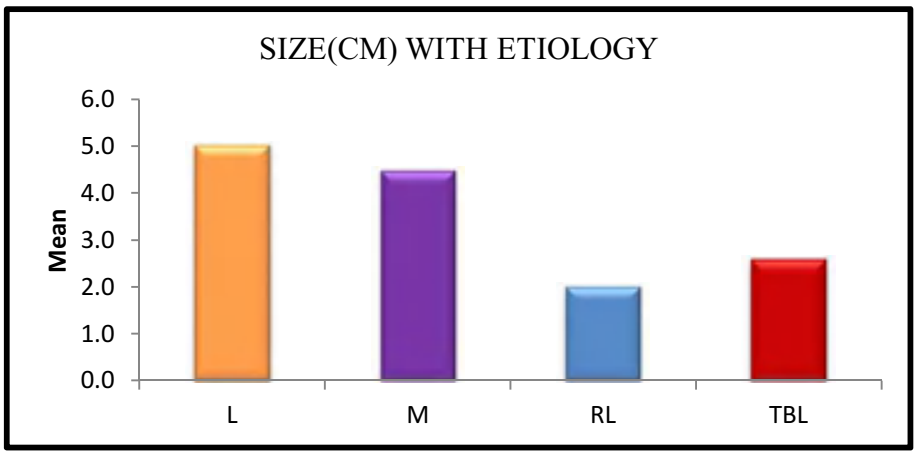

Figure-25

In our study among 110 study subjects, statistical descriptive analysis showed the mean distribution of different size of cervical lymphadenopathy with various etiological factors. The mean size for neoplastic lesions such as Lymphoma(L) and Malignant secondaries(S) accounting for 5 and 4.5cm respectively whereas for non-neoplastic lesions like Nonspecific reactive lymphadenitis (NSRL) and Tuberculous lymphadenitis (TBL) the mean size belonged to 2 to 2.5cm.

The above table shows statistical analysis of cervical lymphadenopathy Size (cm) with various etiologies were KW-χ^2Value=51.293, p=0.0005<0.01 which shows highly statistically significant difference between Size (cm) and etiological factors. (Table 22, figure 25)

19. COMPARISION OF FNA TB CYTOMORPHOLOGY WITH AFB POSITIVITY

AFB with FNA TB pattern		
	FNA	AFB Positivity
Caseating with epithelioid cells (Pattern 1)	20	13(26%)
Non caseating with epithelioid cells (Pattern 2)	8	3(6%)
Purulent with Caseation (Pattern 3)	6	5(9.6%)
Only caseation (Pattern 4)	18	13(25%)
Total	52	34(65.4%)

Table-23

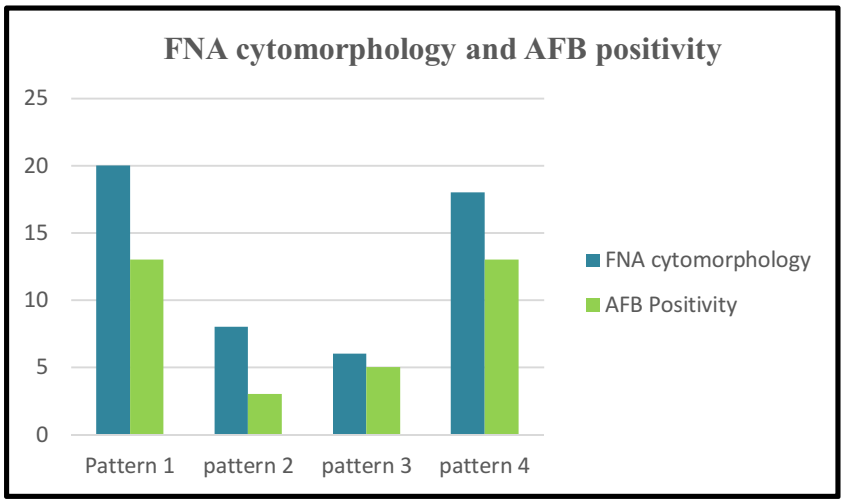

Figure-26

Patients with features of TB cytomorphology were subjected to AFB staining. Out of 52 cases 34 patients were showed AFB Positivity with overall positivity 65.38%. (Table 23, Figure 26)

20. COMPARISION OF PRIMARIES AND THEIR CORRESPONDING NODAL LEVEL DISTRIBUTION IN MALIGNANT SECONDARIES.

		Primaries						Total
		NP	OC	OP	PCG	PF	SGL	
Level	Level 1	0	2	0	0	0	0	2
	Level 2	0	2	2	1	2	2	9
	Level 5	2	0	0	0	0	0	2
	Multiple	0	0	1	0	3	1	5
Total		2	4	3	1	5	3	18

Table -24

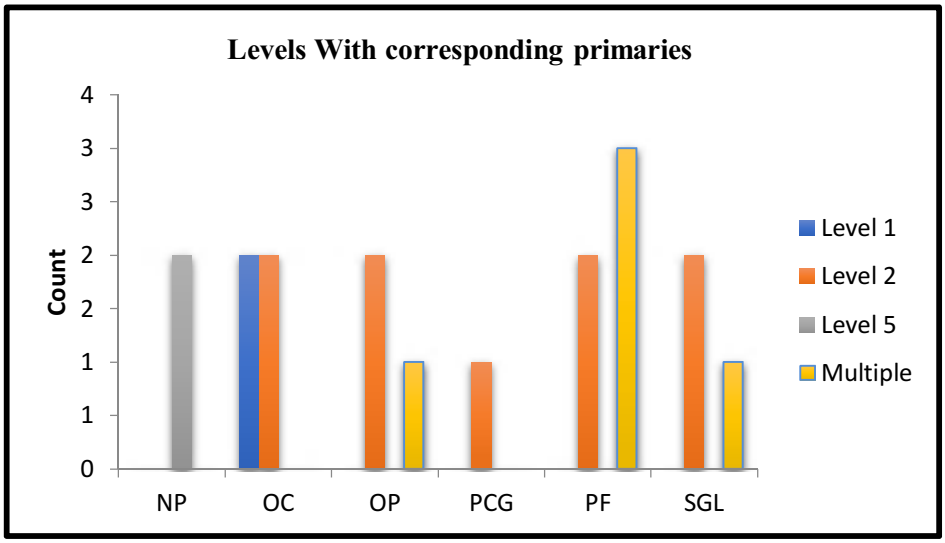

Figure-27

With the use of pan endoscopy, the location of primaries had been identified and their corresponding nodal level distribution were correlated. Among 19 secondaries the following primary was noticed involving 5 cases from pyriform fossa (PF), 4 cases from oropharynx (OC), 3cases each from oropharynx (OP) & supraglottic growth (SGL), 2 cases from nasopharynx (NP)

and 1 case from post cricoid growth (PCG). Among which Nasopharynx (NP) shows Level-V nodal predilection whereas Oral cavity shows Level-1&II involvement.

The above table shows analysis of comparison between primaries with corresponding nodal levels distribution were χ^2=28.813, p=0.017<0.05 which shows **statistically significant** association between primaries and Levels. (Table 24, Figure 27)

21. ACCURACY OF CYTOPATHOLOGY WITH RESPECT TO OPEN LYMPH NODE BIOPSY.

FNAC	TBL	NSRL	NHL	HL	Total
TBL	18	-	-	-	18
NSRL	02	7	-	-	9
NHL	-	-	2	-	2
HL	-	-	-	1	1
Total	20	7	2	1	30

Table-25

In our study analysis of 110 subjects 30 cases accounted for open biopsy. Among 30 lymph node biopsies done in this study reports were consistent with cytopathological reports, two not consistent with cytopathological reports. Hence the accuracy of cytopathology with respect to open biopsy in this study was 91.66%. (Table 25).

DISCUSSION

DISCUSSION

In this study discussion is based on the analysis of observations made on 110 patients from Government Stanley medical college, Chennai, who had been included in the study between October 2020 to September 2021. Patient data has been analyzed with respect to demographic profile, presenting complaints, clinical findings, investigation results such as Fine needle aspiration cytology and open biopsy in relevant cases. Diagnosis was made on the basis of cytology with sufficient material is equally significant as histopathology[1]

1.DISTRIBUTION OF ETIOLOGIES CAUSING CERVICAL LYMPHADENOPATHY

Jha B.C et al in their study observed 94 cases among which tuberculosis lymphadenitis was the most common cause accounting for 60 patients, followed by metastatic deposits 18 patients, nonspecific inflammation 13 patients and lymphoma 3 patients.

