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# Disease-related surgery in patients with distant metastatic breast cancer

E. Amann [a,b], D.J. Huang [c], W.P. Weber [d], S. Eppenberger-Castori [e], S.M. Schmid [f], T.H. Hess [a,b], U. Güth [a,b,c,*]

[a] Cantonal Hospital Winterthur, Department of Gynecology and Obstetrics, Brauerstrasse 15, CH-8401 Winterthur, Switzerland
[b] Breast Center "SenoSuisse", Brauerstrasse 15, CH-8401 Winterthur, Switzerland
[c] University Hospital Basel (UHB), Department of Gynecology and Obstetrics, Spitalstrasse 21, CH-4031 Basel, Switzerland
[d] UHB, Department of Surgery, Spitalstrasse 21, CH-4031 Basel, Switzerland
[e] UHB, Institute of Pathology, Schönbeinstrasse 40, CH-4031 Basel, Switzerland
[f] Spital Grabs, Department of Gynecology & Obstetrics, Spitalstrasse 44, CH-9472 Grabs, Switzerland

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**Abstract**

*Introduction*: This study evaluates the frequency of and indications for disease-related surgical procedures in the palliative breast cancer (BC) situation.

*Patients & methods*: Based on a cohort of women who were treated for newly diagnosed BC during a 20-year period (1990–2009), we analyzed 340 patients who developed distant metastatic disease (DMD) until 2011 and died (i.e. still ongoing palliative disease courses were not included).

*Results*: One hundred and twenty-seven surgical procedures were performed in 100 patients (29.4% of all patients with metastatic disease). The most common site for surgery was breast ($n = 60$, 47.2%). The primary tumor was removed at first diagnosis of DMD in 43 patients (33.9%); sixteen operations (12.6%) were performed for local recurrence. In 37 patients, 50 surgical procedures (39.4%) were necessary to stabilize osseous structures due to metastases. Procedures were rarely performed on other common metastatic sites: lung: $n = 1$ (0.8%); liver: $n = 1$ (0.8%), brain: $n = 4$ (3.1%). When excluding surgery for primary breast tumors at initial diagnosis of DMD from analysis, 34 of 84 surgeries (40.4%) were performed in the first third of survival follow-up (i.e. period of metastatic disease survival); operations in the last two-thirds each totaled 29.8% ($n = 25$). The median survival after surgery was 16 months (range: 0.5–89 months).

*Conclusions*: In a cohort of BC patients who had primary or developed secondary DMD, nearly one third of the patients received disease-related surgical procedures during their palliative disease course. This high rate of operations shows that surgery has a clearly established role in the palliative therapy concept.



*Keywords:* Breast cancer; Distant metastases; Palliative situation; Surgery

## Introduction

In Western countries, approximately 5–10% of all breast cancer (BC) patients present with distant metastases at initial diagnosis (primary metastatic disease). Depending on prognostic factors, up to 30% of node-negative and up to 70% of node-positive BC patients develop distant metastases during the course of their illness (secondary metastatic disease).[1] Once distant metastases occur, BC remains a treatable condition but is no longer considered curable.[1–3] In this situation, surgical procedures might be performed with palliative intention and the primary goals of treatment include prevention and palliation of symptoms, maintenance or improvement of quality of life and – potentially – prolongation of survival.

In the literature, a large amount of information exists on palliative surgical interventions during the disease course of metastatic BC. However, most of the published studies evaluate only the impact of surgery in particular anatomic sites such as the removal of the primary breast tumor[4,5] or surgical treatment for metastatic lesions of the liver,[6–8] the lung,[6] the brain[9] or skeletal metastases.[10] Ruiterkamp and

* Corresponding author. Cantonal Hospital Winterthur, Department of Gynecology and Obstetrics, Brauerstrasse 15, CH-8401 Winterthur, Switzerland. Tel.: +41 52 2662713; fax: +41 52 2664512.
*E-mail address:* uwe.gueth@unibas.ch (U. Güth).

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Ernst[11] as well as Pockaj et al.[12] recently evaluated the role of surgery in the palliative BC situation in a more general approach and examined the various surgical interventions in different anatomic sites in a review. This general approach, however, has not yet been applied to an institutional series of metastatic BC patients. To our knowledge, this study is the first comprehensive description regarding frequency of and indications for BC-related surgical procedures in the palliative situation by analyzing an unselected cohort of BC patients with distant metastatic disease (DMD).

