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

Thesis
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SHERINE

LIST OF ABBREVIATIONS

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

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