

The African Journal of Medicine and Medical Sciences

Editors: T.A. Junaid
O. Bademosi and D.D.O. Oyebola

Editorial Board:

A.K. Addae
S.A. Adebajo
O.O. Adekunle
A. Adeloye
B. Adelusi
A.F. Aderounmu
C.O. Adesanya
A. Adetugbo
A.A. Adeyokunnu
A. Agboola
O.O.O. Ajayi
E.O. Akande
O.O. Akinkugbe
O.O. Akinyemi
T. Atinmo
O. Ayeni
E.A. Ayoola
E.A. Bababunmi
E.A. Badoe
T.O. Cole
O.A. Dada
A.B.O. Desalu

L. Ekpechi
R.A. Elegbe
G. Emerole
J.G.F. Esan
E.M. Essien
G.O. Ezeilo
A. Fabiyi
A.O. Falase
J.B. Familusi
D. Femi-Pearse
K.A. Harrison
P.A. Ibeziako
A.C. Ikeme
A.O. Iyun
F. Jaiyesimi
A.O.K. Johnson
T.O. Johnson
T.M. Kolawole
O.A. Ladipo
S.B. Lagundoye
D.G. Montefiore
E.O. Nkposong

N.C. Nwokolo
H.O. Obianwu
S.A. Oduntan
E.O. Ogunba
O. Ogunbode
M.O. Olatawura
D.A. Olatunbosun
E.O. Olurin
Oyin Olurin
A. Omololu
B.O. Onadeko
G. Onuaguluchi
A.O. Osoba
B.O. Osotimhin
B.O. Osunkoya
B.O. Osuntokun
A.B.O.O. Oyediran
L.A. Salako
T.F. Solanke
O. Tomori
F.A.O. Udekwu
A.O. Uwaifo

Volume 17
1988

BLACKWELL SCIENTIFIC PUBLICATIONS
Oxford London Edinburgh Boston Palo Alto Melbourne

Routine pre-operative chest radiographs in non-cardiopulmonary surgery

A. O. OGUNSEYINDE

Consultant Radiologist, University College Hospital, Ibadan, Nigeria

Summary

The routine pre-operative chest radiographs of 203 consecutive patients scheduled for elective non-cardiopulmonary surgery were reviewed. There were 122 abnormal findings, 27 (22%) of which were significant, 95 (77.8%) insignificant. Of the former, 74% were due to cardiomegaly, while the latter included such findings as aortic unfolding (87%), pleural thickening (5.26%) and cervical ribs (2.11%). No abnormalities were found in subjects below 30 years of age, and there were no significant abnormal findings in subjects aged < 40 years. This study shows that routine pre-operative chest radiographs in patients undergoing elective non-cardiopulmonary surgery should be limited to patients with clinical symptoms, and high-risk patients, especially individuals aged \geq 50 years. Such radiographs are unnecessary in asymptomatic patients \leq 30 years of age.

Résumé

Les radiographies routinières, préopératives de la poitrine de 203 patients consécutifs prévus pour la chirurgie élective non-cardiopulmonaire ont été étudiées. Il y a 122 anomalies dont 27 (soit 22%) sont significatives et 95 (soit 77.8%) sont insignificatives. 74% des anomalies significatives sont dues à la cardiomégalie tandis que celles insignificatives comprennent le dépliage aortique (soit 87%) l'épaississement de la plèvre (soit 5.26%) et côtes cervicales (soit 2.11%). Aucune anomalie ne se présente chez les cas de moins de 40 ans. Cette étude démontre que la radiographie routinière, préopérative de la poitrine chez des patients qui subissent la chirurgie élective non-cardiopulmonaire doit être limitée aux patients manifestant des symp-

tomes cliniques et aux patients courant de grands risques, surtout ceux âgés de 50 ans et plus. Nulle n'est pas nécessaire pour les adultes asymptomatiques de moins de 30 ans.

