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Analysis of the relevance between molecular subtypes and efficacy of neoadjuvant chemotherapy in breast cancer as well as its prognostic factors

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ABSTRACT

Background: Accurate pathological assessment of breast specimens after NACT is crucial. It is beneficial to determine the treatment efficacy and predict prognosis. So we should explore the relevance between molecular subtypes and efficacy of neoadjuvant chemotherapy in breast cancer as well as its prognostic factors, which about survival analysis and disease free survival involved, which was one part of contributing for evaluating in terms of global survival and disease free survival.

Methods: Medical records of 264 patients with breast cancer who received neoadjuvant chemotherapy in Breast Center, the Fourth Hospital of Hebei Medical University, between January 2008 and May 2013. The relationship between molecular subtypes and neoadjuvant chemotherapy, and clinical pathological features were analyzed.

Results: The total pCR rate was 12.50% (33/264). The rate of pCR were 3.03% (1/33), 9.40% (14/149), 17.39%(8/46), 27.78% (10/36) in Luminal A type, Luminal B type, HER2 overexpression type, and Triple negative type, respectively. Which was predicted that The pCR rate associated with breast cancer molecular subtypes ($P < 0.05$). The pCR rate in Triple negative type was highest, HER2 overexpression type was showed higher pCR rate than Luminal A and Luminal B type. Multiple factors analysis results showed that: the independent impact factors of 5-year overall survival rate in neoadjuvant chemotherapy breast cancer patients were clinical stage, tumor size, chemotherapy regimens, lymph node metastasis, estrogen receptor status and pathological remission; the independent impact factors of 5-year disease free survival rate were tumor size, chemotherapy regimens, estrogen receptor status, progesterone receptor status and pathological remission ($P < 0.05$). Triple negative type of breast cancer had shorter overall survival and disease-free survival ($P < 0.05$).

Conclusions: The pCR was more frequently observed in HER2 overexpression type and Triple negative type of breast cancer. That could achieve a higher rate of pCR on paclitaxel class joint anthracycline-based chemotherapy. But Triple negative type showed worse prognosis, due to residual tumor after neoadjuvant chemotherapy, which could be in combination or sequential, at the neoadjuvant / adjuvant setting (NCCN 2016 Breast cancer, chemotherapy regimens), So how to choose a more appropriate neoadjuvant chemotherapy regimens, we should need further research.

1. Background

Global new breast cancer cases and death cases were 1671 149 and 521 907 in 2012, respectively, of which were account for 11.2% and 9.2% in China, respectively. Breast cancer has become the first female incidence of malignant tumor in China [1,2]. Compared to early stage breast cancer, it is more difficult to perform radical surgery for locally advanced breast cancer (LABC). Even if the tumor is surgically removed, the disease may continue to progress within a short period of time after surgery, and the prognosis is usually poor. Neoadjuvant chemotherapy (NACT) is a standardized treatment method for patients with LABC, and is administered preoperatively. The changes of the tumor size after chemotherapy can be directly observed, which provides greater opportunity for surgery or breast-conserving surgery.

Abbreviations: NACT, neoadjuvant chemotherapy; pCR, complete pathological response; HER2, human epidermalgrowth factor receptor-2; NCCN, National Comprehensive Cancer Network; LABC, locally advanced breast cancer; M&P, Miller&Payne; DCIS, ductal carcinoma in situ; ER, estrogen receptor; PR, progesterone receptor