Biswas et al in their study analysis of 423 patients with aspiration cytology the following disease patterns were observed. Among which tuberculosis lymphadenitis ranked top constitute 45.4% followed by Non-specific inflammation/reactive hyperplasia 27.4%, malignant secondaries from different other primary 20.2%, and Lymphoma 7%.

Gaurav Batni et al in their study series of 54 subjects the following cervical lymph node diseases were noticed with aspiration cytology. Out of 54 subjects, reactive lymphadenitis ranked top constitute 33(51.56%) followed by tubercular lymphadenitis 18(28.12%), metastatic carcinoma 11(17.18%) and lymphoma 2(3.1%) cases respectively.

In our study analysis among 110 cases of cervical lymphadenopathy all cases were subjected to Fine needle aspiration cytology. Based on the result of aspiration cytology etiological factors of cervical lymphadenopathy were categorized into Non-Neoplastic and Neoplastic lesions accounted for 88(80%) and 22(20%) respectively. Out of 88 Non- neoplastic lesions greater

number of cases were reported with Tuberculous lymphadenitis 52(47%) followed by Nonspecific reactive lymphadenitis 36(33%). Whereas in 22 Neoplastic lesions Malignant secondaries 19(17%) constitute a greater number of cases followed by lymphoma with 3(3%). The findings of the present study were similar to the above studies.

2. AGE AND GENDER DISTRIBUTION

Chamyal P.C et al conducted a study in 1997 and observed that maximum incidence of cervical lymphadenopathy of 37.3% was in the 41-60 years age group followed by 34.5% in the 1-20 years with male to female ratio was 1.3:1.

Biswas et al 2009 in their analysis of 423 cases observed that 23.4%, 65.2% and 11.3% of the study subjects were in the age group of <14, 15-59 and ≥60 years respectively, with overall mean age of 29.04± 19.14 years and sex ratio (male: female) was 0.93:1. Nonspecific reactive lymphadenitis was significantly more common in <14 years age group, tuberculous lymphadenitis in 15-59 years and malignant metastasis among > 60 years age group.

Gaurav Batni et al in their study series on 2015 noticed that frequency of cervical lymphadenopathy was highest in the age group of 21-30 followed by 31-40 years with age range of 2-80 years and male to female ratio 1.13:1.

In the present study among 110 subjects, it was observed that maximum patients 40/110 (36%) were belonged to age group 21-40 years followed by 31/110(31%) in 41-60 years age group. Patients with age group ≤20 years and >60 years corresponds to 24/110(22%) and 15/110(14%) respectively. The overall mean age was 40.5±17.1 years and sex ratio in this study was 1.3:1. The findings of the present study are more comparable to Biswas et al study.

3. SOCIO-ECONOMIC STATUS DISTRIBUTION

Jha BC et al in their study reported among 60 cases of tuberculosis cervical lymphadenitis 35 (62%) patients belonged to the lower socio-economic group.

Kamal MS et al from Bangladesh reported among 65 cases of tuberculous cervical lymphadenitis socio-economic class were 58.5% patients belonged to lower class, lower- middle in 36.9% patients, and only 4.6% patients came from a middle-class family.[47]

Melkundi RS et al in 2011 in their study, out of 50 cases 38(76%) were belonged to low socioeconomic status. Among which 26 patients affected by tuberculous lymphadenitis 21 were in low socio-economic class. No high socioeconomic patients were observed in the study subjects.[43] In our study socio-economic status of patients were analysed into following classes. Out of 110patients high incidence of cervical lymphadenopathy was observed among low socio-economic status which accounted for 85/110(77.27%) followed by middle-class patients 25/110(22.7%)**.** There were no patients who belonged to the upper class. 42/52(80.7 %) cases of TB lymphadenitis belonged to a low socioeconomic class. The present study is also similar to that of the above studies in which the maximum incidence of tuberculous cervical lymphadenitis was observed in lower socio-economic status.

4. **SYMPTOMATOLOGY OF CERVICAL LYMPHADENOPATHY**

Jha B.C et al in their study series on cervical tuberculous lymphadenopathy observed that neck swelling 94.6% be the most common presenting symptom along with other symptoms such as malaise 17.8%, weight loss 14.3%, fever and cough 10.7% each, discharging sinus 5.3% and hemoptysis 1.8% respectively.

R Khan et al in their study on 1827 cases of tubercular cervical lymphadenopathy observed cervical adenopathy in 89.36% while other symptoms were malaise 9.97%, weight loss 7.83%, fever 6.94%, cold abscess 4.25%, cough 4.03%, and sinuses in 1.67%.[44]

In our study analysis, all 110 cases were presented with neck swelling along with other presenting symptoms such as fever 23.6%, pain 17.3%, cough 16.4%, weight loss 10.9%, difficulty in swallowing 5.5%, voice change 3.6%, and ulcers in oral cavity 3.6%. The main symptomatology was the presentation of neck swelling followed by other constitutional symptoms. The present study was similar to the R.Khan et al and Jha B.C et al.

5. SIDE OF LYMPHADENOPATHY

D. K. Baskota et al in their case series on 100 patients about the distribution of lymph nodes in the neck of tuberculous cervical lymphadenitis were observed 83% unilateral presentation and 17% bilateral presentation.[46]

Melkundi RS et al in their study series among 50 patients observed unilateral involvement of right side 46% followed by left side 38%, bilateral involvement in 14%, and least involved were central group accounting for 2%.

In our study out of 110 patients, 80 patients showed unilateral presentation involving left 40/110(36.4%) and right 50/110(45.5%) side respectively while the remaining 20/110(18.2%) patients presented with bilateral involvement. The present study was comparable to the D. K. Baskota et al and Melkundi RS et al.

6. CONSISTENCY OF CERVICAL LYMPHADENOPATHY

In a study conducted by **P.C.Chamyal et al** firm nodes constituted 65.5%, hard 29.1%, cystic 3.6%, and soft 1.8%. In **Melkundi RS et al** series firm nodes constitutes 78%, hard 20% and rubbery 2%. In this present study among 110 cervical lymphadenopathy cases clinically examined

76 patients had firm consistency (69.09%), 22 had hard in consistency accounting for (20%) and in 12 cases soft consistency (10.9%).

Out of 110 cases studied, it has been observed that 20 cases were matting of lymph nodes, 18 cases were fixed to the underlying structures and remaining 72 cases were discrete which is accounting for 20%, 11% and 69%, respectively. Whereas in Chamyal P.C et al series 60% of the nodes were mobile while 23.6% were fixed to the surrounding structures, and 16.4% were matted. This shows that our study shows similarity with Chamyal P.C et al.

7. LEVEL SPECIFIC DISTRIBUTION OF CERVICAL LYMPHADENOPATHY

Study by **Chamyal P.C et al** in 1992 shows involvement of anterior cervical lymph nodes 65.5%, posterior cervical group 20.9%, submandibular 7.3%, submental 13.6%, preauricular 1.8% and post auricular 0.9%.

D. K. Baskota et al in their study series on tuberculous cervical lymphadenitis observed posterior triangle were found to be commonest 51%, followed by Upper deep cervical group 48% and submandibular 36%. meanwhile, Supraclavicular 3%, submental 4% and lower deep cervical group 9% were found to be least frequently affected.

In a study conducted by **Gautam Biswas et al** jugulo-omohyoid (Level III) and supraclavicular (Level VB) group of lymph nodes were found to be more significantly involved by malignancy whereas, jugulodigastric (Level II), post-auricular, submandibular (Level IB) groups were found to be involved most significantly by tuberculosis.

