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Acknowledgements—We thank Mrs Helen Skiles and Sylvia Trevino for technical assistance. This work was supported in part by grants from the Strategic Defense Initiative MFEL Program, the Leukemia Association of North Central Texas, and the cell biology fund of the Baylor Research Foundation.

Eur J Cancer, Vol. 26, No. 5, pp. 553–555, 1990.
Printed in Great Britain

0277–5379/90$3.00 + 0.00

Papers

The Limited Value of Routine Chest X-Ray in the Follow-up of Stage II Breast Cancer

Vibeke B. Løgager, Aage Vestergaard, Jørn Herrstedt, Henrik S. Thomsen, Karin Zedeler and Per Dombernowsky

In 280 patients with stage II breast cancer, chest X-ray was performed at 6 and 12 months and yearly thereafter to the 6th year or until recurrence, another cancer was detected, the patient refused further follow-up or died. Among 1289 scheduled chest X-rays, malignant changes were found in 20 patients, of which only 3 had pulmonary symptoms. In a further 14 patients malignant changes were suspected, but follow-up examinations could not prove malignancy. 26 patients presented within 12 months after the last scheduled X-ray with pulmonary symptoms and a work-up chest X-ray revealed malignant changes. Thus, in only 1.3% of the scheduled X-rays were unsuspected malignant changes diagnosed. Median survival of patients with malignant chest X-rays found at scheduled controls versus between scheduled controls did not differ significantly ($P = 0.26$). It is concluded that routine chest X-ray is not indicated in patients with stage II breast cancer.
Eur J Cancer, Vol. 26, No. 5, pp. 553—555, 1990.

INTRODUCTION

CHEST X-rays are part of follow-up programmes of breast cancer patients in order to provide an early diagnosis of intrathoracic spread. The examination is easily performed, cheap and considered reasonably sensitive. We recently reported that yearly chest X-rays in patients with stage I breast cancer who were otherwise apparently free of disease have a low cost/benefit ratio [1], as only 0.3% of the scheduled chest X-rays revealed unsuspected malignant changes. Patients with stage II breast cancer have a higher recurrence rate than stage I [2], suggesting a higher cost/benefit ratio. The present study was therefore undertaken in order to examine retrospectively whether repeated X-rays performed at fixed intervals after mastectomy had any value in patients with primary operable breast cancer, Danish Breast Cancer Cooperative Group (DBCG) stage II [2, 3].

Table 1. Causes for leaving DBCG protocol and time of last scheduled chest X-ray

Causes for leaving the protocol	Years after mastectomy								Total
	<0.5	0.5–1	1–2	2–3	3–4	4–5	5–6	6–7	
Recurrence, lungs involved	0	7	12	9	12	1	2	3	46
Recurrence, lungs not involved	2	14	20	11	7	0	0	7	61
Another cancer	0	0	3	0	0	0	2	1	6
Death	0	5	7	2	1	1	1	2	19
Miscellaneous	4	9	3	4	1	2	1	1	25
Total off-study	6	35	45	26	21	4	6	14	157
Cumulative No. of patients	6	41	86	112	133	137	143	157	
No recurrence	0	0	0	0	0	0	0	123	280

PATIENTS AND METHODS

From November 1978 to November 1982, 2141 patients with primary operable breast cancer, DBCG stage II (tumour size > 5 cm in diameter and/or invasion of skin and/or invasion of deep resection line and/or axillary lymph node metastases) entered the nationwide adjuvant protocols (DBCG 77 b+c) [3]. Of these 2141 patients, 280 had follow-up at Herlev University Hospital. The 280 patients differed significantly from the remaining 1861 patients with a lower median age (53 years, range 28–69 years versus 55 years, range 19–69 years), fewer axillary lymph nodes removed, and of these significantly less had tumour involvement, whereas recurrence free survival rate, mortality rate, tumour size and the degree of anaplasia did not differ significantly. According to the treatment protocols, chest X-rays were performed at 6 and 12 months, and then yearly unless the patient left the protocol due to recurrence, another cancer was diagnosed, the patient refused further follow-up or died. The present study includes only X-ray examinations performed until the 6th year after mastectomy and clinical follow-up during the following 12 months.

