

# **Role of Ultrasound & Color Flow Imaging in Assessment of Cervical Lymphadenopathy Correlative Study with Fine Needle Aspiration Cytology**

**Thesis**

**Submitted for partial fulfillment of M.D. degree in  
Radiodiagnosis**

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2005**

# ACKNOWLEDGEMENT

*Thanks first and last to God as we owe him for his great care, support and guidance in every step in our life.*

*Words do fail when I come to express my sincere indebtedness, profound gratitude and cordial appreciation to my **Prof. Dr. Salwa Taha Ismail Professor** of Radiodiagnosis, Faculty of Medicine, Ain Shams University, for her moral support, valuable supervision and for enabling me to fulfill this work. She is not only my professor to whom I am very grateful, but she is also a mother to whom I wish always the best of everything.*

*I also wish to express my sincere gratitude to **Prof. Dr. Laila Hosny** Professor of Radiodiagnosis, Faculty of Medicine, Ain Shams University, whose interest in the subject of the research has been of great help.*

*Special thanks are due to assistant **Prof. Dr. Sahar Naeim** Assistant Professor of Radiodiagnosis, Faculty of Medicine, Ain Shams University, for dedicating so much of her PRECIOUS time and effort, and for her kindness, honest and constant guidance to complete this work,*

**SHERINE**

# LIST OF ABBREVIATIONS

<b>%</b>	=	Percent
<b>+ve</b>	=	Positive
<b>-ve</b>	=	Negative
<b>AIDS</b>	=	Acquired immunodeficiency syndrome
<b>AUC</b>	=	Area under curve
<b>CDS</b>	=	Color Doppler sonogram
<b>cm</b>	=	Centimeter
<b>CT</b>	=	Computed tomography
<b>CW</b>	=	Continuous wave
<b>EDV</b>	=	End diastolic velocity
<b>Ef%</b>	=	Efficacy percent
<b>Fig.</b>	=	Figure
<b>FN</b>	=	False negative
<b>FNAC</b>	=	Fine needle aspiration cytology
<b>FP</b>	=	False positive
<b>H and E stains</b>	=	Hematoxylin & Eosin
<b>HD</b>	=	Hodgkin's disease
<b>HIV</b>	=	Human immunodeficiency virus
<b>Hz</b>	=	Hertz
<b>L/T</b>	=	Longitudinal to transverse ratio
<b>MHz</b>	=	Mega hertz
<b>mm</b>	=	Millimeter

<b>MRI</b>	=	Magnetic resonance imaging
<b>NHLs</b>	=	Non Hodgkin's lymphomas
<b>P</b>	=	Probability
<b>P-%</b>	=	Predictive value for a negative test
<b>P+ %</b>	=	Predictive value for a positive test
<b>PDS</b>	=	Power Doppler sonogram
<b>PI</b>	=	Pulsatility index
<b>PoI</b>	=	Pourcelot index
<b>PRF</b>	=	Pulsed repetition frequency
<b>PSV</b>	=	Peak systolic velocity
<b>RI</b>	=	Resistance Index
<b>RNA</b>	=	Ribonucleic acid
<b>ROC</b>	=	Receiver operating curve
<b>RS</b>	=	Reed - Sternberg
<b>S/L</b>	=	Short axis to long axis ratio
<b>SD</b>	=	Standard deviation
<b>SN%</b>	=	Diagnostic sensitivity percent
<b>Sp%</b>	=	Diagnostic specificity percent
<b>TN</b>	=	True negative
<b>TP</b>	=	True positive
<b>US</b>	=	Ultrasound
<b>WHO</b>	=	World Health Organization

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# INTRODUCTION

**Color Doppler** ultrasound is a reliable and reproducible method for help in the differentiation between benign and malignant alterations of lymph nodes by using findings of intranodal angio-architecture. It is the only method that can display the angio-architecture of lymph nodes in daily practice (*Morton et al., 1988*).

**Power Doppler** sonography, with the advantages of less direction dependence, higher sensitivity and better contrast of vascular contour is combined to the color Doppler for better differentiation of various cervical lymphadenopathies in terms of vascular resistance, vascular pattern and vascular density (*Bude and Rubin, 1996*).

**Ultrasound guided fine needle aspiration cytology** is suitable for detection, demonstration and exclusion of disease, because of its high sensitivity and high specificity, which can be explained by the fact that, this technique is a combination of an imagining modality and cytologic examination. However, biopsy under the guidance of CT & MRI is time consuming and costly, while ultrasound guided fine needle biopsy takes only a few minutes for each node. It is frequently required not only to determine whether the nodes are neoplastic but also to determine the histology of the neoplasm (*Robert and Johanness, 1993*).

# **AIM OF THE WORK**

The aim of this work is to emphasis the role of ultrasound, color Doppler, power Doppler, and ultrasound guided biopsy in differentiation of benign and malignant cervical lymphadenopathies.

# ANATOMY OF CERVICAL LYMPH NODES

## Gross Anatomy

Lymph nodes are small, encapsulated, ovoid soft tissue structures ranging in size between 3 and 25 mm according to the body site. Approximately 800 lymph nodes are present in the body most prevalent in the neck, axilla, groin, body cavities and along major vessels (*Gartner and Hiatt, 1997*).

Cervical lymph nodes are composed of lymphoid tissue and are located along the lymphatic vessels in the neck. There are about 300 lymph nodes in the neck, and the lymph nodes are embedded in the soft tissues of the neck and are either partly or completely surrounded by fat (*Gastenholz, 1990*).

Each cervical lymph node is encapsulated by fibrous tissue and is divided into cortical and medullary regions. The cortex is composed of densely packed lymphocytes which group together to form spherical lymphoid follicles and the medulla of the lymph node consists of medullary trabeculae, medullary cords and medullary sinuses. From the inner surface of the capsule, structures called trabeculae, of similar composition of the capsule, extend towards the medullary region of the lymph node. The capsule and trabeculae form a framework to maintain the shape of the lymph node. The portion of the trabeculae in the

medullary region is known as medullary trabeculae, which guide blood vessels and nerves to different regions of the lymph node. The medullary cords and medullary sinuses are composed of reticulum cells. The medullary cords are arranged in a parallel pattern and most of them are long or irregular in shape and surrounded by medullary sinuses. The medullary sinuses are filled with lymph and in which the lymph drains to the efferent lymphatic vessel. The paracortex, an intermediate area between the cortex and the medulla, is a transition area where the lymphocytes return to the lymphatic system from the blood (*Hall, 1992*).

Similar to other lymph nodes, cervical lymph nodes also have blood vessels. The main artery enters the lymph node at the hilum, where it branches into arterioles. In the medulla, some of the arterioles run along the trabeculae to the cortex, while some of them supply the capillary bed of the medulla. In the cortex, the arterioles further branch into capillaries to supply the lymphoid follicles. The venous system has a similar route to the hilum as the arterial system. In the cortex, the venules converge to form small veins, which further converge to form the main vein in the medulla. The main vein then leaves the lymph node at the hilum (Fig. 1) (*Papadimitriou and Kittas, 1993*).