Chemotherapy: Open Access
ISSN: 2167-7700

Peng, Chemo Open Access 2015, 4:4
DOI: 10.4172/2167-7700.1000173

Commentary Open Access

Effectiveness of Endoscopic Classification in Assessing Tumor Infiltration Depth and Capacity of Early Oesophageal Carcinoma

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Received date: 16 July, 2015, **Accepted date:** 23 November, 2015, **Published date:** 28 November, 2015

Introduction

Tumor infiltration and lymphatic metastasis are the most important factors determining the prognosis of digestive tract cancers. Hence, assessment of tumor infiltration and lymphatic metastasis at an early stage is of great significance for the appropriate selection of treatment in clinical practice. However, preoperative assessment of tumor infiltration and lymphatic metastasis at the early stage of digestive tract cancers is relatively difficult. Our previous research revealed that the intraluminal growth pattern can reflect the growth pattern inside of the esophageal wall of early esophageal carcinomas. Therefore, based on endoscopic and ultrasonographic observations, we proposed a new endoscopic classification system for early esophageal carcinoma.

This System Classifies Esophageal Carcinomas According To Five Tumor Growth Patterns

- **Surface Propagating Growth**: The tumor is characterized by a large area of or continuous patchy mucosal redness with granule-like uneven surfaces and tumor cells mainly localized to the mucosal surface
- **Intraluminal Growth**: The tumor appears as a dish- or pedicle-like protrusion and grows towards the lumen; this type of tumor can be divided into two subtypes, one with a protrusion height <5 mm and the other with a protrusion height ≥5 mm
- **Intramural Growth**: The tumor appears as a patchy erosion or shallow ulcers and mainly grows inside of the esophageal wall; this type of tumor can be divided into two subtypes, one characterized with depressed lesions (erosion/ulceration) in a depth <0.5 mm and the other characterized with depressed lesions in a depth ≥0.5 mm
- **Bilateral Growth**: The tumor lesion appears as a hillock-like protrusion with a broad base and grows both intraluminally and intramurally; this type of tumor can be divided into two subtypes, one with a protrusion height <2 mm and the other with a protrusion height ≥2 mm
- **Mixed Growth**: The tumor shows a surface propagating growth pattern along with any other abovementioned patterns. According to our findings, a tumor that shows a surface propagating growth pattern, an intraluminal growth pattern with a protrusion height <5 mm, an intramural growth pattern with depressed lesions in a depth <0.5 mm, or a bilateral growth pattern with a protrusion height <2 mm can be diagnosed as intramucosal carcinoma. In addition, a tumor that shows an intraluminal growth pattern with a protrusion height ≥5 mm, an intramural growth pattern with depressed lesions in a depth ≥0.5 mm, a bilateral growth pattern with a protrusion height ≥2 mm, or a mixed growth pattern can be diagnosed as submucosal carcinoma. Using these criteria, the diagnosis accuracy reached 89.8% [1]. Thus, this classification system can be used as a valuable guideline for the selection of treatment approaches for early esophageal carcinoma.

The infiltration depth (T) of the tumor is closely related to the lymphatic metastasis of esophageal carcinoma and is a major independent factor determining the prognosis of esophageal carcinoma [2]. However, the growth and infiltration of tumor cells is also an independent influencing factor of prognosis [3].

- There Are Three Growth And Infiltration Forms (INF) Of Tumor Cells Expanding growth with a distinct border from the surrounding tissue in the invasive area (INFa)
- Infiltrating growth with an indistinct border from the surrounding tissue in the invasive area (INFc)
- The growth pattern between the above two types (INFb) [4].

Research has found that the difference in prognosis is insignificant between INFa and INFb tumors, whereas infiltrative growth (INFc) often forebodes a poorer prognosis and lower survival rate due to its close relationship with lymphatic metastasis and hematogenous metastasis [3].

We believe that research on the relationship between endoscopic classification and INF of early esophageal carcinoma will shed some light on the assessment of the pathological infiltration pattern/degree and on the prognosis prediction through endoscopic observation.

Our research revealed an evident relationship between T grading and INF classification of early esophageal carcinoma. Carcinomas in situ are all INFa tumors, intramucosal and submucosal carcinomas are mostly INFb tumors, whereas the proportion of INFc tumors is significantly higher among submucosal carcinomas compared to both carcinomas in situ and intramucosal carcinomas. This finding suggests a close relationship between the infiltration depth and pattern, with a deeper tumor infiltration indicating stronger tumor cell invasion, a higher metastatic risk, and poorer prognosis.

To clarify whether early-stage esophageal carcinomas with different growth patterns show different tumor INF, we investigated two endoscopic classification systems, one suggested by the Japanese Endoscopy Society and the other developed by ourselves for early esophageal carcinomas [1,5] and further explored the relationships between the tumor INF and endoscopic classification. Our findings revealed a close correlation between the above two parameters. Specifically, tumors that showed flattened growth and a surface propagating growth pattern had a weaker infiltrative capacity; tumors that demonstrated depressed lesions and an intramural growth pattern had stronger infiltration ability; and tumors showing other growth patterns had an average infiltrative capacity. Therefore, endoscopic classification can be used as an effective tool to assess the INF of

tumors. A comparison of the predictive value between the aforementioned two endoscopic classification systems for early esophageal carcinoma indicated that our classification system may possess superior performance in assessing pathological infiltration. One possible explanation for this difference is that the Japanese Endoscopy Society classification is based on only the endoscopic observations regarding lesion morphology, protrusion height, and the depth of depressed lesions. In contrast, our classification takes into account not only the above factors but also ultrasonographic observations of the intramural INF and depth, enabling this system to reflect tumor growth more comprehensively.

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