

Patterns of regional nodal relapse after D2 lymphadenectomy in gastric cancer: rethinking the target volume



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Introduction and objectives

A detailed guideline for regional lymph node delineation in patients after D2 lymphadenectomy is still lacking. Therefore, the goal of this study was to map the locations of regional nodal recurrence in patients with gastric cancer who underwent radical gastrectomy and D2 dissection to determine whether we need to redefine the clinical target volume (CTV) in adjuvant radiotherapy.

Methods

Between January 2004 and October 2015, 129 patients with gastric cancer following D2 resection who experienced regional recurrence were retrospectively examined according to criteria of the Japanese Classification of Gastric Carcinoma (JCGC). All diagnostic images including CT, MRI or PET-CT were re-evaluated by two experienced radiation oncologists with gastrointestinal specialties. The lymph nodes were hand-drawn proportionally on the template CT images of a standard patient by referencing surrounding anatomic landmarks to give a visual impression. The association between clinicopathologic factors and LNs at high risk was further investigated.

Results

Based on the contour of recurrent lymph nodes, the author observed high-risk regions for relapse and drew a density distribution map of 16 LN stations on CT images. The most commonly involved recurrent LNs were No.16b (para-aortic LNs between the lower border of the left renal vein and the aortic bifurcation, 51.2%) and No.16a (para-aortic LNs between the diaphragmatic aortic hiatus and the lower border of the left renal vein, 39.5%), followed by station 13 (LNs on the posterior surface of the pancreatic head cranial to the duodenal papilla, 36.4%), station 12 (hepatoduodenal ligament LNs, 33.3%), station 9 (celiac artery LNs, 28.7%) and station 14 (LNs along the superior mesenteric artery or vein, 27.9%). Meanwhile, it is noteworthy that 72% (83/116) of recurrent No.16b LNs were located in the upper half of 16b1. In contrast, only 5 of 129 patients (3.9%) experienced regional relapse limited to the perigastric LNs (No.1-6), and recurrence of LNs located in stations 8 (LNs along the common hepatic artery, 5.4%), 11 (splenic artery LNs, 5%), 10 (splenic hilar LNs, 0.8%), 7 (LNs along the trunk of left gastric artery, 0%) and 15 (LNs along the middle colic vessels, 0%) was also quite rare. An analysis within subgroups showed that pathologic N stage was the only independent risk factor for the failure of station 16b1 based on univariate and multivariate analyses.

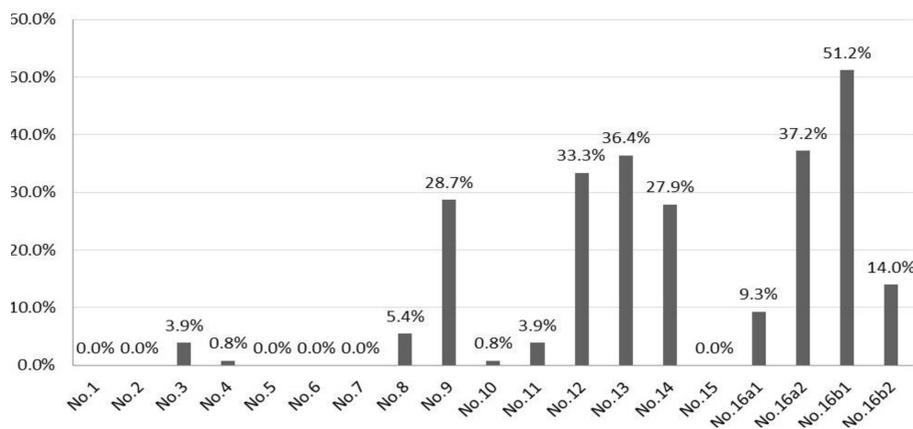


Figure 1. Distribution of recurrent lymph nodes in 129 patients.

