UNIVERSITY OF BRESCIA

PhD Program
in
TECHNOLOGY FOR HEALTH

Translational use of technologies to improve margin control in head and neck cancer

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Background

Involvement of margins of resection represents one of the main negative prognosticators in most head and neck cancers and is observed in almost 20% of patients undergoing surgery for a malignancy of the upper aerodigestive tract. Presence of tumor cells at the margins of the excised tissues significantly increases the probability of loco-regional recurrence and decreased survival. This fact reflects two major unmet needs of head and neck surgeons; first, the possibility to intraoperatively rely on technologies that augment the ability to see the tumor within the complexity of surrounding tissues and structures; second, the ability to detect residual tumor in the surgical bed following ablation.

Objectives

The present research proposal is primarily aimed at transferring surgical navigation-guided ablations and intraoperative optical margin assessment technologies into the operating theater while measuring the feasibility of the implementation and benefits in terms of margin status and oncologic outcomes.

Methodologies

SURGICAL NAVIGATION. Following the same principle of the preclinical study that we performed at the University of Toronto (Figure 1), we plan to apply both commercially available (i.e. Fiagon®, Medtronic®) and in-house (GTxEyes, University of Toronto) surgical navigation system 1) to aid the ablative phase of oncologic procedures in the head and neck and 2) to guide frozen-section sampling in the surgical bed.

OPTICAL IMAGING. With a hyperspectral camera (available at the University of Brescia – Prof. Signoroni) the margin status will be intraoperatively assessed following the ablation phase. Additional optical imaging technologies might be used if available (i.e. Infrared and Blue Light imaging mode of Orbeye®, Olympus®).

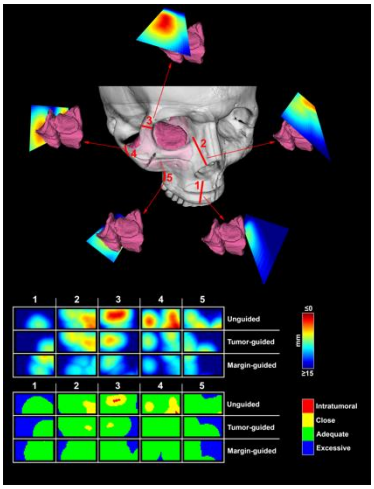

FIGURE 1. PRECLINICAL DEMONSTRATION OF THE ADVANTAGE IN TERMS OF MARGIN DELINEATION PROVIDED BY SURGICAL NAVIGATION (*FERRARI ET AL., ORAL ONCOL 2019*)

Expected Results and Impact

Surgical navigation and intraoperative margin evaluation with optical imaging are expected to provide an improvement of margin delineation and definitive status, thus theoretically increasing the chances of obtaining a favorable oncologic outcome.