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RESEARCH ARTICLE

Lingual flange protrusion: diagnostic marker for metastatic liver cancer

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Abstract

OBJECTIVE: To investigate the diagnostic significance of lingual flange protrusion for liver metastasis of patients with malignant neoplasia.

METHODS: The data of 191 patients with malignant neoplasia were analyzed. All photos of patients' tongue image were recorded and lingual flange protrusion was the positive standard. χ^2 test for paired data and Kappa test were used to determine the diagnostic value of lingual flange protrusion for metastatic liver cancer. Mann-Whitney *U* test was used to compare the levels of liver serological markers. The area under receiver operating characteristic curve (ROC) and logistic regression model were used to analyze the predictive values of lingual flange protrusion, alkaline phosphatase (ALP), and lactate dehydrogenase (LDH) levels.

RESULTS: Patients with lingual flange protrusion had a higher risk of liver metastasis than those without it ($P < 0.001$). There was no significant difference in diagnosis of liver metastasis between lingual flange protrusion and traditional diagnostic criteria ($P = 0.541$). Kappa was 0.738 ($P < 0.001$). Lingual flange protrusion was significantly correlated with increased serum ALP and LDH levels ($P < 0.01$). Comparison of ROC curves showed that the diagnostic value of lingual flange protrusion is better than ALP, LDH and the combination of ALP and LDH ($P < 0.01$). Furthermore, the combined diagnostic values of lingual flange protrusion and ALP, lingual flange protrusion and LDH, and lingual flange protrusion, ALP and LDH are not better than lingual flange protrusion alone ($P > 0.05$).

CONCLUSION: Lingual flange protrusion is a potential diagnostic marker for liver metastasis of patients with malignant neoplasia.

Keywords: Liver neoplasms; Tongue inspection; Lingual flange protrusion; Alkaline phosphatase; Lactate dehydrogenases; Gamma-glutamyltransferase

INTRODUCTION

Malignant neoplasm is the major public health problem which provides high mortality in the developed

country.[1] One decisive condition that determines the prognosis of patients suffering from malignancy is the presence (or absence) of hepatic metastases.[2,3] Up to 50% colorectal cancer patients were diagnosed with disease metastasis spreading to liver. Moreover, liver metastasis is found in 55%-75% of autopsies performed on patients who died from breast cancer.[4,5] Liver metastasis, progressed by many types of cancers, is the survival rate-limiting factor for patients. For example, liver metastases from breast cancer have a poor prognosis, with a median survival of only 4.23 months.[3] Hepatic resection, with a median 5-year survival rate of 23% (15%-37%), offers the only hope for cure.[6,7] Thus, early diagnosis of metastatic liver cancer is essential for timely and adequate treatment, which favors a better prognosis for tumor patients.

Liver metastases may present asymptomatically during a metastatic screen, or may present with upper abdominal fullness, a mass, ascites, jaundice or weight loss.[8] Imaging diagnosis methods, such as contrast enhanced computed tomography (CT), magnetic resonance imaging (MRI), contrast-enhanced ultrasound and positron emission tomography CT (PET-CT) are routinely used for surveillance of tumor metastasis.[9,10] However, it is still difficult to make the final diagnosis of early hepatic lesions due to the absence of typical symptoms and signs. Serological examination including tumor markers and liver function tests are also used for monitoring metastatic liver cancer during treatment, but their accuracy is not high enough.[11] To reduce metastatic liver cancer-related mortality, the development of new and reliable diagnosis method for liver metastasis is of great significance.

Tongue evaluation dates from the Shang Dynasty (1600 to 1000 BC) and consists of visually inspecting the tongue body for vitality, color, shape, moisture, and movement and assessing the tongue coating for color, thickness, distribution, and characteristics at the root.[12-14] Tongue diagnosis is an important diagnostic method in Traditional Chinese Medicine (TCM), and tongue image is an outer manifestation of human body, which reflects characteristics of pathogenic factors and the condition of internal organs.[15,16] According to TCM theory, the tongue provides a geographic map of organ systems (Figure 1). Characteristics of tongue in each of these areas provide information critical to TCM diagnosis. Lingual flange of the tongue body is the presentative area of liver-gall organ and abnormal tongue image in lingual flange represents liver-gall diseases including metastatic liver cancer.

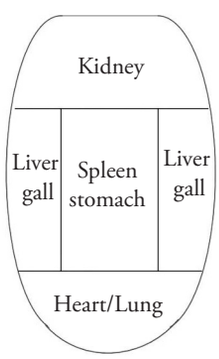

Figure 1 Corresponding locations of Traditional Chinese Medicine features on the tongue

Accordingly, in clinic, we observed that tumor patients who suffered from metastatic liver cancer usually appeared lingual flange protrusion. Therefore, the purpose of this study is to determine the diagnostic significance of lingual flange protrusion for metastatic liver cancer in malignant neoplasm patients.

MATERIALS AND METHODS

Ethical statement

This study was approved by the ethics committee of Tianjin Medical University Cancer Institute and Hospital, National Clinical Center for Cancer, Tianjin, China (No. bc2015003). The procedures were performed according to the approved guidelines and to the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. Informed consents were obtained from all participants involved in this study.

Patients

The data of 191 patients with malignant neoplasm except liver carcinoma in Tianjin Medical University Cancer Institute and Hospital from May 2010 to April 2011 were analyzed. Pathological test was performed to confirm malignant neoplasm and all patients were re-examined by chest computed tomography scan, endoscope, liver biochemical test and tumor markers detection periodically after surgery or systemic therapy (usually performed at three months, six months, and then once a year after surgery). Major inclusion criteria were as follows: aged 18 years or older; pathological test was performed to confirm malignant neoplasm. Major exclusion criteria were as follows: concurrent cancer; pregnant or breastfeeding women; severe mental disorder; incomplete medical records; patients who did not undergo regular re-examination; liver cancer; hepatic benign occupying lesions (hepatitis, liver cirrhosis, hepatic cyst, hepatic hemangioma, hepatic adenoma). Contrast enhanced CT, MRI, PET-CT or biopsy were performed to confirm liver metastasis. Patients were informed that the detail information their faces have not been collected on photos. Determination methods of lingual flange protrusion

The lingual flange protrusion versus relatively normal lingual flange was showed in Figure 2. Two conditions were used to determine lingual flange protrusion: (a) there was obvious protrusion (no tongue-coating covered) on one side of lingual flange making asymmetric distance to tongue midline (Figure 2C). (b) Both side of the lingual flanges had obvious protrusion, which has no tongue-coating cov-