Research Progress in the Treatment of HER2 Positive Breast Cancer

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Abstract: breast cancer is one of the three most common types of cancer in the world, which not only has a high incidence rate, but also is a malignant tumor. In particular, HER2 positive breast cancer has been diagnosed as the most aggressive type of cancer in clinical practice. However, since the emergence of HER2 targeted drugs, it has significant implications for improving patients' quality of life. Especially for early high-risk patients, targeted therapy can improve patient prognosis; However, if the patient is in the late stage of cancer, targeted therapy drugs should be selected reasonably to achieve the goal of prolonging the patient's survival.

***Keywords*:** HER2; breast cancer; research progress

1. Introduction

The probability of women suffering from breast cancer is high. Although the current medical level continues to improve, this cancer still has a very high mortality rate. HER2 positive breast cancer accounts for 20%~25% of all breast cancer. This kind of cancer has high invasiveness and poor prognosis. With the emergence of HER-2 drugs, the treatment status and prognosis of patients can be further improved. Since the US Food and Drug Administration approved the use of lenatinib as an adjuvant treatment for early HER2 positive breast cancer, it represents another major breakthrough in the field of anti HER2 treatment. Therefore, this study comprehensively reviewed and analyzed the progress in clinical treatment of HER2 positive breast cancer.

2. Treatment of HER2 positive early breast cancer

2.1 Neoadjuvant therapy

When HER2 positive breast cancer patients receive a new adjuvant treatment program, it can effectively alleviate the patient's pathological symptoms, because this treatment program can obtain the patient's drug sensitivity information in advance, so as to achieve the purpose of predicting the patient's life cycle. The neoadjuvant therapy mainly includes the following types.

2.1.1 Treatment with Trastuzumab

This type of drug is one of the monoclonal antibody drugs that can further exert anti-tumor effects. Mei Xiangping [1] pointed out through research that trastuzumab type drugs, as one of the new adjuvant treatment schemes, can achieve a pathological complete remission rate of about 45% in HER2 positive breast cancer patients, and the 5-year event free survival rate and overall survival rate have significantly improved, $P<0.05$.

2.1.2 Patuximab treatment

There are certain differences between this type of drug and trastuzumab, but by binding to the HER2 extracellular domain II and through the synergistic effect of both, the efficacy of anti-HER2 therapy can be significantly improved. Scholars have analyzed the therapeutic effect of combination therapy with Qupa and Shuangpa in their research. The study showed that the pathological complete remission rate of patients after combined use was higher than that of the control group. Therefore, this treatment method has shown significant efficacy in new adjuvant therapy. In their research, some researchers discussed the new adjuvant treatment scheme for early breast cancer, and pointed out the safety and effect of the combination of trapa dipyridamole and various chemotherapy schemes. The results show that in the neoadjuvant treatment of HER2 positive breast cancer, the combination of docetaxel plus carboplatin and trapa can further improve the clinical treatment effect of patients.

2.1.3 Rapatinib treatment

Rapatinib is a small molecule tyrosine kinase inhibitor, so scholars have specifically compared the therapeutic effects of different drugs in clinical practice during the research process. The comparative results obtained by scholars during the research process show that the complete pathological remission rate of patients is significantly higher through the use of

combination therapy than through single drug treatment (P<0.05). Although it has short-term efficacy, long-term follow-up found that after 3 years of treatment, there was no significant difference in event free survival between the combination therapy group and the monotherapy group (P>0.05).

2.2 Adjuvant therapy

When patients receive different targeted treatment regimens, there are significant differences in the final treatment outcomes. Specifically, after one year of adjuvant treatment with trastuzumab, DFS and OS of early breast cancer patients were significantly improved. In addition, after 2 years of treatment, the probability of cardiac events and adverse events in patients begins to increase. At this point, it can be determined that the standard treatment time for trastuzumab adjuvant therapy should be one year. In addition, some scholars have pointed out that when HER2 positive early breast cancer patients receive treatment, by adopting different treatment schemes, the final results also have obvious shortcomings. The research results show that patients receiving AC-TH or TCbH regimen as adjuvant chemotherapy do not show significant differences in DFS and OS, and are superior to AC-T regimen. However, patients receiving TCbH regimen have a relatively lower probability of experiencing adverse cardiac events. Therefore, the domestic guidelines believe that the adjuvant treatment scheme for HER2 positive early breast cancer can choose AC-TH and TCbH schemes.