In our study among 110 patients, greater number of cases were presented with Level-II lymph node involvement accounting for 41/110(37.2%), followed by Level-V lymph node involving 31/110(28.2%) cases while in Level-I, Level-III & Level-IV lymph node 20/110(18.1%), 2/110(1.8%) and1/110(0.9%) cases were observed. The remaining 15/110(13.6%) patients shows

multiple level site nodal involvement. In this study Tuberculous lymphadenitis shows more significant involvement of Level-II and Level-V site of cervical lymph node whereas in Lymphoma and malignant secondaries most cases were presented with multiple nodal level involvement. The present study shows similarity with studies of Gautam Biswas et al and D. K. Baskota et al.

8. CYTOMORPHOLOGIC PATTERN OF TB LYMPHADENITIS

Annam et al conducted a study series in 2004 on 336 children with significant lymphadenopathy observed the following cytomorphologic features such as reactive lymphadenitis 58.02%, tuberculous lymphadenitis 30.55% (54.25% caseation with epithelioid cells, 21.28% only caseation, 14.89% noncaseating with epithelioid cells, and 9.57% purulent with caseation. with overall AFB positive rate 94.9%), acute lymphadenitis 7.10%, and malignancy 5.62% respectively **Nidhi P et al** from tertiary center, Delhi reported among 175 cases of tuberculous lymphadenitis, cytomorphology pattern were 14.35 epithelioid granulomas without necrosis, 16.4% epithelioid granulomas with caseous necrosis, 39.25 necrosis only without epithelioid granuloma and 30.1% polymorphs with necrosis. Overall AFB positivity rate was 71.0%.

Chamyal P.C et al in their study observed out of 110 cases 63(57.3) % representing benign nature with 37 of these were found to be due to reactive lymphadenitis and 26 due to tuberculosis. In other 45(40.9%) cases of malignancy 19 were squamous cell carcinoma, 6 anaplastic, 3 adenocarcinoma, 10 Hodgkin's lymphoma and 7 non-Hodgkin's lymphoma.

Based on the cytomorphology pattern in this study the tuberculous lymph nodes were divided into following categories among which maximum had 20/52(38%) Caseating epithelioid granuloma, followed by 18(35%) only caseation, 8(15%) had Non caseating epithelioid granuloma and finally

6(12%) had purulent with caseation. Overall AFB staining positive rate was 65.3%. the present study was similar to the above study.

9. CYTOMORPHOLOGIC PATTERN OF NEOPLASTIC LESIONS

Ghartimagar D et al in their 2005 study series on utility of fine needle aspiration cytology of metaststic lymph nodes observed 508 cases of lymph node revealed 93(18%) positive for metastasis and 10(2%) cases for hematolymphoid malignancies. Among 93 cases 67(67%) positive for adenocarcinomatous deposits, 14(15%) for squamous cell deposits, 3(3%) for breast ductal carcinoma, 8(9%) for non-small cell carcinoma and 2(2%) each for papillary carcinoma thyroid, small cell carcinoma and malignant melanoma respectively.

I Bagwan et al conducted a study in 2003 about cytologic evaluation of enlarged neck node in metastatic disease revealed the most common metastasis noticed in neck was squamous cell deposits from the oral cavity. The analysis revealed among 1978 specimen 36.81% had squamous carcinoma, 12.18% poorly differentiated carcinoma, 7.33% adenocarcinoma, 2.83% thyroid carcinoma, 1.82% undifferentiated carcinoma, 1.57% non-small cell carcinoma, 1.52% uncommon metastasis, 0.9% small cell carcinoma and 0.7% salivary gland tumor.

In our study out of 22 cases of neoplastic lesions 19 patients were presented with malignant secondaries. Among which 17(77.2%) squamous cell metastatic deposits, 2(9%) non-Hodgkin lymphoma, and 1(4.5%) each for Hodgkin lymphoma, neuroendocrine and medullary thyroid carcinoma were observed. Our current study analysis was similar to I Bagwan et al study.

10. DISTRIBUTION OF PRIMARIES WITH CORRESPONDING NODAL LEVEL DISTRIBUTION IN METASTATIC SECONDARIES.

Mili MK et al in their study on 2011 among 112 cases revealed 30.36% cases of malignant secondaries among which primary constitute 67% larynx squamous cell carcinoma, 15% thyroid

papillary carcinoma, 12% unknown squamous cell carcinoma and 6% parotid mucoepidermoid carcinoma.[49]

Gaurav Batni et al conducted a study on 64 cases showed 11(17.18%) malignant secondaries among which the most frequent primary site reported was Nasopharyngeal carcinoma.

In our study out of 19 secondaries the distribution of primary site included 5 cases from pyriform fossa (PF), 4 cases from oral cavity (OC), 3cases each from oropharynx (OP) & supraglottic growth (SGL), 2 cases from nasopharynx (NP) and 1 case from post cricoid growth (PCG). Our present study shows the maximum primary site was from pharynx and larynx which was similar to the above studies.

11. ACCURACY OF FNAC WITH RESPECT TO OPEN BIOPSY

Out of 110 cases, 30 cases were subjected to open biopsy of which 20 (18.1%) have been found out to be tuberculous, 7(6.36%) as nonspecific reactive lymphadenitis and 3(3%) as Lymphoma. Among 19 cases of malignant secondaries did not undergo open biopsy as it may intervene in the future management of the case and hence primary site were identified for appropriate management. It has been observed by Martin et al 1957, MM Singh et al 1990 opined to defer from open biopsy of neck nodes in malignancy for the possibility of tumours seedling, increase in distal metastasis and local tumor recurrence. The above statement is also confirmed by **McCabe and McGuirt** 1978. [41,42] In **Chamyal P.C et al** series FNAC accuracy was 88.3%. In A.K. sarda et al series diagnostic accuracy was 97% and **Melkundi RS et al** series accuracy was 91.66%. Among 30 biopsies done in the study 28 FNAC reports were consistent with biopsy reports two were not consistent, hence the accuracy of FNAC with respect to biopsy in this study was 93.34%.

12. COMPARATIVE STUDY WITH OTHER SIMILAR STUDIES

Author	Total cases	TBL	NSRL	Lymphoma	Metastasis	Others
Chamyal P.C 1997	110	26	37	17	28	2
Jha B.C 1998	94	60	13	3	18	-
Batni 2016	64	18	33	2	11	-
Melkundi RS 2012	50	26	12	10	1	1
Present study 2021	110	52	36	3	19	-

Table-29

SUMMARY

SUMMARY

The clinical material for this study includes the detailed history and investigation reports of 110 cases of cervical lymphadenopathy who had attended the DEPARTMENT OF ENT & HEAD AND NECK SURGERY, Government Stanley medical college between October 2020 to September 2021. All patients were subjected to FNAC and in relevant cases open biopsy was done. Based on the cytopathological diagnosis the various etiologies and their clinico-pathological correlation have been summarized below.

1. TUBERCULOUS CERVICAL LYMPHADENOPATHY

Tuberculous cervical lymphadenitis forms the major etiology in this study accounting for about (47%) 52 patients with the maximum incidence among 21-40 years age group. The most common group of lymph node involvement is Level II and Level V respectively.

Based on the cytomorphology pattern the tuberculous lymph nodes were divided into following categories among which maximum patients 20/52(38%) were presented with Caseating epithelioid granuloma followed by only caseation with 18(35%) while, non-caseating epithelioid granuloma and purulent with caseation shows 15% and 12% each respectively. overall AFB positivity 65.3%. After confirmation they were started on Anti tuberculosis treatment and checked periodically.

2.NON-SPECIFIC REACTIVE LYMPHADENITIS

Non-specific reactive lymphadenitis constitutes 33% of cervical lymphadenopathy with maximum incidence among 12-20 years age group. The most common presenting symptom along with cervical adenopathy are fever and pain with mean duration of presentation within 2 months and

size 2-2.5 cm. The most common group of lymph node involvement is Level I and II each constitute 16(14.5%) and 12(10.9%) respectively. In Non-specific reactive lymphadenitis greater number of cases were presented with solitary swelling, discrete mobile and firm in consistency.

In the present study FNAC was diagnostic among which 36/110 (33%) patients showed the cytomorphology pattern of polymorphs admixed with histiocytes suggestive of Reactive lymphadenitis. All confirmed cases were treated symptomatically and checked periodically.

