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Background

Chemoradiation has gained favor over the past two decades as a primary treatment of selected head and neck malignancies. Conventional external beam radiation is associated with post-treatment complications, including dysphagia and aspiration due to collateral damage to surrounding structures required for normal deglutition. Intensity Modulated Radiation Therapy (IMRT) has recently become used more frequently as a definitive treatment of these lesions because of its potential to deliver highly conformational radiation doses to malignant tissue with relative sparing of contiguous structures.

Objectives

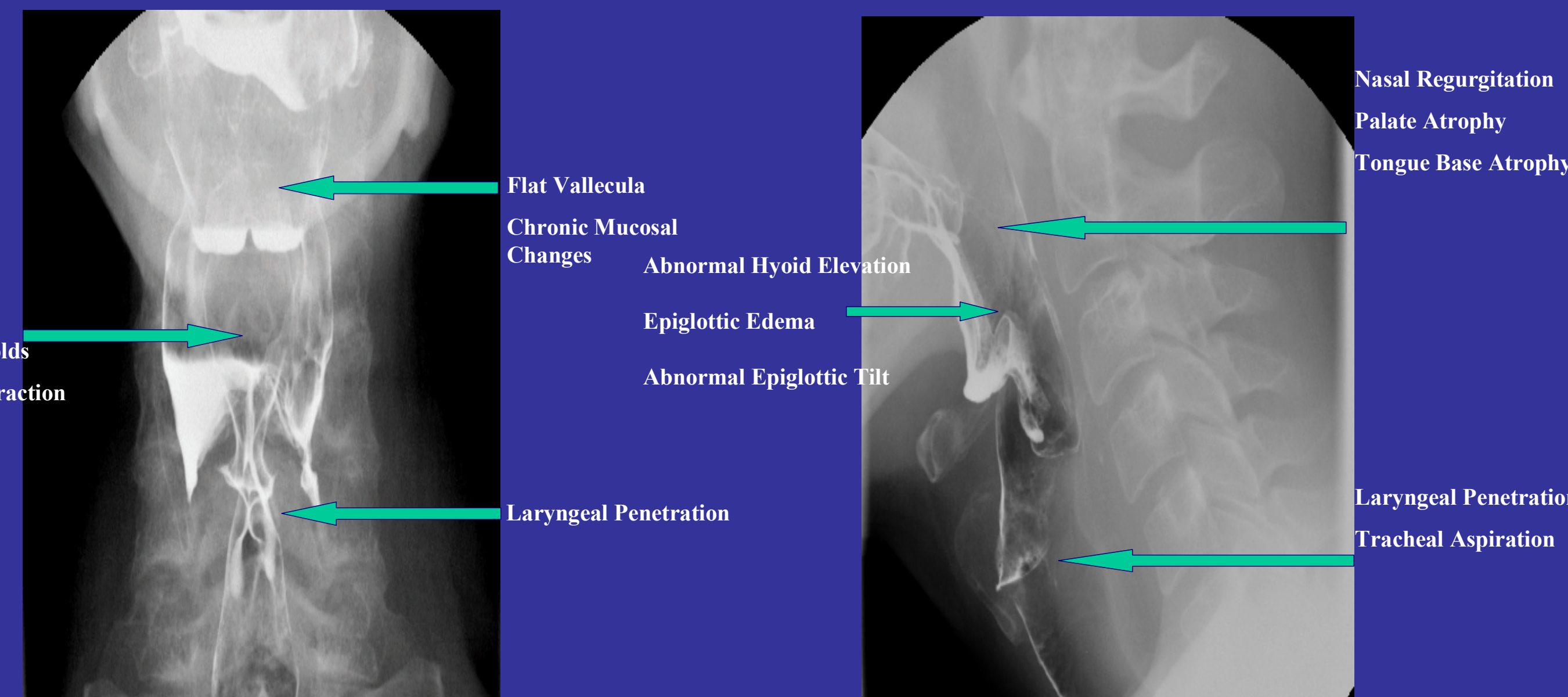
We sought to characterize the modified barium swallow (MBS) findings of patients who underwent conventional radiotherapy and IMRT as definitive treatment modalities. We compared these findings to assess whether the IMRT allows for relative sparing of the areas surrounding the primary lesion.

