

ORIGINAL ARTICLE

ROUTINE PREOPERATIVE CHEST X-RAY AND ITS IMPACT ON DECISION MAKING IN PATIENTS UNDERGOING ELECTIVE SURGICAL PROCEDURES

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Background: It is the routine of our hospital that all patients undergoing any kind of surgery in any specialty are subjected to routine pre-op chest x-ray (CXR). However there is increasing evidence that this practice does not have much influence on patient management and thus could be limited to a very small number of patients in whom it is justified. We conducted this study to know the significance of routine pre-op x-rays chest in patients admitted in a surgical unit for elective surgery and to what extent such routine x-ray affected our surgical intervention. **Methods:** It is a cross sectional study in which 500 consecutive adult patients admitted in surgical 'C' unit of Lady Reading Hospital Peshawar, for elective surgical procedures were included. The age, gender, co-morbidity, delay in operation if any was recorded and CXR were reported upon by a qualified radiologist. The influence on decision making regarding fitness of patients for general anaesthesia/surgery was also determined. Data were analysed using SPSS-20. **Results:** Out of total of 500 chest x-rays 109 (21.8%) were reported to have some abnormality in the film. Out of these 109, 58 were male 51 were female patients. The percentages of abnormal CXR according to age were 13.6%, 35.8%, and 50% in the 16–39 years, 40–69 years and ≥ 70 year age groups respectively. Amongst the patients with abnormal CXR, 30 had their surgery delayed. However in only one patient out of the 30 the delay was on the basis of significant finding on the CXR. **Conclusion:** Good medical history and clinical examination can save many patients from unnecessary CXR. Preoperative CXR may only be done in patients who have a clear indication for this investigation.

Keywords: Surgery, impact, Chest X-ray, pre-operative, fitness, anaesthesia

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INTRODUCTION

X-rays were discovered in 1895 by Wilhelm Conrad Röntgen, for which he received the first Nobel Prize in Physics in 1901.¹ This discovery revolutionised the practice of medicine as it allowed, for the first time, to see inside the body without surgery. The chest x-ray since then has become the most commonly performed radiographic examination in many countries.² Approximately 45% of all radiographic examination fall in the category of chest x-rays (CXR). Over 150,000,000 chest x-rays are done yearly in the US at a cost of over 11 billion dollars.²

Clinicians have always thought it logical to order tests that would detect abnormalities that might lead to increased morbidity or mortality in the peri-operative period and doing a preoperative CXR is a very common practice in this regard. However the value of routine pre-operative CXR has been questioned, now for many years. Despite its widespread use systematic evaluations of the clinical effectiveness and cost-effectiveness of this test were often lacking. The prevalence of unexpected abnormalities in routine preoperative CXRs taken before elective surgery may be high, but the influence of their detection on patient management is minimal.³ Pre-operative chest x-ray (CXR) are still routinely requested without prior establishment of any medical indication in patients undergoing elective surgery.

The aim of this study was to see how justifiable it is to do this investigation in every patient because by changing this practice we can not only curb unnecessary health costs and labour but also substantially reduce the radiation exposure both to the subjects and to general population.

MATERIAL AND METHODS

The cross-sectional, descriptive study was conducted from July 2011 to January 2012 in Surgical C Unit of Lady Reading Hospital Peshawar on Chest X-rays of 500 consecutive patients who were admitted from out-patients department for elective surgery.

All adult patients of both genders admitted through OPD for elective surgery were included. Patients admitted through or operated in Emergency and diagnosed with Malignancy were excluded. Data was recorded on a semi-structured proforma.

The preoperative chest x-ray of patients meeting the inclusion criteria were done as per the ward protocol. All the X-rays were duly reported by a radiologist. Patients' age, gender, diagnosis, operation performed, type of anaesthesia given, any delay in operation, co-morbidities, and the findings of CXR were recorded. Data were analysed using SPSS-20 and represented as frequencies, percentages and cross tabulation to establish correlations.