3. METASTATIC SECONDARIES AND LYMPHOMA.

Malignant metastatic secondaries and Lymphoma accounting for 19(17%) and 3(3%) respectively with greater number of cases among >60 years age group and male predominance. It presented most commonly as neck swelling in association with other presenting symptoms such as pain, difficulty in swallowing, voice change and ulcers in oral cavity.

Among the metastatic secondaries, squamous cell carcinoma was most common (77%) with underlying occult primary frequently from pharynx and larynx involving corresponding nodal level distribution which was statistically significant. Lymphoma accounts for 3(3%) patients 2 were non-Hodgkin and one was a case of Hodgkin lymphoma associated with multiple level of neck nodes.

All primary lesions were confirmed either by brushing cytology and concurrent punch biopsy with pan endoscopy. Whereas in lymphoma all 3 cases were confirmed by open biopsy. In advanced neck secondary treatment started with concurrent chemotherapy and radiotherapy meanwhile for lymphoma concurrent chemotherapy was initiated. All cases were followed up periodically for outcomes

CONCLUSION

CONCLUSION

1. Most of the patients in this study series, belonged to the age group of 21-40 years with 36% followed by the age group of 41-60 years with 28%. Thus, there is a male preponderance with 1.3:1 ratio and belonged to low socio-economic status
2. The most common etiology diagnosed was Tuberculosis lymphadenitis accounting for 52(47%) patients followed by Non-specific reactive lymphadenitis in 36(33%) patients, Malignant secondaries in 19(17%) patients and Lymphomas in 3(3%) patients.
3. The most common TB cytomorphologic pattern was caseating epithelioid type 20(38%) and only caseating type (35%) with overall AFB positivity of 65.3%
4. Among the metastatic secondaries, squamous cell carcinoma was the most common constitute 77% with underlying occult primary more frequently from Pyriform fossa and oral cavity involving corresponding nodal level distribution which was statistically significant.
5. Open Biopsy was done in 30 cases FNAC reports was not consistent in two cases with that of biopsy report, so diagnostic accuracy of FNAC in this study is 91.66%.
6. The findings of the present study provided the first-hand information regarding the Demographic distribution of various etiologies causing cervical lymphadenopathies, their mode of presentation and level specific predilection with etiologies. FNAC is good and front-line investigation tool to diagnose the condition early and start the management accordingly.