Introduction

Over the past years, the chest radiograph (X-ray) has become a routine part of assessing a patient before administering general anaesthetics. The chest radiograph is now considered to be an extension of the routine clinical examination rather than a specialized procedure to be used in specific instances. The chest X-ray has now become a routine examination in patients going for surgery rather than an adjunct to clinical diagnosis. With greater increases in requests for radiological investigation than increases in staff, as well as shortages of some key materials used in radiology, there is a need to make more effective use of the available resources, especially in patients undergoing non-cardiopulmonary surgery.

The value of, and the criteria for, routinely performing such investigations as skull radiography after acute trauma in childhood, pre-operative chest radiographs and intravenous urograms have been questioned [1-5]. These studies were prompted not only by the increasing number of requests, but also by the lack of adequate information on the reasons for requesting these investigations, and on the extent of their influence on the subsequent management of patients. The rising cost of hospital care, shortage of manpower, inadequate basic infrastructural facilities such as film, and insufficient technological back-up caused us to appraise the usefulness of this examination in this hospital.

Patients and methods

The chest radiographs performed on 203 consecutive patients admitted into the surgical wards at the University College Hospital (UCH), Ibadan, and scheduled for elective non-cardiopulmonary surgery from July to December 1984, were evaluated.

Information about their age and sex were obtained from the request cards, while information about the nature of operation, length of stay in hospital, post-operative complications and contribution of past medical history were obtained from the case-notes and intra-operative records of anaesthetists.

Routine pre-operative chest radiographs were taken in full inspiration with the patient erect, using an exposure time of 0.3-0.4 sec on 300 ma, 50-60 kv and an Anode-film distance of 100 cm.

The findings of evaluation of the chest radiographs were classified as those of enlarged heart, unfolded aorta and prominent pulmonary vessels, using the criteria of Simon [6]. Abnormalities of the lung, pleural and skeletal systems, such as consolidation, pleural effusion and congenital abnormalities, were looked for. These abnormalities were again subdivided into significant and non-significant categories, with reference to their relevance to general anaesthesia and surgery, i.e., whether it prevents the use of general anaesthesia.

Results

The chest radiographs of all the 203 consecutive patients (110 males, 93 females, 1-79 years) were available for evaluation.

Table 1 shows the age and sex distribution of the patients and Table 2 shows the number of abnormal chest findings in each group.

Table 3 shows the sources of requests and the nature of the operation performed on the patients. The majority of the cases were not scheduled for major surgery: 130 (64%) had eye surgery, mainly for cataract extraction, and 22 of the 48 (46%) surgical cases had herniorrhaphy operations.

Table 4 shows the type and distribution of abnormal findings on the chest radiographs. There was a total of 122 abnormal findings. No abnormalities were found in subjects below 30 years of age, and there were no significant

Table 1. Age and sex distribution of patients

Age (years)	Male	Female	Total
1-10	3	4	7
11-20	9	6	15
21-30	3	7	10
31-40	9	10	19
41-50	19	23	42
51-60	29	20	49
61-71	27	13	40
> 71	11	10	21
Total	110	93	203

Table 2. Age and sex distribution of the abnormal findings

Age (years)	Male	Female
1-10	—	—
11-20	—	—
21-30	—	—
41-50	10	16
51-60	25	22*
61-70	8	8
> 70	8	10
Total	66	56

*More than one abnormality in one patient.

