



SSA19-03

Exploratory Study for Identifying Predictors for Persistent Disease and Tumor Reoccurrence After Treatment of Head and Neck Cancers

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Participants

Sean A. Woolen, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose
Lubomir M. Hadjiiski, PhD, Ann Arbor, MI (*Abstract Co-Author*) Nothing to Disclose
Apurva Virkud, Ann Arbor, MI (*Abstract Co-Author*) Nothing to Disclose
Heang-Ping Chan, PhD, Ann Arbor, MI (*Abstract Co-Author*) Research collaboration, General Electric Company; Institutional Grant, General Electric Company ;
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Paul Swiecicki, Ann Arbor, MI (*Abstract Co-Author*) Nothing to Disclose
Ashok Srinivasan, MD, Ann Arbor, MI (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Laryngeal cancer is treated with organ preservation therapy or total laryngectomy. However, little is known about which tumors will persist or reoccur after definitive therapy. The objective of our study is to investigate the feasibility of using radiomic and perfusion features as predictors to determine tumors that will persistent or recur at 1 year after treatment.

METHOD AND MATERIALS

Retrospective analysis of pre and post therapy CT neck scans was performed in 36 patients diagnosed with laryngeal cancer in this IRB approved study. Contouring of the tumors was performed by the computer and tumor features were generated on an internally developed/validated computer-aided detection (CAD) system. Twenty-six radiomic features including morphological and gray-level features were extracted from the computer. Five perfusion features including permeability surface area product (PS), blood flow (flow), blood volume (BV), mean transit time (MTT), and time-to-maximum (Tmax) were extracted from the computer. One year persistent/recurrent disease data were obtained from the time starting after the last treatment of definitive chemoradiation or after total laryngectomy surgery. We performed a two-loop leave one out feature selection using linear discriminant analysis classifier for radiomic and perfusion features. Receiver operator curves and standard deviation were generated.

RESULTS

All 36 lesions examined were primary laryngeal cancers. Out of the 36 patients, there were 10 patients (28%) that had reoccurrence/persistent disease at 1 year. Percent change in volume was the best predictive feature with an area under the curve (AUC) of 0.63 +/- 0.09. Selecting two features had a testing area under the curve (AUC) of 0.69 +/- 0.09. The best features selected were a combination of radiomic and perfusion features including percent change in volume and percent change in blood perfusion.

CONCLUSION

Our pilot study indicates that a combination of radiomic and perfusion features are good predictors of tumor reoccurrence/persistent disease after treatment with definitive radiation or total laryngectomy. Our next step is to expand our data set with additional patients.

CLINICAL RELEVANCE/APPLICATION

Predicting tumors that will reoccur or persist after traditional treatments is an important tool for head and neck cancer management. Good predictors can help providers determine prognosis and patients decide between therapeutic options.