ANNEXURES

CLINICAL PHOTOGRAPHS

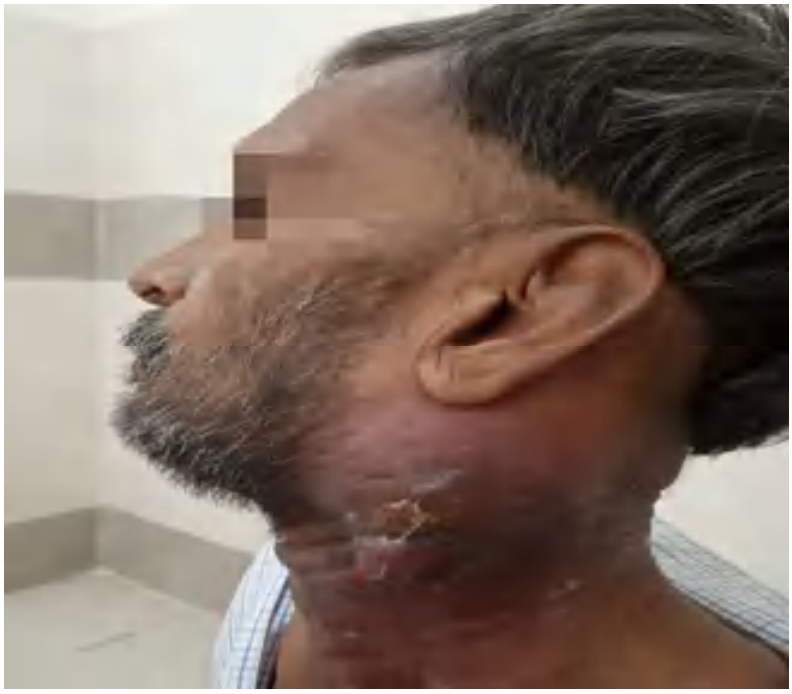

Figure-28 A case of Metastatic secondaries neck with occult primary

Figure-29 A case of Non Hodgkin Lymphoma

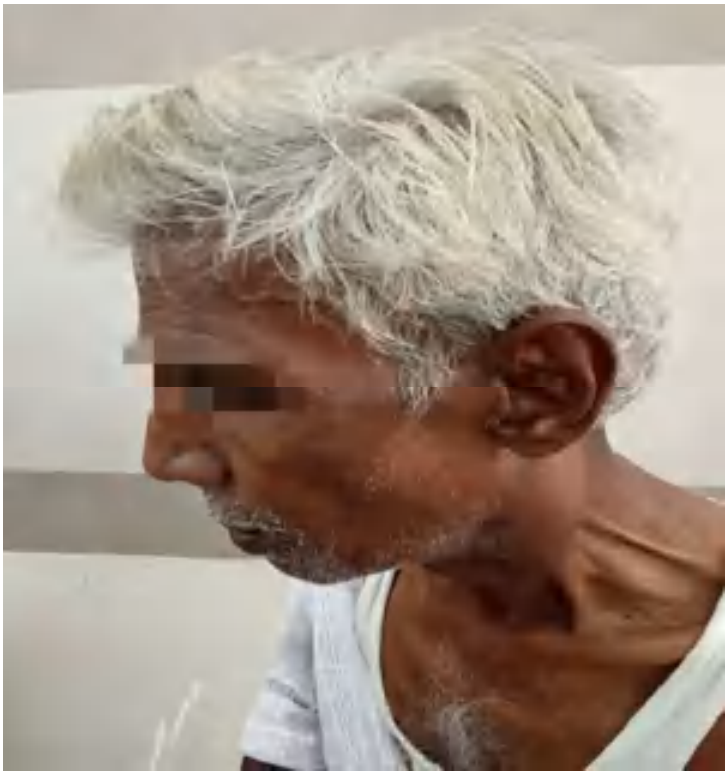

Figure-30 A case of TB cervical lymphadenitis

Figure-31 A case of Reactive Lymphadenitis

FNA CYTOMORPHOLOGIC PICTURES

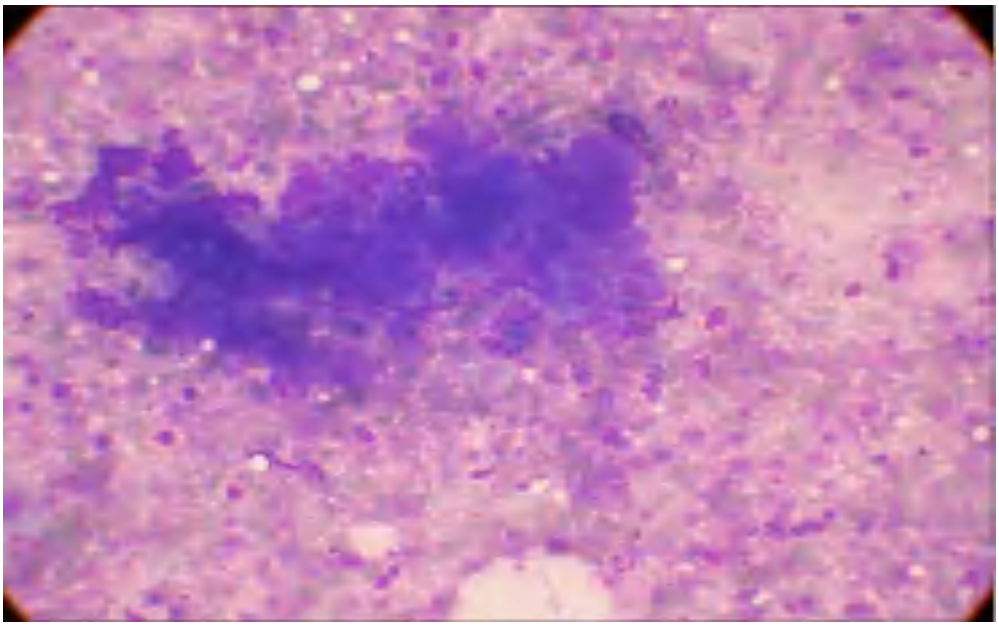

Figure – 32 Caseating Granulomatous TBL

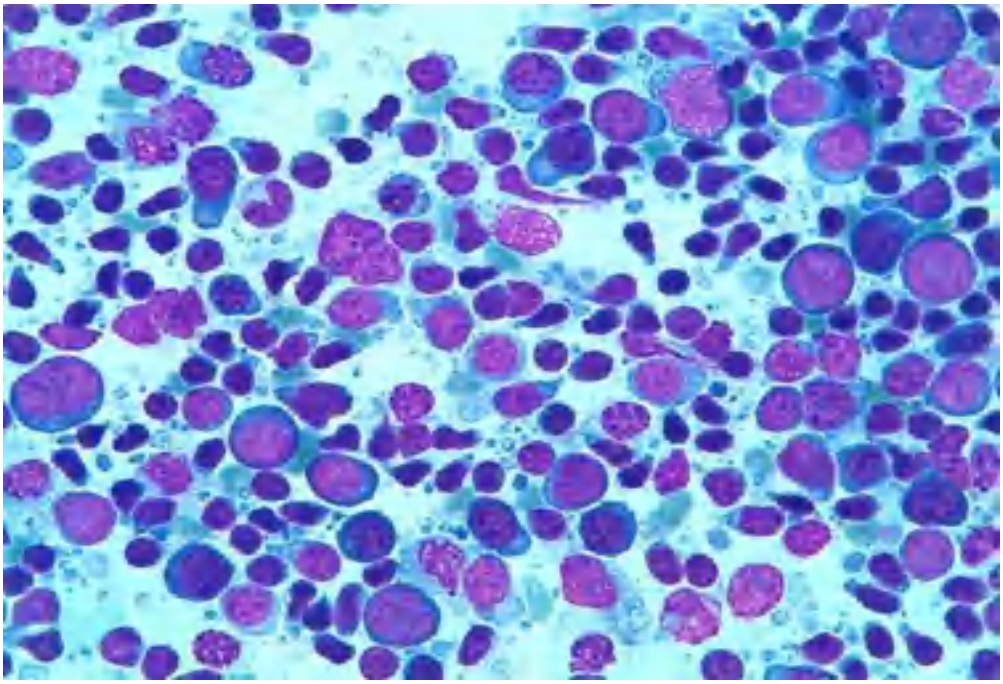

Figure -33 Reactive Lymphadenitis

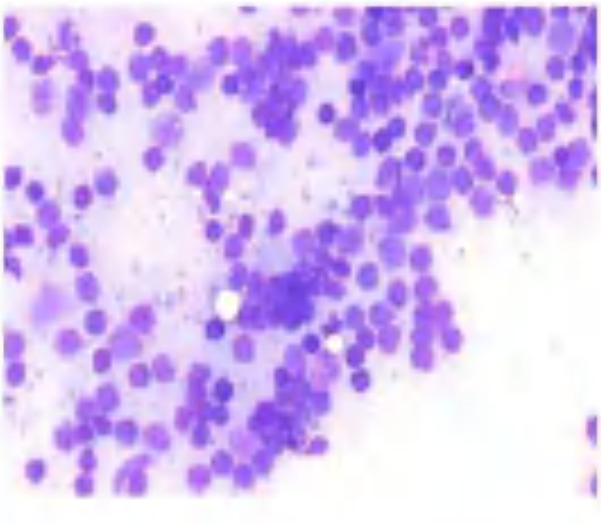

Figure-34 Hodgkin's Lymphoma

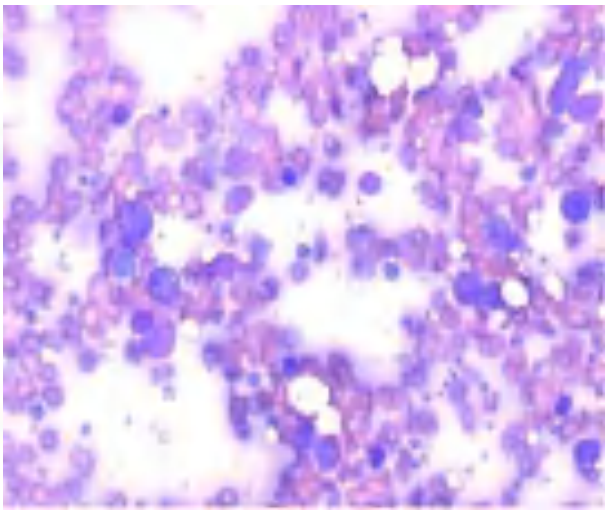

Figure-35 Non Hodgkin lymphoma

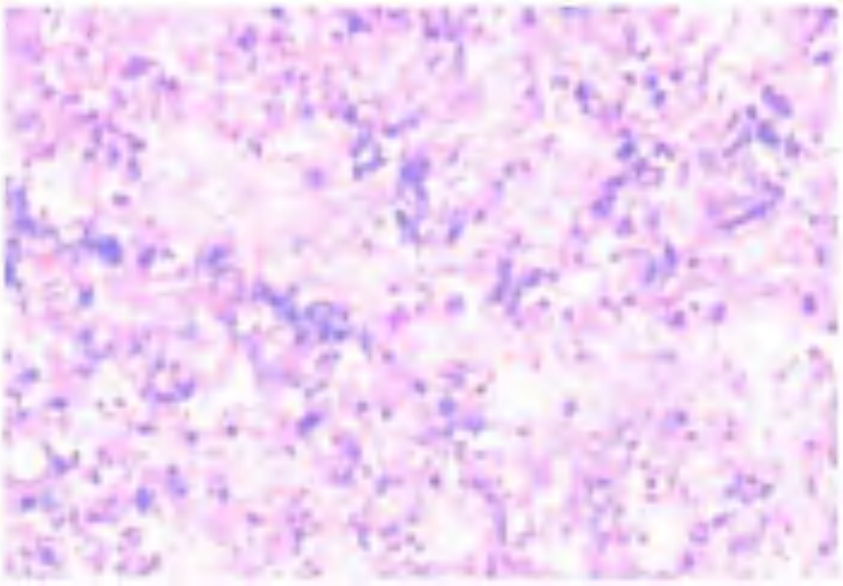

Figure-36 Metastatic squamous cell deposits

LIST OF ABBREVIATIONS

FNAB - Fine needle aspiration biopsy

WHO/RNTCP – World Health Organization /Revised National Tuberculosis Control Program

TBL – Tuberculosis Lymphadenitis

NSRL – Non -Specific Reactive Lymphadenitis

HL – Hodgkin Lymphoma

NHL – Non- Hodgkin Lymphoma

HIV – Human Immunodeficiency Virus

AIDS – Acquired Immunodeficiency state

AFB – Acid Fast Bacilli

PGL – Persistent Generalised Lymphadenopathy

MTC -Medullary Thyroid Carcinoma

SCC – Squamous Cell Carcinoma

UICC -Union International Against Cancer

AJC – American Journal Cancer

TNM – Tumour Nodes Metastasis

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PROFORMA

Name:	Age/gender:
DOA:	IP.NO:
Address:	

SYMPTOMS

Swelling	Site	
	Duration	
	Onset / progression	
Throat	Pain/ulcer	
	Difficulty in swallowing	
	Difficulty in breathing	
	Voice change	
Nasal	Epistaxis	
	Discharge	
	Obstruction	
Ear	Ear pain	

	Block/ hard of hearing	
	Discharge	
Respiratory symptoms	Cough	
	Hemoptysis	

General symptoms	Weight loss	
	Loss of appetite	
H/o prior ATT		
H/o tobacco/alcohol abuse		

SIGNS

Characteristics of swelling	Size	
	Shape	
	Site	
	Discrete/matted/fixed	
	Soft/firm/hard	
	Tenderness	

ENT examination	

Neck examination		
Indirect Laryngoscopy		
Post nasal examination		
Neck	Nodal levels	
	Trachea	
	Carotids	
	Spine	
Cranial nerve examination		
Respiratory system		

PROVISIONAL DIAGNOSIS:

INVESTIGATIONS:

ROUTINE	Blood: CBC, RFT, RBS, ESR, BT, CT Urine: Albumin/Sugar/Microscopy Radiological: Chest Xray Pathology: Fine needle aspiration cytology
SPECIFIC	Xray neck, sputum AFB, Peripheral smear, Lymph node HPE, USG abdomen, Endoscopy

FINAL DIAGNOSIS:

MASTER CHART

S NO	IP NO	PT NAME	AGE	SEX	SES	DUR	SYMP	SIDE	NO.	D/M	SIZE (cm)	LEVEL	CONSISTENCY	FNAC DIAGNOSIS	FNA cytomorph	OCCULT PRIMARIES	CXR	HPE	TREATMENT	OUTCOME
1	2052090	karunakaran	35	Male	UL	1	pain	Left	single	d	2	level 2	soft	TBL	A2	nad	N	TBL	ATT	good
2	2054243	subramani	58	Male	UL	1	pain	Right	single	d	2	level 2	soft	TBL	A2	nad	pl	TBL	ATT	good
3	2094158	nandagopal	18	Male	UM	3	wt loss	Right	multiple	m	3	level 3	firm	TBL	A3	nad	N		ATT	good
4	2008824	preetha	23	Female	LM	6	wt loss	Right	multiple	m	3	level 3	firm	TBL	A4	nad	N		ATT	good
5	2801343	Malini	15	Female	L	2	fever	Right	single	d	2	level 2	firm	RL	F	nad	N	TBL	cym treat	good
6	2085817	joseph	25	Male	UL	4	cough	Right	multiple	m	2	level 3	firm	TBL	A3	nad	N		ATT	good
7	2121830	rajeshkanth	42	Male	UL	0.75	pain	Right	single	d	1.5	level 1	firm	RL	F	nad	N		cym treat	good
8	2075908	srinivasalu	65	Male	L	3	wt loss	Right	multiple	m	2	level 2	firm	TBL	A1	nad	N		ATT	good
9	2038203	gowri	15	Female	UL	0.75	fever	Left	single	d	2	level 1	firm	RL	F	nad	N		cym treat	good
10	2084313	navajodha	45	Female	L	2	dysphagia	Right	single	f	3	level 2	hard	M	M1	post cricoid growth	N		CCRT	poor
11	2064090	sugnu	58	Male	UL	3	cough	Left	single	d	3	level 2	firm	TBL	A2	nad	pl		ATT	good
12	2068009	sankari	35	Female	UL	6	wt loss	Left	multiple	m	3	level 3	soft	TBL	A3	nad	N	TBL	ATT	good
13	2081874	krithika	28	Female	UL	3	cough	Right	multiple	m	2	level 2	soft	TBL	A2	nad	N	TBL	ATT	good
14	2083308	vinothini	22	Female	UL	3	cough	Right	single	d	2	level 2	firm	TBL	A1	nad	N		ATT	good
15	2073317	gopal	35	Male	LM	2	fever	Bilateral	single	d	2	level 3	firm	TBL	A3	nad	N		ATT	good
16	2275572	durai	39	Male	LM	5	ulcers in oral cavity	Left	single	d	3	level 1	hard	M	M1	OC GROWTH	N		surgery & cort	good
17	238467	dhanapriya	35	Female	UL	2	fever	Bilateral	multiple	f	6	level 1,2,3	hard	L	L1	nad	MW	NHL	CCRT	poor
18	156700	viswanathan	55	Male	UL	2	Fever	Left	single	d	2	level 2	firm	TBL	A3	nad	N		ATT	good
19	2058876	kavyasaran	72	Male	L	3	cough	Left	single	d	3	level 3	firm	TBL	A3	nad	N		ATT	good
20	214339	bass	25	Male	LM	13	wt loss	Right	multiple	m	2	level 2	soft	TBL	A3	nad	N	TBL	ATT	good
21	2043241	murugesa	45	Male	UL	6	pain	Bilateral	multiple	f	6	level 3	hard	M	M1	NP GROWTH	N		CCRT	poor
22	208933	priya	16	Female	UL	1	pain	Right	single	d	2	level 2	firm	RL	F	nad	N		cym treat	good
23	208541	eswari	28	Female	UL	2	cough	Left	multiple	m	4	level 3	firm	TBL	A3	nad	N		ATT	good
24	2074083	nagamani	49	Female	UL	3	cough	Right	multiple	m	3	level 3	firm	TBL	A3	nad	N		ATT	good
25	2076101	parthiban	35	Male	L	5	wt loss	Right	single	d	3	level 3	soft	TBL	A3	nad	N	TBL	ATT	good
26	2092118	saritha	47	Female	UL	3	wt loss	Right	single	d	2	level 1	firm	TBL	A4	nad	N	TBL	ATT	good
27	2087344	Muthiryan	50	Female	L	3	dysphagia	Left	single	f	3	level 2	hard	M	M1	PF GROWTH	N		CCRT	good
28	208093	aishwarya	21	Female	LM	3	fever	Right	single	d	2	level 2	firm	TBL	A3	nad	N		ATT	good
29	218161	pavithra	18	Female	UL	3	pain	Left	single	d	2	level 2	soft	TBL	A2	nad	N	TBL	ATT	good
30	206434	kevin	50	Male	UL	3	ulcers in oral cavity	Right	multiple	f	4	level 2	hard	M	M1	OC GROWTH	N		surgery & cort	poor
31	2038883	valli	35	Female	L	1	pain	Right	single	d	2	level 1	firm	RL	F	nad	N		cym treat	good
32	208298	radha	40	Female	UL	2	cal	Right	single	d	2	level 1	firm	RL	F	nad	N		cym treat	good
33	2309867	mallиga	25	Female	UL	2	fever	Right	single	d	3	level 3	firm	RL	F	nad	N	RL	cym treat	good
34	275988	selvan	43	Male	UL	3	ulcers in oral cavity	Right	single	f	2	level 1	hard	M	M1	OC GROWTH	N		surgery & cort	good
35	2302094	nalini	15	Female	LM	2	pain	Bilateral	single	d	2	level 1	firm	RL	F	nad	N	RL	cym treat	good
36	302398	sagitha	19	Female	L	3	cough	Left	single	d	3	level 3	firm	TBL	A3	nad	N		ATT	good
37	2093383	ranganathan	40	Male	LM	1	cal	Left	single	d	2	level 2	firm	RL	F	nad	N		cym treat	good
38	2101160	sinatha	21	Female	UL	0.75	pain	Bilateral	single	d	2	level 1	firm	RL	F	nad	N		cym treat	good
39	2101545	mani	25	Male	UM	2	cal	Bilateral	single	d	2	level 2	firm	RL	F	nad	N		cym treat	good
40	2801895	aravel	14	Male	UL	1	cough	Left	single	d	2	level 2	firm	TBL	A2	nad	N		ATT	good
41	2109083	sanjivarhan	69	Male	LM	2	cal	Bilateral	single	d	2	level 2	firm	RL	F	nad	N		cym treat	good
42	2121821	velusamy	45	Male	UL	3	pain	Bilateral	single	d	2	level 1	firm	RL	F	nad	N		cym treat	good
43	2023062	kaliyappan	67	Male	UL	3	dysphagia	Right	multiple	f	4	level 2,3	hard	M	M1	PF GROWTH	N		CCRT	poor
44	2100404	gowtham	13	Male	UL	2	cal	Right	single	d	2	level 3	firm	RL	F	nad	N		cym treat	good
45	2184140	sheik saleem	30	Male	UL	2	cough	Left	single	d	2	level 2	firm	RL	F	nad	N	RL	cym treat	good
46	2006433	kumari	45	Female	L	2	wt loss	Right	multiple	m	3	level 2	firm	TBL	A2	nad	N		ATT	good
47	2613781	santhosh	18	Male	LM	2	fever	Bilateral	single	d	2	level 2	firm	RL	F	nad	N		cym treat	good
48	2091865	prasanth	19	Male	UL	8	fever	Left	multiple	f	4	level 2,3,4	hard	L	L2	nad	MW	HL	CCRT	good
49	2016093	aishwarya	31	Female	UL	3	cough	Right	multiple	m	5	level 3	firm	TBL	A3	nad	N		ATT	poor
50	2124727	aravind kumar	18	Male	L	0.75	fever	Right	single	d	1.5	level 1	firm	RL	F	nad	N		cym treat	good
51	2122231	kavitha	19	Female	UL	2	fever	Right	single	d	1.5	level 1	firm	RL	F	nad	N		cym treat	good
52	2049761	vivekha	50	Female	UL	3	fever	Left	multiple	m	4	level 2	soft	TBL	A2	nad	pl	TBL	ATT	poor
53	2078120	abdul	70	Male	UM	3	dysphagia	Left	multiple	f	4	level 2	hard	M	M1	PF GROWTH	N		CCRT	poor
54	2132581	ayyanan	58	Male	L	2	hoarseness	Bilateral	single	f	3	level 2	hard	M	M2	SGL GROWTH	N		surgery & cort	poor
55	2190871	venkatesan	48	Male	L	2	hoarseness	Bilateral	multiple	f	4	level 2,3	hard	M	M1	SGL GROWTH	N		surgery & cort	poor

