

Indian Journal of
Radiology

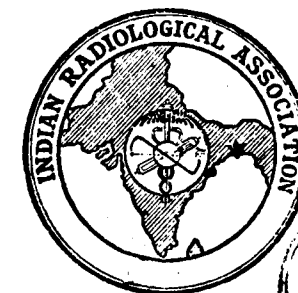
Aug. 1958



5L
:4:625m2,N₄
V58.12.3
194029.

THE
Indian Journal of Radiology

A quarterly Journal devoted
 to Clinical Radiology and
 allied Sciences



146
 Owned and published as its
 Official organ by the Indian

Radiological Association



18 OCT 1958

Vol. XII

AUGUST 1958

MADRAS

No. 3

CONTENTS

- | | | |
|---|-----|-----|
| 1. EDITORIAL | ... | i |
| By Dr. K. M. Rai | | |
| 2. BRONCHOGRAPHY WITH DIONOSIL | ... | 99 |
| By Dr. Om. P. Bhardwaj & Dr. Chaman Lall Nagrath | | |
| 3. THE SPACE BETWEEN STOMACH AND DIAPHRAGM | ... | 111 |
| By Dr. G. S. Sarin & Dr. N. G. Gadekar | | |
| 4. ROLE OF RADIOTHERAPY IN CALCANEAL SPUR | ... | 115 |
| By Dr. O. N. Saxena | | |
| 5. ALL-INDIA RADIOLOGICAL CONFERENCE SYMPOSIUM
ON TUMOURS OF THE LUNGS | ... | 117 |
| By Dr. B. B. Bhatia | | |
| 6. CANCER OF THE LUNG | ... | 120 |
| By Dr. C. B. Singh | | |
| 7. ABSTRACTS OF RADIOLOGICAL LITERATURE | ... | 125 |

INDEX TO ADVERTISERS

DL
2040625-2, N42
PAGE
1758-12-3

Agfa India Private Limited	...	...	vi
CAWO Photochemische Fabrik GmbH	...	...	vii
Dey's Medical Stores Private Ltd.	...	...	viii
The East Asiatic Co. (India) Private Ltd.	...	...	ix
Glaxo Laboratories (India) Private Ltd.	...	...	x
The General Electric Co. of India Private Ltd.	...	...	xiv
Hind Chemicals Ltd.	...	...	xi
International General Electric Co. (India) Private Ltd.	...	...	xiv
Khatau Valabhdas & Company	...	...	xii
Kodak Limited	...	...	iv, x
May & Baker (India) Private Ltd.	...	...	xiii
Philips India Limited	...	...	xvi
Picker International Corporation	...	...	xv
Schering Asia G. m. b. H.	...	...	

When replying please mention the Indian Journal of Radiology

THE INDIAN JOURNAL OF RADIOLOGY

(QUARTERLY)

The official Journal of the Indian Radiological Association

Editor-in-Chief:

DR. K. M. RAI, Madras.

Editorial Board:

DR. S. N. DEBBO, Bombay.

DR. K. P. MODY, Bombay.

DR. N. G. GADEKAR, New Delhi.

DR. M. L. AGGARWAL, Amritsar.

Hon. Secretary-in-Charge:

DR. M. V. K. SHETTY, Madras.

EDITORIAL NOTICES

Articles offered for publications and other correspondence relating to the Editorial Management and books for review should be sent to the Editor-in-Chief, DR. K. M. RAI, "Lake Side", 110, Mount Road, Madras-18. Original Articles are accepted with the understanding that they are contributed solely to the Indian Journal of Radiology.

All exchange copies of Journals, may be kindly sent to the Editor-in-chief Direct.

Only Typed manuscripts in original (on one side of the paper) with good margin and double spacing are accepted.

The Editorial Board reserves the right to make literary corrections. Drawings and charts should always be in black (preferably chinese ink) and photographic prints on glossy paper. All the illustrations should be numbered with title of the paper at the back of each one, and the top marked with arrow (↑).

Only 6 illustrations per article will be allowed free of cost, and for the remaining the cost will be charged to the contributor.

25 Re-prints on imitation art paper are supplied free of charge to authors. Additional copies may be ordered to a scale of price laid down.

Correspondence regarding subscriptions, advertisements and other business relating to the Indian Journal of Radiology should be addressed to the "Hon. Secretary-in-Charge" - Dr. M. V. K. Shetty, 21-E, Ormes Road, Kilpauk, Madras-10.

Subscription for India Rs. 16 - per annum. Single copy Rs. 4 - plus postage.

Foreign subscription £ 1.6 per annum.

Free to members of the Indian Radiological Association.

Annual subscription for Membership Rs. 13 -.

OFFICE BEARERS
Indian Radiological Association
1957

President:

CAPT. P. B. MUKHERJEE, Calcutta.

Immediate Past President:

DR. DIWAN CHAND AGGARWAL, New Delhi.

Vice-President:

DR. K. B. MATHUR, Lucknow.

Hon. General Secretary:

DR. VED PRAKASH, New Delhi.

Hon. Treasurer:

DR. S. P. SHARDA, New Delhi.

Joint Hon. Secretary:

DR. L. H. ATHLE, Bombay.

Editor-in-Chief:

DR. K. M. RAO, Madras.

Central Council:

Members:

DR. B. N. KHANNA, U. P.
DR. H. SYED ALI, Hyderabad.
DR. U. S. PRASAD, Nagpur.
DR. RAM SINGH, Patiala.
DR. P. K. HALDAR, Agra.

Branch Representatives:

DR. S. N. BASU, Bengal.
DR. G. H. NERURKAR, Bombay.
DR. O. P. BHARADWAJ, Delhi.
DR. P. S. BABU NAIDU, Madras.
DR. B. N. MEHROTRA, U. P.

Hon. General Secretary's Address:

Dr. VED PRAKASH,
48, Hanuman Road, New Delhi-I.

THE
INDIAN JOURNAL OF RADIOLOGY

ADVERTISEMENT RATES

Ordinary Position:

One Page	...	Rs. 100 - per insertion
Half Page	...	Rs. 53 - ,,

Special Position:

Facing Editorial	) ...	50% over and above the Schedule Rates.
Reading Matter and		
Cover Pages 2 3 4		

Discount:

A Series discount of 5% and 10% is allowed on contracts of 6 and 12 insertions respectively.

Commission:

An Agency Commission of 15% is allowed on all orders booked by Advertising Agencies.

Advertising in The Indian Journal of Radiology will pay the Advertisers well. A trial order will prove the above fact.

★
*For all matters regarding advertising in the Journal,
communication may be sent to:*

Dr. M. V. K. SHETTY

HON. SECRETARY-IN-CHARGE

THE INDIAN JOURNAL OF RADIOLOGY

21-E, ORMES ROAD

KILPAUK, MADRAS-10.

...and nothing but the truth

IN CHOLECYSTOGRAPHY
AND CHOLANGIOGRAPHY
WITH



A NEW M&B BRAND X-RAY PRODUCT

MANUFACTURED BY



MAY & BAKER LTD

Distributed by: MAY & BAKER (INDIA) PRIVATE LTD. BOMBAY • CALCUTTA • GAUHATI • MADRAS • NEW DELHI

After extensive clinical investigations, this opaque medium has been introduced to radiologists and radiotherapists. It permits a high standard of visualization of the gall bladder, and frequently of part or all of the biliary tree. It is a well tolerated compound, which is administered orally.

"Biliodyl" is supplied as 0.5 gramme tablets of phenobutiodil in boxes of 6 tubes, each tube containing 6 tablets. Further information is available on request.

an M&B Brand Medical Product

THE INDIAN JOURNAL OF RADIOLOGY

OFFICIAL ORGAN OF

THE INDIAN RADIOLOGICAL ASSOCIATION

IMPORTANT ANNOUNCEMENT

All communications to the Secretary-in-Charge, Indian Journal of Radiology, may kindly be addressed to:

Dr. M. V. K. SHETTY, B.Sc., M.D.B.S., D.M.R.

21-E, Ormes Road

KILPAUK

MADRAS-10

Editor-in-Chief.

