Clinical diagnostic value of Molybdenum Target X-ray combined with four Serum tumor markers in the detection of Mastocarcinoma

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Abstract

Objective: To explore the clinical diagnostic value of Molybdenum Target X-ray combined with serum CA15-3, CA125, CEA and CYFRA21-1 tumor markers in the detection of Mastocarcinoma. Method: 90 cases confirmed by surgery pathology diagnosis according to the diagnosis of breast nodules disease patients were divided into benign tumor group (n=32) and breast cancer group (n=58), all patients were with preoperative line of molybdenum target X-ray radiography examination; Another group chose healthy women of our hospital for check-up in 56 cases as the control group, electrochemiluminescence immunoassay detection of three groups of participants were four kinds of serum tumor markers level, evaluation of single and combined testing the sensitivity of the diagnosis of breast cancer, specific degree, positive predictive value and negative predictive value. Results: CA15-3, CA125, CEA and CYFRA21-1 in breast cancer group were significantly higher than that of the control group and benign tumor group, the difference was statistically significant (all \( P < 0.05 \)), benign tumor group and the control group four levels of tumor markers to compare differences that had no statistical significance (\( P > 0.05 \)); Molybdenum target X-ray slice of the sensitivity of the diagnosis of breast cancer was higher, but the specific degree was low, and lower the sensitivity of the serum tumor markers in the diagnosis of breast cancer, the specific degree was higher, the molybdenum target X-ray slice joint the sensitivity of the four tumor markers in the diagnosis of breast cancer was 89.66%, 78.13%. Conclusions: The combined Mastocarcinoma detection of Molybdenum Target X-ray with serum CA15-3, CA125, CEA and CYFRA21-1 tumor markers can improve the detective rate and plays an important role in Mastocarcinoma early detection.

Materials and methods

1.1 Clinical information

The study was undertaken in 90 cases of patients with breast nodules in our hospital from Jan. to Dec., 2014, aged from 26 to 70, with a mean age of 45.36±22.82; all patients were confirmed by surgery and pathology, the benign tumor group with 32 cases of patients and the breast cancer group with 58 cases of patients. All patients underwent Molybdenum Target X-ray examination and serum tumor markers of carbohydrate antigen 15-3 (CA15-3), carbohydrate antigen 125 (CA125), carcinoembryonic antigen (CEA) and cytokeratin 19 fragment antigen 21-1 (CYFRA21-1) detection before the surgery. Another 56 healthy women were collected as the control group, aged from 24 to 65, with a mean age of 46.46±27.23. Two groups had no significant difference in gender and age. All patients were furnished with complete clinical data and informed consent.
2.2 The diagnostic value of single and combined detection of breast cancer

In the diagnosis of breast cancer, Molybdenum Target X-ray film has higher sensitivity, but lower specificity, while serum tumor markers have lower sensitivity but higher specificity. Thus, a combined detection method can improve the sensitivity of breast cancer diagnosis.

**Table 1**

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>CA15-3 (μg/ml)</th>
<th>CA125 (μg/ml)</th>
<th>CEA (ng/ml)</th>
<th>CYFRA21-1 (ng/ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>control</td>
<td>56</td>
<td>15.87±10.26</td>
<td>18.23±15.15</td>
<td>2.56±2.21</td>
<td>1.12±0.78</td>
</tr>
<tr>
<td>benign tumor</td>
<td>32</td>
<td>16.02±12.54</td>
<td>20.33±14.86</td>
<td>3.05±2.87</td>
<td>1.23±1.05</td>
</tr>
<tr>
<td>breast cancer</td>
<td>58</td>
<td>46.87±18.54*#</td>
<td>46.87±22.82*#</td>
<td>15.86±10.12*#</td>
<td>5.65±2.98*#</td>
</tr>
</tbody>
</table>

Ps: compared with the benign tumor group, *P* < 0.05, compared with the control group, #*P* < 0.05, &*P* > 0.05

2.2.2 Serum tumor markers detection

Patients' venous blood were collected when fasting, separated serum through centrifugal. Serum CA15-3, CA125, CEA and CYFRA21-1 levels were detected by electro-chemiluminescence immunoassay (Roche ModularE-170 automatic ECLI analyzer), detection kits were provided by Shanghai SiXin Bio-technology Co Ltd, and operations are in strict accordance with the kits instructions. Positive value of reference: CA15-3 >28U/ml, CYFRA21-1 >3.5ng/mL, CEA >6ng/mL, CA125 >35U/ml.

1.3 Statistical treatment

Data were analyzed by statistical software SPSS20.00, ratios were compared using chi square test or corrected chi square test; measurement data showed by (x±s), the groups were compared using t test, P<0.05 was considered for the significant difference.