The secretariat of DBCG delivered a list of patients controlled at Herlev University Hospital. The list noted whether the patient was still on protocol or whether the patient had left the protocol ('off-study' form received) and, if so, why and when. At the Department of Diagnostic Radiology the scheduled chest X-ray was checked and a diagnosis of benign or malignant intrathoracic lesion was recorded. The records of all patients reported as having left the protocols and those patients having a malignant diagnosis at the routinely performed X-ray, independent of whether they still were in protocol or not, were reviewed.

Chest X-ray in anterior–posterior (AP) and lateral projection was performed with a high (120–150) kilovoltage technique, and was, in the majority of the cases, performed in connection with the clinical control at the Department of Oncology. In a case of suspected malignant findings, further evaluation, which could include conventional tomography, CT scans, bronchoscopy, thoracoscopy, or percutaneous biopsy, was performed.

RESULTS

During the 7 years of observation 157 patients left the study (Table 1). According to the protocol, 1302 scheduled X-rays were planned, but only 1289 examinations were done. In these 13 missing cases subsequent examinations did not reveal malignancy.

Unexpected positive scheduled chest X-rays

Among the 280 patients, pulmonary metastases were found in 13, pleural effusion in 2, pleural metastases in 1 and skeletal metastases (sternum) in 1. At the clinical control preceding the routine chest X-ray no pulmonary symptoms were reported and clinical findings were normal in these 17 patients. The incidence of unexpected positive chest X-rays was: 6 months 0.0%; 1st year 2.1%; 2nd year 2.1%; 3rd year 3.0%; 4th year 0.0%; 5th year 0.7% and 6th year 1.5% (Table 2), giving an overall incidence of 1.3% unexpected findings per performed X-ray until the 6th year after mastectomy. 15 of the 17 patients died at a median of 15 months (range: 1–51 months) after recurrence had been detected at the scheduled chest X-ray. The remaining 2 patients are alive at 21+ and 104+ months after recurrence diagnosed at chest X-ray. The overall median survival of the whole group was 19 months (range: 1–104 months).

Expected positive scheduled chest X-rays

3 patients with pulmonary symptoms at the routine clinical control had malignant changes at the corresponding chest X-ray, consisting of pulmonary metastases in 1 and pleural effusion in 2 patients. The 3 patients survived 3, 8 and 14 months, respectively, after the abnormal chest X-ray. The median survival was 8 months (range: 3–14 months). The median survival of all patients with positive X-ray findings at scheduled controls was 14.5 months (range: 1–104+ months).

False positive scheduled chest X-rays

Fourteen chest X-ray examinations showed suspected malignant changes causing supplementary examinations which could

Table 2. Number of routine chest X-rays

	Years after mastectomy							
	0	0.5	1	2	3	4	5	6
No. of patients	280	274	239	194	168	147	143	137
Cumulative No. of examinations	0	271	507	701	869	1015	1156	1289
True positive malignant findings at chest X-ray								
Expected	0	2	0	0	1	0	0	0
Unexpected	0	0	5	4	5	0	1	2

Correspondence and reprint requests to: V.B. Løgager, Sandbyvej 46, 3, 2730 Herlev, Denmark.
V.B. Løgager, A. Vestergaard and H.S. Thomsen are at the Department of Diagnostic Radiology, J. Herrstedt and P. Dombernowsky are at the Department of Oncology, H.S. Thomsen is also at the Department of Nuclear Medicine, Herlev Hospital, University of Copenhagen and K. Zedeler is at the DBCG Secretariat, Finsen Institut/University Hospital, Copenhagen, Denmark.

not confirm the initial findings. In 6 patients, no recurrence has developed from 6 to 8 years after the abnormal chest X-ray diagnosis. In the remaining 8 patients recurrence was detected, in 6 outside the chest and in 2 in the sternum or ribs. 2 of these 8 patients are still alive 3 and 6 years later. The remaining 6 died from 1 to 6 years (median 2.5 years) after the false positive diagnosis. No intrathoracic spread has developed in these 8 patients.