For perfection in RADIOLOGY

- Reliable diagnosis
- Constant exposure data
- Uniform darkroom processing
- Sharp definition
- High speed
- Excellent contrast

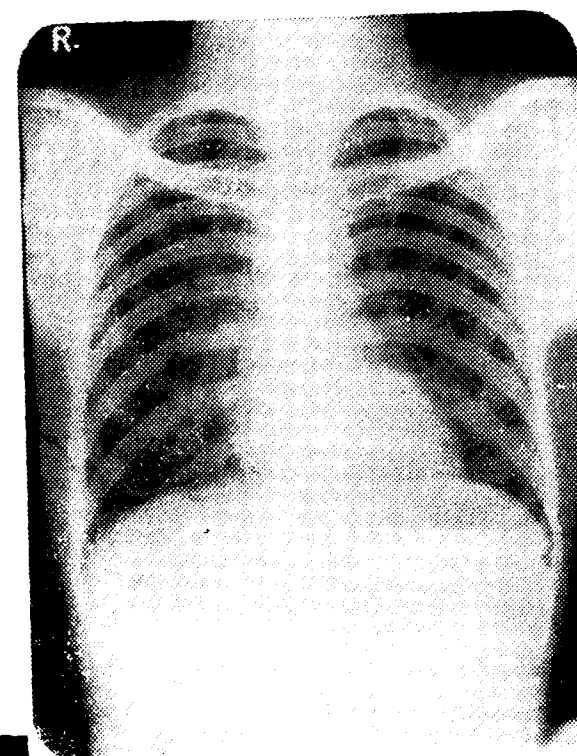
Agfa

**X-RAY
FILM**

Clear and Blue Base

AGFA INDIA PRIVATE LTD.

- 198, Jamshedji Tata Road, Bombay 1.
- Behind Kamla Market, New Delhi 13.
- 31, Chittaranjan Avenue, Calcutta 12.
- 202, Mount Road, Madras 2.



CAWO

Ultimate picture quality as to detail and contrast produced by

CAWO X-RAY INTENSIFYING SCREENS

Type CAWO-DETAIL: maximum definition with resulting reproduction of finest details

Type CAWO-OPTIMA: increased definition combined with reduced exposure times for all techniques

Type CAWO-UNIVERSAL: the standard screen for general X-ray work

Type CAWO-ULTRA-RAPID: for short time exposures.

Up to 7 simultaneous tomographs in the size 24 x 30, 18 x 24 and 13 x 18 cm. in one common exposure allowed by

CAWO SIMULTANEOUS MULTIPLE LAYER X-RAY CASSETTE UNIT

which consists of:

1 special cassette

1 set of 7 matched CAWO Combinations of screens

1 book-type holder for screens and films

By request can be supplied: 1 holder for special cassette.

Optional definition, brightest luminescence, excellent contrast guaranteed by

CAWO FLUOROSCOPIC SCREENS

for visual screening, fluoradiography and other special procedures.

Excellent radiographs obtained on

CAWO X-RAY PAPER

the X-ray paper for medical and technical radiography excelling in high sensitivity, sharpness of definition and brilliance.

It embodies a high economical value.

We search for relations with well-introduced expert-firms for the representation of our firm.

For further particulars please write to:

CAWO

PHOTOCHEMISCHE FABRIK GmbH.
Schrobenhausen WESTERN GERMANY



TELEPAQUE

Brand of Iopanoic Acid

SUPERIOR ORAL CHOLECYSTOPAQUE

FOR BETTER GALL BLADDER AND BILE DUCT VISUALIZATION

- ★ More Consistent Results
- ★ Quicker Absorption and Elimination
- ★ Repetition of Dose Rarely Required
- ★ Shorter Interval
- ★ Sharp Delineation of Stones
- ★ Visualization of Bile Ducts even with Customary dose
- ★ Rapid and Adequate Emptying of Gall Bladder
- ★ Excellent Tolerance
- ★ Greater Opacification in Smaller Dosage than with other Oral Mediums

Manufactured by: WINTHROP PRODUCTS, LONDON, NEW YORK.

Exclusive Distributors in India:

DEY'S MEDICAL STORES PRIVATE LTD.

CALCUTTA

BOMBAY

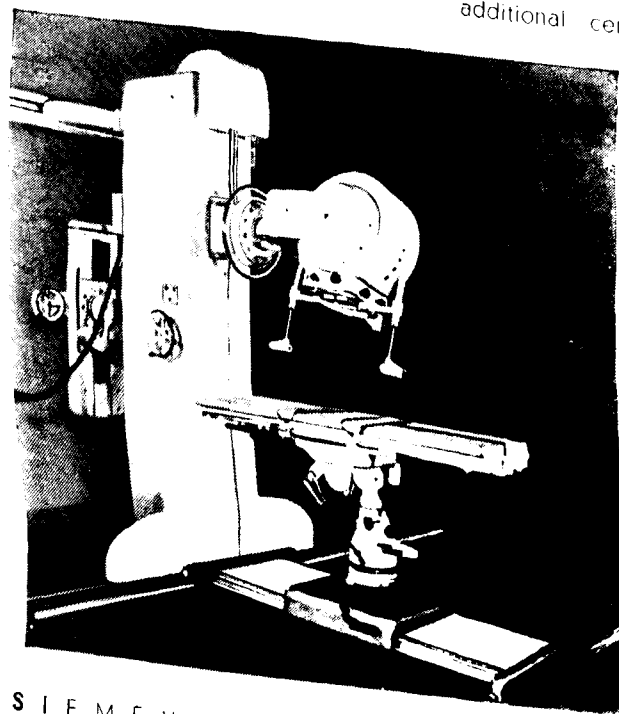
DELHI

MADRAS



GAMMATRON

High-capacity unit
for deep therapy
with gamma radiation
of cobalt-60



SIEMENS-REINIGER WERKE AG, ERLANGEN

Representatives:

The East Asiatic Company, Private Ltd.

Bombay Calcutta Madras

Decisive clinical, operational
and ray-protective advantages: -

for cobalt sources up to 2000 curies - pendulum
therapy: normal, convergent, eccentric (tangen-
tial) - radius of oscillation adjustable between 16
and 26 ins - axis of oscillation variable between
35 and 53 ins - stationary field therapy in any posi-
tion - extremely short distance source to ray port
12½ ins - maximum operational safety - 4 shutters
working independent of each other are provided
in the head - central visual localizer exactly in-
dicating the field size and the penumbra area and
additional centering spot lights - unimpeded
access - any treatment table and
chair can be comfortably used -
tumour localisation, by means
of special unit, with the patient
already on the treatment table;
thus, no repositioning for the
treatment proper required.

Detailed literature will be sent
on postal request.



Rajasthan

SUBTLETIES OF SHADOW

FINE shades and distinctions
seldom count so much as in
the interpretation of a radio-
graph...and seldom are they
more consistently achieved
than with Glaxo radio-
logical contrast media. From
this range the preparation
best suited to your
individual requirements can
be nicely selected.



GLAXO LABORATORIES (INDIA) PRIVATE LTD.,
BOMBAY . CALCUTTA . MADRAS . NEW DELHI

DIONOSIL AQUEOUS DIONOSIL OILY

(vials of 20 cc.)

DIONOSIL POWDER

(for increasing viscosity of
suspensions if desired:
bottles of 2 gm.)

For
bronchography

MYODIL

For myelography
and ventriculography
3 cc. ampoules . boxes of 3

PYELECTAN

for intravenous pyelography
and venography
20 cc. ampoules .

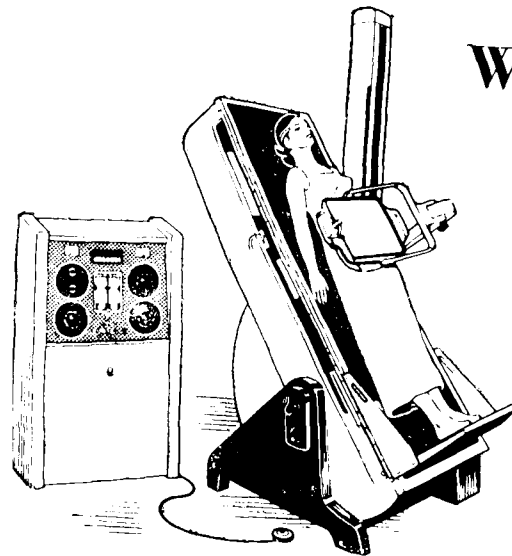
PYELECTAN Retrograde

For retrograde pyelography
10 cc. ampoules

PYELOSIL

'35' and '50'—for excretion pyelography
'70'—for angiocardiology.
All in ampoules of 20 cc.

