Check for updates

OPEN ACCESS

DOI: 10.46903/gjms/21.04.1370

ORIGINAL ARTICLE

EVALUATION OF X-RAY CHEST AS A PRE-OPERATIVE SCREENING TEST IN ENT SURGERY

Mujahid Raza[1], Altaf Hussain[2], Saleh Khurshied[2], Nawal Khurshid[2], Muhammad Azeem Khizer[3], Ghazal Iftakhar[2]

Departments of [1]Radiology, [2]ENT Head & Neck Surgery & [3]Ophthalmology, Pakistan Institute of Medical Sciences, Islamabad, Pakistan

ABSTRACT

Background: Chest radiography is not routinely recommended before certain elective surgeries, considering it as unnecessary investigation. The objective of this study was to evaluate chest radiography as a pre-operative screening test for elective ENT surgeries and to highlight importance of its utility in routine.

Materials & Methods: This cross-sectional study was carried out in the Departments of Radiology and ENT Head and Neck Surgery, Pakistan Institute of Medical Sciences, Islamabad, Pakistan from September 2021 to March 2023. 2826 patients, undergoing elective non-cancerous ENT surgery, and their CXR were evaluated preoperatively. Patients with ASA 1 and 2 and aged between 10-60 years were included. CXR were evaluated by radiologist and findings were divided into normal and abnormal with abnormalities further classified into significant and non-significant with respect to organ system.

Results: The mean age of participants was 28±9.61 years, with a preponderance of the male gender (60.5%). Of total, 2697 (95.7%), CXRs had no abnormality, while 122 (4.3%) CXRs had abnormalities. Out of 122 total abnormalities, only 25 (20.5%) were significant, while rest 97 (79.5%) were non-significant.

Conclusion: Chest x-rays are not regularly required in pre-operative assessment of clinically well patients. Almost all of the patients in our study had no abnormality and those few who had abnormality was incidental and mostly non-significant.

KEY WORDS: X-ray; Radiation; Surgery; Otolaryngology.

Cited as: Raza M, Hussain A, Khurshied S, Khurshid N, Khizer MA, Iftakhar G. Evaluation of x-ray chest as a pre-operative screening test in ENT surgery. Gomal J Med Sci 2023 Oct-Dec;21(4):260-63. https://doi.org/10.46903/gjms/21.04.1370

INTRODUCTION

Pre-operative assessment of patients for general anesthesia fitness is considered a standard protocol for elective surgery. In addition to detailed history and examination; certain investigations are also required to find out any surgery associated risk factors, which can complicate general anesthesia and to correct any preoperative abnormality to reduce or mortality and morbidity of the patients.[1] Its been found that not all patients require same investigations and extra investigations can be costly, waste of resources, time taking, uncomfortable for the patients and some may have harmful effects on patients.[2] Pre-op investigations advised should be based on patient history, co-morbidities or any disease and findings on examination. Certain studies have concluded that there is no benefit of routine pre-op investigations in otherwise healthy patients with low risk and undergoing elective ambulatory surgery.[3]

Standard pre-op investigations include complete blood count, liver function tests, renal function tests, clotting profile, ECG and chest X-ray.[4]

Chest X-ray is frequently advised pre-op investigation, however according to guidelines it is only recommended in patients over 60 years of age, smokers, having American Society of Anaesthesiologists (ASA) physical status of 3 or higher, with signs and symptoms of respiratory or cardiopulmonary disease.[5,6] In contrast, chest radiography is not routinely recommended before certain elective surgeries.[7] It's being considered as an unnecessary investigation and many institutes have not justified the use of pre-op chest X-ray without any significant reason.[8,9] X-rays are not recommended as routine

Corresponding Author:

Professor Dr. Altaf Hussain
Head Department of ENT Head & Neck Surgery
Pakistan Institute of Medical Sciences
Islamabad, Pakistan
E-mail: draltafhussain74@yahoo.com

Date Submitted: 07-06-2023
Date Revised: 22-11-2023
Date Accepted: 01-12-2023

pre-op investigation due to low specificity and false positive results,[10] and these rarely affect post-operative management.[11,12] Chest X-ray on average emits a cumulative radiation dose of 0.02 millisievert seconds which may have many harmful effects on patients. Also unjustified use of chest X-ray is wastage of resources and is costly for the patients.[13]

The objective of the study was to evaluate the pre-operative chest X-ray of clinically normal patients undergoing elective non-cancerous ENT surgeries, so to find out any abnormalities found on these x-rays. We will categorize these abnormalities into standard groups and on the basis of these findings we will conclude if routine pre-operative chest X-rays are important in our settings and do they have any affect in clinically normal patients. This would help us to reduce the unjustified use of chest X-rays, waste of resources and harmful effects on patients.

