ORIGINAL ARTICLE

Pre-Operative Value of X-Ray Chest in Patients Undergoing Elective General Surgeries

Mujahid Raza[1], Muhammad Tariq Abdullah[2], Syeda Zakia Shah[3], Maqbool Hussain[4], Ishil Bangash[5], Musa Khan, Saleem Abbasi[7]

[1]Associate Professor, Department of Radiology, PIMS, Islamabad
[2]Associate Professor, Department of General Surgery, PIMS, Islamabad
[3]Assistant Professor, Department of Radiology, PIMS, Islamabad
[4]Professor & Head of Pediatrics, Children Hospital, PIMS, Islamabad
[5]Medical Officer, MCH Center, PIMS, Islamabad
[6]Principal Demonstrator, Saidu Medical College, Swat
[7]Epidemiologist, Pakistan Institute of Medical Sciences, Islamabad

Correspondence Author:
Saleem Abbasi
Email:saleemsw@hotmail.com

Abstract

Background: Imaging evaluation of patients undergoing general surgeries is routinely done pre-operatively. The indications of radiographic evaluation are only for acute nature of complication. However, sometimes all elective and acute general surgery patients undergo a chest x-ray. Unnecessary exposure of radiation is a significant health threat.

Objective: This study aimed to assess the role of pre-operative chest radiographs in patients undergoing general surgeries.

Material and Methods: This retrospective analysis was conducted at the Department of Radiology, Pakistan Institute of Medical Sciences, Islamabad spanned over a period of 15 months from October 2021 to January 2023. A total of 7850 adult patients were included. Record of patients coming for x-ray chest from other departments than the general surgery was excluded. Administrative permission was taken from head of department and a verbal consent was taken from patients/caregivers before x-ray. All x-ray films were reported by a senior radiologist. Data were entered and analyzed in SPSS-22.

Results: The mean age was 45.8 ± 11.6 years with a male predominance with 4632 (59.1%). There were 528 (6.7%) cases with positive findings while the remaining 7322 (93.2%) were negative. It was noted that 273 (3.59%) had apical plural thickening, while 105 (1.31%) had right upper lobe fibrosis. Other frequent findings were left upper lob fibrosis 32 (0.41%), blunting of right CP angle 31 (0.40%), blunting of left CP angle 62 (0.79%).

Conclusion: The study found out that more than 90.0% of chest-rays were normal and a very few 7.2% were found abnormal.

Keywords: Chest x-ray, pre-operative, general surgery, mandatory

Cite this article: Raza M, Abdullah T.M, Shah Z S, Hussain M, Bangash I, Khan M, Abbasi S. Pre-Operative Value of X-Ray Chest in Patients Undergoing Elective General Surgeries. BMC J Med Sci. 2024. 5(1): 34-37

Introduction

Imaging evaluation of patients undergoing general surgeries is routinely done as a pre-operative screening tool. The indication of radiographic evaluation is necessarily done in acute nature of complication. However, sometimes all elective and acute general surgery patients undergo a chest x-ray without taking in regard the presence or absence of any complication.[1]

Moreover, unnecessary exposure of radiation for the patients, technicians and overall environment are a significant health threat. Since it is a routine practice that almost 100.0% cases of general surgery undergo a chest x-ray due to which billions of rupees are spent in the country.[2]

The common indications for a necessary chest x-ray evaluation include; acute respiratory symptoms, metastases, suspected or confirmed cardio-respiratory diseases, h/o chest trauma, visitors of tuberculosis endemic regions/areas, thoracotomy and cases of major abdominal operations.[3,4] The standardized guidelines suggest that pre-operative chest x-rays should only be opted in patients who are either undergoing cardiothoracic surgeries or those with serious cardiorespiratory condition or other significant aforementioned indications. The guidelines also suggest that the images must be viewed and findings noted by the surgical and anesthetic teams.[5]