THE INDIAN JOURNAL OF RADIOLOGY



WATSON 'BEAVER 100' X-RAY INSTALLATION

Entirely new, and incorporating the most recent advances in design, this attractive, compact diagnostic installation is ideal for private practice or the smaller general hospital.

The table is available with either manual or motor-driven tilt (from a 15° trendelenburgh position to the vertical) and has a counter-weighted Potter-Bucky Diaphragm.

The generator, having an output of 100kV and 100 mA, incorporates push-button selection for the mA and tube-focus. It is normally arranged to energise a double focus Dynanox 20 rotating anode tube.

For further particulars please write to:

G.E.C.

THE GENERAL ELECTRIC CO. OF INDIA PRIVATE LTD

CALCUTTA DELHI KANPUR PATNA
MADRAS BANGALORE COIMBATORE SECUNDERABAD
BOMBAY AHMEDABAD

Representing: THE GENERAL ELECTRIC CO. LTD. OF ENGLAND

x35

**Good
tolerance
and better shadows with**



The use of high doses of sodium acetizoate in association with the Lundstrom method of compression enables pyelograms of the highest quality to be obtained, often equal to those obtained by the retrograde method. The urinary iodine content following intravenous sodium acetizoate is twice as high as with diiodone and, consequently, the degree of radio-opacity is greater. 'Diaginol', therefore, is of particular value in those patients with whom poor films are liable to occur using other media — for example in those who are fat, or whose bowels have not been cleared by purging, or who have not abstained from drinking for a prolonged period — and it should prove of especial use in patients with symptoms suggestive of renal colic, and in out patients for whom there are good medical or social reasons for an immediate pyelogram.

PREPARED BY:
50% solution — 20 c.c. ampoules
30% solution — 25 c.c. ampoules

Detailed information is available on request
BY MAIL FROM THE MANUFACTURER



MAY & BAKER LTD

Distributed by: MAY & BAKER (INDIA) PRIVATE LTD. BOMBAY • CALCUTTA • CHENNAI • MADRAS • NEW DELHI

33 Years of Service to India's Medical Profession INTERNATIONAL GENERAL ELECTRIC

Represents with pride

GENERAL ELECTRIC COMPANY
X-Ray Department
Milwaukee, Wisconsin, U.S.A.

World renowned for the supply of highest quality X-Ray equipment, Deep Therapy apparatus, Physio-therapy equipment and all types of components and accessories.

FRITZ HOFMANN G.M.B.H.
Erlangen. (Western Germany)

Continental X-Ray equipment.

ATOMIC ENERGY OF CANADA LTD.
Ottawa, Canada.

Cobalt '60' Beam Therapy equipment
Isotopes and Radium.

AMERICAN STERILIZER COMPANY
Erie, Pennsylvania, U.S.A.

For the finest in all types of Sterilizers
Surgical Lights, Operation Tables,
Orthopedic and Obstetrical Tables.

**GOMCO SURGICAL
MANUFACTURING CORPORATION,**
Buffalo, N.Y., U.S.A.

All types of suction, ether and surgical
pumps.

LIEBEL FLARSHEIM COMPANY
Cincinnati, Ohio, U.S.A.

World famous "AG" Bovie Electro-surgical
unit and other models.

**BARNSTEAD STILL &
STERILIZER CO.**
Boston 31, Mass. U.S.A.

Single, Double and Triple distillate water
still.

McKESSON APPLIANCE COMPANY
Toledo, Ohio, U.S.A.

Resuscitators, Inhalers and gas anaesthesia
equipment.



Progress Is Our Most Important Product

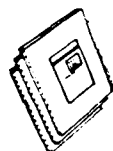
INTERNATIONAL GENERAL ELECTRIC CO. (INDIA) PRIVATE LTD.
BOMBAY • CALCUTTA • NEW DELHI • MADRAS

*So much depends on you
—and YOU can depend on*

Kodak X-ray Materials and Equipment

Your diagnosis, swift and unerring, is so vital — and to aid you, 'Kodak' offer the finest in X-ray Films, Chemicals and Equipment . . . tested by time and experience, relied on by eminent medical practitioners everywhere.

For radiographs having fine detail, with correct contrast use 'Kodak' X-ray Film. And for the all-important processing, 'Kodak' Tested X-ray Chemicals . . . always easily available, and ready-packed in time-saving, labour-saving tins!



'Kodak' Tested X-ray Chemicals:

Developing and replenishing powders; fixers; wetting agents; etc.

Exposure Equipment:

Intensifying screens; X-ray cassettes; etc.

Processing Equipment:

Film hangers; film clips; corner cutters; processing tanks; safelight lamps; etc.

Viewing Equipment:

X-ray illuminators of various types

Kodak Limited (Incorporated in England with Limited Liability) Bombay Calcutta Delhi Madras

The 11" Image Intensifier

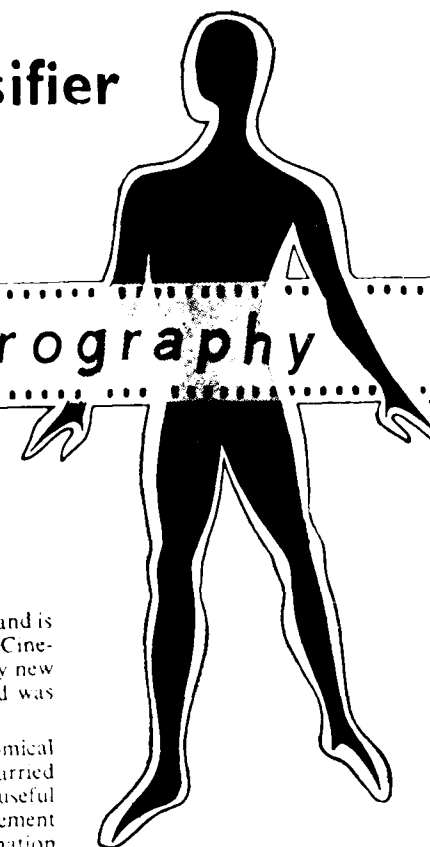
THE GATEWAY TO

Cinefluorography

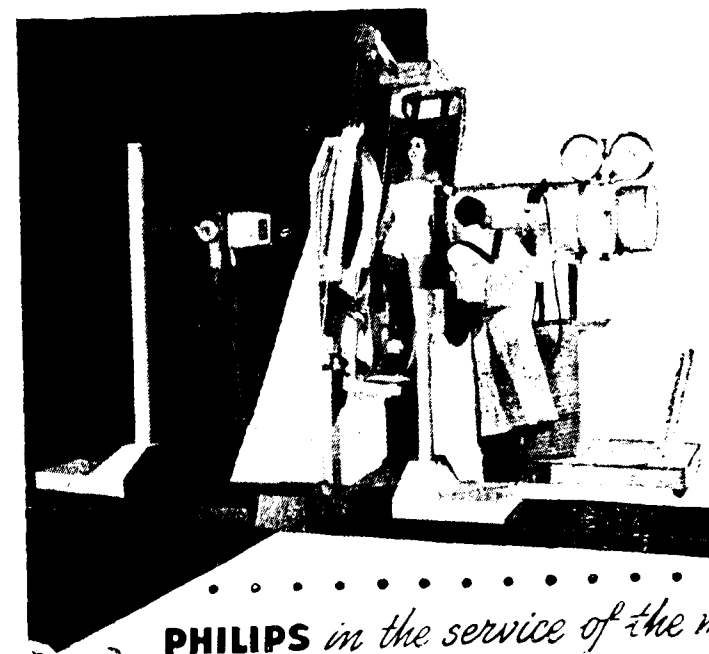
of large
anatomical regions

The screen size of the original 5" Image Intensifier was, and is still, quite suitable for a wide range of applications in Cinefluorography. However, it was felt that to make a really new approach to this technique just one more step forward was needed; a larger screen.

The installation for Cinefluorography of large anatomical regions permits a wide variety of examinations to be carried out with ease. The large screen diameter is particularly useful in functional diagnostics, where observation of movement is of primary importance e.g. blood circulation, examination of the alimentary canal, the respiratory system, the limbs etc.



