

DEDICATION

To my father

To my kind mother

To my wife

To my supervisor for his
appreciable, great help, advice,
and endurance

To my friends and colleagues

To everyone help me

To all of them I dedicate this work.

Acknowledgements

Praise is to the almighty Allah who gifted me the knowledge and the ability to write this thesis.

I would like to express my sincere thanks to Dr. Bushra Hussein Ahmed - for his continuous and valuable guidance, supervision, faithful encouragement, patience and appreciable efforts during preparation of this thesis.

My deepest thanks and sincere appreciated are extended to the members of the Department of Radiology in (RICK), and my friends and colleagues in Radiotherapy Department for their valuable advice, endurance and assistance.

Also I would like to thank the staff of the library of College of Medical Radiologic Sciences for their help, patience and co-operation.

Finally, all and greatest thanks are to everyone who has participated in completion and improvement of this study.

Abbreviations

<i>Abbreviations</i>	Refer to
PA	posterior Antero
BRCA1	Tumors marker
BRCA2	Tumors marker
Cm	Centimeter
CT	Computerized Tomography
DCIS	Ductal Carcinoma In Situ
Fig	Figure
ERT	Estrogen Replacement Therapy
FNA	Fine Needle Aspiration
Lat	Lateral
LCIS	Lobular Carcinoma In Situ
MRI	Magnetic Resonance Imaging
N	no
PET	Positron Emission Tomography
RICK	Radiation and Isotopes Centre of Khartoum
SPECT	Single Photon Emission Computed Tomography
Sud	Sudan
TNM	Tumor, Lymph Node, and Metastasis
UK	United Kingdom
US	United States
Y	yes
Yr	Year
<	Less than
>	More than

Abstract

The study is conducted at Radiation and Isotopes Centre of Khartoum (RICK), in the period from June 2009 to December 2009. A number of 100 patients reported as patients of breast cancer and underwent radiotherapy treatment and most of them chemotherapy too.

The ages of the patients ranged between 20 and 80 years. High incidence of breast cancer was in northern of Sudan 25 patients (25%), western of Sudan 25 patients (25%) and Khartoum 21 patients (21%). Out of the 100 patients distant metastases were found in 34 patients (34%) of them, 46 patients (46%) of them did not have any metastasis, and the remainder 20 patients (20%) were not mentioned in the patient's records. Only 82 patients (82%) chest x-ray was done to them; 23 of them (28%) with chest metastases.

According to the 23 patients who did have chest metastases out of 82 patients: in 17 patients (74%) chest x-ray was done after 1 to 4 years of the first symptoms of cancer appeared, This is due to failure of patients to contact oncologists. 12 patients (52%) chest x-ray was done once referring to Rick.

22 patients (96%) of metastasis chest x-rays reported as lung metastases, 4 patients (17.4%) of lung metastases with chest wall metastases as well and 1 patient (4.3%) with mediastinal metastases.

Nodules were seen in 16 patients (70%), pleural in 6 patients (26%), lytic lesions in 4 patients (17.4%), and lung replacement in 1 patient (4.3%). Other distant metastases were seen in 11 patients (48%) with chest metastases.

With regards to the use of other modalities out of the 82 patients: 53 patients (65%) were examined by ultrasound for abdomen, 7 patients (8%) by CT, 3 patients (4%) by MRI, 4 patients (5%) by nuclear, 9 patients

(11%) by mammography, 7 patients (8%) by breast ultrasound, and 9 patients (11%) by others radiological investigation.

It concluded that chest x-ray is the first modality used in suspected chest metastases, so it recommended to be done as frequency as possible.

ملخص الأطروحة

أجريت هذه الدراسة في المركز القومي للعلاج بالأشعة والطب النووي بالخرطوم في الفترة ما بين يونيو 2009 وحتى ديسمبر 2009 م. عدد 100 حالة من المرضى والمشخصة حالاتهم بسرطان الثدي والذين خضعوا للعلاج الإشعاعي وغالبيتهم يعالجون بالجرعات الكيماوية أيضا.

تراوحت أعمار المرضى ما بين 20 - 80 عاما. أعلي وجود لسرطان الثدي في شمال السودان 25 مريض (25 %), غرب السودان 25 مريض (25%) والخرطوم 21 مريض (21%). من ال 100 مريض نقائل سرطان الثدي للأعضاء البعيدة وُجِدَت عند 34 مريض (34%) من الحالات ، و 46 مريض (46%) منهم ليس لديهم أى نقائل ، والمتبقى من الحالات 20 مريض (20%) فهم لم يذكروا بسجلات المرضى. فقط 82 مريض (82%) عملت لهم أشعة سينية للصدر, 23 منهم (28 %) مصابين باورام ثانوية بالصدر. بالنسبة لل 23 مريض المصابين بثانويات الصدر من ال 82 مريض: فى 17 مريض (74%) عملت أشعة للصدر بعد سنة إلى 4 سنوات من أول ظهور لأعراض السرطان, وذلك لعجز المرضى من الوصول لأخصائى الأورام. 12 مريض (52%) عملت أشعة الصدر بمجرد دخولهم مستشفى الذرة.

