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CASE REPORT

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Repeated courses of radiation treatment in an HER2-positive breast cancer patient with diffuse brain metastases: A case report

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Abstract

In human epidermal growth factor receptor 2 (HER2+) expressing breast cancer subtype, the incidence of brain metastases is common and patients often die due to uncontrolled cranial disease. This is a case report of a HER2+ breast cancer woman with diffuse brain metastases that experienced long survival and clinical benefit from multiple radiotherapy treatments and combined systemic therapy, without increased toxicity.

KEYWORDS

brain metastases, breast cancer, lapatinib

1 | INTRODUCTION

In human epidermal growth factor receptor 2 (HER2+) expressing breast cancer subtype, the incidence of brain metastasis (BM) is common, even in the post-trastuzumab era.[1] Standard treatment for intracranial disease includes whole-brain radiation therapy (WBRT), resection, or radiosurgery (SRS).[2]

This is a case report of an HER2+ breast cancer patient with a diffuse BM that experienced long survival and clinical benefit from multiple radiotherapy treatments and combined systemic therapy.

2 | CASE REPORT

In 2005, a 28-year-old patient affected by locally advanced ductal breast carcinoma underwent neo-adjuvant chemotherapy followed by radical mastectomy and axillary lymphadenectomy (ypT2 pN2 pMX, estrogen receptors 60%, progesterone receptors 70%, HER2+, and Ki67 35%). After surgery, patient started hormonal therapy and trastuzumab and received radiotherapy to the chest and supraclavicular nodes. Subsequent controls showed no recurrence of disease until 2016 when pulmonary, hepatic, and more than twenty BMs occurred. A re-biopsy confirmed biologic profile, and the patient started pertuzumab-trastuzumab-docetaxel. At this time, WBRT was not performed as the patient was asymptomatic. In April 2017, a CT scan showed partial response of extracranial disease, while a brain magnetic resonance (MRI) showed brain progression with at least 30 lesions, some with perilesional edema. In May, the patient was treated with WBRT for a dose of 30 Gy (10 fractions). At 8 months, most lesions had disappeared and one was growing; for this reason, she underwent fractionated stereotactic radiotherapy (fSR) (dose of 27 Gy, prescribed to the PTV-enclosing 80%-isodose) on the growing lesion. In July 2018, despite systemic stable disease, a new MRI showed brain progression and the appearance of radionecrosis in the region previously treated with fSR. The patient was started on lapatinib-capecitabine, still in progress. In January 2019, further progression of seven brain lesions was documented and, given the young age, excellent performance status, the very long disease-free interval and stable nonbrain disease associated with better prognosis, fSR was indicated on all lesions (dose of 18 Gy in 3 fractions, prescribed to the PTV-enclosing 80%-isodose). After 9 months, MRI showed size reduction of four out of the seven lesions treated and stability of the remaining three; millimetric increase of few lesions not treated with fSR (two lesions with diameter > 1 cm) was also detected.

Currently, the patient is in general and neurological good conditions, with stable systemic disease. For this reason, the patient was deemed eligible for further fSR to the two larger lesions.

3 | DISCUSSION

We have reported the case of a HER2+ breast cancer patient diagnosed with diffuse BM and alive 36 months after this diagnosis, without cerebral symptomatology. This survival time is higher than that reported in other series ranging from 18 to 24 months in the modern era.[3]

In this setting, WBRT still represents the standard treatment.[4]

After the WBRT, our patient underwent two courses of fSR chosen for the optimal sparing of healthy brain tissue and low risk of additional neurocognitive deterioration.[5] Generally, selection for retreatment depends on good performance status, absence of neurologic deficits, limited number of BM, and previous WBRT performed at least 6 months before reirradiation.[6] Moreover, a recent update of the breast GPA showed that patients with BM in the best prognostic group could now expect to live more than 3 years.[7] This supports the utility of retreatment in these patients.

The second course of fSR was delivered to seven progressing BM. We decided not to repeat WBRT because: first, the median reported survival time after re-WBRT is limited (2.5 - 5.2 months) [8]; second, it can cause additional neurological toxicity; third, the patient was receiving lapatinib, a molecule with intracranial activity.[8] Parsai et al showed that lapatinib with SRS reduced local failures, while not increasing the rate of radionecrosis.[9] We speculated that it would be sufficient to treat only progressive lesions with a radiation technique able to achieve greater local control, leaving the others to lapatinib activity. A single-isocenter volumetric arc-therapy technique was used given the extreme clinical efficiency compared to multiple isocenter techniques.[10]

In this patient, we observed only a grade 1 radionecrosis occurring after the first course of fSR during pertuzumab-trastuzumab. We did not record additional neurologic toxicity with a second course of fSR given with lapatinib.

In conclusion, in HER2+ breast cancer patients we can observe a prolonged survival despite diffuse BM, and therefore, repeated radiation treatments may be necessary.

The choice of the best treatment for the single patient must be based on achieving the longest disease control with low toxicity. Concurrent systemic treatments can increase the therapeutic ratio.

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