*This complete
Cinefluorographic unit
consists of: the 11" Image
Intensifier tube and a 35 mm
cine-mirror-camera,
combined with a special
designed control desk Cine
DLX, and the UGX stand.*

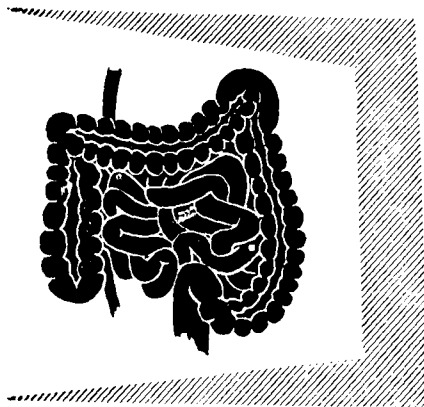


PHILIPS INDIA LIMITED



PHILIPS in the service of the medical world

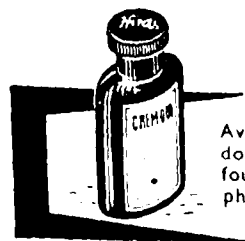
A Step Forward in RADIOGRAPHY



CRÉM-O-BAR

Clinical trials have proved the superiority of CREM-O-BAR over other preparations in barium radiography. Its chief characteristics are:

- Concentrated cream form — dilutes easily and gives uniform suspension
- No flocculation or settling with change of PH in gastric acids or intestinal alkalis
- Absence of toxicity
- Gentle peristaltic stimulation, greatly reducing period of examination
- Mint flavour to suit Indian taste.



Available in single dose (4 fl. oz.) and four doses (16 fl. oz) phials.

Sample and literature on request

HIND CHEMICALS LTD.

Post Box No. 227 KANPUR

DR. A. WANDER S.A. BERNE SWITZERLAND

Alubar

WANDER

Contrast medium for radiological examination of the digestive tract.

Aqueous suspensions of ALUBAR are homogeneous, fine-grained and cast a dark shadow

They guarantee sharp and even contrast pictures

They are stable in acid and alkaline media

They can be prepared easily without tedious whisking.

ALUBAR stimulates peristalsis within physiological limits.

ALUBAR is economical in use, attractive in appearance, has a pleasant flavour and unobtrusive taste.

Waterproof containers with 125 gm.
Tins of 1 kg and 5 kg

Sole Importers:

KHATAU VALABHDAS & COMPANY

Indian Globe Chambers, Fort Street. BOMBAY 1



Schering

X-ray

CONTRAST AGENTS

characterized by:

Excellent contrasts

Outstanding local and
general tolerance

Biligradin i. v.

**Biligradin i. v.
forte**

For differential diagnosis of bilious affections. Visualization of the total gall-duct system (intra- and extra-hepatic bile ducts and gallbladder).

1 ampoule of 20 c.c. / 30%
5 ampoules of 20 c.c. / 30%
1 ampoule of 20 c.c. / 50%
5 ampoules of 20 c.c. / 50%

Urografin

60%

76%

For excretion urography as well as all forms of angiography

1 ampoule of 20 c.c.
5 ampoules of 20 c.c.
25 ampoules of 20 c.c.
1 ampoule of 20 c.c.
5 ampoules of 20 c.c.
25 ampoules of 20 c.c.

SCHERING A. G. BERLIN. West-Germany.

Information Service
Schering Asia G. m. b. H.
Bombay Branch,
Sir Vithaldas Chambers,
16, Apollo Street,
P. O. Box No. 10085,
Fort, Bombay 1.

Sole Importers
**Messrs. Gernian Remedies &
Trading Co. (Private) Limited,**
Laxmi Building,
Ballard Estate,
P. O. Box No. 1945,
Fort, Bombay 1.

When conditions began to change rapidly with the advent of radio-isotopes and X-ray and other like machines to produce very powerful ionising radiations such as the Beta-tron, the Cyclotron etc., it was found necessary to re-organise the Protection Committee in Great Britain and the British X-ray and Radium Protection Committee handed over their responsibilities to the Medical Research Council and the Ministry of Health which maintains the closest co-operation with the International Committee which functions under the International Congress of Radiology. This Commission was first set up in 1928 to make recommendations on radiation safety standards. The recommendations then made were for the last time amended in 1953 which are now the accepted standards of protection. The most important among them are as follows :—

Responsibility

1. The head of the Radiological Department shall be responsible for the observance of any regulations, recommendations or Codes of practice on radiation protection in operation in his own Country and for instruction of all personnel regarding radiation hazards and methods of control.

A technically competent radiation-safety officer should be appointed, to be specifically responsible for the radiation protection measures in the Department. It is the duty of the workers to follow the instructions of the above expert with respect to radiation protection and to use the protective devices provided for their welfare and to bring to the notice of those in charge any defect which has been revealed.

2. Plans for new or alterations to existing Radiological departments should be discussed with appropriate protection organisation or qualified expert.

3. A radiation Survey shall be made by a qualified expert. Routine use of the department shall be deferred until it has been found to comply with the regulations, Codes of practice etc. in operation in the Country concerned.

Personnel tests : Health Surveillance

4. All new personnel in Radiological work shall have a pre-employment blood examination. The results of such an examination shall determine the acceptance or refusal of the potential employee in radiological

work. In doubtful borderline cases of abnormality, the blood count should be repeated on successive days or at intervals of a few days. If site monitoring and personnel monitoring are carried out, then routine blood counts are unnecessary in the case of workers who receive doses not exceeding one third of the permissible doses, it is optional in the case of workers who receive doses between one third and two thirds of the permissible doses and routine blood counts are desirable in those workers who receive doses exceeding two thirds of the permissible doses.

Blood Count Technique

Since the individual trend in blood counts may be of great importance, the technique employed shall be standardised and all observations should be made under similar conditions. Abnormal effects indicated by the haematological test should be discussed with a radiologist and haematologist before any action is taken involving suspension or dismissal from Radiological work.

Radiation Monitoring

(a) **External radiation** :—The doses of external radiation such as α , β or γ radiation received by personnel should be preferably checked continuously with film badges or ionization chambers.

(b) **Internal radiation** :—Where unsealed radio-active isotopes are used, environmental surveys with specially designed equipment may be necessary, if the quantities involved are such as to be potentially hazardous.

Exception to the above may be made when conditions as revealed by site monitoring are such that the weekly dose cannot be greater than one tenth of the permissible dose for external and internal radiation.

Radiation warning signs shall be provided to indicate the existence of a radiation hazard, even if this is of a temporary nature only.

The following organs are considered critical from the point of view of protection :

Skin, Blood forming organs, Gonads with respect to impaired fertility and eyes with respect to cataract.

The permissible weekly dose—i.e. for any seven consecutive days as recommended by the International Committee should not exceed 300 millirontgens, the exception to this recommendation being certain very limited areas of the body.

In spite of the above Universally accepted International standards of protection against the hazards of radiation, it is doubtful whether even 10% of the people engaged in these hazardous occupations in our Country know the dangers they are exposed to and employ the necessary protective measures enumerated above. In the experience of the Editor not more than ten Institutions using the various ionising radiations whether for diagnostic or therapeutic purposes have provided either personnel monitoring or site monitoring, although facilities are now provided by the Health Physics Division of the Atomic Energy Department at Bombay. How many of them have a Physicist in their staff is not known. It is therefore a matter for compliment that the Hon. General Secretary of the Indian Radiological Association has tried to focus attention of the public and authorities concerned on this very important matter. We are fast developing nuclear science. We have our own atomic reactor and it is expected that in addition to the large number of X-ray plants that are already in use in this Country in medicine and Industry, there will be available a large number of Radioactive isotopes for the above purposes. Unless timely action is taken from now on for effective control and use of these very powerful agents, it will be too late to prevent the dangerous consequences that may follow both to the workers and the public, by the injudicious or ignorant use of these agents. As in other Countries we should have a National Committee for Radiation Protection which could work in close collaboration with the International Committee. It should be the imperative duty of all heads of Radiation Departments to see that adequate protection is given not only to the workers, but also the patients and the public resorting to these Institutions. It is not an uncommon sight to see that relations and friends are allowed to crowd round the X-ray table when a patient is X-rayed or treated with Deep X-rays.

