UNIVERSITY OF BRESCIA

PhD Program

in

TECHNOLOGY FOR HEALTH

Intraoperative surgical navigation to improve oncological and functional outcomes in patients affected by head and neck cancers

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Background

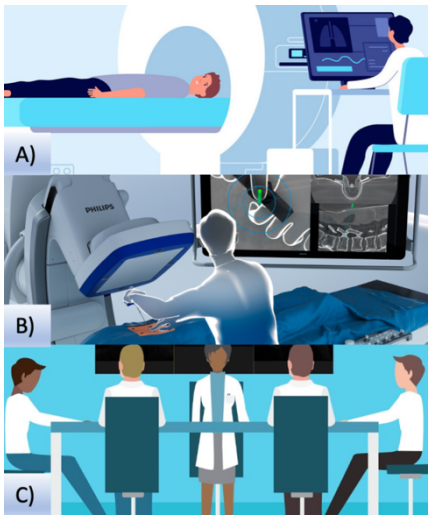
The management of head and neck cancers (HNCs) poses specific challenges to the surgeon as the adequacy of tumor resection must be balanced with functional results. Presence of tumor cells at the margins of the excised tissues significantly increases the probability of loco-regional recurrence and decreases the overall survival. Surgical navigation (SN) has been hypothesized to provide therapeutic advantages by enhancing the precision of oncologic treatment improving surgical margin control. Another challenge is the post-operative multidisciplinary interaction when establishing the status of tumor resection margins. This process is remarkably difficult due to the complex anatomy of the district. SN could enhance the anatomical orientation and the interpretation of surgical margins, by marking intra-operatively the topographic coordinates of each sampling of the specimen itself.

Objectives

The present research proposal is primarily aimed at translating surgical navigation guided ablations into the operating rooms to improve outcomes (margin status, locoregional control, overall survival, recurrence-free survival, disease-specific survival, intraoperative complications, postoperative morbidity, postoperative QoL) of patients affected by advanced HNCs. Another goal is to facilitate the dialogue between surgeons, pathologists, oncologists, and radiotherapists giving specific 3D-coordinates to the resection margins.

Methodologies

A) Patients will be preoperatively assessed with a high-resolution CT scan and an MRI of the head and neck. The DICOM data images will be imported into the software of the navigation system and the resection will be simulated by delineating tumor and resection margins. B) SN will be used to guide tumor resection in complex head and neck cases. During surgery, the margin tissues will be sent for frozen-section analysis, after their position will be marked by the probe on the navigation system. C) A randomized trial will be designed to compare the group of patients treated with SN guidance versus a randomly selected group of controls treated with the current standard of practice approach.



Expected Results and Impact

The application of the SN in the clinical practice is still very limited and this project will provide data on the benefits that such technologies can bring to patients affected by advanced HNCs. Moreover, a 3D mapping of critical tumor extensions and involved margins, will probably simplify and optimize the postoperative course of care.