MATERIALS AND METHODS

This cross-sectional study was conducted in the Department of Radiology, Pakistan Institute of Medical Sciences, Islamabad, Pakistan from Sep 2021 to March 2023. Ethics approval was provided by the Institutional Review Board of this institute for this study.

Inclusion criteria comprised of patients aged 10 to 60 years referred by anesthesiologist with no known co-morbidities and ASA 1 and 2 undergoing elective ENT/Head and Neck non- cancerous surgery and advised chest X-ray as a part of pre-operative investigation for general anesthesia. Those having emergency surgery and those who had known co-morbidities, cardiovascular or pulmonary diseases with clinical symptoms were excluded from the study.

Sample size was 2826 chest X-rays, which were performed during the study period of 1.5 years.

X-rays were performed by radiology technician. Standard technique was used which included x-ray taken in in PA view with patient face position towards flint, chin directed upward, shoulders turned forward to displace scapula from the field. Patient was asked for full inspiration with breast pushed against the film. Chest x-rays were evaluated by senior radiologist as normal and abnormal and those having abnormalities 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 nonsignificant categories with reference to their importance to anaesthetic and surgical management. We classified significant and non-significant abnormalities according to Rees AM et al. criteria.[14] Data was collected on a specified data collection tool including baseline characteristics like demographics and chest x-ray findings.

Statistical Package for Social Services v23 (IBM Corp., Armonk, NY) for windows was used to enter and analyze the data. Percentages and frequencies were calculated for categorical variables while mean with standard deviation and ranges were calculated for continuous variables.

RESULTS

A total of 2826 chest x-ray, done during the study duration from Sep 2021 to March 2023, for preop assessment of ENT patients for elective ear, nose or throat surgery were included in the study. Age of participants ranged from 10 to 60 years. The mean age of the participants was 28±9.61 years. Of the total 2886 x-rays, 1711 (60.5%) belonged to male patients, while 1115 (39.5%) belonged to female patients.

Out of total 2826 x-rays, 2697 (95.7%) chest x-rays were normal, with no abnormality seen by radiologist on reporting, while 122 (4.3%) x-rays were found to have different abnormalities. One or more significant abnormality was present in 25/122 (20.5%), while non-significant abnormalities were present in 97/122 (79.5%) x-rays out of total 122 abnormal x-rays as shown in Figure 1.

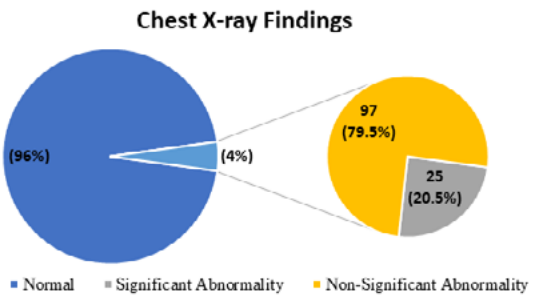

Figure 1: Distribution of normal and abnormal chest x-ray findings (n=2826)

A total of 12 (9.8%) findings were found in pulmonary artery or aorta; out of these 10 (83.3%) were non-significant and only 2 (16.7%) x-rays had significant enlarged pulmonary artery. On evaluating lung fields, 63 (51.6%) abnormalities were found; out of which 22 (34.9%) had significant and 41 (65.1%) had non-significant findings. Non-significant findings included radiological evidence of old tuberculosis in 29 (70.7%) x-rays. The significant findings in the lung fields included chronic obstructive pulmonary disease (COPD), fibrosis, consolidation, atelectasis and bronchiectasis in nine (40.9%), six (27.3%), three (13.6%) and four (18.1%) x-rays respectively. A total of 15 (12.3%) abnormalities were found in pleura; all had non-significant pleural thickening. While evaluating skeleton on x-ray, 21 (17.2%) non-significant abnormalities were noted. Eleven (90.2%) abnormalities were found in mediastinum; out of which only one (9%) had significant tracheal deviation while 10 (91%) had non-significant findings in mediastinum. No significant or non-significant abnormality was found in heart.

Frequency distribution of significant and non-significant abnormalities reported for various organs is given in Table 1.