Bronchography with Dionosil

BY

*DR. OM P. BHARDWAJ, M.B.B.S., D.M.R.P.,

Diplomate of American Board of Radiology in Radiology

AND

†DR. CHAMAN LALL NAGRAH, F.R.C.S. (England).

Chevalier Jackson in 1905, by insufflation with bismuth oxide, was the first to outline the tracheo-bronchial tree successfully. Later on suspensions of iodoform or of bismuth carbonate in olive oil were tried, which resulted in great mortality.

In 1922, French investigators, Siccard and Forestier first described the use of lipiodol, 10% iodised poppyseed oil to outline the bronchial tree satisfactorily for diagnosis of various tracheobronchial and lung parenchymatous lesions. For a long time, it remained the medium of choice for bronchography, though its supremacy has now and then been challenged by new improved water soluble media. Lipiodol has the advantages of high radiographic density, relatively less irritant, and can be easily introduced with easy flow, and does not mix with bronchial secretions. But the greatest disadvantage of this material is its rapid entry into the alveoli and its persistence is seen roentgenographically for a long time after instillation and thus obscuring radiological details in the lungs for weeks and months. This unpredictable retention of this medium in the alveoli and post-bronchography lung complications such as Pneumonitis and lung collapse, are great

hazards, resulting in undue delay in subsequent surgery. Lipiodol also causes local tissue granulomatous reactions which have been well demonstrated by Felton in human surgical specimens, and by Joynt and Harnick in dogs; and untoward reactions to iodine, though rare, at times may be serious, are other minor disadvantages.

So there was a great search for a medium which would be eliminated from the lungs rapidly, would be non-irritable and at the same time, would overcome all other drawbacks of lipiodol.

Fischer in 1943 introduced Ioduron "B" and Morales and Heiwinkel in 1948, utilized viscous umbradil for bronchography. These new contrast media were water-soluble media containing Diodone or Diodrast in Carboxymethyl cellulose base. Atwel and Pendersen in 1950, Branderstein in 1951, reported on similar types of media. Salzman, Peck and Neerken in 1952 introduced a water-soluble medium called Methocel Diodrast. These media became very popular due to their rapid absorption of their iodine contents from the lungs roentgenographically in few days, but later on, due to their immediate and late effects

*Radiologist, Willington Hospital, New Delhi. Formerly, Lecturer in Radiology, M. G. M. Medical College, S. M. Y. Hospital, Indore.

†Thoracic Surgeon, M. G. M. Medical College, S. M. Y. Hospital, Indore.

produced, as a result of severe bronchial irritation, these media did not receive wide spread acceptance and soon went out of use. The concentration of diiodone in these media needed for bronchography is highly irritant to the mucosal membrane and is hypertonic and thus extracts copious secretions into the bronchus with consequent uncontrollable coughing.

So search for a perfect bronchographic contrast medium, which would be rapidly eliminated from the lungs and at the same time, be less irritable, still continued.

In 1952, Don reported a new type of bronchographic medium, known as Dionosil, a suspension of radio-opaque compound in water with good results. In 1953, Holden and Crone reported their experiences with Dionosil oily, a suspension of the same radio-opaque compound, with slightly increased concentration of Iodine, in arachis oil.

This medium has so far proved quite satisfactory bronchographic agent and encouraging reports are coming out in Foreign literature e.g. Cumins & Silver, Wisof & Felson, Joynt & Harnick. In our experience, at M. Y. Hospital, Indore, Dionosil Aquous and oily, both have given successful results. We mixed Dionosil Aquous with Dionosil powder for bronchography, and it has shown much better results than either Dionosil Aquous or Dionosil oily when used alone.

The object of this paper is to describe the nature of Dionosil, the technique used, and results obtained with Dionosil, in its various forms, by us in this institution.

Dionosil was first introduced in India in 1953 and we started using this medium in this hospital early in 1955. It is available in two forms:

(i) Dionosil—An aqueous suspension made with cellulose derivative.

(ii) Dionosil oily—A suspension in arachis oil. Dionosil—Powder-n-propyl ester, to increase the viscosity of dionosil aqueous or oily.

Dionosil is not a water-soluble medium, but a suspension in water of 50% W/V of n-propyl ester of 3:5 di-iodo-4-pyridone-N-acetic acid. Propyl iodone with thickening agent sodium carboxy methyl-cellulose. Sodium citrate is a buffer and small quantity of benzyl alcohol as bacteriostatic agent is also added to it. The suspension is rendered isotonic to bronchial secretions with sodium chloride and so causes no osmotic disturbances. The iodine contents of dionosil is about 30%, which is about 6 grams of iodine in 20 c.c. Dionosil oily is a 60% suspension of the same proportion of the ester in arachis oil. Dionosil oily contains about 34% of iodine in 20 c.c. approximately 7 grams of iodine.

The ester is chemically akin to the well known pyelographic contrast medium Diiodone which is diethanolamine salts of the same acid. The iodine is in firm organic combination. It is practically non-toxic as there is no liberation of any free iodine or any inorganic iodides that might cause undesirable effects, thus eliminating the danger of iodine or iodine reactions.

Dionosil is well tolerated by the tissues. It is less viscous and thus easier to inject. The suspension is of fairly thick consistency and its suspended material deposits itself on the bronchial mucosal surface, thus producing a coating on the bronchial walls, clearly outlining rather than filling the bronchi with very little or no alveolar filling. It is largely retained in the bronchi and even on coughing does not fill the alveoli or occlude smaller bronchi.

Its great advantage is the rapidity of its absorption which starts within few minutes and is completely eliminated in few days and

leaves behind clear lung fields, thus obscuring no radiological details and also allows subsequent surgery any time after bronchography.

The ester (Propyl iodone) is slowly hydrolysed enzymatically and the resultant organic anion, then rapidly absorbed from the lungs into the blood stream and is excreted via the kidneys.

The Dionosil is less viscous than iodised oil and remains in fluid form for a long time which can be easily aspirated or coughed up after bronchography. The toxicity of Dionosil has been well studied in rabbits by Tomnick, Boril and Davis. Aquous suspension which was found somewhat more irritant than the oily Dionosil showed microscopic signs of irritation in lungs of rabbits in 16 hours which reached to maximum in 3 days. After 2 weeks lungs appeared normal. No evidence of cellulose base was seen after 5 days. But being a watery suspension, it is much more irritant to the tracheo-bronchial tree, which calls for more effective anaesthesia. However, this irritation can be prevented by using endotracheal catheter and delivering the material direct to the bronchi. Oily suspension is less irritant than the aqueous, but has the disadvantage of oily base, leading to the possibility of foreign body granulomatous changes and patchy atelectasis seen grossly and microscopically. Joynt & Harnick.

The Carboxy methyl cellulose used as a base in Dionosil is partially expectorated and partially ingested by alveolar Phagocytes and it completely disappears in 3 weeks. Effects of this cellulose base has been well studied by Zollinger and Fischer in 100 human surgical specimens. Only 5 cases showed remnant of Carboxy methyl cellulose in diseased area, which they believed was the result of massive bronchial

and alveolar filling, and concluded that it would rarely cause granulomatous changes. Their experimental observation on rabbits also confirmed the findings that no evidence of retention of carboxy methyl cellulose was seen when tracheo-bronchial tree alone was filled, but when there was massive alveolar filling, carboxy methyl cellulose was retained for several weeks and followed by granulomatous reaction in the lungs.

Dionosil aqueous mixed with Dionosil powder increases the viscosity of the medium, results in no alveolar filling and is much less irritant to bronchial tree.

Material

Before 1954, iodised oil as Neohydriol was used in M. Y. Hospital, Indore. In the beginning of 1954, Neohydriol mixed with Sulphonamide Powder was introduced, which did improve bronchograms quality and decreased the alveolar filling with less pulmonary complications but still was unsatisfactory due to disadvantages of iodised oil. So in 1955 it was replaced by Dionosil in its various forms, with further improvement in technique which produced a high proportion of successful results. Our present study is based on a review of 75 bronchograms performed on 60 patients, out of which twelve were bilateral bronchograms. In 9 bilateral bronchograms both sides were filled simultaneously, but in 3 cases each lung was filled separately with few days interval. Equal number of bronchograms were done with Dionosil oily, Dionosil Aq. and Dionosil Aq. mixed with Dionosil powder. In 3 cases one side of the lung was filled with Neohydriol and the other side with Dionosil for comparison purposes. The age range was from 10 to 65 years in these patients. Except for two cases aged 10 and 12 years which were done under general anaesthesia, all the others, were done under local anaesthesia.