Malignant findings at X-ray within 12 months after scheduled X-ray

26 patients developed pulmonary symptoms including chest pain between scheduled clinical controls. In all these patients chest X-ray revealed malignant changes. 4 had pulmonary metastases, three carcinomatous lymphangitis, 10 pleural effusion, 1 pleural metastases and 8 skeletal metastases. 25 of the 26 patients have died; the median survival after recurrence was 11 months (range: 1–60+ months).

DISCUSSION

After performing a total of 1289 chest X-rays in 280 patients with primary operable breast cancer, DBCG stage II, unexpected malignant findings were revealed in only 17 patients. Almost twice as many (3 plus 26) had symptoms indicating thoracic spread at the time of diagnosis at chest X-ray, of which 90% were performed unscheduled (i.e. not fixed to the time of mastectomy). There was no significant survival difference after the diagnosis of thoracic spread between the 29 symptomatic and the 17 asymptomatic patients. According to Ojeda *et al.* [4], it is still uncertain whether chemotherapy and/or radiation may prolong the survival further if given to asymptomatic patients. This could, however, in part be due to the different symptomatology of the different types of spread. Pleural effusions and malignant lymphangitis rarely occur without symptoms, whereas pulmonary nodules usually cause no symptoms in the early stage [5].

In stage I breast cancer patients, it was necessary to perform 400 examinations to diagnose one case of asymptomatic thoracic spread [1]. The present study shows that in stage II breast cancer patients one case of malignancy was found when 76 scheduled chest X-rays were performed. This is of course a better cost/benefit ratio, but still low. As regards routinely performed bone scintigraphy in primary operable breast cancer patients who at the time of the scintigraphy are considered to be recurrence free, it has been stated that no more than 50 examinations should be done between the finding of one case of malignancy [6].

In our opinion the number of normal examinations between two abnormal examinations may not exceed 50 in a screening programme, where the examination dates are related to the day of surgery, especially when abnormal findings in asymptomatic patients do not seem to result in a significantly longer survival.

We conclude that due to an unsatisfactory cost/benefit ratio (number of malignant cases/total number of examinations, no difference in life time between asymptomatic and symptomatic patients) and a high frequency of false positive cases (causing expensive supplementary examinations), repeated routine chest X-rays in patients with stage II breast cancer are not warranted. Chest X-ray should therefore be reserved for patients with a suspicion of recurrence or with pulmonary symptoms; in this case the cost/benefit ratio is more satisfactory.

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Eur J Cancer, Vol. 26, No. 5, pp. 555–557, 1990.
Printed in Great Britain

0277–5379/90$3.00 + 0.00

Risk of Breast Cancer Subsequent to Proven Gross Cystic Disease

Stefano Ciatto, Annibale Biggeri, Marco Rosselli Del Turco, Dusca Bartoli and Anna Iossa

3809 women in whom breast cysts were aspirated were followed up to evaluate the observed/expected ratio of subsequent breast cancer. Breast cancer at cyst aspiration was excluded by physical examination and mammography. The first year of follow-up was censored to avoid a prevalence screening effect. Subsequent breast cancers were found either directly or by means of a cancer registry which also provided the expected age and residence specific incidence rates. The number of expected cancers was assessed in person-years (15,915 in the total series). The observed/expected subsequent breast cancer ratio was 1.77 (34/19.15; 95% confidence interval 1.23–2.48, $P < 0.05$). The presence of gross cysts was associated with a moderately though significantly increased risk of subsequent breast cancer. Increased surveillance in such patients is not justified.
Eur J Cancer, Vol. 26, No. 5, pp. 555—557, 1990.