INTRAORAL ULTRASOUND EXAMINATION OF ORAL SQUAMOUS CELL CARCINOMA

PROJECT BACKGROUND

Oral squamous cell carcinoma (OSCC) can present locoregional evolution: it tends to invade the surrounding tissue and metastasize to regional neck nodes while the haematogenous metastases are infrequent and late. For this reason, the surgical treatment of the primary tumor cannot be considered oncologically complete if the neck is not evaluated.

With reference to the TNM staging system, in T3 and T4 lesions or preoperative positive neck disease, a neck dissection is recommended. The management of patients with early stage, clinically node-negative OSCC is still controversial. If on the one hand, a "wait and see" approach has been shown to be accompanied by a high percentage of occult metastases that arose after the surgical treatment, on the other hand the neck dissection proved to be an overtreatment in 70% of patients without OSCC at the clinical and radiographical level.

The presence of occult metastasis to the cervical lymph nodes can lead to a reduction in the probability of disease control and shortens the survival of patients. Occult metastasis may occur in up to 40% of patients but the rate is found to be higher in tongue and floor of the mouth tumors.

Several studies show that tumor thickness and tumor depth can be considered the most important prognostic factors in predicting local recurrence and cervical lymph node metastasis. Specifically, depth of invasion and tumor thickness are not the same. Depth of invasion means the extent of cancer growth into the tissue beneath an epithelial surface while tumor thickness concerns the entire tumor mass.

The increasing depth of invasion and the microvascular proliferation caused by neoplastic growth might determine proximity to blood vessels and lymphatics, thus facilitating the tumor’s ability to metastasize. The exact depth cut off point in which it would be advisable to decide to treat the neck is still in doubt. In fact, Pentenero et al. in a review demonstrate that the depth cut-off varies from 2 mm to 8 mm; a precise and standardized depth cut-off value can help oral and maxillo-facial surgeons decide whether to treat the neck immediately or to wait and see. An accurate preoperative assessment of the tumor thickness and tumor depth would provide useful informations for targeting those patients who need elective treatment of the neck. To measure the thickness and the depth of the tumor, several techniques are available such as Magnetic Resonance Imaging (MRI), Computed Tomography (CT) and Ultrasonography (US). The limitation in the use of MRI and CT in the assessment of tumor thickness and depth is that in tumors with a thickness less than 5 mm, it could be difficult to differentiate the tumor from the surrounding tissues.
Recently, the development of US technology and the introduction of intraoral probes allow the direct evaluation of tumor. In addition, US has several advantages such as it is harmless, radiation free, widely available, easy-to-use, non-invasive, inexpensive, and unaffected by metal artefacts such as dental restorations.

FIRST YEAR PhD REPORT

➢ Literature review: including all English language articles published after 1990. The literature search was carried out using MEDLINE, Pubmed, Scopus, library catalogs and Cochrane Library.

➢ Definition of the study protocol:
  • Study type: prospective, interventional
  • Aim: is to determine the extent of the tumor thickness and the tumor depth by US as compared to histological sections, and is to assess the predictive capacity of tumor thickness by ultrasound in detecting lymph node metastasis in order to insert US in the diagnostic flow-chart of the OSCC.
  • Location: Department of Oral and Maxillofacial Sciences (Operative Unit of Pediatric Dentistry and Odontostomathology and Operative Unit of Oncological and Reconstructive Maxillo-Facial Surgery) and Unit of Head and Neck Radiology and at Simple Unit of Diagnostic and Ultrasonography Innovations (Policlinic Umberto I of Sapienza University of Rome
  • Inclusion criteria:
    - patients affected by OSCC (tongue, cheek and mouth floor)
    - age > 18 years and < 85 years;
    - no history of a prior malignancy in the head and neck region;
    - patient will be reliable for follow-up;
    - understands the protocol and can give informed consent.
  • Exclusion criteria:
    - non-cooperative patients;
    - inoperable patients;
    - non OSCC.
  • Estimated Enrollment: 30 patients
  • Materials and methods: This study will be performed on patients with histological diagnosis of OSCC evaluated with incisional scalpel biopsy enrolled at the Department of Oral and Maxillofacial Sciences. US will be performed at the Simple Unit of Diagnostic and Ultrasonography Innovations using an E-CUBE 15 EX scanner (Alpinion, Seoul, Korea) with a 3-12 MHz intraoral transducer. This probe is characterized by its small and thin dimensions, like a toothbrush, that help directly reach the oral lesions. Oral lesions will be classified according to their localization, morphological and structural characteristics and their relationships with the surrounding tissues (bones, vases, nervous). Furthermore, the presence of lymphadenopathies will be evaluated with transcutaneous high frequency probe in the submental, submandibular and lateral cervical regions. Each patient will be subjected to intra-operative histological examination at the time of the primary surgery in order to establish precise tumor depth. This data will be compared with the US value in order to determine sensitivity and specificity of US.

SECOND YEAR PhD REPORT
➢ **Research progress:** 15 patients affected by OSSC are enrolled in this study until now. Data are included in an Excel database and undergoing to statistical analysis with STATA 15.1 software.

➢ **Preliminary results:** By considering the level of tumor infiltration, 93.3% sensitivity and 50% specificity was found for intraoral ultrasound. In fact, 13 true-positive results, 1 false-negative result and 1 false-positive results occurred in our patients in determining the lamina propria infiltration by intraoral ultrasound. Using the Fisher Test to compare the ultrasound tumor depth with the histological depth, it was found that there is not a statistically significant difference between the 2 groups (chi-square=0.077; p= 0.933).

➢ **Future perspective:** These preliminary results show that Ultrasound is accurate for demonstrating the level of tumor infiltration. It’s necessary to increase the number of patients in the study in order to evaluate the diagnostic capacity of Ultrasound.

**PROCEEDINGS:**


*Oral vascular malformations: laser treatment and management.* U. Romeo; F. Rocchetti; G. Gaimari; G. Tenore; G. Palaia; G. Lo Giudice; Proc. SPIE. 9670, Sixth International Conference on Lasers in Medicine, 967003. (March 22, 2016) DOI: 10.1117/12.2191879

*The use of laser CO2 in salivary gland disease.* C. Ciolfi; F. Rocchetti; M. Fioravanti; G. Tenore; G. Palaia; U. Romeo; Proc. SPIE. 9670, Sixth International Conference on Lasers in Medicine, 96700F. (March 22, 2016) DOI: 10.1117/12.2191499


Local anesthetics efficacy on patients affected by Ehlers-Danlos syndrome. Montori A, Nuvoli A, Rocchetti F, Palaia G, Del Vecchio A. Minerva Stomatologica 2018 April; Vol. 67 - Suppl. 1 to No. 2. 25th National Congress of the Collegio dei Docenti Universitari delle Discipline Odontostomatologiche; Roma, 12-14 April 2018.


PUBLICATIONS:


CONGRESS PARTICIPATION:


Oral presentation “Eating Disorders: sinergy of the multidisciplinary team”. SpringMeeting AIDI, 6 May 2017, Roma.

BOOKS CHAPTERS:
