

Radiofrequency Surgery of an Oral Squamous Cell Carcinoma followed by Reconstruction with a Radial Forearm Flap

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Radiofrequency (RF) surgery enables precise soft tissue resection while causing limited thermal damage. In this study, an advanced stage tongue tumor was successfully resected with RF surgery followed by reconstruction with a radial forearm flap.

Introduction: Surgery is the preferred treatment option for early stage and resectable advanced Oral Squamous Cell Carcinoma (OSCC) [1]. Particularly for tongue tumors, precise resection is crucial to ensure tumor-free surgical margins while preserving as much healthy tongue tissue as possible to retain functionality. Over the past years, transoral laser microsurgery has been established as a viable organ-preserving approach [2]; however, while facilitating precise resection, thermal tissue damage is a key limiting factor. Both the evaluation of surgical margins, as well as the integration of reconstructive flaps may be compromised [3]. By comparison, RF surgery induces lower temperatures, thereby causing less damage to surrounding tissues. While RF surgery has become increasingly popular for inferior turbinate, soft palate and base of tongue procedures ensuring precise local resection with low complication rates [4-6], its application for tumor resection has yet to be evaluated.

Materials and Methods: In this proof of concept study, we performed primary tumor resection of a T3 squamous cell carcinoma of the tongue (Fig. 1) with RF surgery with intraoperative frozen section evaluation.



Fig. 1: Preoperative image of the large tongue tumor

Bilateral neck dissection was performed prior to tumor resection. We used the RF generator BM-780 II with a straight ARROWtip™ electrode (long shaft, electrode diameter 0.3 mm) in the monopolar cutting mode (Sutter Medizintechnik, Freiburg/Germany). Pre-operative MRI showed a tumor extension of 41 x 16 mm. The large tumor could be precisely resected in one piece with the RF electrode, causing minimal bleeding and no visible thermal damage



Fig. 2: Precise tumor resection with the monopolar RF electrode showing minimal visible thermal damage to surrounding tissues.

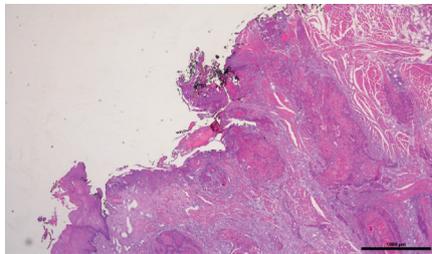


Fig. 3: Infiltrating tumor cells at the resection border are clearly visible, due to minimal thermal damage caused by RF.

to the surrounding tissue (Fig. 2). After initial removal of the tumor, tissue samples were obtained from all resection borders. Intraoperative frozen section analysis showed tumor cells infiltrating margins (Fig 3), warranting further resection. Hereby, tumor-free surgical margins were achieved, allowing for ensuing tongue reconstruction with a radial forearm flap (Fig. 4).

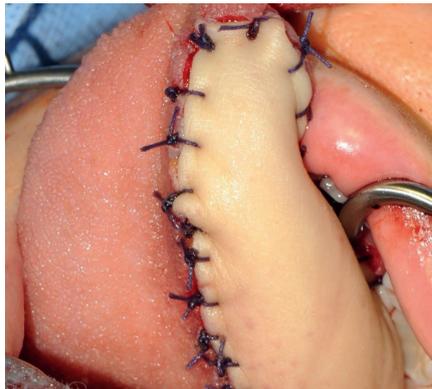


Fig 4: Tongue reconstruction with a radial forearm flap after tumor excision.

Results and Conclusions: In this single case study, RF surgery enabled accurate resection of an advanced tongue tumor. Importantly, limited thermal damage at the resection borders allowed for uncompromised intraoperative frozen section analysis revealing localized tumor remnants, ultimately leading to tumor-free (R0) resection

status after further selective resection. The RF device was easy to handle requiring no additional safety measures for study personnel. Notably, surgical precision was not compromised by intraoperative tongue movement. Intraoperative lingual muscle stimulation frequently occurs during conventional high-frequency surgery and is reduced with RF, as long as direct stimulation of the hypoglossal nerve can be avoided. Despite the large size of the tumor which required substantial resection, post-operative analysis showed limited tongue swelling and excellent local adaptation of the free flap.

In conclusion, our single case experience suggests that RF surgery is a promising technology for the resection of oral squamous cell carcinomas, particularly where maximum preservation of surrounding tissue is required.



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