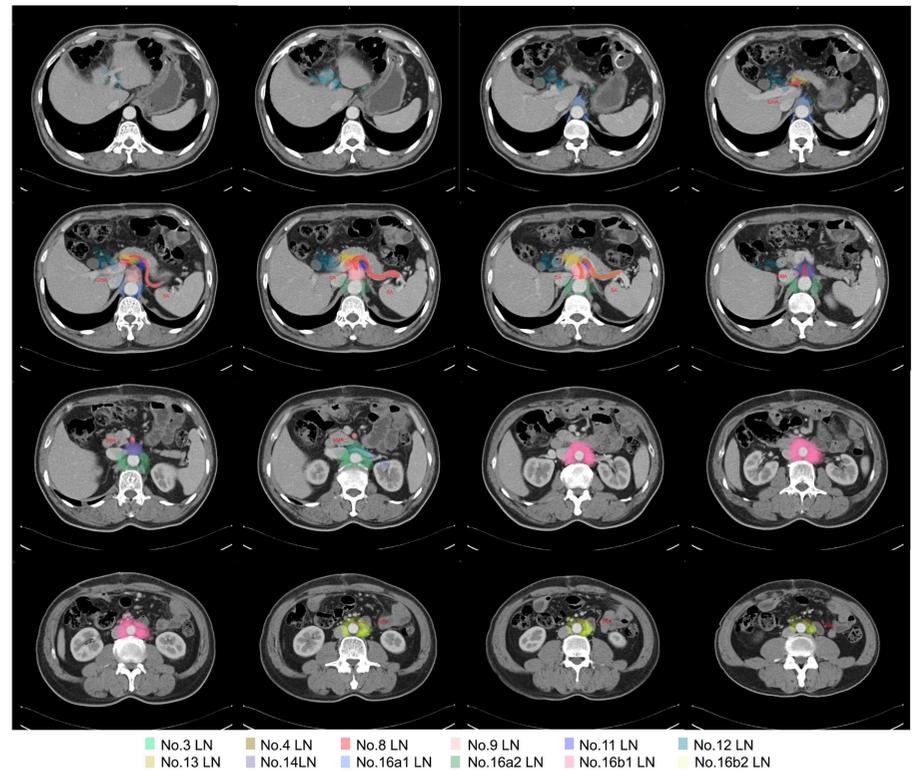


Figure 2. Mapping of 16 lymph node stations.

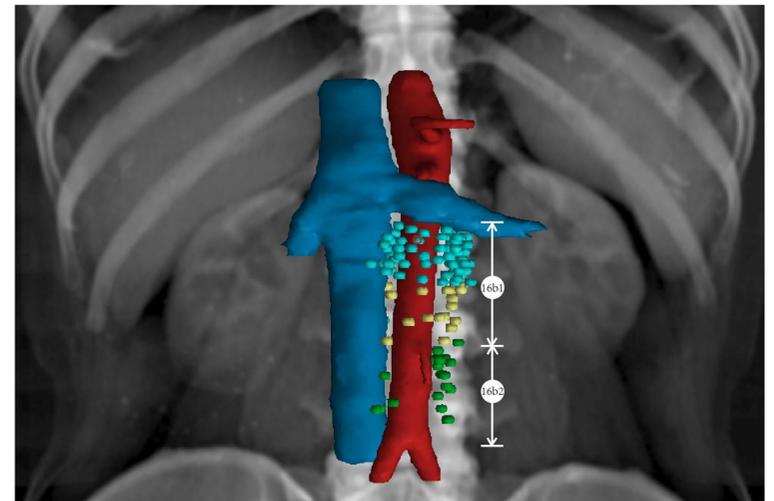


Figure 3. Three-dimensional analysis of No.16b lymph node recurrence. The blue dots represent the upper half of No.16b1 nodes. The yellow dots represent the lower half of No.16b1 nodes. The green dots represent No.16b2 nodes.

Conclusions

Our mapping provides a new suggestion for the vessel-guided delineation of regional lymph nodes when defining the CTV in patients after standard D2 resection. LNs around the abdominal aorta and its main branches, as well as regions around the hepatic hilar and head of the pancreas (Stations 16b1, 16a2, 13, 12, 9 and 14) should be the most important radiotherapy targets, whereas stations 10 and 16b2 were recommended to be excluded from the radiation field. For patients after standard D2 lymphadenectomy performed by well-trained surgeons, skipping the inclusion of perigastric LNs in the CTV to reduce gastrointestinal toxicity may be considerable.

References

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