

# Value of Routine PreOperative Chest X-Ray in Patients Over the Age of 40 Years

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Mohammad Ishaq, Rehana S. Kamal ( Department of Anaesthesia, Aga Khan University Hospital, Karachi. )  
Mansoor Aqil ( Department of Anaesthesia, Quaid-e-Azam Medical College, Bahawalpur. )

## Abstract

The overall usefulness of routine chest X-ray, its cost benefit ratio and effect on anaesthetic management in patients over the age of 40 years was assessed. Four hundred and seventy-seven consecutive patients undergoing elective non-cardiopulmonary surgery with no cardiopulmonary diseases, having a routine preoperative chest x-ray were selected at the Aga Khan University Hospital, Karachi. Twenty five (5.2%) were excluded from the study as their chest x-ray were not available at the time of surgery. Twenty eight (8.3%) below and 33(28.7%) above 60 years of age had abnormalities in chest x-ray but the difference in cardiac abnormalities in two age groups was insignificant. The frequency of lung field abnormalities increased with age from 3.2% in less than 60 to 15.6% in patients above 60 years of age. The difference in frequency of occurrence of lung field abnormalities was statistically significant in case of lung abnormalities. Only one case required change in anaesthetic management based on routine preoperative chest x-ray. Our study showed that the incidence of significant lung field abnormalities increased in patients aged 60 years and above with no history of chronic obstructive airway disease. We recommend routine preoperative chest x-ray be carried out only in patients over the age of 60 years (JPMA 47:279,1997).

## Introduction

Preoperative assessment decreases surgical morbidity and mortality by optimizing health status, reducing patients anxiety and facilitating the planning of preoperative, intraoperative and post-operative management. Haemoglobin (Hb%) and haematocrit (HCT), serum electrolytes, serum Creatinine, blood urea nitrogen (BUN), electrocardiogram (ECG) and chest x-ray are the most commonly performed preoperative investigations. The practice of routinely ordering preoperative test has been questioned<sup>1</sup>. Routine preoperative testing without suspected or known disease in patients yields an extremely low rate of true positive results and may not be beneficial to patients<sup>2</sup>. Some routine preoperative laboratory screening may actually harm the patient because the false positive and borderline positive results may lead to false diagnosis and even postponement of surgical treatment. The cost of medical management is a major factor in encouraging physicians to reduce preoperative laboratory tests. A study calculating costs which could be reduced, estimates that more than 1 billion US dollars could be saved if preoperative chest x-rays were ordered on the basis of clinical assessment<sup>3</sup>. There is also a small but real risk of cancer from exposure to x-rays. The life time risk of cancer death which could result from routine preoperative chest x-rays can be estimated to be approximately 1.2 per 100,000<sup>4</sup>. There is no consensus anywhere as to the best approach to the use of preoperative chest x-rays. The decision to order routine preoperative chest x-ray depends on the detection of clinically useful positive findings versus the costs and possible adverse health effects of the procedure. This study approved by human ethics committee was conducted at the Aga Khan University Hospital to determine the overall usefulness of routinely performed preoperative chest x-rays in Pakistani patients over the age of forty years, positive findings in the chest x-ray which altered the course of anaesthetic management and the cost benefit ratio of routinely performed chest x-rays.

## **Materials and Methods**

Four hundred and seventy-seven consecutive patients undergoing elective non-acute and non-cardiopulmonary surgery were studied from 1st February, 1992 to 9th May, 1993. All patients over forty years of age undergoing elective non-cardiopulmonary surgery with no known pulmonary and cardiovascular problems, in whom, routine preoperative chest x-rays were done were included in this study. They were divided into two groups. Group A (40-59 years) and Group B (>60 years). Patients with known history of cardiovascular and pulmonary diseases were excluded. While taking chest x-ray PA view, the patient faces the film, chin up with shoulders rotated forward to displace the scapula from the lung fields. Exposure was made on full inspiration for optimum visualization of the bases, centering at T5. The breasts were compressed against the film to prevent them obscuring the lung bases. Chest x-rays were examined by a radiologist as well as an anaesthetist. Abnormal radiographic findings were classified under six headings i.e., cardiac, aorta, pulmonary artery, lung field, pleura, skeletal system and mediastinum. Within each group the abnormalities were classified into significant and non-significant with reference to their relevance to anaesthetic and surgical management as shown in Table 1<sup>5</sup>.