56	2783401	anandarai	40	Male	L	2	nil	Bilateral	single	d	2	level 2	firm	RL	F	nad	N	RL	sym treat	good
57	2783096	raja	50	Male	UL	2	nil	Bilateral	single	d	2	level 2	firm	RL	F	nad	N		sym treat	good
58	2004572	kuppusamy	68	Male	LM	2	dysphagia	Left	multiple	f	5	level 2,3	hard	M	M1	PF GROWTH	N		CCRT	poor
59	2835209	chandran	71	Male	UL	3	wt loss	Left	single	f	8	level 2,3,4,5	hard	M	M1	OP GROWTH	N		CCRT	poor
60	2133362	ravichandran	62	Male	UL	1	fever	Left	single	d	2	level 2	soft	TBL	A3	nad	N	TBL	ATT	good
61	2133345	cheran	36	Male	UL	1	pain	Right	single	d	2	level 4	firm	RL	F	nad	N		sym treat	good
62	2132145	subashini	35	Female	L	0.75	fever	Right	single	d	2	level 3	firm	RL	F	nad	N	RL	sym treat	good
63	2127517	thangavelu	57	Male	LM	1	fever	Left	single	d	2	level 5	firm	RL	F	nad	N		sym treat	good
64	2095432	veerasan	57	Male	LM	2	pain	Right	multiple	d	3	level 2	firm	TBL	A4	nad	N	TBL	ATT	good
65	2087582	vignesh	43	Male	LM	0.75	fever	Left	single	d	2	level 2	firm	RL	F	nad	N		sym treat	good
66	2085617	joseph	35	Male	L	1	cough	Right	single	d	2	level 1	firm	TBL	A2	nad	N	TBL	ATT	good
67	2123136	rajasikamani	42	Male	L	0.75	nil	Right	single	d	1.5	level 1	firm	RL	F	nad	N		sym treat	good
68	2180919	parija	16	Female	UL	2	fever	Left	single	d	3	level 3	firm	RL	F	nad	N	RL	sym treat	good
69	2188857	kaleimaran	29	Male	UL	2	fever	Bilateral	multiple	m	2	level 5	firm	TBL	A4	nad	N		ATT	good
70	2187902	nandhini	25	Female	UL	3	nil	Right	single	d	3	level 5	firm	TBL	A3	nad	N		ATT	good
71	2180909	mariyamma	54	Female	UM	4	nil	Right	multiple	d	1.5	level 1	soft	TBL	A1	nad	N	TBL	ATT	good
72	2004157	savitha	33	Female	UL	2	wt loss	Right	multiple	m	5	level 3	soft	TBL	A2	nad	N	TBL	ATT	poor
73	2004081	vimala	22	Female	L	6	wt loss	Left	single	d	5	level 5	firm	TBL	A4	nad	N	TBL	ATT	good
74	2004379	lethi	29	Female	L	2	cough	Right	multiple	m	2	level 1	firm	TBL	A3	nad	N		ATT	good
75	2003217	asanthi	40	Female	LM	3	nil	Right	single	d	3	level 3	firm	TBL	A3	nad	N		ATT	good
76	2126321	arun	30	Male	UM	4	cough	Right	multiple	m	3	level 5	firm	TBL	A3	nad	N		ATT	good
77	2083291	rekha	30	Female	UL	2	pain	Bilateral	multiple	m	2	level 5	firm	TBL	A2	nad	pl		ATT	poor
78	2004365	suresh	27	Male	UL	3	cough	Left	single	d	2	level 5	firm	TBL	A1	nad	N		ATT	good
79	2103894	bhavathy	38	Female	L	2	pain	Left	single	d	2	level 5	firm	TBL	A2	nad	N		ATT	good
80	2013694	shakila	38	Female	L	0.75	pain	Left	single	d	1.5	level 2	firm	RL	F	nad	N		sym treat	good
81	2132145	chandran	71	Male	LM	0.75	fever	Right	single	d	1.5	level 1	firm	RL	F	nad	N		sym treat	good
82	2013643	mahathy	42	Female	L	0.75	nil	Left	single	d	2	level 5	firm	RL	F	nad	N		sym treat	good
83	2185829	arun	30	Male	UL	3	nil	Right	multiple	m	3	level 3	firm	TBL	A4	nad	N		ATT	good
84	2130083	sekar	43	Male	L	1	fever	Right	single	d	2	level 2	firm	TBL	A4	nad	N		ATT	good
85	2033309	manjula	21	Female	UL	3	nil	Left	multiple	m	2	level 2	firm	TBL	A1	nad	N		ATT	good
86	2039702	ramu	58	Male	L	1	dysphagia	Left	single	d	4	level 2	hard	M	M1	OP GROWTH	N		CCRT	poor
87	2139702	bhavanu	19	Male	L	2	nil	Left	single	d	1.5	level 1	firm	TBL	A2	nad	N		ATT	good
88	2029214	yamuna	38	Female	L	2	nil	Right	single	d	2	level 2	firm	TBL	A1	nad	N		ATT	good
89	2078053	mahendran	38	Male	UL	3	cough	Right	single	d	2	level 2	firm	TBL	A3	nad	N		ATT	good
90	2059328	vijayan	35	Male	LM	2	nil	Right	multiple	d	1.5	level 1	firm	TBL	A2	Nad	N		ATT	good
91	2185189	Krishnan	63	Male	UL	4	hoarseness	Bilateral	multiple	f	3	level 2	hard	M	M1	SGL GROWTH	N		surgery & ccrt	poor
92	2185190	arumugam	45	Male	UL	3	wt loss	Left	single	d	3	level 2	firm	TBL	A2	nad	pl		ATT	good
93	2178573	kamala	35	Female	LM	1	nil	Left	single	d	2	level 2	firm	RL	F	nad	N		sym treat	good
94	2150340	usharani	35	Female	L	3	cough	Right	single	d	2	level 3	firm	TBL	A4	nad	N		ATT	good
95	2187077	shanmugam	50	Male	UL	2	nil	Bilateral	multiple	f	6	level 2	hard	M	M1	OP GROWTH	N		CCRT	poor
96	2187168	prabhakaran	60	Male	UL	2	nil	Left	multiple	f	7	level 2,3,4	hard	M	M1	PF GROWTH	N		CCRT	poor
97	2188739	mariyammal	53	Female	LM	2	fever	Right	single	d	1.5	level 2	firm	RL	F	nad	N		sym treat	good
98	2188685	mazhi	45	Female	L	2	pain	Left	multiple	d	5	level 2,3,5	hard	L	L1	nad	N	NIL	CCRT	good
99	2188644	ganeshan	45	Female	L	3	fever	Right	multiple	m	9	level 2	firm	TBL	A2	nad	N	TBL	ATT	good
100	2189348	samuel	54	Male	UL	2	nil	Bilateral	multiple	d	2	level 2	firm	RL	F	nad	N		sym treat	good
101	2189925	durgadevi	41	Female	UL	1	fever	Bilateral	multiple	m	2	level 5	firm	TBL	A2	nad	N		ATT	good
102	2189985	charles	35	Male	UL	1	fever	Left	single	d	3	level 2	firm	RL	F	nad	N	RL	sym treat	good
103	2189986	padma	66	Female	LM	2	ulcers in oral cavity	Left	single	d	5	level 2	hard	M	M1	OC GROWTH	N		surgery & ccrt	good
104	2189966	vaishnavi	38	Female	UL	2	cough	Left	single	d	3	level 3	soft	TBL	A2	nad	pl	TBL	ATT	good
105	2189945	gaffer	50	Male	UL	2	nil	Left	multiple	d	3	level 5	firm	RL	F	nad	N	TBL	sym treat	good
106	2154584	hemanath	42	Male	UL	2	fever	Right	multiple	m	3	level 2	firm	TBL	A3	nad	N	TBL	ATT	good
107	2185087	priyanka	17	Female	L	2	pain	Right	single	d	1.5	level 1	firm	RL	F	nad	N		sym treat	good
108	2154320	balakumaran	54	Male	L	3	pain	Bilateral	multiple	f	6	level 2,3,4	hard	M	M3	nad	N		surgery & ccrt	poor
109	2189968	murthy	55	Male	L	2	pain	Right	multiple	f	5	level 5	hard	M	M1	NP GROWTH	N		CCRT	good
110	2189859	lethi	18	Female	LM	0.75	fever	Left	single	d	1.5	level 2	firm	RL	F	nad	N		sym treat	good