Table 1: Frequency distribution of significant and non-significant abnormalities reported for various organs on chest x-rays (n=122)

Organs	Total Count (%)	Significant Count (%)	Non-Significant Count (%)
Heart	0 (0%)	0 (0%)	0 (0%)
Aorta and Pulmonary artery	12 (9.8%)	2 (16.7%)	10 (83.3%)
Lung Field	63 (51.6%)	22 (34.9%)	41 (65.1%)
Pleura	15 (12.3%)	0 (0%)	15 (100%)
Skeleton	21 (17.2%)	0 (0%)	21 (100%)
Mediastinum	11 (90.2%)	1 (9%)	10 (91%)
Total	122 (100%)	25 (20.5%)	97 (79.5%)

DISCUSSION

We evaluated the utility of pre-operative chest x-rays (CXR) in patients undergoing elective ENT surgery. It was found that majority of the patient had normal chest x-rays. Similar results were the reported by Ali IS, et al.[15] who concluded in their study that 21.8% patients had normal chest x-rays. Malnick S, et al.[16] in their study found that 23.5% of their patients had any major abnormality in chest x-rays, concluding majority of CXR were normal or having minor abnormality not contributing to diagnosis or management. According to conclusion made by Young EM, et al.[17] chest x-rays are not recommended in clinically normal patients and pre-operative clinical assessment is sufficient which was similar to conclusion made in our study. Tape TG, et al.[18] also concluded that routine pre-operative chest x-rays are not recommended as they have high false positive and false negative results. In a study done by Nze PU, et al.[19] they concluded that 84% CXR had significant abnormalities which was contradicting our results but they only included patients with age more than 70 years with having significant medical conditions, such patients were excluded from our study. Summerville TF, et al.[20] in their study found that out of 797 cases, 17% of CXR with abnormalities belong to patients with age above 60 year and only 2% with those below 60 years and concluded routine pre-operative x-rays chest are least usefull which was comparable to our results and conclusion. A comprehensive study[21] concluded that unjustified use of CXR causes a lot of burden on health care system in terms of waste of resources and high cost and their use should be justified when ordered.

Limitations of our study included an objective clinical assessment of patients pre-operatively based on anesthesiologist judgment. Reporting of CXR could have some human errors. The strengths of this study include large sample size based on our inclusion/ exclusion criteria and classifying CXR findings on organ system wise according to already used criteria. The overall total chest x-rays that were included in this study were 2826, the sample size included all the data available during the conduct of the study. The study has a huge impact on our daily practice. By minimizing unjustified use of CXR, we can save resources and relieve cost burden from health care system and patients. The harmful effects of radiation on patients can also be minimized.

CONCLUSION

We concluded that chest x-rays are not necessary in pre-operative assessment of clinically well patients. Almost all of the patients didn't have any abnormality on chest X-ray and those few who had abnormality was incidental and mostly non-significant, which didn't add into/ change management plan. So pre-operative chest x-ray has no role in elective ENT surgery and should not be done unless clinically indicated as these are a source of harmful radiations which have adverse effects on patients in long term.

REFERENCES

1. Bierle DM, Raslau D, Regan DW, Sundsted KK, Mauck KF. Preoperative evaluation before noncardiac surgery. Mayo Clin Proc 2020;95(4):807-22. https://doi.org/10.1016/j.mayocp.2019.04.029
2. De Hert S, Staender S, Fritsch G, Hinkelbein J, Afshari A, Bettelli G et al. Pre-operative evaluation of adults undergoing elective noncardiac surgery. Eur J Anaesthesiol 2018; 35(6):407-65. https://doi.org/10.1097/EJA.0000000000000817
3. Kling SM, Taylor GA, Philp MM, Poggio JL, Ross HM, Kuo LE. Use of preoperative laboratory testing among low-risk patients undergoing elective anorectal surgery. J Surg Res 2022; 270:421-9. https://doi.org/10.1016/j.jss.2021.08.042
4. Hinds S, Hariharan S. An economic evaluation of the preoperative investigations for elective surgical patients at a Caribbean tertiary care teaching hospital. Cureus 2023;15(1)e33528. https://doi.org/10.7759/cureus.33528
5. Martin SK, Cifu AS. Routine preoperative laboratory tests for elective surgery. JAMA 2017;318(6):567-8. https://doi.org/10.1001/jama.2017.7508
6. Okocha O, Gerlach RM, Sweitzer B. Preoperative evaluation for ambulatory anesthesia: what, when, and how? Anesthesiol Clin 2019 ;37(2):195-213. https://doi.org/10.1016/j.anclin.2019.01.014