In reality, many investigators have reported that pre-operative chest radiographs do not contribute much to the patient management in elective surgery. In this way the standardized guidelines regarding imaging are not followed appropriately and patients are put on unnecessary risk of hazardous exposure. One study witnessed that 79.0% of the chest x-rays done pre-operatively were normal.[6] Another local trial also reported that 67.6% of chest x-rays done prior to surgery were found normal.[1] These high rates

Authorship Contribution: [1-7]Substantial contributions to the conception or design of the work; or the acquisition, data analysis, drafting the work or revising it critically for important intellectual content, Final approval of the version to be published & supervision

Funding Source: none
Conflict of Interest: none

Received: March 29, 2024
Accepted:June7, 2024
Published:July2, 2024

of normal radiographs make it debatable as to why every patient undergoing surgery would need an x-ray chest. This is violation of the health safety protocols and guidelines of proper x-ray prescription. Since these practices are debatable and need constant monitoring in terms of evidence generation and reporting. Furthermore, the country is already cash strapped and health budgetary allocation is minimal, putting individuals and healthcare settings under additional costs is not necessary and this prescription must be revisited. This retrospective analysis aimed to gather data of all patients undergoing general surgeries to find out their chest radiographic outcome. It is foreseen that this study may help to reduce unnecessary x-rays by introducing stricter compliance of the standardized guidelines.

Material and Methods:

This retrospective analysis was conducted at the department of Radiology, Pakistan Institute of Medical Sciences, Islamabad. The data comprised of patient record spanned over 15 months from October 2021 to January 2023. These patients presented to the General Surgery department for any surgical procedure and as a pre-requisite they were advised x-ray chest. A total of 7850 adult patients above 18 years of age of both genders were included in this study. Record of patients coming for x-ray chest from other departments than the general surgery was excluded from study.

The data was gathered after getting administrative permission from the head of the department. Verbal consent was taken from the patients/caregivers before x-ray chest.

All adult patients of both genders admitted for elective surgery were included. Patients admitted through or operated in emergency were excluded from this study. Data was gathered on a structured proforma, specifically designed for this study. The preoperative chest x-ray of patients meeting the inclusion criteria were done as per protocol. The x-ray films were reported by a senior radiologist. The data available was patients' age, gender, diagnosis as positive and negative, and the detailed findings of CXR which was noted.

Data were entered and analyzed in Statistical Package for Social Sciences (SPSS) version 22.0. The analysis included frequency and percentages for categorical variables like gender, diagnosis and x-ray findings. While the continuous numerical variables like age were measured as mean and standard deviation.

Results:

There were a total of 7850 patients whose x-ray chest were done for assessment before operation in the general surgery department. The mean age of patients was 45.8 ± 11.6 years ranging from 18 to 79 years. There was a male predominance with 4632 (59.1%) while remaining were females 3218 (40.9%).

Out of the total 7850 cases, there were 528 (6.7%) cases with positive findings while the remaining 7322 (93.2%) cases were found with negative results. (Table 1)

When the distribution of the positive cases was assessed, it was noted that 273 (3.59%) had apical plural thickening, while 105 (1.31%) cases were found to have right upper lobe fibrosis. Similarly, the other frequent findings were left upper lob firbrosis 32 (0.41%), blunting of right CP angle 31 (0.40%), blunting of left CP angle 62 (0.79%), small granuloma in right lung 15 (0.19%) and small granuloma in left lung was found in 10 (0.12%) of the study cases. The great majority of the cases i.e. 7322 (93.2%) were found out to be normal. (Table 2)

Table 1: Demographic characteristics of patients (n=7850)

	No of cases	%age
Gender		
Male	**4632**	**59.1%**
Female	**3218**	**40.9%**
Age (years)		
Mean ± SD	**45.8 ± 11.6**	
Range (mix - max)	**18-79**	