124.c29

Technique

Preparation. All the patients were admitted in the wards one night before and were given postural drainage. "Wet cases" were given postural drainage, a course of appropriate anti-biotics and bronchoscopic aspirations, performed until they were dry. All these cases were tested for sensitivity to iodine or Anethaine hydrochloride, the local anaesthetic used.

Pre-Medications.—2 Capsules of Nembutal (grs. $1\frac{1}{2}$ each) 3 hours before and morphia grs. $\frac{1}{4}$ and atropine grs. $\frac{1}{100}$ one hour before bronchography were given. One Nu-Percaine lozenge (50 mgm.) was given to suck 15 minutes before bronchography.

Anaesthesia. 4 c.c. of Anethaine hydrochloride 2% solution mixed with 4 minims of adrenaline 1:1000 were used for local anaesthesia. About 2 c. cs. of this solution were used to paint the posterior third of the tongue, fauces, epiglottis and the vocal cords. The remaining anaesthetic solution was diluted with equal quantity of sterile distilled water and 1 cc. of this diluted solution was injected directly in the trachea through the end of the curved cannula of the laryngeal syringe passed between the vocal cords.

This gave rise to some coughing, which soon settled down after further intra-tracheal instillation of this diluted local anaesthetic. A rubber catheter was passed through the nose, into the trachea and pushed down to about one inch above the level of the carina and strapped to the nose. The patient was tilted to the side to be filled and remaining diluted solution was then injected in the tracheo-bronchial tree on both sides in cases of bilateral bronchograms. The patients were asked not to cough or swallow and encouraged to breathe gently through mouth. They were explained the whole procedure and were asked to co-operate.

Filling. It was aimed to obtain the terminal filling of every desired broncho pulmonary segments. Fluoroscopy during and after the procedure was felt necessary in order to check up proper filling. Dionosil Aqueous alone, or Dionosil Aqueous mixed with 2 grams of Dionosil Powder to increase the viscosity or Dionosil oily were used at room temperature, after vigorous shaking before use.

About 15 to 18 c.c. of Dionosil was needed for average patient to fill each side.

Various techniques were tried for filling the bronchi, but the best results were obtained by the following method. The first few c. cs. were injected through the catheter under fluoroscopy so as to check the position of the catheter and the side, the dye was going in. 8 to 10 c.c. of Dionosil were injected while the patient was kept on the side being filled, with the head and shoulders slightly raised. The patient was asked to take a deep breath in order to obtain complete filling of the upper lobe bronchial tree. Further 4-5 c.c. were injected with the patient still on his side with head raised, but the trunk tilted backward to an angle of 60 degrees and another 4-5 c.c. were injected with patient still on his side with head raised, but the trunk tilted forwards to an angle of 60 degree. The patient was turned flat on the back and asked to take a deep breath again and filling of the whole lung bronchial tree was checked under fluoroscopy. In cases where it was found that the desired segmental bronchi filled completely, more dye was injected under fluoroscopy in order to get the desired result. If it has not been found necessary to tilt the head, end of the table down to tilt the upper lobe bronchi as the dye could easily flow. On the contrary, this head tilting caused flowing back of the dye to trachea and larynx and with cough reflex, reached the

swallowing of Dionosil and incomplete filling of the bronchial tree. Table top supine and lateral films of the chest were routinely taken. In bilateral bronchograms the right side was filled first and followed by A. P. and lateral table top films. The left side was filled immediately later, followed by table top A.P. and both oblique films. The patients were asked to cough in the end of this procedure in order to bring out Dionosil. Skiagrams were taken in order to see white washed outline of the bronchial tree, when the extra Dionosil was coughed out. Most of the medium was recovered by coughing and postural drainage, after the completion of the examination while on the X-ray table. Skiagrams were repeated after 1/2 hours, 24 hours, 48 hours, 72 hours and 96 hours, in order to find out the clearance time of Dionosil.

Results

The Comparisons were made for Diagnostic and technical quality of bronchograms, patient reactions during and after

the procedure, clearance time and contrast of medium. Table I—shows more detailed list of these cases, with the final conclusions reached with Roentgen diagnosis.

Table I

Diagnosis	Dionosil oily	Dionosil Aq.	Dionosil Aq. plus Dionosil Powder
Normal	3	5	7
Bronchiectasis	7	4	4
Collapsed lung with lobe bronchiectasis	4	5	4
Neoplasm	2	2	1
Lung abscess	1	1	1
pleural diseases	0	2	1
Unilateral Pulmonary	1	1	2
Lung cyst	2	0	0
Bilateral Pulmonary	0	0	1
Unsatisfactory diagnosis	0	1	0
Total No. of Patients	0	20	20
Total No. of Bronchograms	25	25	25



Fig. 1-a



Fig. 1-b

Fig. 1-a & 1-b show good filling of all the bronchi and segments.



Fig. 2-a



Fig. 2 b

Fig. 2f: Shows complete filling of the re-paired bronchial segments and partial filling of the other segments in both lungs. Fig. 2g and 2h: lungs. Fig. 2h: adequate for diagnostic purposes.

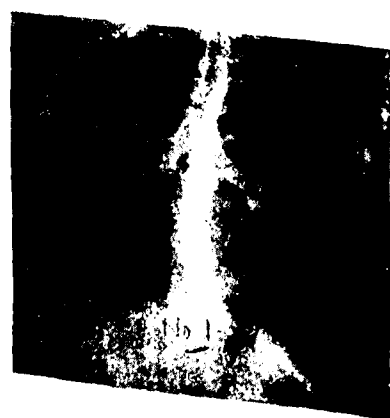


Fig. 3-a



Fig. 34,



Fig. 3-c

Shows incomplete filling of atelecatic Rt. middle lobe. *atelecatia* = failure to fill. Fig. 3-b shows successful filling of atelecatic Rt. middle lobe. Enlarged view Rt. middle lobe enlarged.

All these bronchograms were graded as shown in Table II depending upon the adequacy of bronchographic filling.

Table II

Particulars.	Dionosil Oily.	Dionosil Aq.	Dionosil Aq. plus powder.
Good ...	11	12	13
Adequate ...	8	10	7
Poor ...	3.4 (2*)	3.2 (1*)	0
Total ...	25	25	25

*Poor results were due to heating of Diapost.

Good. Where in selective bronchography, the diseased bronchi were well filled and in one or both lung filling, all segmental bronchi were clearly outlined without filling of alveoli.

Adequacy. Where in selective segmental bronchography the filling was partial or incomplete and in one or both lung fillings, one or two segmental bronchi did not fill or there was a partial alveolar filling. But no

repeat examination, was thought necessary, as the bronchograms were adequate for diagnostic purposes.

Poor. Where due to inadequate filling of the diseased segmental bronchi, or non filling of more than two segments in one or both lung filling or too much alveoli filling as a result of severe coughing, the bronchograms were poor for diagnostic purposes and repeat examination was necessary before surgery could be considered.

Table No. II shows the maximum number of good results obtained with Dionosil Aqueous mixed with Dionosil Powder, without a single failure. Our failures with Dionosil oily and Aqueous were due to warming of the material and severe coughing as a result of bronchial irritation in the beginning. When these media were used on room temperature after vigorous shaking with further improvement in technique as described and with instillation of intra tracheal and bronchial local anaesthetic, the results improved considerably.

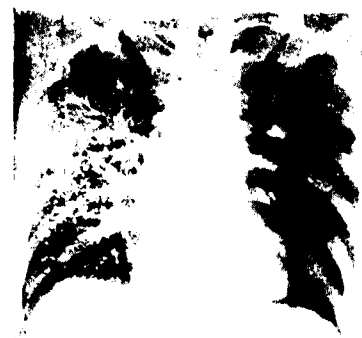


Fig. 4-a



Fig. 4-b



Fig. 4-c

Fig. 4a shows complete filling of alveoli with Dron-sil. Ag due to the inadequate local anaesthesia and severe coughing. Fig. 4b repeat examination with Dron-sil Ag mixed with Dron-sil powder, after good local anaesthesia. Fig 4c After deep breathing, dye congested out alveoli resulted in residual smaller bronchial filling, good bronchial wall outline and no alveoli filling.