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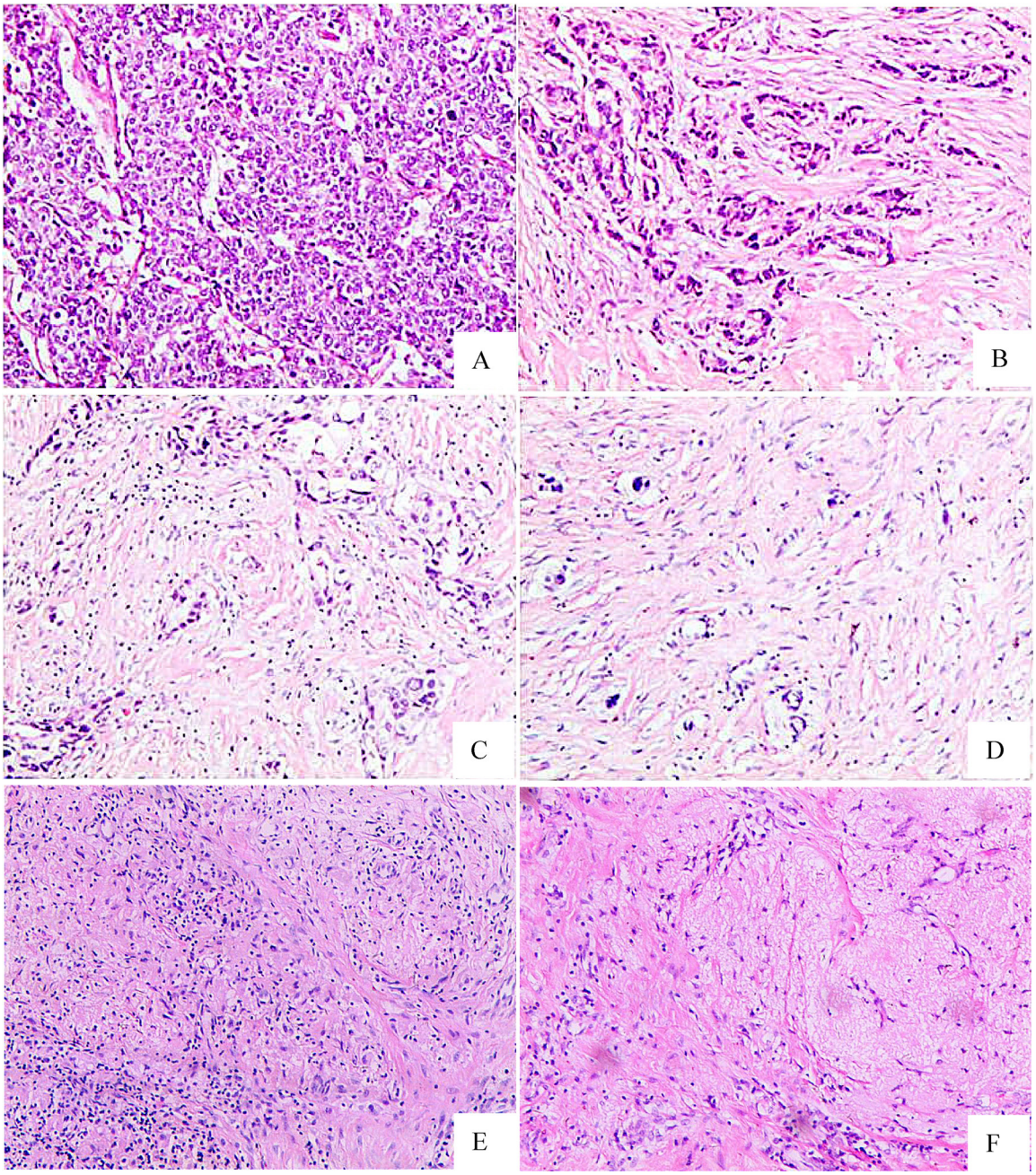

Fig. 1. Neoadjuvant chemotherapy response classification (Miller-Payne classification) (HE 100 times magnification).
A: G1; B: G2; C: G3; D: G4; E,F: G5.

NACT can reduce the stage of the tumor, improve resection rates, and enable the identification of the sensitivity of the tumor to chemotherapy, and evaluate treatment efficacy [3]. However, the response of breast cancers to chemotherapy varies from patient to patient, and is a huge problem besetting clinical practice. Thus, effective evaluation of chemotherapy is particularly important to clinical prognosis. The evaluation criteria for NACT include Response Evaluation Criteria in Solid Tumors and pathological assessment. Currently, pathological evaluation is the gold standard for NACT [4]. After chemotherapy, tumors undergo numerous gross and histological changes, rendering the pathological evaluation of postoperative specimens difficult. Therefore, accurate pathological assessment of breast specimens after NACT is crucial. It is beneficial to determine the treatment efficacy and predict prognosis. Complete pathological response is an important indicator r of response to NACT and patient prognosis. However, not all breast cancer patients benefit from NACT. If patients who will not benefit from NACT can be identified before treatment, it will allow them to receive other, more effective treatments. In this study, we conducted a retrospective analysis of the information from 264 selected cases of patients with breast cancer who received NACT, and investigated the efficacy of NACT for LABC, the clinical-pathological parameters, and patient prognosis.

2. Material and methods

2.1. Clinical data

264 cases of neoadjuvant chemotherapy of breast cancer cases were collected and screened out between January 2008 and May 2013 in the department of breast center, the fourth hospital of Hebei Medical

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