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# Research of Preoperative Lateral Cervical Lymph Node Metastasis Prediction Models Based on Cervical Contrast Enhanced CT Radiomics

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## Introduction
- Papillary thyroid carcinoma (PTC) accounts for the largest proportion of thyroid cancers and is prone to early lymph node metastasis.
- Radiomics technology is widely used in medical image recognition, which greatly improves the detection rate of malignant tumors.
- The aim of this study was to establish a radiomics model to evaluate lymph node status in patients with PTC before surgery.
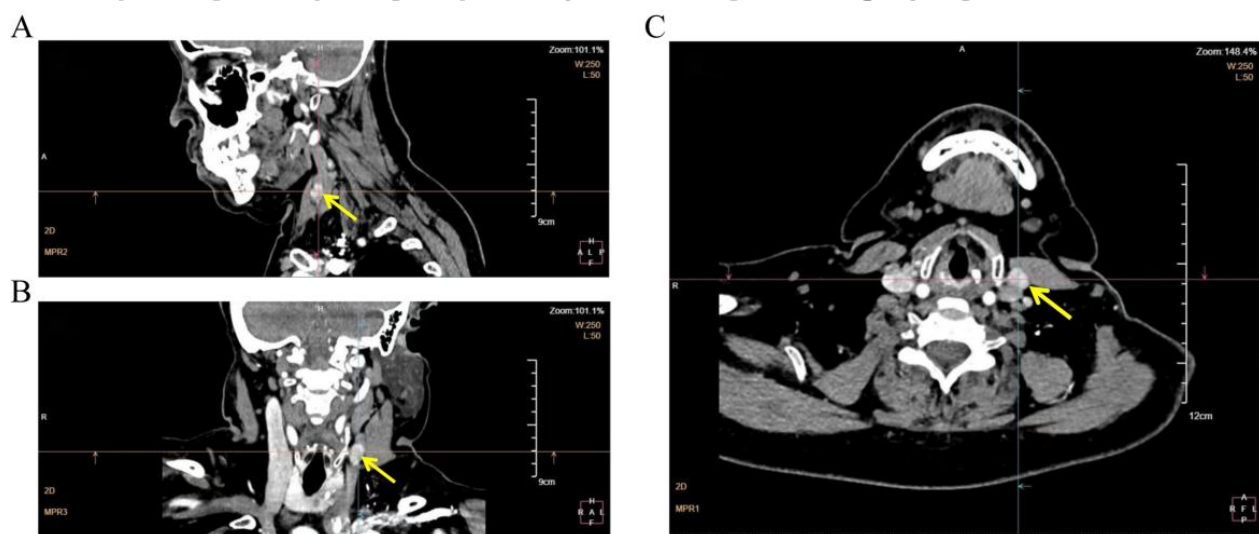
## Materials and methods



Figure1. Preoperative CT 3D location of target lymph node (arrow indicates target lymph node CT image). A: Sagittal bitmap. B: Coronal bitmap. C: Axial bitmap.
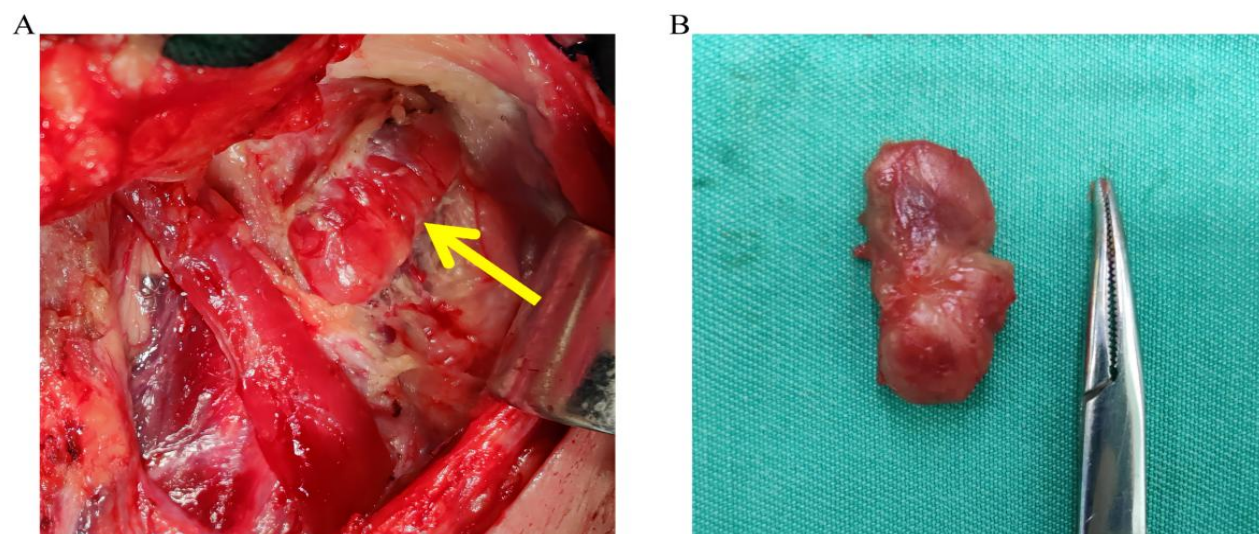


