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**Differential functional outcomes following transoral surgery for oropharyngeal carcinoma - laser versus robot**

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**Topic**

HPV or EBV related cancers

**Keywords**

robot, laser, HPV

**Purpose/Objective**

Transoral robotic surgery (TORS) has become a more popular technique than transoral laser microsurgery (TLM) for the treatment of oropharyngeal carcinoma (OPC), in particular for human papilloma virus (HPV) related OPC. The two techniques differ in terms of the energy source used and the resection philosophy. TLM commonly employs transtumoural cuts to assess the depth of a tumour, whereas TORS usually performs an en bloc resection, avoiding breaching the tumour. This could result in differences in post-operative healing and quality of life (QoL). The ongoing PATHOS trial is recruiting participants undergoing transoral surgery (technique is centre choice) for HPV-related OPC with the aim to analyse the oncological effectiveness of de-intensified adjuvant therapies. The trials' QoL and functional data pre- and post-surgery present a unique opportunity to conduct this pre-planned sub-study comparing early post-operative functional and QoL outcomes following TLM and TORS.

**Material/Methods**

PATHOS trial participants who underwent TLM or TORS without re-resection or later, staged neck dissection, and who had 4 weeks post-surgery data available were included. The MD Anderson Dysphagia Inventory (MDADI), EORTC QLQC30 and H&N35, and 100mls Water Swallow Test (volume, capacity, speed) were administered pre-surgery and 4 weeks post-surgery. Data on length of in-hospital stay is collected post-surgery and nasogastric tube (NGT) use is collected at 12 months post-surgery.

Data were analysed according to a pre-specified plan using mixed effects cox, linear and logistic regression models that included surgery type, age, anatomical site (lateral vs non-lateral), pathological T-stage, gender, smoking status, pre-surgery scores (for QoL/functional outcomes) and centre as a random effect. For the NGT analysis, only NGTs inserted within 4 weeks of surgery were considered as events and patients who had an NGT inserted pre-surgery were excluded.

## Results

Between November 2015 and July 2023, 508 eligible patients were recruited from 40 centres in UK, Germany, France, USA, Australia. 313 (62%) underwent TORS, and 195 (38%) underwent TLM. There was no significant difference in length of hospital stay after surgery between patients undergoing TORS and TLM, when centre was taken in consideration (HR=0.89, 95%CI 0.69-1.16, p=0.401). NGT insertion rates were significantly higher after TORS than TLM (85/189 – 45.0% vs 10/126 - 7.9%, respectively, OR=4.41, 95%CI=1.01-19.3, p=0.049) but there was no difference in duration (median 5 (95% CI=0.5-12) days TLM, 6 (95% CI=4-6) days TORS; HR=1.05, 95%CI=0.52-2.12, p=0.897). Mean scores significantly favoured TLM (relative to TORS) in all MDADI domains and the H&N35 swallowing item at 4 weeks post-surgery (see table 1); between group difference (95% CI): MDADI composite -4.89 (8.27,-1.50), p=0.005; MDADI physical -6.37 (-10.15, -2.59), p=0.001; MDADI global -10.02 (-16.50, -3.54), p=0.002; H&N35 swallowing 7.24 (2.17, 12.30), p=0.005. There was a trend (p<0.1) for difference in EORTC H&N 35 pain score (4.58, 95%CI(-0.90, 9.96), p=0.095) and water swallow capacity (mL/second) (-1.51, 95%CI(-3.11, 0.10), p=0.067) favouring TLM. There was no significant difference between the following scores: EORTC C30 global, constipation, and summary; H&N35 opening mouth, pain killers, and weight loss.

## Conclusion

PATHOS presents a unique opportunity to compare two different transoral surgical techniques. In this study population, TORS was associated with significantly higher rates of NGT use, worse H&N35 swallowing scores, and worse MDADI scores at 4 weeks post-surgery compared to TLM. There was also a trend (p<0.1) favouring TLM in H&N35 pain score and water swallow capacity. This is the largest comparative study of functional outcomes following TORS vs TLM. The recruiting institutions' practices are likely to impact on length of stay and NGT use and has been accounted for in the analysis. This represents a non-randomised, unpowered sub-study for multiple secondary endpoints across which multiplicity was unadjusted. As such the results should be seen as hypothesis generating rather than confirmatory. Furthermore, the study has focused solely on the post-operative recovery period following surgery. It cannot comment on the impact of surgical philosophy (TORS vs TLM) on margins and how this may relate to the PATHOS randomised groups.

Head and neck surgical oncologists may wish to reconsider the role that laser surgery, both as an energy source and a philosophy, has in the emerging field of robotic surgery.

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## Objective evaluation of plan quality in the PATHOS clinical trial using automated treatment planning

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