RESULTS

Out of the total 500 X-rays initially included in this study, 338 (67.6%) were reported to be normal, 109 (21.8%) as abnormal, and 53 (10.6%) were labelled as poor films and hence excluded from the study (Table-1). Of the total abnormal x-rays (n=109), cardiac field abnormalities alone were seen in 43 patients (39.4%), lung field abnormality in 63 (57.7%) patients whereas combined cardiopulmonary abnormalities were present in 3 (2.7%) patients. Out of the 447 x-rays there were 242 (54.1%) patients in 16–39 year age group, out of which 33 patients had abnormal CXR. There were 187 (41.8%) patients in the 40–69 year age group, of which 67 were abnormal. Out of the total 18 (4%) patients in the ≥70 year age group there was an equal proportion between the normal and abnormal CXRs (Table-2).

Regarding history of co-morbidities, 66 of our patients had some sort of co-morbidity. The correlation of co-morbidities and CXR finding is shown in Table-3.

Amongst the 109 patients with abnormal CXR, 30 (27.5%) patients had their operation delayed. However in only one patient the reason for delay was significant lung field abnormality on CXR (Table-4). The delay was due to other reasons in the rest of the patients and was judged in all cases by clinical findings and not on the ground of an abnormal CXR.

Table-1: Frequency of chest x-ray abnormality

| | No. | % |
|-----------|-----|------|
| Normal | 338 | 67.6 |
| Abnormal | 109 | 21.8 |
| Poor film | 53 | 11.6 |

Table-2: Correlation of age with findings on CXR

| Age (Years) | Normal CXR | Abnormal CXR |
|-------------|------------|--------------|
| 16–39 | 86.4% | 33 (13.6%) |
| 40–69 | 64.2% | 67 (35.8%) |
| ≥70 | 50% | 9 (50%) |

Table-3: CXR findings and co-morbidity

| Findings | Abnormal CXR | Normal CXR | Total |
|----------------------------------|--------------|------------|-------|
| Cardiac disease ± Hypertension | 14 (53.8) | 12 (46.1) | 26 |
| Diabetes + Cardiac disease ± HTN | 4 (50.0) | 4 (50.0) | 8 |
| Diabetes | 11 (47.8) | 12 (52.1) | 23 |
| Pulmonary Disease | 2 (40.0) | 3 (60.0) | 5 |
| Smoking | 4 (100) | 0 (0) | 4 |
| TOTAL | 35 | 31 | 66 |

Table-4: Impact of CXR regarding delay of operation

| | No. | % |
|---|-----|------|
| Patients with no impact of CXR on surgery | 1 | 0.2 |
| Patients with delay in surgery due to significant findings on CXR | 446 | 99.8 |

DISCUSSION

Preoperative CXR is routinely done in patients undergoing surgical procedures in our set-up. This practice causes unnecessary exposure to radiation, cost to the national exchequer and time utilisation of radiologists. Furthermore it does not influence decision

regarding the surgical procedure being performed. We analysed 500 preoperative chest films retrospectively, reported by a radiologist of >5 years experience. Out of these 500 x-rays, 109 (21.87%) were reported to have abnormalities. Most of these could not be detected in the history of the patient. Summerville TF *et al*¹ reported in their retrospective study of 797 cases the overall positive yield of 6%; 17% of these patients were over 60 years of age, and in those, only 2% were under 60 years, hence authors' conclusion was that routine pre-op x-ray chest are of minimal usefulness. It was also reported in the same study that the 'Clinical Skills' in determining which patients require this investigation is more authentic.³ Significant abnormalities in CXR are quite unlikely in younger age groups and the positive yield increases with advancing age. Half of the patients above the age of 70 years had abnormalities in their CXR. The same finding is highlighted in many studies. Joo HS *et al*² have reported that routine CXR in patients below 70 year of age are not required as the prevalence of abnormalities is very low. Likewise a study by Nze PU *et al*⁴, has reported that routine chest x-ray in the elderly patients are worthwhile even without medical indication. They came to this conclusion when they conducted a study on 120 patients aged 70 years are more.

