Biomedical Research 2017; Special Issue: *ISSN 0970-938X*
www.biomedres.info

Imageological study on esophageal carcinoma at clinical stages and significance of tumor markers MMP-9 and NGAL.

Jing Li[1], Dongxin Liu[2], Zhibiao Liu[3], Jian Wei[3*]

[1]Sports Health Technology College, Jilin Sports University, PR China

[2]Wu Yi Hospital, Jilin Province, Siping City, Yi tong County, PR China

[3]College of Life Sciences, Changchun Normal University, PR China

Abstract

Objective: The images of esophageal carcinoma patients at different clinical stages were studied and the tumor markers Matrix metallopeptidase 9 (MMP-9) and the urinary neutrophil gelatinase-associated lipocalin (NGAL) were analyzed relatively to assess their clinical significance in treatment.
Method: 60 esophageal carcinoma patients, who took a cure in our hospital, were selected as the observation objects and examined by CT and ultrasonic endoscope (EUS), the examination results were compared with those of pathological sections and then the expression levels of tumor markers MMP-9 and NGAL were determined to assess accuracy of clinical stages.
Result: The accuracy rate of T-stage examination means of esophageal carcinoma was higher than that of CT, the comparative difference of both was of statistical significance (P<0.05), but there was no significant difference between EUS and CT examination at N stages. The positive expression rates of MMP-9 and NGAL were higher in the tissue of esophageal carcinoma than those in normal tissues near carcinoma, and the difference was of statistical significance (P<0.05).
Conclusion: EUS examination had higher accuracy in diagnosing T stages of esophageal carcinoma patients and the MMP-9 and NGAL markers had higher expression rates in esophageal carcinoma than in normal cells, which might be associated with occurrence and development of the esophageal carcinoma. So, EUS examination could be regarded as relevant prognostic assessment indicators of MMP-9 and NGAL.

Keywords: Esophageal carcinoma, Imageology, MMP-9, NGAL.

Accepted on July 27, 2017

Introduction

Recently, esophageal carcinoma is a common crinose tumorous disease with higher malignant degree in clinic. Morbidity rate of our nation now is about 13 cases/100,000, which covers No. 1 in the world and leads to malignant threat for human's health. In recent years, morbidity rate is gradually prone to significant rise [1]. Progressive dysphasia is the main clinical manifestation of esophageal carcinoma. There are more patients at early stage which is not significant. When diagnosed in clinical admission, most of carcinoma patients has developed into middle and advanced stage, losing optimum advantages of surgical treatments. Esophageal carcinoma international TNM stage standards are only applied to the patients who take surgical treatments [2]. Now esophageal carcinoma surgery is a surgical means for large digestive tract trauma in clinic which is generally taken for the elder patients. And esophageal carcinoma surgery is thoracotomy. It is involved in neck, chest and abdominal cavity with long operation time. In addition, traction and cutting on ambient relevant tissues, extrusion for lung and hilum on surgical side and other aspects may cause different degrees of damage for bodies and trigger strong partial and systemic injuries. Therefore, there is lack of non-surgical treatment of esophageal carcinoma clinical stage standards in clinic [3,4]. EUS has gradually become clinic stage gold standards of esophageal carcinoma at prior-treatment stage.

Tumor marker is equipped with high efficiency, convenience, easy to obtain and little trauma and other characteristics and has important clinic significance in screening, diagnosis, monitoring of tumor and judgement of prognosis and search for sensitive tumor marker. There are also studies reported that some judgements can be done for clinical diagnosis, reoccurrence and distant metastasis according to detection for serum tumor marker [5]. Therefore, measurement and analysis for many tumor markers MMP-9 and NGAL of serum of carcinoma patient are conducted and their clinical values are discussed in the study.

Materials and Methods

General data

Our hospital selects 60 esophageal carcinoma patients as research objects from January, 2016 to February, 2017 among which 35 cases are male and 25 cases are female. Age is between 48 and 73 and average age is (62.7 ± 10.8) years. All patients selected were approved by Ethics Committee of our hospital and sign informed consent forms in the case of knowledge.