Table 3. Department of referral and the operations performed

Department of referral	No.	Type of operation	No.
Surgical	48	Thyroidectomy	5
		Fistulectomy	8
		Haemorrhoidectomy	5
		Cholecystectomy	3
		Herniorrhaphy	22
		Appendicectomy	5
Gynaecological	25	Repair of vesico-vaginal fistula	6
		Utero-vaginal prolapse	8
		Myomectomy	9
		Tubal surgery	2
Ophthalmology	130	Cataract extraction	130
Total			203

Table 4. Abnormality recorded in 203 patients

		Significant abnormality and no. patients	Non-significant abnormality and no. patients	
Heart	Cardiomegaly	20	—	
Aorta	—		Unfolding	83
Pulmonary artery	—		—	
Lung fields	Chronic inflammatory changes	2	Healed pulmonary tuberculosis	2
	Active pulmonary tuberculosis	1	Linear scar	2
Pleural	Plaque of calcification	2	Pleural thickening	5
Skeletal	—		Cervical rib	2
			Bifid rib	1
Mediastinum	Tracheal deviation	2	—	
Total		27		95

abnormal findings below 40 years of age. There were only 27 significant findings: 20 (74%) of these were due to cardiomegaly, 15 occurring in males and 5 in females; 2 (11%) showed thyroid enlargement with deviations of the trachea that were obvious clinically; 2 (11%) revealed chronic inflammatory changes; and one showed radiological evidence of active tuberculosis, which was unsuspected clinically (Fig. 1). Of the 95 insignificant findings, 83 (87%) were due to aortic unfolding; 44 (53%) occurred in males and 39 (47%) in females. Table 5 shows the age distribution of the patients with aortic unfolding: 69 (83.1%) of the subjects were above 50 years old, and none was aged 40 years or below.

Discussion

The chest radiograph is the most frequently performed radiological procedure throughout the world, and constitutes the commonest radiological investigation in our environment [7, 8]. In this study, pre-operative chest radiograph performed on patients under 30 years of age showed no abnormalities, but only 2 non-significant findings were recorded in patients below 40 years of age. It, therefore, follows that if patients below 30 years old had been excluded from routine examination, the work-load of the Radiology Department, in respect of pre-operative chest radiographs, would have been

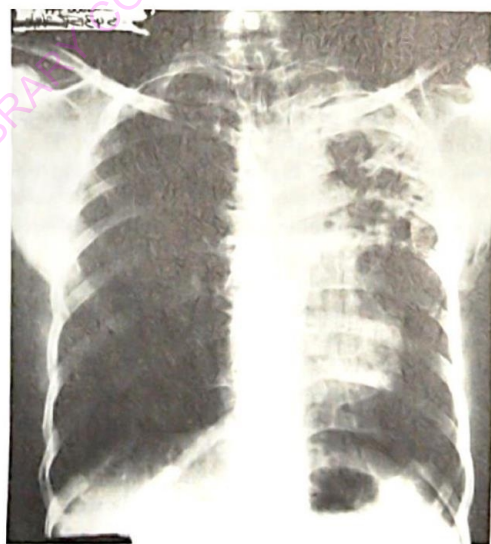


Fig. 1. Pre-operative chest radiograph showing chronic tuberculous disease in the left upper lobe. Note the apical pleural thickening, multiple cavities and elevated hilum.

reduced by 16%; and 25% if all patients below 40 years of age were excluded. In 1973, Brill *et al.* studied routine chest radiographs of 1000 consecutive patients, aged up to 18 years, and found 2% significant abnormality [9]. Sagel *et al.* in his study of over 10,000 routine chest radiographs, found new information in only 4%

Table 5. Age and sex distribution of patients with aortic unfolding

Age (years)	Male	Female	Total	Percentage
< 40	—	—	—	0.0
41-50	6	8	14	16.9
51-60	16	18	34	40.9
61-70	15	7	22	26.5
> 70	7	6	13	15.7
Total	44	39	83	100.0
Percentage	53.0	47.0	100.0	

of the patients studied, and this was often of doubtful clinical significance [10]. Sane *et al.*, in their study of children ranging from newborn to 19 years, found that in only 3.8% did the result of pre-operative chest X-ray change either anaesthesia or their treatment [11].