ETHICAL COMMITTEE APPROVAL LETTER

GOVERNMENT STANLEY MEDICAL COLLEGE & HOSPITAL,CHENNAI -01

INSTITUTIONAL ETHICS COMMITTEE

TITLE OF THE WORK	:"A PROSPECTIVE CLINICO PATHOLOGICAL STUDY ON CERVICAL LYMPHADENOPATHY AMONG PATIENTS IN A TERTIARY CARE CENTRE"
PRINCIPAL INVESTIGATOR	: DR. V.KANAGAVEL,
DESIGNATION	: PG IN MS ENT,
DEPARTMENT	: DEPARTMENT OF ENT , GOVT. STANLEY MEDICAL COLLEGE.

The request for an approval from the Institutional Ethical Committee (IEC) was considered on the IEC meeting held on 10.09.2020 at the Council Hall, Stanley Medical College, Chennai-1 at 10am.

The members of the Committee, the secretary and the Chairman are pleased to approve the proposed work mentioned above, submitted by the principal investigator.

The Principal investigator and their team are directed to adhere to the guidelines given below:

1. You should inform the IEC in case of changes in study procedure, site investigator investigation or guide or any other changes.
2. You should not deviate from the area of the work for which you applied for ethical clearance.
3. You should inform the IEC immediately, in case of any adverse events or serious adverse reaction.
4. You should abide to the rules and regulation of the institution(s).
5. You should complete the work within the specified period and if any extension of time is required, you should apply for permission again and do the work.
6. You should submit the summary of the work to the ethical committee on completion of the work.

14/10/20

MEMBER SECRETARY,
IEC, SMC, CHENNAI

PLAGIARISM_CERTIFICATE

Curigional

Document Information

Analyzed document	A PROSPECTIVE CLINICO PATHOLOGICAL STUDY ON CERVICAL LYMPHADENOPATHY AMONG PATIENTS IN A TERTIARY CARE CENTRE.docx (D122976325)
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CERTIFICATE -II

This is to certify that this dissertation work titled "**A PROSPECTIVE CLINICO PATHOLOGICAL STUDY ON CERVICAL LYMPHADENOPATHY AMONG PATIENTS IN A TERTIARY CARE CENTRE**" CHENNAI DISTRICT, TAMIL NADU-2021" of the candidate, **DR. V. KANAGAVEL** with REGISTRATION NUMBER - 221914053 for the award of M.S. in the BRANCH OF OTORHINOLARYNGOLGY.

I personally verified the urkund.com website for the purpose of plagiarism Check. I found that the uploaded thesis file contains from introduction to conclusion pages and result shows --------- percentage of plagiarism in the dissertation.

GUIDE & SUPERVISOR SIGN WITH SEAL

INFORMED CONSENT

TITLE: **A PROSPECTIVE CLINICO PATHOLOGICAL STUDY ON CERVICAL LYMPHADENOPATHY AMONG PATIENTS IN A TERTIARY CARE CENTRE**

The content of the information sheet dated _____ that was provided have been read carefully by me/explained in detail to me, in a language that I comprehend and fully understood the contents.

I confirm that I have had the opportunity to ask questions.

The nature and purpose of the study and its potential risks/benefits and expected duration of the study and other relevant details of the study have been explained to me in detail.

I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my medical care or legal right being affected.

I agree to take part in the above study

_____

(Signature/Left thumb impression)

Name of the Participant: _____

Son/Daughter/Spouse of _____

Complete postal address: _____

This is to certify that the above consent has been obtained in my presence.

_____ Date:

Signature of the principal investigator Place:

1)Witness – 1

_____

Signature:

Name:

Address:

2) Witness – 2

_____

Signature:

Name:

Address:

சுய ஒப்புதல் படிவம்

- ஆய்வு செய்யப்படும் தலைப்பு: "**A PROSPECTIVE CLINICO PATHOLOGICAL STUDY ON CERVICAL LYMPHADENOPATHY AMONG PATIENTS IN A TERTIARY CARE CENTRE"**
- ஆராய்ச்சி நிலையம் : ENT and Head & Neck Surgery
- தமிழ்நாடு அரசு ஸ்டான்லி மருத்துவக்கல்லூரி & மருத்துவமனை, சென்னை - 600 001.
- பங்குபெறுபவரின் பெயர்:
- பங்குபெறுபவரின் எண் :
- மேலேகுறிப்பிட்டுள்ள மருத்துவ ஆய்வின் விவரங்கள் எனக்கு விளக்கப்பட்டது. என்னுடைய சந்தேகங்களை கேட்கவும், அதற்கான தகுந்தவிளக்கங்களை பெறவும் வாய்ப்பளிக்கப்பட்டது.
- நான் இவ்வாய்வில் தன்னிச்சையாக தான் பங்கேற்கிறேன். எந்த காரணத்தினாலோ எந்தகட்டத்திலும் எந்த சட்டசிக்கலுக்கும் உட்படாமல்நான் இவ்வாய்வில் இருந்து விலகி கொள்ளலாம் என்றும் அறிந்து கொண்டேன்.
- இந்த ஆய்வு சம்மந்தகமாகவோ, இதை சார்ந்த மேலும் ஆய்வு மேற்கொள்ளும் போதும் இந்த ஆய்வில் பங்குபெறும் மருத்துவர் என்னுடைய மருத்துவ அறிக்கைகளை பார்ப்பதற்கு என் அனுமதி தேவையில்லை என அறிந்துகொள்கிறேன். நான் ஆய்வில் இருந்து விலகிக்கொண்டாலும் இது பொருந்தும்எனஅறிகிறேன்.
- இந்த ஆய்வின் மூலம் கிடைக்கும் தகவல்களையும், பரிசோதனை முடிவுகளையும் மற்றும் சிகிச்சை தொடர்பான தகவல்களையும் மருத்துவர் மேற்கொள்ளும் ஆய்வில் பயன்படுத்திக்கொள்ளவும் அதைபிரசுரிக்கவும் என் முழு மனதுடன் சம்மதிக்கிறேன்.
- இந்த ஆய்வில் பங்குகொள்ள ஒப்புக்கொள்கிறேன். எனக்கு கொடுக்கப்பட்ட அறிவுரைகளின் படி நடந்துகொள்வதுடன் இந்த ஆய்வை மேற்கொள்ளும் மருத்துவ அணிக்கு உண்மையுடன் இருப்பேன்என்றும் உறுதியளிக்கிறேன். என்
- உடல்நலம்பாதிக்கப்பட்டாலோஅல்லதுஎதிர்பாராதவழக்கத்திற்குமாறானநோய்க்குறிதென் பட்டாலோஉடனேஅதைமருத்துவஅணியிடம்தெரிவிப்பேன்எனஉறுதிஅளிக்கிறேன்.

- பங்கேற்பவரின்கையொப்பம் ..... இடம் ..... தேதி

- கட்டைவிரல்ரேகை

- பங்கேற்பவரின்பெயர்மற்றும்விலாசம் .....