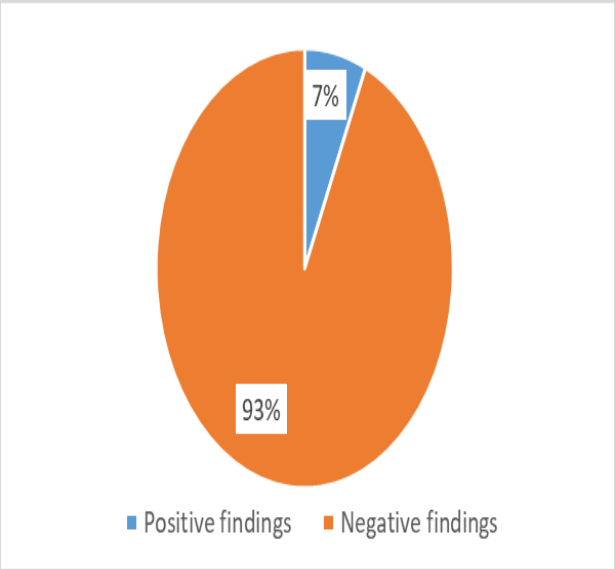

Figure I: Distribution of total x-rays done in study (n=7850)

Table 2: Findings of chest x-rays in the study (n=7850)

	No of cases	%age
Normal x-rays	**7322**	**93.20%**
Apical plural thickening	**273**	**3.59%**
Right upper lobe fibrosis	**105**	**1.31%**
Blunting of left CP angle	**62**	**0.79%**
Left upper lob fibrosis	**32**	**0.41%**
Blunting of right CP angle	**31**	**0.40%**
Small granuloma in right lung	**15**	**0.19%**
Small granuloma in left lung	**10**	**0.12%**

Discussion

The current study aimed to assess whether pre-operative x-ray chest has any benefit in terms of surgical and overall management of these patients. The results revealed that the great majority of chest radiographs were normal and re-iterates the suggestion of avoiding x-rays in every patient undergoing an abdominal and extra-abdominal surgery. Since, there is a debate on whether the patients undergoing any general surgery need x-ray chest pre-operatively, it must be standardized and the recommendations of only prescribing chest radiographs in certain conditions and specific indications must be followed. Exposing all patients to x-ray rays unnecessarily is highly debatable and have programmatic practical implications.[7]

In the present study more than 90.0% of the total patients had normal x-ray findings, thus, this supports the perspective of many previous experts on the topic. Numerous previous studies have witnessed similar data to these findings. A previous local study by Ali IS and colleagues witnessed that close to 68% of their patients' x-rays chest were normal while close 10% had poor films.[1] Another study by Summerville TF and colleagues reported that only 6.0% of their patients chest x-rays were abnormal, this finding is very close to the current study results where we witnessed only 7.0% had abnormal findings.[8] Many factors need to be kept in mind before ordering a routine chest radiograph before general surgery.[9] A study by Joo HS concluded that routine chest radiograph prior to surgery should only be opted in patients above 70 years of age as majority of the radiographs are found normal.[10] Many others have also suggested that only in case of a chest complications, heart condition, chest trauma, and in case of old age an x-ray should be done otherwise an unnecessary exposure to rays and financial burden on individuals and hospitals would keep piling on. Even a recent study on patients undergoing cardiac surgery has shown that half of the x-ray films came out to be normal.[11]

Malone et al conducted a study to assess the routine use of chest radiographs before biliary lithotripsy. They witnessed that in all 75 patients referred for this procedure, no significant pulmonary or pleural disease was reported.[12] Another study by Grier et al also noted that routine chest radiography before angiography wasn't must if any specific clinical indications is not present. In their 240 study cases, no angiogram was postponed or canceled because of any chest abnormality found on routine chest radiographs.[13] The above cited comparative evidence is in line with the findings of the current study and mandates revision of the guidelines about the routine prescription of chest x-rays in all patients undergoing elective general surgeries.

In the present study, in patients with positive chest x-ray the most frequent findings were apical plural thickening, upper lobe fibrosis, and blunting of CP angle. Few of these caused re-scheduling of surgery date, however, the great majority had no influence towards treatment decisions.