In this study, 74% of the significant findings were due to cardiomegaly and about 11% to pulmonary inflammatory changes. This compares well with the findings of Sagel *et al.* [10], in which 50% of the patients with significant findings were also due to cardiomegaly. They, however, found a higher incidence of chronic inflammatory disease. The relatively low yield of chest radiographic abnormalities in subjects under 40 years of age in this study is similar to the experience of Makanjuola [12] who suggested that only subjects aged 50 years and above should have routine chest radiographs pre-operatively. In another study of elderly patients, Sewell *et al.* [13] found abnormalities in 21% of chest radiographs and these changes included findings such as blunted costophrenic angles or healed tuberculosis.

All the patients with cardiomegaly were over 50 years of age, and 85% of them (17 out of 20) were not hypertensive. This gives support to the suggestion by Simon [6] that the diameter of the thorax shrinks with advancing age, with a consequent increase in the cardiothoracic ratio. This, therefore, raises the question of how much asymptomatic cardiomegaly should be considered as an abnormal finding in such a population of individuals aged 50 years and above. The results of this study suggest that an adequate and well-executed clinical evaluation of the subjects, including a detailed past medical history, would identify subjects at risk, such

as the individual with pulmonary tuberculosis in this study. Aortic unfolding as an abnormal radiographic finding showed a distinct age dependence, as the majority of the subjects with these findings were above 50 years old.

Some people argue that pre-operative radiograph serves as a base-line study for comparison in the post-operative period. In this series, only three (1.48%) patients had repeat chest radiographs in the post-operative period, for suspected pneumonia, and in none of the patients was the post-operative management of the patients altered by the findings on repeat chest radiographs. This observation is similar to the findings of a survey by the Royal College of Radiology [14], which showed that the result of routine chest radiographs did not affect the decision to operate, or alter the type of anaesthesia and the post-operative complication rate.

References

1. Kerr IH. The pre-operative chest. *Br J Anaesth* 1974;46:558-63.
2. Atkinson AB, Kellett RJ. Value of intravenous urograph in investigating hypertension. *J R Coll Physicians Lond* 1974;8:175-81.
3. Obisesan AA, Bohrer SP. The uses and abuses of skull X-ray in head injury. *Nig Med J* 1979;9:65-9.
4. Ogunmekan AO. Routine skull roentgenography in the clinical evaluation of children with febrile convulsion. *Br J Radiol* 1980;53:815.
5. Wood RA, Hoekelman RA. Value of the chest X-ray as a screening test for elective surgery in children. *Paediatrics* 1981;76:447-52.
6. Simon, G. The anterior view chest radiograph — criteria for normality derived from a basic analysis of the shadows. *Clin Radiol* 1975;26:429-37.
7. Makanjuola D. Trauma in the rural areas of Western Nigeria and the need for basic radiological service. *Diagn Imag Clin Med* 1982; 51:139-45.
8. Lagundoye SB, Olowa PA. A basic X-ray service for a rural community in South Western Nigeria. *Diagn Imag Clin Med* 1982;51:193-7.
9. Brill PW, Edwing ML, Dunn AH. The value of routine chest radiographs in children and adolescents. *Paediatrics* 1973;52:125-7.
10. Sagel SS, Evens RG, Forrest JV *et al.* Efficacy of routine screening and lateral chest radiographs in a hospital based population. *N Engl J Med* 1974;291:1001-4.
11. Sane SM, Worsing RA, Wiens CW, Sharma

- RK. Value of pre-operative chest X-ray in children. *Paediatrics* 1977;60:669-72.
12. Mankanjuola D. Re-appraisal of the routine pre-operative chest X-ray. *Nig Med Pract* 1985; 9:45-8.
13. Sewell JM, Spooner LL, Dixomy AK, Rubenstein D. Screening investigation in the elderly. *Age and Ageing* 1981;10:165-8.
14. National Study by the Royal College of Radiologists. Pre-operative Chest Radiology. *Lancet* 1979;ii:84-6.

(Accepted 20 May 1987)

DIGITIZED BY E-LATUNDE ODEKU LIBRARY COLLEGE OF MEDICINE, UI