Figure2. Precise intraoperative sampling of target lymph nodes (arrow indicates gross anatomical location of target lymph nodes). A: Local neck field images. B: Skeletal separation of target lymph nodes.
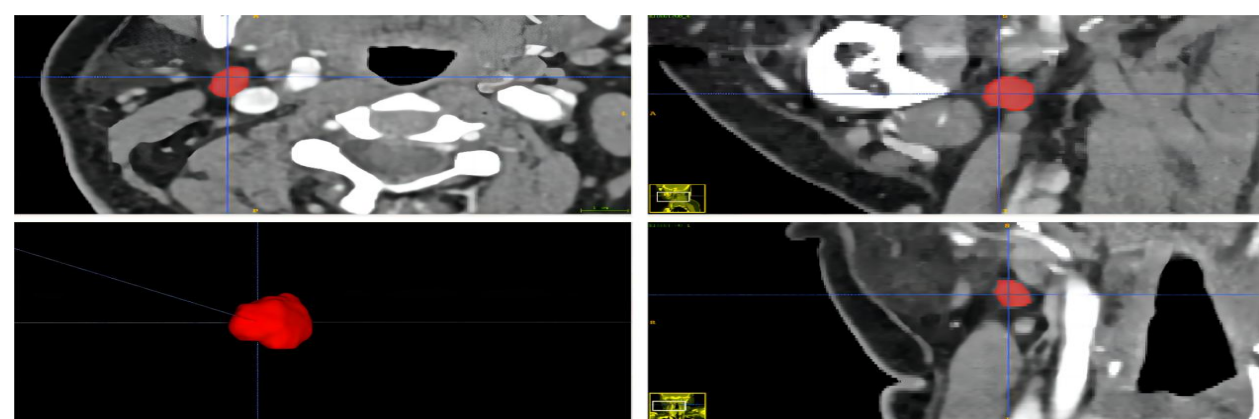
Figure3. Segmentation diagram of target lymph node VOI using ITK-SNAP (Version 3.8, www.itksnap.org) software.

## Results:

- 14 RFs most associated with LCLNM were retained to construct the radiomics prediction model. The AUC of the train set was 0.958. The AUC of the test set = 0.905.
- After statistical analysis of clinical data, one clinical feature related to LCLNM was obtained, that is, gender. It was fused with 14 RFs to construct the clinical fusion model together. In the clinical fusion model, the AUC of the train set and the test set were 0.969 and 0.914, respectively.
- Finally, DCA was carried out on the 2 prediction models respectively, and the results showed that both models had good clinical practicability.
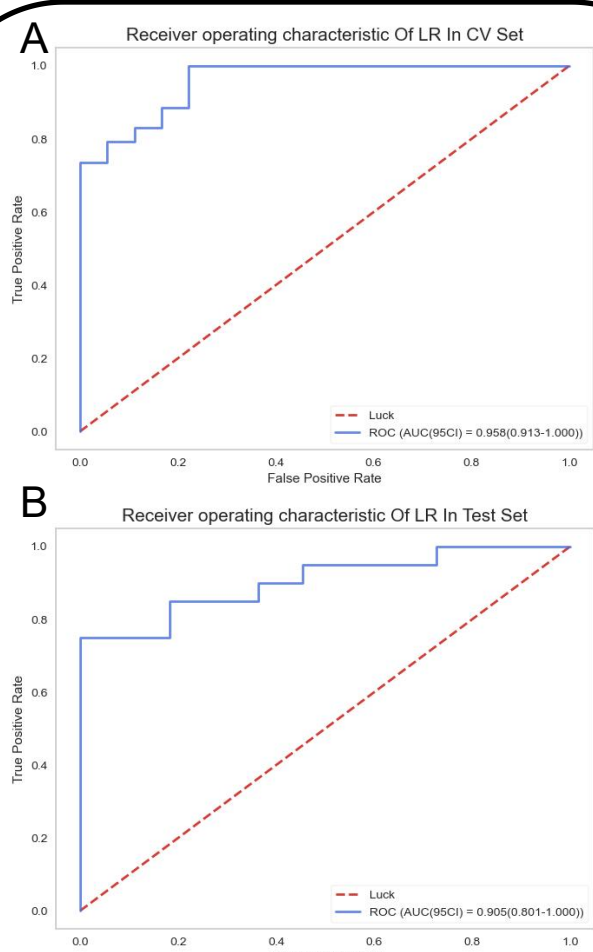