Inclusion and exclusion criteria [6,7] Inclusion criteria: (1) primary esophageal carcinoma is confirmed through pathological examination; (2) esophageal carcinoma in thoractic segments; (3) tumor stage is I b-III a stage; (4) ages of the patients are not more than 80 years; (5) there is no history of large and medium surgery within six months before admission; (6) cardiac function is I-II grade and operative wound can be tolerated. Exclusion criteria: (1) primary malignant tumor diseases of other tissues and organs; (2) autommune diseases; (3) severe hepatorenal function insufficiency; (4) systemic infectious diseases; (5) pregnant or lactational female; (6) cognition impairment, failure to cooperate with postoperative examination items, inexistence of chronic lung diseases, infection, diseases of vital organs and metabolic diseases.

Treatment methods

During EUS examination for the patients, it needs to adopt Japanese Olympus GIF-UM2000 type of ultrasonic endoscope and probe frequency is set to 15 MHz. Degassed water is injected. When esophageal cavity on diseased region is full of water, insert ultrasonic probe and continuously scan multilayers. During CT examination, scanning mode of Siemens CT scanner made in Germany is adopted and parameter is set to 120 Kv, 90 mAs, collimation is 2.5~5.0 mm, speed is 50 mm/s, screw pitch is 25 mm, thickness of layer is 4 mm, layer spacing is 5 mm. Expression levels of MMP-9 and NGAL of pathological tissues of the patients selected after operation are detected with immunohistochemical SP method. The kits come from American Santa [8].

Assessment criteria

Scanning of esophageal carcinoma at stages with EUS is determined according to literature. CT scanning is used for stages evaluation of esophageal carcinoma according to literature. Taking examination results of pathological section as golden standards, comparison and analysis for accuracy rates of EUS and CT are conducted. According to rate of positive cells and staining intensity, comprehensive evaluation is conducted and grades of shading intensity of the cells are: colorless -0 score, light brown-1 score, brown yellow -2 scores, brown tawny -3 scores; percentage scores of positive cell: no positive -0 score, positive rate ≤ 25%-1 score, 25%<positive rate ≤ 50% -2 scores, 50%<positive rate ≤ 75%-3 scores, 75<positive rate ≤ 100% 4 scores. Multiply two scores and obtain integral of 0~12 scores of each view, total score=score of staining intensity × percentage scores of positive cell, ≤ 1 score is set to negative, >1 score is positive [9,10].

Statistical analysis

After treatments for two groups with different means, statistical data obtained is compared with SPSS 14.0 statistical analysis software. When t Test is adopted for verification, measurement data is expressed as (x ± s); count data is expressed in (%) and verified with χ^2 Test. When P<0.05, it indicates that there is significant difference.

Results

Comparison of accuracy rate of imageology examination

From the results, compared with results of CT examination, the accuracy rate of esophageal carcinoma T stage examined by EUS can reach 86.7% which has remarkable rise and significant difference (P<0.05). The accuracy rate of N stages in clinic can reach 70%, which has equivalent effect to accuracy rate of CT examination. And the difference has no statistical significance (P>0.05). The details are shown in Table 1. It indicates that the accuracy rate of esophageal carcinoma T stage examined by EUS is significantly higher. It is probably due to the lack of advantage characteristic by EUS examination itself to lymphatic metastasis and distant metastasis.

Table 1. Comparison of accuracy rates of two groups of imageology examinations.

Methods	T1	T2	T3	T4	Accuracy rates	N0	N1	Accuracy rates
Pathology	12	21	19	8	60 (100%)	39	21	60 (100%)
EUS	11	16	17	8	52 (86.7%)	23	19	42 (70%)
CT	5	13	10	8	36 (60%)	23	20	43 (71.7%)
X^2					15.338			2.173
P					<0.05			>0.05

Expression of tumor marker in esophageal carcinoma

The results show that, MMP-9 and NGAL positive staining are brown yellow or brown tawny in carcinoma tissues. Positive expression rate of MMP-9 reaches 63.3% in carcinoma tissues, while the positive expression rate of NGAL is 58.3% (Table 2). Therefore, no statistical difference can be seen between the positive expression rate of MMP-9 and NGAL. Separated or combined examination to the accuracy rate of esophageal carcinoma T stage and N stage, and the difference has no statistical significance.

Table 2. Expression results of tumor markers.