Fig. 5

Fig. 5 shows swallowing of Dionosil in the oesophagus and stomach due to reorientation as a result of mild coughing during the procedure and holding of the head in a non-orthostatic position, but filling upper lobe segment.

Table III indicates the patient's reactions and complications during and after bronchography with various forms of Dionosil.

Table III

Particulars.	Dionosil Oily	Dionosil Aq.	Dionosil Aq. plus powder
1. Cough during procedure:			
Nil	90%	80%	50%
Mild	10%	20%	20%
Moderate	0%	10%	1%
Severe	0%	1%	0%
2. Cough subsequent Hours:			
Slight	20%	10%	20%
Moderate	60%	60%	30%
Severe	20%	30%	0%
3. Temperature:			
Mild	10%	20%	10%
Moderate (above 100 F)	10%	1%	0%
Nil	80%	80%	90%
4. Side Reactions:			
Late or early	Nil	Nil	Nil
5. Lung complications:			
Pneumonitis or atelectasis	30%	Nil	Nil



Fig. 5

As indicated from Table III the coughing was prominent in Dionosil Aqueous and was less with Dionosil Oily and the least in Dionosil Aqueous and Powder. Coughing resulted in more alveolar filling and less aspiration of medium into the oesophagus in Dionosil Oily and just the reverse in Dionosil Aqueous. Even with no appreciable cough, 2 cases in Dionosil oily and 2 in Dionosil Aqueous showed alveolar filling, but in Dionosil Aqueous with Powder even coughing did not show alveolar filling in a single case, probably as a result of increased viscosity. Coughing did cause swallowing of the medium into the oesophagus. (Fig. 5.)

No reaction developed with these media during bronchography, in our whole series of 75 bronchograms. Post operative temperature developed in 11 cases, 6 of which were

with Dionosil Aqueous, and two out of these 11 cases showed temperature above 100 F. However temperature came to normal within 24 hours except in 3 cases where it took 24 to 48 hours to come to normal. It is interesting to note that pyrexial reaction in about 40% cases with water solution medium was observed by Salzman, Peck and Neerken.

Only two cases, with Dionosil oily, showed post-bronchographic lung complications as atelectosis and Pneumonitis, on the 5th day and 7th day respectively. It is difficult to attribute this complication to the medium itself, as aspiration of infected material due to local anaesthetic is also possible.

Post operative coughing was also noted more in Dionosil Aqueous.

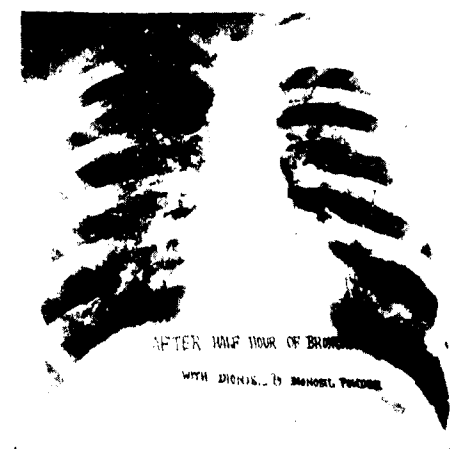


Fig. 6-a

Fig. 6-a shows 80% disappearance of Dionosil in the R. Lung half an hour after coughing out. (Fig. 6-a)

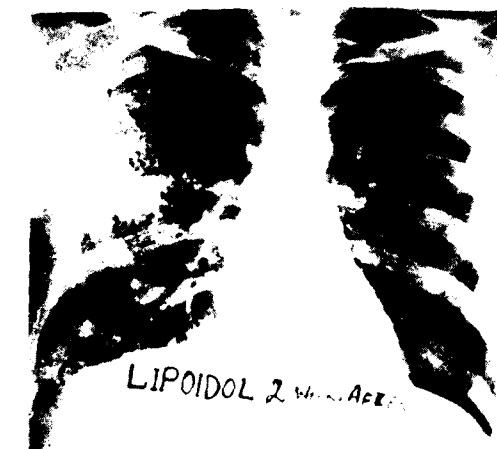


Fig. 6-b

Fig. 6-b remains of Lipoidol in the R. lung after three weeks.

Bronchograms with Dionosil showed 80% disappearance of the media after coughing out within half an hour. In cases of Dionosil oily and Aqueous where alveoli were filled, it took slightly longer time. Films were taken after 12 hours, 24 hours, 48 hours, 72 hours, and 96 hours. Films after 24 hours showed

approximately 90% disappearance of Dionosil on the average. Dionosil Aqueous disappeared completely from the lungs roentgenologically within 48 hours to 72 hours, but Dionosil oily took about 72 hours to disappear.

The Bronchograms done with one side lipiodol and another side with Dionosil for comparison purposes showed approximately 50% of lipiodol retention in the alveoli after 96 hours, when Dionosil had completely disappeared. In the chest skiagrams even after one month, lipiodol could be seen.

There was not much appreciable difference in contrast between Dionosil Aqueous mixed with Dionosil powder and Dionosil oily. However the contrast was slightly less in Dionosil Aqueous, but adequate for good bronchograms.



Fig. 7-a



Fig. 7-b



Fig. 7-c

Fig. 7-a & b: show outline of the bronchial walls and cavities filled with contrast medium in the presence of secretion filled cavities. Fig. 7-c shows blocked bronchi due to mucus plugs.

The relative utility of various forms of Dionosil to coat the bronchial tree was nearly the same. Outline of the cavity walls, could be well seen, even in the presence of secretion filled cavities. Smaller bronchioles were well outlined with one or two quiet inspirations.

The ester was absorbed slowly and shadow remained well defined for sometime, which gave ample time to expose films.

Bronchoscopic examination carried out in few cases, 24 hours and 48 hours after bronchography failed to show any unusual features or irritation in bronchial wall.

The whole procedure including radiography took 15 to 20 minutes.

Every case was pre-medicated with barbiturates and maximum of 1 c.c. of 2% Methamine as local anaesthetic was required to obtain successful local anaesthesia. Instillation of intra-tracheal and intra-bronchial local anaesthetic with slight inspiration was thought necessary to avoid cough and for successful bronchograms. No toxic reactions were observed with this anaesthetic except in one case which showed toxic reaction with 2 c.c. of this local anaesthetic. This case later on, was discovered to be sensitive to methamine.

Conclusions

Dionosil has the advantage over lipiodol of rapid disappearance from the lungs and hence there is no need to delay the

operations following bronchography, where urgent operative intervention is required.

The medium is entirely in-ocuous and rarely produce any immediate or delayed complications. The medium stays in contact with bronchial lining for a short time which is helpful in avoiding pulmonary complications.

Dionosil outlines, rather than fills the bronchi, thus improving the visualisation of bronchial details. Even fine bronchioles filling, can be obtained with quiet inspiration. Contrast, though less than with iodised oil, is quite adequate.

Rarely does it produce a troublesome degree of alveolar filling. Without any urgency, complete bronchial filling can be obtained under fluoroscopy and there is enough time for posturing the patient and taking adequate films.

Dionosil, especially the aqueous preparation requires careful local anaesthesia, which reduces the cough considerably and thus bronchograms of good quality can be obtained. The medium is isotonic and much less irritant than the water-soluble media.

In our study, better results were obtained with Dionosil Aqueous mixed with Dionosil powder than either form of Dionosil used alone, and in our opinion, use of intra-tracheal catheter for instillation of Dionosil, is the method of choice for bronchography.

Our thanks are due to Dr. R. R. Rishi, Chief Radiologist and Superintendent M. Y. Hospital, Indore, without whose help and guidance the work would have not been possible and for his kind permission to publish this work. We are also grateful to Glaxo Company, England for supplying literature on Dionosil.