7. Lim EH, Liu EH. The usefulness of routine pre-operative chest X-rays and ECGs: a prospective audit. Singapore Med J 2003 ;44(7):340-3.
8. Quecedo Gutiérrez L, Ruiz Abascal R, Calvo Vecino JM, Peral García AI, Matute González E, Muñoz Alameda L, et al. "Do not do" recommendations of the Spanish Society of Anaesthesiology, Critical Care and Pain Therapy." Commitment to Quality by Scientific Societies" Project. Rev Esp Anestesiol Reanim 2016 ;63(9):519-27. https://doi.org/10.1016/j.redar.2016.05.002
9. National Guideline Centre (UK). Preoperative Tests (Update): Routine Preoperative Tests for Elective Surgery. London: National Institute for Health and Care Excellence (NICE); April 2016. Available at: https://pubmed.ncbi.nlm.nih.gov/27077168/
10. Lumbreras B, González-Alvárez I, Lorente MF, Calbo J, Aranaz J, Hernández-Aguado I. Unexpected findings at imaging: predicting frequency in various types of studies. Eur J Radiol 2010;74(1):269-274. https://doi.org/10.1016/j.ejrad.2009.01.029
11. Gencer B, Gale CP, Aktaa S, Halvorsen S, Beska B, Abdelhamid M, et al. European Society of Cardiology quality indicators for the cardiovascular pre-operative assessment and management of patients considered for non-cardiac surgery. Developed in collaboration with the European Society of Anaesthesiology and Intensive Care. Eur Heart J Qual Care Clin Outcomes 2023 ;9(4):331-41. https://doi.org/10.1093/ehjqcco/qcac057
12. Galata C, Cascant Ortolano L, Shafiei S, Hetjens S, Müller L, Stauber RH, et al. Are routine chest x-rays necessary following thoracic surgery? A systematic literature review and meta-analysis. Cancers 2022 ;14(18):4361. https://doi.org/10.3390/cancers14184361
13. Brown DL, Clement F. Calculating health care waste in Washington state: first, do no harm. JAMA Intern Med 2018 ;178(9):1262-3. https://doi.org/10.1001/jamainternmed.2018.3516
14. Rees AM, Roberts CJ, Bligh AS, Evans KT. Routine preoperative chest radiography in non-cardiopulmonary surgery. Br Med J 1976 ;1(6021):1333-5. https://doi.org/10.1136/bmj.1.6021.1333
15. Ali IS, Khan M, Khan MA. Routine preoperative chest x-ray and its impact on decision making in patients undergoing elective surgical procedures. J Ayub Med Coll Abbottabad 2013;25(1-2):23-5.
16. Gabriel Duek MD, Nick Beilinson MD, Vladimir Neogolani MD, Basevitz A, Marina Somin MD, Joel Cohen MD, et al. Routine chest X-ray on hospital admission: does it contribute to diagnosis or treatment? Isr Med Assoc J 2010;12(6):357-61.
17. Young EM, Farmer JD. Preoperative Chest Radiography in Elective Surgery: Review and Update. S D Med 2017;70(2):81-7.
18. Tape TG, Mushlin AI. How useful are routine chest x-rays of preoperative patients at risk for postoperative chest disease? J Gen Intern Med 1988;3:15-20. https://doi.org/10.1007/BF02595750
19. Nze PU, Njike C. Is routine preoperative chest X-ray indicated in elderly patients undergoing elective surgery? Niger J Med 2008 ;17(2):150-2. https://doi.org/10.4314/njm.v17i2.37371
20. Sommerville TE, Murray WB. Information yield from routine pre-operative chest radiography and electrocardiography. S Afr Med J 1992 ;81(4):190-6.
21. Vicente-Guijarro J, Valencia-Martín JL, Moreno-Nunez P, Ruiz-López P, Mira-Solves JJ, Aranaz-Andrés JM, et al. Estimation of the overuse of preoperative chest X-rays according to "Choosing Wisely", "No Hacer", and "Essencial" Initiatives: Are they equally applicable and comparable? Int J Environ Res Public Health 2020;17(23):8783. https://doi.org/10.3390/ijerph17238783

CONFLICT OF INTEREST
Authors declare no conflict of interest.
GRANT SUPPORT AND FINANCIAL DISCLOSURE
None declared.

AUTHORS' CONTRIBUTION

The following authors have made substantial contributions to the manuscript as under:

Conception or Design:	MR, AH
Acquisition, Analysis or Interpretation of Data:	MR, AH, SK, NK, MAK, GI
Manuscript Writing & Approval:	MR, AH, SK, NK, MAK, GI

All the authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.