Materials and Methods

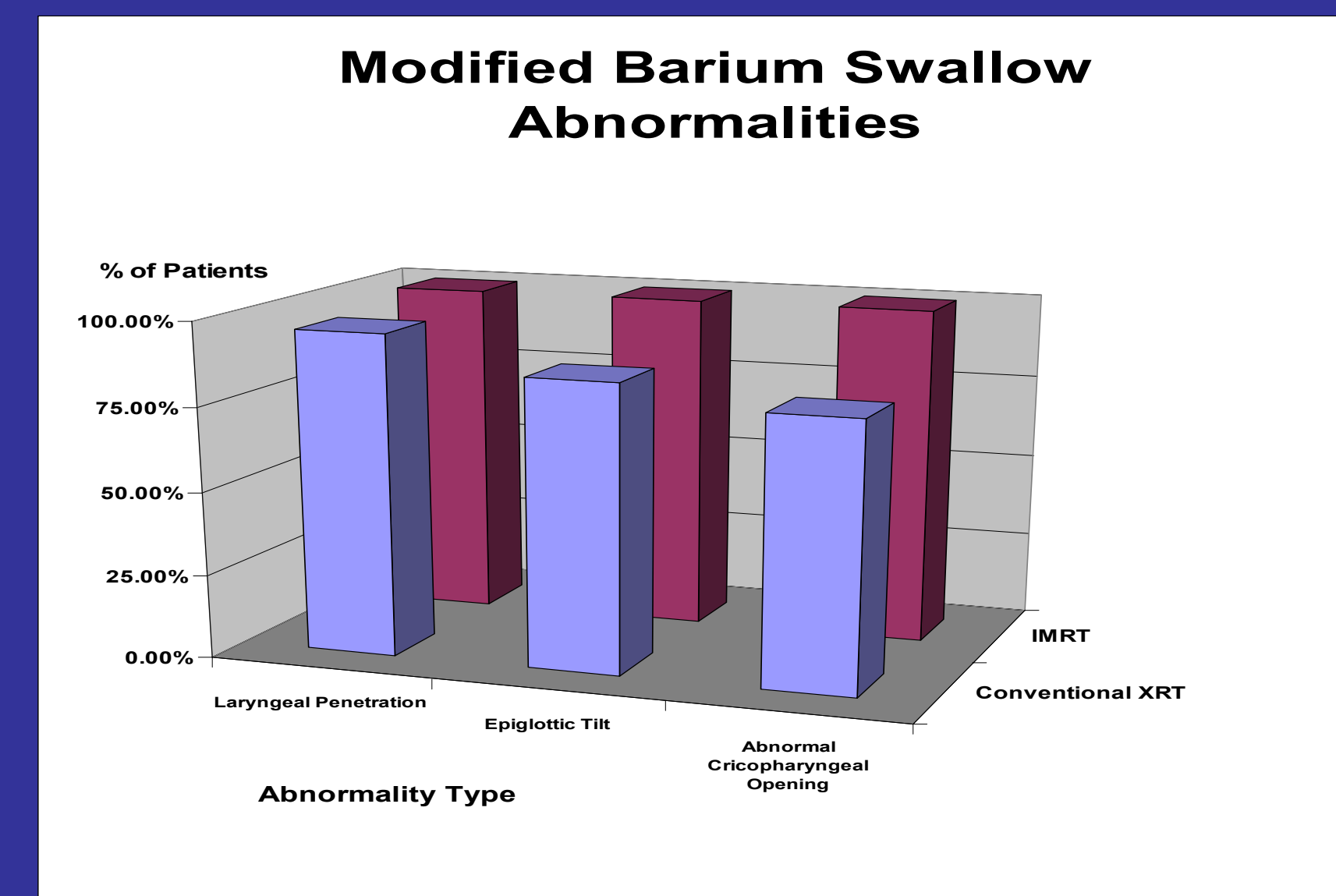
Our retrospective study included 10 patients with dysphagia who presented at a tertiary care hospital from 2003-2006, following definitive IMRT for head and neck squamous cell carcinoma (HNSCC) of the aerodigestive tract. All patients underwent an MBS which was analyzed for 19 separate criteria. MBS data was collected and compared to a matched group of 45 HNSCC patients who previously underwent conventional XRT between 1996 and 2005.

Results

The majority of the patients had lesions localized to the oropharynx (80.0%, n=8). All 10 patients in the IMRT group were free of recurrence at the time of evaluation. The most common MBS abnormalities in the IMRT group were laryngeal penetration, poor epiglottic tilt and abnormal cricopharyngeal opening (100% each). This corresponded to the same abnormalities that were most common among the conventional radiotherapy population (95.9%, 85.7%, and 79.6%, respectively), demonstrating no significant difference in the impact of radiation type on the locus of post-treatment dysphagia.



Examples of individual modified barium swallow abnormalities



Most common MBS abnormalities by mode of radiotherapy

Conclusion

Persistent dysphagia is a debilitating and life-threatening sequela of radiation therapy for HNSCC. IMRT offers the potential to spare uninvolved regions of the oropharynx while delivering high levels of radiation to the tumor site. However, this study demonstrates that swallow abnormalities in patients following IMRT are similar to those undergoing conventional radiotherapy. Further studies with larger populations are required to fully elucidate these findings.

Discussion

In 1991 following the publication of the Veterans Affairs Laryngeal Cancer Study Group, radiotherapy began to gain broad acceptance as primary treatment for select head and neck malignancies. Conventional radiotherapy has been associated with several post-treatment complications including aspiration, dysphagia, and prolonged gastrostomy tube dependence.

Acute chemoradiation related toxicity can lead to several complications including severe mucositis. Later complications include both functional and morphological changes in the upper aerodigestive tract due to fibrosis of the associated soft tissue structures. Over time, these lesions may progress and manifest clinically as dysphagia. Intensity-modulated radiation therapy has been recently added to the therapeutic armamentarium and carries the unique ability to create conformal isodose distributions of different levels. This has allowed for the creation of newer fractionation strategies that provide high doses of radiation to the primary lesion and associated lymphatic basins while minimizing exposure of surrounding healthy structures of deglutition.

Despite the promise of these new treatment algorithms, our study found that modified barium swallow abnormalities in patients undergoing IMRT were similar to those receiving conventional radiotherapy. Given that 80.0% of IMRT group had oropharyngeal lesions and the most common swallow abnormalities were all localized to the areas adjacent to the oropharynx it is possible that these findings are all referable to dosing of the primary lesion. Alternatively, given the fine sensory and motor control required for normal swallow function, even the reduced radiation exposure of normal tissue following IMRT may be sufficient to result in clinically significant post-treatment dysphagia.

References

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