The Breast 26 (2016) 80–86

Contents lists available at ScienceDirect

The Breast

journal homepage: www.elsevier.com/brst

Original article

The quality of preoperative diagnostics and surgery and their impact on delays in breast cancer treatment – A population based study

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ARTICLE INFO

Article history:
Received 15 October 2015
Received in revised form
7 December 2015
Accepted 19 December 2015
Available online xxx

Keywords:
Breast cancer
Surgery
Quality of care
Treatment delay
Waiting time

ABSTRACT

Background and objectives: This study aims to clarify quality of breast cancer surgery in population-based setting. We aim to elucidate factors influencing waiting periods, and to evaluate the effect of hospital volume on surgical treatment policies. Special interest was given to diagnostic and surgical processes and their impact on waiting times.
Methods: All 1307 patients having primary breast cancer surgery at the Helsinki and Uusimaa Hospital District during 2010 were included in this retrospective study.
Results: Median waiting time for primary surgery was 24 days and significantly affected by additional imaging and diagnostic biopsies as well as hospital volume. Final rate of breast conserving surgery was surprisingly low, 51%, not affected by hospital volume, $p = 0.781$. Oncoplastic resection and immediate breast reconstruction (IBR) were performed more often in high volume units, $p < 0.001$. Quality of axillary surgery varied with unit size. Multiple operations, IBR and high volume unit were factors prolonging initiation of adjuvant treatment.
Conclusion: Quality of preoperative diagnostics play a crucial role in minimizing the need of repeated imaging and biopsies as well as multiple operations. Positive impact of high-volume hospitals becomes evident when analyzing procedures requiring advanced surgical techniques. High-volume hospitals achieved better quality in axillary surgery.

Introduction

The aim of breast cancer surgery is to provide excellent oncological outcome without unnecessarily compromising quality of life [1]. Both timely diagnosis and treatment without delay are considered core quality indicators in breast cancer treatment [1,2]. The waiting time for breast cancer surgery has generally increased over the past decade, likely due to increased use of additional imaging modalities and frequent second opinions [3,4]. Furthermore, many surgery-related factors may delay the initiation of adjuvant treatments and thus increase recurrence risk [5–8]. Therefore, describing the process of breast cancer care is important in improving the quality of treatment. Previous studies have identified several factors associated with delays in breast cancer treatment [4,9,10], but organizational factors remain to be evaluated.

The significance of surgical volume on breast cancer survival remains controversial. There are reports [11,12] showing that high surgical volume hospitals are associated with better overall survival and higher breast conserving surgery (BCS) rate [13,14], whereas other studies indicate that the role of surgical volume is not substantial [15,16]. Centralization may provide better facilities for immediate breast reconstructions.

This study aims to clarify quality of breast cancer surgery in a population-based setting. Furthermore, we aim to elucidate factors influencing waiting periods, and to evaluate the effect of hospital volume on surgical treatment policies. Special interest will be given to diagnostic and surgical processes and their impact on waiting times.

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http://dx.doi.org/10.1016/j.breast.2015.12.009
0960-9776/

Patients and methods

Patients

All patients having primary breast cancer surgery at the Helsinki and Uusimaa Hospital District during year 2010 were included in this study. Patients were identified from a database. The data was checked and completed with information from electronic patient records. The study plan was approved by the Ethics Committee of Helsinki University Central Hospital.

Database search found 1488 patients of which 181 patients were excluded. Reasons for exclusion were as follows: 49 patients had earlier breast cancer in the same breast, 21 patients had primary breast cancer surgery in 2009, 13 patients had benign breast tumor or risk reducing surgery, 3 patients had other malignant tumor or metastasis in the breast (sarcoma, lung cancer metastasis), 95 patients had corrective breast surgery only, including 61 patients with delayed breast reconstruction. The remaining 1307 patients were included in this study. 23 patients had bilateral breast cancer surgery in 2010 either simultaneously or separately. In these patients, the tumor with more advanced stage was used as index tumor.

Quality indicators

There are no validated and tested quality indicators for breast cancer patients in Finland. The following parameters were modified from EUSOMA recommendation [1] and used as quality indicators:

- Proportion of patients having breast conserving surgery (BCS)
- Proportion of mastectomy patients receiving immediate breast reconstruction (IBR)
- Proportion of oncoplastic resections of all BCS
- Need for re-operation due to insufficient resection margins
- Need for re-operation due to false-negative sentinel node in the intraoperative assessment
- Failure in identifying sentinel node
- Axillary lymph node dissection (ALND) in node negative patients
- Time from referral to surgery
- Time from surgery to adjuvant therapy
- Number of cancer operations.