Though, routine chest x-rays are a valuable diagnostic procedure which aids in the early detection and treatment of various thoracic conditions but in case of prescription without any indication, it becomes questionable.[14] There are various economic and health risks associated with this procedure, healthcare providers strive to minimize these risks by implementing appropriate safety measures.[15] Patients should also be proactive in discussing their concerns with their healthcare provider to ensure they make informed decisions regarding their health.

Despite the safety and effectiveness of this procedure, there are still some potential economic and health risks. From an economic perspective, patients who undergo routine chest X-rays before surgery may incur significant costs that can be detrimental to their overall financial well-being. Depending on the facility and healthcare provider, these costs vary from a few hundreds to thousands of rupees, especially if additional diagnostic tests are required.[16] Irony is that it is part of the guidelines and not in the decision making of the physician or patient. Patients need to weigh the potential benefits versus the cost before making a decision.

In terms of health risks, routine chest x-rays exposure to ionizing radiation which can increase the risk of cancer development, particularly in children, pregnant women, and individuals with pre-existing conditions. However, the level of exposure from this type of x-ray is generally considered to be low and the benefits of accurate diagnosis often outweigh the risks.[17] Additionally, modern x-ray machines are equipped with advanced safety features that minimize radiation levels and protect patients from over-exposure.[18]

Keeping in view the economic situation of Pakistan as well as the limited allocation of health budget and scarcity of health care settings and workers, even a single additional x-ray becomes a significant burden. In this country, the care seeking is mostly done as last resort when patient becomes dependent or seriously ill because of low affordance of the general population as close to 40% people are poverty stricken. The other factor is lack of awareness regarding health needs. In any case patients and caretakers bear a lot of financial and personal hassle by visiting a tertiary level health care setting. In our social setup mostly the patients and their families take loans for travel and other expenses related to care seeking, in such scenarios even a single additional radiograph is a burden on them. Thus, it can be suggested in the light of the current evidence and many previous similar evidences on this topic, the guidelines of routine x-ray chest before any surgery be revised. It should be made mandatory in the presence of the medical indications such as COPD, lung cancer, tuberculosis or the patient is over 60 years of age and/or smoker.

This study has many advantages and programmatic implications, firstly, a very significant healthcare practice of diagnostic radiographs has been targeted. The outcome suggests that the routine prescription of x-ray chest is unnecessary in majority of cases, thus exposes patients to health and economic risks. The current study findings challenge the routine chest radiograph in all patients undergoing abdominal surgery, thus, provides evidence which can save patients from health risks in terms of exposure to radiation as well as saving unnecessary health costs both at personal and national level.

Conclusion

This study highlights that more than 90.0% of chest x-rays ordered prior to abdominal surgeries in patients presented to the general surgery department were normal. The very few with positive findings were also non-significant that didn't implicate in the surgery decision. Many healthcare bodies have advised and some have implemented suggestions that routinely performing preoperative chest x-ray or spirometry prior to surgery should be avoided, and instead these investigations must only be ordered in response to patient factors.