The authors of systematic review of the preoperative testing wrote that the use of laboratory tests before surgery became ingrained in clinical practice not only across the USA but also across the world in the latter half of the 20th century. At that time clinicians thought it logical to order tests to detect abnormalities that might lead to increase morbidity in the peri-operative period.⁵

Kaplan and colleagues retrospectively reviewed the charts of 2,000 patients who had undergone elective surgery.⁶ Turnbull and Buck⁷ reviewed charts of 2,570 patients undergoing elective surgery and found that 104 of 5,003 lab tests results were abnormal and that only 4 patients would have benefited from 'routine' laboratory testing. A good history and physical examination are the most important routine tests needed.⁷ A meta analysis of 21 studies that included 14,390 routine CXRs showed that only 140 of 1,444 abnormal results were not clinically expected and that only 14 affected decision in managing patients.⁸ Similar conclusion has been drawn by Ishaq M *et al*⁹ in their study on 477 patients where their aim was to know the overall usefulness of routine CXRs and its cost benefit ratio and effect on anaesthetic management in patients over the age of 40 years. Bouillot JL, *et al*¹⁰ studied 3,959 patients where in 23.2% of the preoperative CXR films were considered to be abnormal. They concluded that when pulmonary or cardiac complication did occur after surgery the preoperative CXR was of no help for making this diagnoses in more than 50% of cases.¹⁰

These results are quite similar to that of our study. Garcia-Miguel FJ *et al*¹¹ concluded in their study that a preoperative CXR may be done in those patients who are above 60 years of age and those who have comorbidity like COAD, CAD, contact with TB patients and in smokers. Two studies conducted in Italy and Spain evaluated the usefulness of preoperative CXR in elective surgery. Preoperative CXR performed in 152 cases yielded useful information with effect on clinical management in 20 instances (13.1%). The protocol suggested was that routine preoperative CXR can be avoided in non-smokers, patients <60 years of age, where there is no acute respiratory tract infection, in those free of neo-plastic disease not treated with immunosuppressive drugs, with no cardiac symptoms.^{12,13} To assess the value of preoperative CXR a study was conducted in Australia on 500 adult patients. In this study the authors reported that out of 500 cases 33 (6.6%) had abnormalities thought to be of significance; but only in 4 (0.08%) patients surgery was postponed, 3 with pulmonary metastatic disease and one with emphysema.¹⁴ This percentage is comparable with our results in which surgery was postponed due to significant positive findings on a CXR. Another study conducted by Yves C *et al*¹⁵ reported 1,101 CXRs ordered in 3,866 patients. Out of these, 568 (51.5%) were abnormal, 166 were found useful by the anaesthetist, although only in 51 (5%), i.e., much higher than our findings, an impact on the surgical plan was recorded. This study reported that abandoning of routine pre-op CXR does not produce adverse effects on patient care.¹⁵

A study from Nigeria has reported that preoperative CXR should be limited to patients with clinical symptoms and that routine Chest X-ray is unnecessary in asymptomatic patients ≤30 years of age.¹⁶ Two studies from Thailand have reported that routine pre-op CXR is not mandatory as there was statistical difference of the intra-operative and postoperative complications among patients aged less than 45 years who had both normal and abnormal CXRs. The risk of intra-operative cardiovascular complications increased in the group with CXR abnormalities and age over 45 years.^{17,18} In our study only 1 patient had their surgery delayed because of positive findings in chest radiograph.

CONCLUSION

Good medical history and clinical examination can save many patients from unnecessary CXR. The chest x-ray may be done only in patients above the age of 60 years,

who have an indication, and where clinical examination reveals any cardio-pulmonary abnormalities.

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