European Journal of Cancer 102 (2018) 1–9

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.ejcancer.com

Original Research

Treatment and outcomes of patients in the Brain Metastases in Breast Cancer Network Registry

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Received 2 July 2018; accepted 3 July 2018

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https://doi.org/10.1016/j.ejca.2018.07.004

KEYWORDS
Brain metastases;
Breast cancer;
Survival;
Diagnostic procedures

Abstract ***Background:*** Brain metastases (BMs) have a major impact on life expectancy and quality of life for many breast cancer patients. Knowledge about treatment patterns and outcomes is limited.
Methods: We analysed clinical data of 1712 patients diagnosed with BMs from breast cancer between January 2000 and December 2016 at 80 institutions.
Results: Median age at diagnosis of BMs was 56 years (22–90 years). About 47.8% (n = 732) of patients had HER2-positive, 21.4% (n = 328) had triple-negative and 30.8% (n = 471) had hormone receptor (HR)–positive, HER2-negative (luminal-like) primary tumours. The proportion of patients with HER2-positive BMs decreased comparing the years 2000–2009 with 2010–2015 (51%–44%), whereas the percentage of patients with luminal-like tumours increased (28%–34%; p = 0.0331). Patients with BMs in the posterior fossa were more often HER2 positive (n = 169/314, 53.8%) than those diagnosed with triple-negative (n = 65/314, 20.7%) or luminal-like primary breast cancer (n = 80/314, 25.5%), (p < 0.0001). Median overall survival (OS) time after development of BMs for the overall cohort was 7.4 months (95% confidence interval [CI]: 6.7–8.0 months). One-year survival rate was 37.7% (95% CI: 35.2–40.1). Patients with HER2-positive tumours had the longest median OS of 11.6 months (95% CI: 10.0–13.4) compared with 5.9 months (95% CI: 5.0–7.2) for patients with luminal-like and 4.6 months (95% CI: 3.9–5.4) for patients with triple-negative tumours. Patients with HER2-positive tumours who received anti-HER2 treatment had longer median OS than those without (17.1 months versus 7.2 months, p < 0.0001).
Conclusions: Prognosis of patients after developing BMs varies significantly according to the subtype. The outcome in this cohort is similarly poor as in triple-negative and HR-positive/HER2-negative patients. Our results underline the high medical need for improvement of treatment and prevention strategies for BMs in breast cancer patients.

1. Introduction

About 30% of patients with metastatic breast cancer develop brain metastases (BMs), despite systemic therapies [1]. BMs are associated not only with a very unfavourable prognosis compared with other metastatic sites but also with severe neurological symptoms including cognitive and motoric impairments. In almost all patients, this results in a severe reduction of quality of life [2]. After lung cancer, breast cancer is the second most common primary cancer of patients with BMs. The incidence of BMs is higher than that of primary brain tumours.

Improvements in systemic therapy with better control of extracranial disease probably explain in part the rising incidence of BMs in breast cancer patients during the last years. This also reflects insufficient control of cerebral tumour spread and growth by current treatment strategies. Moreover, detection rates of asymptomatic BMs have increased with improved imaging techniques by contrast-enhanced magnetic resonance imaging (MRI) as a standard approach for the diagnosis of BMs.

Several risk factors for the development of BMs after breast cancer diagnosis have been identified. Younger age, poorly differentiated primary tumours, negative hormone receptor (HR) status and axillary node–positive breast cancer have been associated with increased BM risk. Patients with HER2-positive and triple-negative breast cancer have a higher risk of developing BMs than patients with luminal tumours [3,4]. In patients with metastatic HER2-positive or triple-negative disease, prevalence of BMs as high as 30–40% has been described [3–5].

Most current reports on BMs lack detailed data about treatment patterns. Furthermore, sample sizes of published studies are limited, and analyses with regard to characteristics of BMs in specific subgroups are scarce. To improve knowledge about this clinically important cohort, we initiated the registry ‘Brain Metastases in Breast Cancer Network Germany’ (BMBC, German Breast Group [GBG] 79).

2. Material and methods

We retrospectively identified patients diagnosed with BMs between January 2000 and December 2016 at 80 participating institutions in Germany. The presence of BMs was defined based on appropriate imaging and/or histological findings since the year 2000. Patients were excluded if they had a history of other malignant diseases, no histological verification of the diagnosis of breast cancer or a history of a neurologic disease.

The project is a collaborative study of the University Medical Center Hamburg-Eppendorf, the German