**Table I. Significant and non-significant chest x-ray abnormalities (Rees et al<sup>4</sup>).**

Organ	Significant radiological abnormalities	Non-significant radiological abnormalities
Heart	Left ventricle enlargement	-
Aorta and pulmonary artery	Enlarged pulmonary artery	Unfolded aorta Right sided aorta
Lung field	COPD Collapse Metastasis Asbestosis Fibrosis Pulmonary infarction Complicated pneumoconiosis	
Pleura	Effusion	Thickening of pleura
Skeletal	Metastasis Cervical spondylosis	Kyphosis and Scoliosis Old fracture Disc degeneration Old rib operation Pectus excavates
Mediastinum	Deviated Trachea	Calcified lymphnode Goiter

## Results

Of 477 patients over the age of forty years, 25 (5.2%) patients were excluded from the study as their chest x-rays and reports were not available at the time of surgery. Three hundred and thirty-seven (74%) patients were below and 115 (26%) above the age of 60 years. There were 254 (56%) females and 198(44%) males. Two third of cases belonged to general surgery and urology, while gynaecology and obstetrics accounted for rest one fifth of the cases. Two hundred and three (44.9%) of 452 patients had abnormalities in chest x-rays. Sixty one (13.4%) were significant and 142 (3 1.5%) non-

significant abnormalities (Table II).

**Table II. Abnormalities on chest radiographs.**

Organ	Significant		Non-significant		Total	
	No	%	No	%	No	%
Cardiac	22	4.9	1	0.2	23	5.1
Aorta and pulmonary artery	2	0.4	70	16.3	7	16.7
Lung field	29	6.4	38	8.4	67	14.8
Pleura	2	0.4	9	2.01	11	2.4
Skeleton	1	0.2	19	3.8	20	4.0
Mediastinum	5	1.11	4	0.9	9	2.01
<b>Total</b>	<b>61</b>	<b>13.4</b>	<b>142</b>	<b>31.9</b>	<b>203</b>	<b>44.9</b>

Twenty-two (4.9%) had cardiomegaly and one dextrocardia, of those, with cardiomegaly, 10 (2.9%) were less than 60 years of age and 12 (19.4%) above 60 years. The frequency of detection of significant versus non-significant cardiac abnormalities was not statistically significant due to small numbers. A total of 72 findings were detected in aorta and pulmonary artery of which, 70 were non-significant while only two cases had enlarged pulmonary artery. Out of 452 patients, 29 (6.4%) had significant and 38 (8.4%) non-significant findings in the lung field. Out of 38 non-significant findings, 25 had radiological evidence of old tuberculosis, but only 2 cases had past history of tuberculosis. The significant findings in the lung field in decreasing frequencies comprised of chronic obstructive pulmonary diseases atelectasis, fibrosis and bronchiectasis. Of those with lung abnormalities, 11 (3.2%) were less than 60 years of age and 18 (15.6%) above 60. The frequency of detecting significant lung abnormalities with increasing age was found to be statistically significant. The odds ratio was 2.92 (0.97 - 8.98) with chi square value of 4.57 (P value 0.03).

There were 9 non-significant and 2 significant (pleural effusion) pleural abnormalities and 19 non-significant and 1 significant (severe kyphosis) skeletal abnormalities. Of the 9 abnormalities of mediastinum, 5 were significant and 4 were non-significant. The statistical association of these abnormalities could not be ascertained due to small number of abnormal positive findings. Out of 203 significant and non-significant abnormalities detected, only one required a change in anaesthetic management. She was a 42 years old female, admitted for right modified radical mastectomy. Her right thyroid lobe was palpable and firm in consistency. The routine chest x-ray showed deviated trachea and retrosternal goiters, difficult intubation was anticipated, for which all preparations were carried out. The patient intubation was Lehane grade III and the trachea was intubated without any difficulty.

## Discussion

No consensus exists in literature as to the best approach to preoperative chest x-ray. The decision to order a routine preoperative chest x-ray depends on the detection of clinically useful positive findings

versus the cost and possible adverse health effects of this procedure. Out of 61 significant abnormalities in this study, 22 (36.0%) were due to cardiomegaly. This is comparable to other similar series<sup>5,6</sup>. Of 61 significant abnormalities, 29 (49.11%) were due to pulmonary pathology. The frequency of significant lung field abnormalities increased with age in this study which is comparable with the study done by Vic Velanovich<sup>7</sup>. Pulmonary tuberculosis is very common in Pakistan, but most of the new cases of active tuberculosis are diagnosed when a patient seeks medical treatment for symptoms of his illness. The presence of AFB in sputum microscopy appears to be more advantageous than routine chest x-ray for diagnosis of tuberculosis. In our study, anaesthetic management was changed in one case which is comparable with other studies done by Archer et al. in 1993<sup>2</sup> and Blery et al in 1986g. There is no safe radiation dose. The life time risk of cancer death due to routine preoperative CXR can be estimated to be approximately 1.2 per 100,000 (Archer et al, 1993<sup>2</sup>). Health authorities, trust and individuals using ionizing radiation must comply with regulations recommended by POPUMET. The legal requirements in France is that omission of a preoperative test is not negligence, provided that the decision is consistent with the patient's clinical features (Blery et al 1980<sup>4</sup>). The cost of a routine chest x-ray PA view is Rs. 145 in our hospital. We studied 477 patients, thus the total cost was Rs. 78,165 and anaesthetic management was changed in one patient. The incidence of significant lung field abnormalities is 15.6%, over the age of 60 years which is statistically significant. We recommend routine preoperative CXR be mandatory in all patients over the age of sixty years with no cardio-pulmonary disease undergoing any kind of surgery.

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