When HER2 positive breast cancer patients receive adjuvant treatment and do not obtain pCR, then ADC type drugs can be considered. After analyzing ADC type drugs, it was found that Enmetuzumab is one of these drugs, aimed at killing cancer cells. Scholars have compared the efficacy of neoadjuvant therapy with paclitaxel combined with trastuzumab in patients who did not achieve pCR. Clinical treatment shows that patients in the T-DM1 group have significant effects in iDFS, which can further improve their prognosis [2]. However, due to the widespread use of dual target therapy with Qupa in the process of neoadjuvant therapy, the lack of clinical empirical research has resulted in patients of this type not benefiting from this treatment regimen.

3. Treatment of HER2 positive advanced breast cancer

3.1 Frontline treatment

Since Patuzumab came into the market, clinical treatment of HER2 positive advanced breast cancer patients began to increase Patuzumab in the original first-line program. The results of the study can extend the PFS and OS of patients. Wu You and Dai Jianguo [3] pointed out in their study that when patients receive adjuvant therapy with pertuzumab, PFS is prolonged to 18.6 months and OS is prolonged to 57.2 months. The results of this study show that when clinical treatment of HER2 positive advanced breast cancer, docetaxel and trapa dual target therapy can be used as the first-line treatment. In addition, empirical studies by relevant scholars have shown that the selected research subjects were subdivided into the trastuzumab combined with paclitaxel group, T-DM1 group, and T-DM1 combined with pertuzumab group, and these regimens were compared as first-line treatment methods. The results showed that the differences in progression free survival (PFS) and overall survival (OS) among the three groups of patients were not statistically significant (P>0.05).

3.2 Second line treatment

Trastuzumab is a second-line treatment for HER2 positive advanced breast cancer patients, and patients generally choose TKI type drugs when receiving treatment. Among them, pyrotinib is one of the drugs of this type, which can block the growth of tumor cells. Empirical studies by relevant scholars have shown that the combination of pyrotinib and capecitabine is much more effective than single drug treatment, and can further prolong the PFS of patients.

In addition to the above drug types, antibody drug conjugates (ADC) can also be used as a second line treatment option for HER2 positive patients with advanced breast cancer. In one study, scholars evaluated the specific application of T-DXd in HER2 positive metastatic breast cancer patients after previous treatment progress. The research results indicate that the objective response rate of patients is approximately 60%, and the median progression free survival (PFS) can reach 16.4 months. In addition, a researcher studied 600 HER2 positive advanced breast cancer patients who received T-DM1 treatment. The results showed that after the treatment, the median PFS of patients was prolonged, the risk of death was reduced, and the total survival period (OS) was significantly increased. These research results indicate that T-DXd has shown high value in both safety and efficacy in the treatment of patients after T-DM1 therapy.

3.3 Back line treatment

Naratinib belongs to the second generation of TKI drugs, which are not only widely used but also effectively inhibit the spread of cancer cells. Studies by relevant scholars have shown that patients receiving treatment with nalatinib have a significantly lower median risk of progression of PFS disease and a lower mortality rate, but this is not statistically

significant (P>0.05). However, this type of drug has been applied to the clinical treatment of HER2 positive advanced breast cancer after many trials, and has played a significant role.

4. Conclusion

With the continuous development and exploration of HER2 drugs, the prognostic effects of various treatment plans are also constantly improving, especially the application of combination chemotherapy drugs and various small molecule inhibitors, whose clinical efficacy has been recognized. However, under the influence of multiple factors, it is necessary to comprehensively consider all factors in order to choose a reasonable treatment plan.

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