## Patients and methods

Data from the prospective relational Basel Breast Cancer Database (BBCD), which includes all newly diagnosed pathologically proven primary invasive BC cases treated at the University Women's Hospital Basel, Switzerland since 1990, provided the basis for this study. It is the largest breast center in the canton of Basel and the patient population is representative of the population of the region. For this study, data from all female patients who were diagnosed with BC up to and including 2009 was analyzed ($n = 1459$).

During this 20-year period, 92 patients (6.3%) had DMD at initial diagnosis, or in other words, had primary metastatic disease (PMD). In 2011, with the exception of 37 patients who were lost to follow-up (2.5% of the entire study group), outcome information was available for all patients recorded in the BBCD (median follow-up time: 72 months, range 0.5–252 months). As of March 2011, 277 patients (20.3% of all patients who had stage I–III disease at initial BC diagnosis) had developed distant metastases over time, i.e. had secondary metastatic disease (SMD). The median time between initial BC diagnosis and first diagnosis of DMD was 38.5 months (range: 2–215 months).

Out of 369 patients with confirmed distant metastatic BC, we obtained information regarding the time of diagnosis of metastatic disease and date of death but we did not have complete information about the disease course and palliative therapy details for six patients (PMD, $n = 1$; SMD, $n = 5$). Thus, these patients were not considered for analysis, and ultimately 363 patients were included in the study (Table 1).

The patients in this cohort were followed until death. Patients who remained alive were followed until January 2013, i.e. patients who are still alive had a minimum follow-up time of 24 months. The outcome status of the cohort ($n = 363$) was as follows: (1) died of metastatic BC: 316 patients (87.1%); (2) died of other causes: 24 patients (6.6%); (3) alive with metastatic disease: 20 patients (5.5%); and (4) alive, no evidence of disease: 3 patients (0.8%, Table 1).

In order to analyze surgical procedures during the palliative therapy course, we examined only the 340 patients who ultimately died (PMD, $n = 78$; SMD, $n = 262$). In other words, we analyzed only completed disease and treatment courses (Table 1).

Table 1
Disease-related surgery in breast cancer patients with distant metastatic disease.

| Variable | *n* (%) |
|---|---|
| Patients with DM and complete information about disease and therapy course. | 363 |
| Last follow-up: alive[a] | 23 (6.3) |
| Study cohort: patients who died, i.e. patients with completed disease and therapy courses. | 340 (93.7) |
| | |
| Study cohort | 340 |
| A. Breast cancer-related surgery | 100 (29.4) |
| B. No surgery | 240 (70.6) |
| | |
| *Breast cancer-related surgery* | |
| Number of patients | 100 |
| Number of procedures | 127 (100) |
| Breast and locoregional lymph nodes | 60 (47.2) |
| Primary tumor (PMD) | 43 (33.9) |
| Contralateral breast | 1 (0.8) |
| Locoregional recurrence, all procedures | 16 (12.6) |
| Metastasectomy after mastectomy | 8 (6.3) |
| Mastectomy after breast-conserving therapy | 4 (3.1) |
| Tumorectomy after breast-conserving therapy | 1 (0.8) |
| Locoregional lymph nodes | 3 (2.4) |
| | |
| Bone | 50 (39.4) |
| Femur | 28 (22.1) |
| Vertebrae | 14 (11.0) |
| Humerus | 6 (4.7) |
| Clavicle | 1 (0.8) |
| Jawbone | 1 (0.8) |
| | |
| Lung | 1 (0.8) |
| Liver | 1 (0.8) |
| Brain | 4 (3.1) |
| | |
| Other locations | 11 (8.7) |
| Ovary/peritoneal cavity | 5 (3.9) |
| Skin (excluding breast region) | 3 (2.4) |
| Lymph nodes (mediastinal) | 1 (0.8) |
| Urinary bladder | 1 (0.8) |
| Gallbladder | 1 (0.8) |

DM, distant metastases; PMD, primary metastatic disease.

[a] Three patients were alive with no evidence of disease. The long time survival after pathologically confirmed distant metastatic disease of these three patients was as follows: (i) 204 months after diagnosis of bone metastases, (ii) 209 months after diagnosis of bone and lung metastases, (iii) 230 months after diagnosis of lung metastases. Details on the disease course of these patients have previously been described.[27]

For each surgical intervention, we recorded the time to surgery, in months, with respect to the first diagnosis of DMD and the survival time after the procedure. Based on this data, we also calculated in which third of the palliative disease course the surgical procedure had been performed. For example, a patient was diagnosed with DMD, consisting of bone and liver metastases, in June 2005. Eight months later, she received surgery for bone metastases. Eventually, the patient died of metastatic BC in June 2008 (i.e. 28 months after surgery and 36 months after the first diagnosis of DMD). In this particular case, we