22 مريض (96%) من ثانويات الصدر شخضت كثنويات بالرئة, 4 مرضى (17.4%) من ثانويات الرئة معها ثانويات بجدار الصدر كذلك, و 1 مريض (4.3%) معها ثانويات بالمنطقة وسط القصية. الحبيبات وجدت فى 16 مريض (70%), السائل البلورى فى 6 مرضى (26%), تأكل العظام فى 4 مرضى (17.4%) وإزاحة الرئة فى 1 مريض (4.3%). نقائل سرطان الثدي البعيدة وجدت مع 11 مريض (48%) من ثانويات الصدر.

أخذا فى الاعتبار الفحوصات الأخرى من ال 82 مريض : 53 مريض (65%) عمل لهم فحص بالموجات للبطن, 7 مرضى (8%) بالأشعة المقطعية, 3 مرضى (4%) بالرنين, 4 مرضى (5%) بالطب النووي, 9 مرضى (11%) بالمماموغرافي, 7 مرضى (8%) بموجات الثدي, و 9 مرضى (11%) بفحوصات اشعاعية أخرى.

ختمت الدراسة بأن الأشعة السينية للصدر هي الطريقة الأولى المستخدمة للكشف عن ثانويات الصدر, لذلك يوصى بعملها بانتظام قدر المستطاع.

List of figures

Fig.2.1.1	: The location of the breasts	7
Fig.2.1.2	: The construction of the breast	9
Fig.2.1.3	: Lymph drainage of the breast	11
Fig.2.1.4	: Lobules and glandular alveoli	13
Fig.2.1.5	: Diagram of the microscopic structure of breast tissue.	13
Fig 2.1.6	: Dissection of thorax, anterior view	15
Fig.2.1.7	: Dissection of lungs and mediastinum, posterior view	15
Fig.2.1.8	: Bronchogram, right upper lobe	17
Fig.2.1.9	: Cast of trachea and bronchi, anterior view	17
Fig.2.2.1	: The cyclic breast changes	18
Fig.2.2.2	: The types of tumors of the breast	19
Fig.2.2.3	: breast carcinoma: (a) Skin color change (b) Discharge (c) Ulceration	25
Fig.2.2.4	: MRI of chest, sagital view	32
Fig.2.3.1	: lung metastases on chest x-ray	39
Fig.4.1	: The distribution of ages	48
Fig.4.2	: Patients' gender	49
Fig.4.3	: Patients' history	49
Fig.4.4	: The distribution of the districts	51
Fig.4.5	: The percentages of menarche and menopause	51
Fig.4.6	: Age of menarche	52
Fig.4.7	: Age of menopause	52
Fig.4.8	: The percentage of surgery	54
Fig.4.9	: Evidence of chest metastasis	54
Fig.4.10	: The distribution of stages	59

List of tables

Table.2.2.1	: Breast cancer risk factors	21
Table.4.1	: The age of the mentioned patients from 20 - 80 years	48
Table.4.2	: The districts of the mentioned patients	50

Table.4.3	: first age of pregnant	53
Table.4.4	: breast feed	53
Table.4.5	: patients' lactation	53
Table.4.6	: biopsy and fna done	55
Table.4.7	: Radiographic findings of ca breast secondary on chest x-ray	55-56
Table.4.8	: Evidence of chest metastases according to duration of symptoms since first discovery of the ca breast	57
Table.4.9	: Other radiological exams which done to those patients were chest x-ray was done also	58
Table.4.11	: The Distant Metastasis	58
Table.4.12	: The lymph nodes metastasis	59

CONTENTS

Title	Page
Dedication	I
Acknowledgement	II
Abbreviation	III
English abstract	IV
Arabic abstract	V
List of figures	VI
List of tables	VII
CHAPTER ONE	
Introduction	1
CHAPTER TWO:	
Part One: Anatomy and physiology	
Anatomy of the Breast	6
physiology of the Breast	11
Anatomy of the lung	14
mechanics of breathing	16
Part Two: pathology	
Breast pathology	18
Lung pathology	27
Radiological Investigations of the chest	28
Part Three: spread of breast Cancer	
spread of breast Cancer	33
CHAPTER THREE	
Patients and Method	46
CHAPTER FOUR	
Results	48
CHAPTER FIVE	
Discussion	60
Conclusion	67
Recommendation	68
Reference	69
APPENDICS	
Data collected from the patients	72-73

بسم الله الرحمن الرحيم

Sudan University of Science & Technology

College of Graduate Studies

**Radiographic Findings of CA Breast
Secondaries
on Chest X-Ray**

**ثانويات سرطان الثدي في صورة الأشعة
السينية للصدر**

**A Thesis submitted for partial fulfillment of
the award of the degree of M.Sc in
Diagnostic Radiologic Technology**

Presented By:

Mohammed Musa Mustafa

Supervisor:

Dr. Bushra Hussein Ahmed

Assoc. Professor Ribat University

December 2009