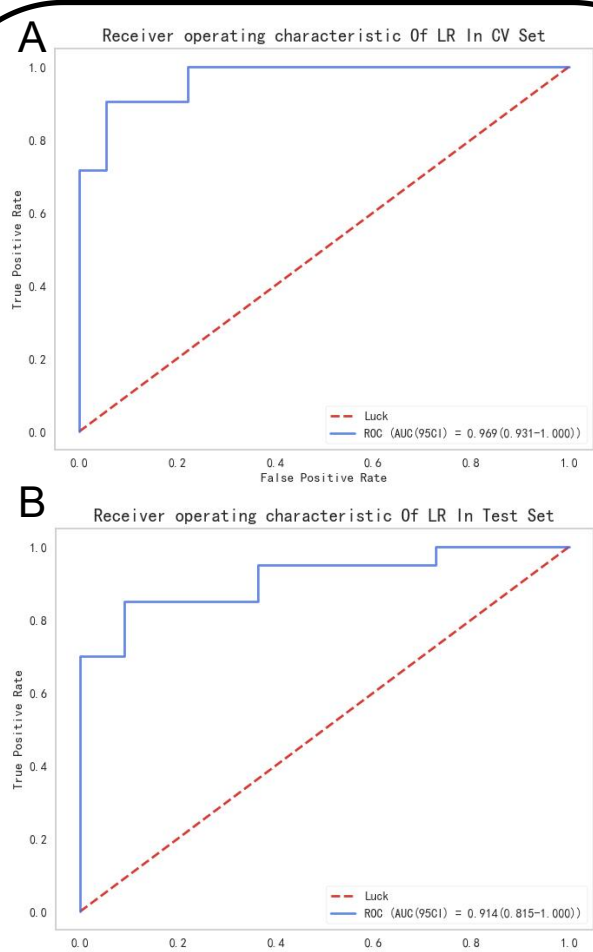Figure4. The AUC of radiomics prediction model. A: the train set. B: the test set.

Figure5. The AUC of clinical fusion model. A: the train set. B: the test set.
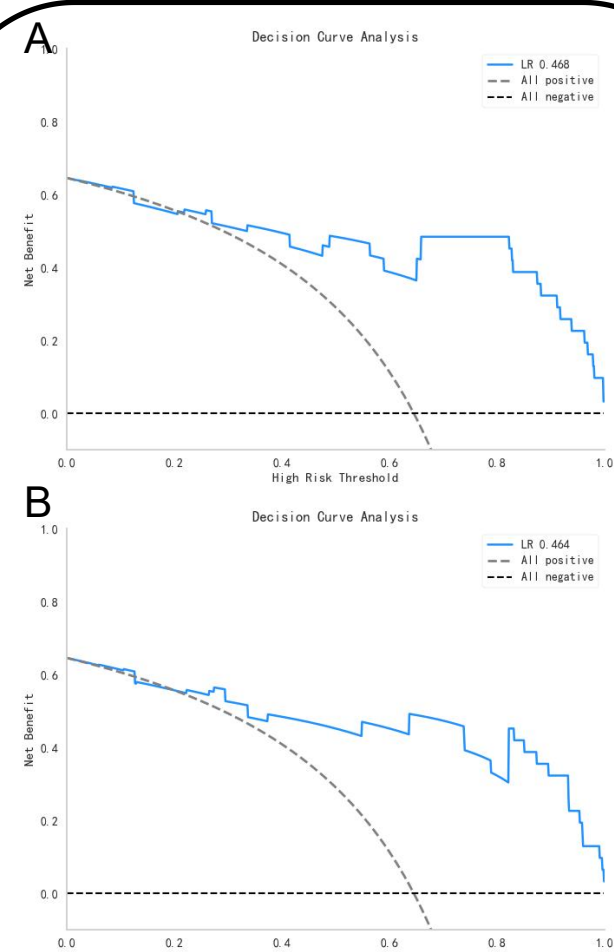
Figure6. DCA curves. A: Radiomics prediction model. B: Clinical fusion model.

## Conclusions:
The radiomics model and clinical fusion model developed in this study based on neck contrast enhanced CT can predict the situation and improve non-invasive prediction and risk assessment of LCLN in patients with PTC.