References

1. Ali IS, Khan M, Khan MA. Routine preoperative chest x-ray and its impact on decision making in patients undergoing elective surgical procedures. Journal of Ayub Medical College Abbottabad. 2013;25(1-2):23-5.
2. Jindal S, Gombar S, Jain K. Is routine preoperative chest X-ray: An underutilized tool in asymptomatic patients!. Annals of Cardiac Anaesthesia. 2018 Oct 1;21(4):460-1.
3. Bhalla AS, Goyal A, Guleria R, Gupta AK. Chest tuberculosis: Radiological review and imaging recommendations. Indian Journal of Radiology and Imaging. 2015 Jul;25(03):213-25.
4. Callister ME, Baldwin DR, Akram AR, Barnard S, Cane P, Draffan J, Franks K, Gleeson F, Graham R, Malhotra P, Prokop M. British Thoracic Society guidelines for the investigation and management of pulmonary nodules: accredited by NICE. Thorax. 2015 Aug 1;70(Suppl 2):ii1-54..
5. O'Neill F, Carter E, Pink N, Smith I. Routine preoperative tests for elective surgery: summary of updated NICE guidance. Bmj. 2016 Jul 14;354.
6. Kovacevic M, Goranovic T, Markic A, Jelisavac M, Zuric I, Tonkovic D. Usefulness of routine chest X-ray in preoperative evaluation of patients undergoing non-cardiopulmonary surgery: a prospective observational study: 1AP5-5. European Journal of Anaesthesiology| EJA. 2012 Jun 1;29:16.
7. Naqvi ST, Batool SW, Rizvi SA, Farhan K. Awareness of hazards of X-ray imaging and perception regarding necessary safety measures to be taken during X-ray imaging procedures among patients in public sector tertiary hospitals of Karachi, Pakistan. Cureus. 2019 May 25;11(5): e4756
8. Sommerville TE, Murray WB. Information yield from routine pre-operative chest radiography and electrocardiography. S Afr Med J 1992;81(4):190–6.
9. Yurt A, Çavuşoğlu B, Günay T. Evaluation of awareness on radiation protection and knowledge about radiological examinations in healthcare professionals who use ionized radiation at work. Mol Imaging RadionuclTher. 2014 Jun 5;23(2):48-53.
10. Joo HS, Wong J, Naik VN, Savoldelli GL. The value of screening preoperative chest x-rays: a systematic review. Canadian Journal of Anesthesia. 2005 Jun 1;52(6):568.
11. den Harder AM, De Heer LM, de Jong PA, Suyker WJ, Leiner T, Budde RP. Frequency of abnormal findings on routine chest radiography before cardiac surgery. The Journal of Thoracic and Cardiovascular Surgery. 2018 May 1;155(5):2035-40.
12. Malone DE, Becker CD, Muller NL, Burhenne HJ. Is routine chest radiography required with biliary lithotripsy?. American Journal of Roentgenology. 1989 May 1;152(5):987-9.
13. Grier DJ, Watson LJ, Hartnell GG, Wilde P. Are routine chest radiographs prior to angiography of any value?. Clinical radiology. 1993 Aug 1;48(2):131-3.
14. Fiebach JB, Schellinger PD, Jansen O, Meyer M, Wilde P, Bender J, Schramm P, Juttler E, Oehler J, Hartmann M, Hahnel S. CT and diffusion-weighted MR imaging in randomized order: diffusion-weighted imaging results in higher accuracy and lower interrater variability in the diagnosis of hyperacute ischemic stroke. Stroke. 2002 Sep 1;33(9):2206-10.
15. Vahdat S, Hamzehgardeshi L, Hessam S, Hamzehgardeshi Z. Patient involvement in health care decision making: a review. Iranian Red Crescent Medical Journal. 2014 Jan;16(1):e12454
16. Yellapa V, Devadasan N, Krumeich A, Pant Pai N, Vadnais C, Pai M, Engel N. How patients navigate the diagnostic ecosystem in a fragmented health system: a qualitative study from India. Global Health Action. 2017 Jan 1;10(1):1350452.
17. Briggs-Kamara MA, Okoye PC, Omubo-Pepple VB. Radiation safety awareness among patients and radiographers in three hospitals in Port Harcourt. Am J SciInd Res. 2013;4(1):83-88.
18. Heidbuchel H, Wittkampf FH, Vano E, Ernst S, Schilling R, Picano E, Mont L, ESC Scientific Document Group Jais Pierre 1 de Bono Joseph 2 Piorkowski Christopher 3 Saad Eduardo 4 Femenia Francisco 5. Practical ways to reduce radiation dose for patients and staff during device implantations and electrophysiological procedures. Europace. 2014 Jul 1;16(7):946-64.