Population-based screening

Municipal authorities manage breast cancer screening in Finland. Biennial screening is offered to all women aged 50–69 years. According to the Health and Social Services Ministry statistics, screening participation in 2010 was 85% nationally and 79% in the Helsinki and Uusimaa hospital district.

Hospital volume and facilities

Treatment of malignant diseases is almost exclusively performed by public health care system in Finland. Regional health care districts are organizing the treatment. The number of breast cancer operations in each hospital is mainly dependent on the size of the population and incidence of breast cancer within the hospital districts. We do consider this study population-based since patients are referred to certain hospitals based solely on their place of residence. Some special cases, such as those with IBR, are referred to high-volume hospitals performing these operations - hospitals A and B in the present study.

Before referral to hospital for breast cancer surgery, diagnostic imaging and percutaneous needle biopsy are required. During study period indications for pre-operative MRI imaging were:

Table 1
Study population and tumor characteristics.

		All n = 1307	Hospital A n = 697	Hospital B n = 394	Hospital C n = 125	Hospital D n = 57	Hospital E n = 34	p-value
Age, median (range)		62 (22–100)	62 (22–93)	60 (23–100)	62 (31–96)	62 (35–92)	66 (44–89)	0.005
Histological T-stage	Tis&T1mi	97 (7%)	50 (7%)	38 (10%)	5 (4%)	3 (5%)	1 (3%)	<0.001
	T1	813 (62%)	453 (65%)	231 (59%)	77 (62%)	33 (58%)	19 (56%)	
	T2	306 (23%)	157 (22%)	100 (25%)	26 (20%)	16 (28%)	7 (20%)	
	T3-T4	71 (5%)	25 (4%)	20 (5%)	16 (13%)	3 (5%)	7 (20%)	
	N.A.	20 (2%)	12 (2%)	5 (1%)	1 (1%)	2 (4%)	0	
Nodal stage	N0	774 (59%)	420 (60%)	224 (57%)	80 (64%)	33 (57%)	17 (50%)	0.005
	N1mi	82 (6%)	46 (6%)	24 (6%)	4 (3%)	5 (9%)	3 (9%)	
	N1	237 (18%)	118 (17%)	86 (22%)	21 (17%)	4 (7%)	8 (23%)	
	N2, N3	156 (12%)	77 (11%)	44 (11%)	19 (15%)	10 (18%)	6 (18%)	
	N.A.	58 (4%)	36 (5%)	16 (4%)	1 (1%)	5 (9%)	0	
Histological grade	1	306 (24%)	189 (28%)	79 (21%)	21 (17%)	12 (22%)	5 (15%)	0.029
	2	537 (42%)	262 (39%)	175 (45%)	61 (49%)	26 (48%)	13 (38%)	
	3	433 (34%)	228 (33%)	131 (34%)	42 (34%)	16 (30%)	16 (47%)	
ER	positive	1025 (85%)	558 (87%)	306 (86%)	92 (79%)	41 (77%)	28 (85%)	0.070
PR	positive	797 (66%)	431 (67%)	230 (64%)	80 (68%)	33 (62%)	23 (70%)	0.800
HER2	positive	158 (13%)	74 (12%)	47 (13%)	20 (17%)	10 (19%)	7 (21%)	0.173
Histological type	DCIS	96 (7%)	52 (7%)	35 (9%)	5 (4%)	3 (5%)	1 (3%)	0.117
	Ductal	871 (68%)	447 (66%)	274 (70%)	84 (68%)	43 (75%)	23 (69%)	
	Lobular	185 (14%)	98 (14%)	60 (15%)	14 (11%)	7 (12%)	6 (18%)	
	Other Invasive	144 (11%)	92 (13%)	13 (6%)	21 (17%)	4 (7%)	4 (12%)	
Adjuvant treatment	None	94 (7%)	51 (7%)	24 (6%)	12 (10%)	6 (11%)	1 (2%)	<0.001
	Endocrine only	169 (13%)	97 (14%)	38 (10%)	20 (16%)	8 (14%)	6 (18%)	
	Radiotherapy ± endocrine	457 (36%)	261 (37%)	131 (33%)	42 (33%)	18 (32%)	5 (15%)	
	Chemotherapy ± radio ± endo	540 (41%)	265 (38%)	182 (46%)	49 (39%)	22 (38%)	22 (65%)	
	Neoadjuvant treatment	13 (1%)	9 (1%)	2 (1%)	0	2 (3%)	0	
	N.A.	34 (2%)	14 (2%)	17 (4%)	2 (2%)	1 (2%)	0	

ER: oestrogen receptor.
PR: progesterone receptor.
HER2: Human Epidermal Growth Factor Receptor 2.
N.A.: Not available.