Positions	n	MMP-9 Positive cases	MMP-9 positive rates

MMP-9	60	38	63.3%
NGAL	60	13	21.7%
X^2			2.024
P			>0.05

Discussion

At early stage, there is no typical clinical symptom. And it's easy to neglect. There is higher rate of missed diagnosis, difficulty in treatment, fast disease development speed and poor prognosis effect. Clinic curatverate is low and survival rate is low, so early diagnosis and treatment is key link to reduce arcinoma mortality also the focus of the current study [11]. Therefore, seeking a detection method that can improve diagnostic rate at early stage is essential. There are studies reported that screening of highly sensitive serum tumor markers is helpful for early diagnosis and treatment and prognosis evaluation. Esophageal carcinoma has been one means of important auxiliary diagnosis and disease evaluation along with study on tumor marker. MMP-9 and NGAL, with higher specificity and used for diagnostic carcinoma and tumor marker, are helpful to regard measurement for MMP-9 and NGAL as one of auxiliary indicators of carcinoma diagnosis, disease monitoring and prognosis before diagnosis, detection and clinic.

The results in the experiment show that, large increase is observed in expression levels of MMP-9 and NGAL of markers, while the comparative difference of two groups has no statistical significance (P>0.05) , indicating that expressions of cells of MMP-9 and NGAL markers of esophageal carcinoma show high expression, which is benefical for higher accuracy. Compared with the results of CT examination, both the accuracy rate of esophageal carcinoma T stage examined by EUS, and the accuracy rate of N stages in clinic, have equivalent accuracy rate of CT examination, with no statistical difference (P>0.05), indicating that the high accuracy of diagnosis of T-stage esophageal carcinoma patients with EUS examination is propably relavant to the occurrence and development of carcinoma.

In summary, the EUS examination of esophageal carcinoma is superior to the CT examination, and can provide more accurate TN stage, helpful for the proper selection of treatmnent and prognosis evaluation. EUS examination can be regarded as relevant prognostic assessment indicators of MMP-9 and NGAL.

References

1. Jie H, Kang S. Chinese esophageal cancer epidemiology: Its current situation, status of diagnosis and treatment, and future strategy. China Oncol 2011; 7: 501-504.
2. Shuoyan L, Feng W, Qingfeng Z. Clinical applications of thoracoscopic mckeown radical resection of esophageal carcinoma. Chinese J Gastrointest Surg 2012; 15: 947-949.
3. Hang Z, Chaojun D, Heng Z. Expression of RhoA Protein in esophagus cancer and its clinical significance. Chinese J Exp Surg 2012; 29: 2586-2589.
4. Yazhou L, Jiashou D, Jun Y. Study of esophageal carcinoma imageology and tumor markers at the different stages. China Tropic Med 2014; 14: 216-220.
5. Haiyuan L, Yufang Z, Lihui T. The comparison analysis on the clinical effects of esophageal intraluminal irradiation stent and common stent for the treatment of advanced esophageal carcinoma. Progress Mod Biomed 2013; 13: 3929-3931.
6. Zheng W, Zhu Y, Guo CH. Esophageal suspension method in scavenging peripheral lymph nodes of the left recurrent laryngeal nerve in thoracic esophageal carcinoma through semi-prone-position thoracoscopy. J Cancer Res Ther 2014; 10: 985-990.
7. Ju Y, Jian W, Fei Y. Study to 25 cases of thoracoscopic mckeown radical resection of esophageal carcinoma. Acta Universitatis Medicinalis Nanjing (Nat Sci) 2015; 35: 1274-1278.
8. Dang H, Bing Z, Jianhua F. Clinical evaluation of endoscopic ultrasonography and ct in the prediction of the respectability of esophageal carcinoma. Chinese J Gastrointest Surg 2010; 13: 205-209.
9. Yuanyuan Y, Wenwu L. Application of CT perfusion in esophageal carcinoma. Chinese J Carcinoma Prevent Treat 2011; 18: 1054-1056.
10. Jianhua F. Biomarkers of predicting response to neoadjuvant chemoradiotherapy in esophageal carcinoma. Zhonghua Wei Chang Wai Ke Za Zhi 2013; 16: 805-810.
11. Changkang K, Qinghua C. Study on esophageal carcinoma at stages combining CT scanning with endoscopic ultrasonography before surgery. J Pract Med 2012; 28: 1847-1849.

***Correspondence to**

Jian Wei

College of Life Sciences

Changchun Normal University

PR China