Role of diffusion Weighted MRI in the Differentiation between Post treatment Changes and Residual/Recurrent Head and Neck carcinoma

Thesis

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✍ *Ibrahim Abd El-Rahim*

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Introduction

Squamous cell carcinoma are presents almost 90% of the Head and neck tumor and it shows different biological behaviors according to location ***(van Dijk et al., 2012)***.Imaging techniques are commonly required in order to define tumor's locoregional extension recurrences of the head and neck area. In Europe, "European Journal of Cancer 2015had mentioned that MRI is increasingly becoming the preferred examination method as it provides additional information on tumor extension, muscles and lymph nodes involvement, and skull base and intracranial invasion.

After surgery, normal anatomic structures can be extensively distorted. The use of radiation therapy renders physical examination, CT, and MR stander imaging unreliable because of the edema and fibrosis that are often present after treatment. Biopsy is often necessary, but the results of histopathological specimens can be inaccurate because of sampling errors ***(Hermans et al., 2000).*** In MRI the recurrent tumors were found to demonstrate higher signal intensity on T2-weighted images than fibrotic benign changes do. But further studies had shown that non neoplastic inflammation or edema may also be responsible for T2 hyper intensity so this finding is nonspecific ***(Semiz Oysu et al., 2005).*** The dynamic

contrast enhanced magnetic resonance imaging is a useful clinical tool in evaluation of soft tissue neoplasm and lymph nodes in head and neck. It is thought to be a useful predictor of response to radiotherapy for head and neck carcinoma and used to monitor the treatment and distinguish post-therapeutic changes from recurrent mass with greater confidence. It can be used to distinguish between normal and malignant tissue ***(King, 2007).*** The Diffusion weighted magnetic resonance imaging (DWI) is a noninvasive imaging technique that measures the differences in water mobility in different tissue microstructures ***(Vandecaveye et al., 2008).***

In summary: malignant tumors have significantly lower ADC values than benign lesions provided that necrotic areas are excluded from image analysis.

Aim of the Study

The aim of this study is to illustrate the value of diffusion weighted images with ADC measurement in the differentiation between post treatment changes and residual/recurrent carcinoma of the head & neck.

Head & Neck Anatomy

The Mouth

(Cavum Oris; Oral or Buccal Cavity)

The cavity of the mouth is placed at the commencement of the digestive tube figure); it is a nearly oval-shaped cavity which consists of two parts: an outer, smaller portion, the vestibule, and an inner, larger part, the mouth cavity proper ***(Brizel et al., 2004).***

The Mouth Cavity Proper (cavum oris proprium) is bounded laterally and in front by the alveolar arches with their contained teeth behind **(Fig 1)**, it communicates with the pharynx by a constricted aperture termed the isthmus faucium. It is roofed in by the hard and soft palates, while the greater part of the floor is formed by the tongue, the remainder by the reflection of the mucous membrane from the sides and under surface of the tongue to the gum lining the inner aspect of the mandible. It receives the secretion from the sub maxillary and sublingual salivary glands***(de Vries et al., 200).***

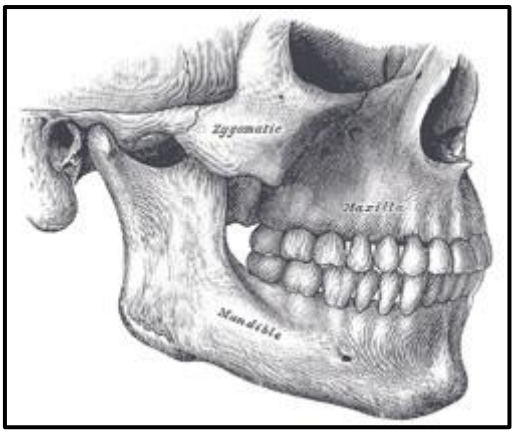

Figure (1): Side view of the teeth and jaws ***(Grey's, 2013).***

The Lips (labia oris), the two fleshy folds which surround the orifice of the mouth, are formed externally of integument and internally of mucous membrane, between which are found the Orbicularis oris muscle, the labial vessels, some nerves, areolar tissue, and fat, and numerous small labial glands. The inner surface of each lip is connected in the middle line to the corresponding gum by a fold of mucous membrane, the frenulum—the upper being the larger ***(Eastwood et al., 2003).***

The Gums (gingivœ) are composed of dense fibrous tissue, closely connected to the periosteum of the alveolar processes, and surrounding the necks of the teeth. They are covered by smooth and vascular mucous membrane, which is remarkable for its limited sensibility. Around the necks of the teeth this membrane presents numerous fine papillæ, and is reflected into the alveoli, where it is continuous with the periosteal membrane lining these cavities.

The Palate (palatum) forms the roof of the mouth; it consists of two portions, the hard palate in front, the soft palate behind. The Hard Palate (palatum durum) is bounded in front and at the sides by the alveolar arches and gums; behind, it is continuous with the soft palate. It is covered by a dense structure, formed by the periosteum and mucous membrane of the mouth, which are intimately adherent. Along the middle line is a linear raphæ, which ends anteriorly in a small papilla corresponding with the incisive canal. On either side and in front of the raphé the mucous membrane is thick, pale in color, and corrugated; behind, it is thin, smooth, and of a deeper color; it is covered with stratified squamous epithelium, and furnished with numerous palatal glands, which lie between the mucous membrane and the surface of the bone **Fig (2)** ***(Ferlito et al., 2009).***

The Soft Palate (palatum molle) is a movable fold, suspended from the posterior border of the hard palate, and forming an incomplete septum between the mouth and pharynx. It consists of a fold of mucous membrane enclosing muscular fibers, an aponeurosis, vessels, nerves, adenoid tissue, and mucous glands. When occupying its usual position, i. e., relaxed and pendent, its anterior surface is concave, continuous with the roof of the mouth, and marked by a median raphé. Its posterior surface is