2 Results

2.1 Comparison of four serum tumor marker levels of the three groups

Serum levels of CA15-3, CA125, CEA and CYFRA21-1 in breast cancer group were significantly higher than that in the control group and benign tumor group, the difference was statistically significant (all *P*<0.05), the levels of those four tumor markers had no statistical significance in benign tumor group and the control group (*P*>0.05).

**Table 2**

The diagnostic results of single and combined detection of breast cancer

<table>
<thead>
<tr>
<th>subject</th>
<th>sensitivity</th>
<th>specificity</th>
<th>positive predictive value</th>
<th>negative predictive value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molybdenum Target X-ray</td>
<td>79.31%</td>
<td>68.75%</td>
<td>82.14%</td>
<td>64.71%</td>
</tr>
<tr>
<td>CA15-3</td>
<td>60.34%</td>
<td>93.75%</td>
<td>94.59%</td>
<td>56.60%</td>
</tr>
<tr>
<td>CA125</td>
<td>34.48%</td>
<td>81.25%</td>
<td>76.92%</td>
<td>40.63%</td>
</tr>
<tr>
<td>CEA</td>
<td>37.93%</td>
<td>87.50%</td>
<td>84.62%</td>
<td>43.75%</td>
</tr>
<tr>
<td>CYFRA21-1</td>
<td>48.28%</td>
<td>100.00%</td>
<td>100.00%</td>
<td>51.61%</td>
</tr>
<tr>
<td>CA15-3+CA125+CEA+CYFRA21-1</td>
<td>65.52%</td>
<td>78.13%</td>
<td>84.44%</td>
<td>55.56%</td>
</tr>
<tr>
<td>combined detection</td>
<td>89.66%</td>
<td>75.00%</td>
<td>86.67%</td>
<td>80.00%</td>
</tr>
</tbody>
</table>

3. Discussion

Mammography X-ray photography is an effective means for early detection of breast cancer, which can identify the abnormal changes of soft tissue and density in mammary gland tissue, micro calcification is the only sign for the diagnosis of early breast cancer[4]. However, its clinical application has limitations, it exists missed diagnosis in non-typical breast lesions especially in dense breast and near the chest wall lesions; low accuracy for displaying lesions size and position[5]; the decreased sensitivity with the increased mammary gland density[6]. Nevertheless, the technology has become the preferred imaging method for its advantage of simple, convenient and low cost. Our study also found that Molybdenum target X-ray detection breast cancer with higher sensitivity, that reached 79.31%, but the specificity was only 68.75%. There will be certain error and missed diagnosis if simply relies on target X-ray detection breast cancer.

With that, other methods are constantly being explored. Breast
cancer tumor markers has made great progress in diagnosis of mammary cancer, CA125, CEA and CYFRA21-1 are four commonly used markers. Our study found this four serum tumor markers levels in breast cancer group were significantly higher than that in the control group and benign tumor group. Tumor markers are produced by the cancer cells and release into the blood, so there is very small quantities in healthy human serum. However, one tumor can release several kinds of tumor markers, and one tumor marker can appear in many kinds of tumor, therefore, single tumor marker has low sensitivity and certain limitations in diagnosing mammary cancer, especially for patients with early breast cancer, are more easily missed diagnosed[7]. CA15-3 is considered to be a specific mammary cancer diagnosis marker[8], but it has little diagnostic mean in early diagnosis of breast cancer for its low positive rate, expression level and sensitivity[9-11]. In addition, false positives exist in benign breast disease and some inflammatory diseases[12]. CEA is a broad-spectrum tumor marker, and often used as auxiliary index for diagnosis of mammary cancer[6,7]. The positive rate of CA125 was only 24% in mammary cancer diagnosis[13,14]. CYFRA21-1 is an epithelial tumor markers, which can identify cancer and non-cancer, but it has very low sensitivity in diagnosing stage I and II breast cancer[10,15-16]. All the four exist in the drawbacks of low positive diagnosis rate, and are hard to balance sensitivity and specificity. Our study also found that single tumor marker has low sensitivity and the sensitivity of Molybdenum Target X-ray combined with CA15-3, CA125, CEA and CYFRA21-1 detection was significantly increased compared with separately detection, the sensitivity was 89.66% and the specificity was 78.13%.

In summary, our study found that four tumor markers CA15-3, CA125, CEA and CYFRA21-1 were highly expressed in breast cancer patients, Molybdenum target X-ray combined with tumor markers can improve the detection sensitivity of breast cancer and has important clinical significance in early diagnosis and treatment.

References