REFERENCES:

1. Atwell, R. J. and Pendergan, R. L.: A Water-soluble Contrast Medium for Bronchography. *Diseases of Chest* 1950, 18: 535.
2. Browne, M. E., Lovel, K. W., Rawlings, C. and Richard, J. P.: Aqueous for Bronchography in Children. *The Lancet* 1953 Aug., 269.
3. Cummins, C. and Silver, C. P.: Bronchography with a rapidly Eliminated Contrast, "Dionosil". *British J. of Radiology*: 1953, 26: 135.
4. Dou, C.: A New Medium for Bronchography. *British Journal of Radiology*: 1952, 25: 57.
5. Felton, W. L.: The Reaction of Pulmonary Tissue to Lipiodol. *Journal of Thoracic Surg.* 1953, 26: 430.
6. Logan, Morle K. D. and Robertson, P. W.: Letter, Bronchography with Dionosil. *The Lancet* Feb. 51, 369.
7. Griffiths, M. L., Calhoun, L. and Shen, N.: Bronchography in Children. *B. M. J.* March 1953, 601.
8. Holden, W. S. and Crane, R. S.: Bronchography using Dionosil only. *British Journal of Radiology* 1953, 26: 317.
9. Joynt, G. H. C. and Harnick, L. R.: Bronchography with Dionosil. *Surgery, Gynaecology, and Obstetrics* 1955, 101: 425.

10. Morales, O., and Heiwinkel, H.: A Viscous Water-soluble Contrast Preparation, Preliminary Report² Acta Radiol. 1948, 30: 257.
11. McKechnie, J. K.: Bronchography in Pulmonary Tuberculosis, Tubercle 1953, 51: 351.
12. Norris, C. M., Stantler, H. M.: Bronchography with Diiodal³ Ann. Onc. Rhin. and Laryng. 1951, 63: 520.
13. Peck, M. E., Neerken, A. J., and Salzman, E.: Clinical and Experimental Studies in the use of Water-soluble agent for Bronchography, Surg., Gynec. and Obstet. 1951, 92: 683.
14. Poppi, L., and Odgaard, H.: Bronchography with Water-soluble Contrast Medium, Radiology 1952, 59: 341.
15. Peck, M. E., Neerken, A. J., Salzman, E.: Clinical Experience with Water-soluble Bronchographic Compound, Journal of Thoracic Surg. 1953, 25: 244.
16. Robertson, P. W., Morle, K. D. J.: Delayed Pulmonary Complications, Lancet, 1951, 334.
17. Rendle, Short, J.: Report on Use of Diiodal in Bronchogram, on Chabrey B.M.J. Jan. 1953, 759.
18. Salzman, E., Peck, M. E., Neerken, A. J.: Method of Diiodal, A Viscous Water-soluble Contrast Medium for Bronchography, 1952, 67: 969.
19. Tomic, E. G., Basil, R., and Davis, B.: A report on properties of a Propyl Ester of Diiodal⁴ (Iperidol[®] N-acetate propylidone), British Journal Pharm. 1953, 31: 166.
20. Wisoff, C. P., Felton, B.: Bronchography with Od. Diiodal, The Journal of Urologic Surgery 1953, 29: 445.

The Space Between Stomach and Diaphragm*

BY

*Dr. G. S. SARIN, M.B.B.S.,

Radiology Dept., Irwin Hospital

AND

‡Dr. N. G. GADEKAR, M.B.B.S., D.M.R.P. (Cantab),

Prof. of Radiology, All-India Institute of Medical Sciences,

At the 7th Indian Radiological Congress Dr. V. G. Vohra read an interesting paper on “*Gastric air shadow as an aid in Diagnosis of the Lesions of the Fundus*” describing how Carcinoma of Fundus of the stomach can be diagnosed by the study of the gastric air shadow. The purpose of the paper is to discuss the various lesions which will increase the space between the stomach and the diaphragm so as to help in the differential diagnosis.

To recapitulate briefly the anatomy of the region, two layers of pleura separate the upper surface of diaphragm from the base of the lung and pericardium further separates it from left ventricle of the heart. Inferiorly, left diaphragm is in relation with left lobe of liver, Fundus of Stomach, Spleen; Left Kidney and Left Supra Renal Gland lie over crus of the diaphragm. Sometimes, splenic flexure of colon comes in contact with the diaphragm on the left of the stomach.

Normal Radiological Appearance

There is almost always a gas bubble, small or large in the fundus of stomach

which is in close contact with under surface of diaphragm. So, there is only a potential space between the diaphragm and the stomach. Normally, in an x-ray film, the space between lung and gas in stomach, is less than 5 mm. thick.

We shall now consider the various conditions which will increase the soft tissue thickness between the stomach and diaphragm.

This space can be increased easily by air, fluid and soft tissue masses. Obviously, enlargements and diseases of the organs in the region will increase this potential space. The female breast casts a shadow convex downwards over the upper half of the gastric air-shadow. This should not cause any difficulty in recognition.

Incidentally, complete stricture of the oesophagus will not allow air to be swallowed in the stomach and this should be kept in mind.

There are two conditions which apparently increase the space between stomach

*From the Department of Radiology, Irwin Hospital, New Delhi, presented at 11th Indian Congress of Radiology Feb. 2-3-1957.

‡Radiologist, Irwin Hospital, New Delhi.

§Professor of Radiology, All-India Institute of Medical Sciences, New Delhi.



Fig. 1

Intra-pulmonary, Supra-diaphragmatic localized effusion. Note the tubercular infiltration left upper zone.



Fig. II (a)

and diaphragm though the pathology is above the diaphragm. First, Intra-pulmonary, Supra-diaphragmatic localized pleural effusion. (Fig. 1).

The other condition is that the left ventricle enlarges to the left, posteriorly and downwards and then causes apparent increase in the space.

The enlargement of left lobe of the liver or lesions such as abscess, hydatid cyst etc. in it are not an uncommon cause of increased space. Authors have seen a case of large hydatid cyst in left lobe of liver pressing the fundus of the stomach downwards.

One case is shown of an extra lobe of the liver lying between diaphragm and stomach, proved by operation. There was also atrophy of the diaphragm. (Fig. II-a & b).

Enlarged Spleen

Spleen lies on left and posterior aspect of stomach; usually it enlarges downwards.



Fig. III

Enlarged spleen coming between the diaphragm and the stomach which is filled with Barium.



Fig. IV (a)



Fig. IV (b)

(a) and (b) two cases of Carcinoma of fundus of the stomach, showing increased space between the stomach and diaphragm as well as the distortion of gastric outline.

Sometimes, however, it enlarges upwards and towards right and then comes between diaphragm and fundus of the stomach. (Fig. III).

Of course, *Carcinoma of fundus of the stomach* is the most important lesion, producing increased space. Two typical case are shown. (Fig. IV-a & b).

An unusual case is an abscess arising from caries of the rib and dorsal spine extending forward and coming between stomach and the diaphragm. This case was referred for symptoms of Dysphagia. (Fig. V).

A case of adeno-carcinoma of the adrenal cortex is presented with the increase in the space. Patient presented with a mass and dysphagia. (Fig. VI).



Fig. V

An abscess due to tubercular cavity of the left lung causing a filling defect of the fundus of the stomach and narrowing between stomach and diaphragm.



Fig. VI

A dilated abdominal aorta and the left crus of the diaphragm may also apparently cause increased space.

Tumours arising in the tail of pancreas and the upper pole of the kidney (Fig. VII) may also extend upwards and cause increased space.



Fig. VII

Tumours arising in the tail of pancreas and the upper pole of the kidney may also extend upwards and cause increased space.

In conclusion, we may say that the carcinoma of the fundus of the stomach may be detected early and is the most important cause of the increased space. The other conditions should always be kept in mind whenever the condition presents this abnormality.

Role of Radiotherapy in Calcaneal Spur

BY

Dr. O. N. SAXENA, M.B., B.S., (Lucknow),

D.M.R.E. (Lucknow), D.M.R.D. (England), D.M.R.T. (Liverpool).

Among the varied causes of painful heel, calcaneal spur is one of the important ones, which comes to a radiologist mainly for diagnosis. It is said that the calcaneal spur as such is not the cause of pain but pain is the result of planter fascitis, trauma, pull of a shortened planter fascia or traumatic separation of the slips of planter fascia. Whatever be the cause of pain, it is a distressing condition to deal with.

The causative factor of pain is probably responsible for the repeated hyperaemia leading to mobilisation of calcium from the calcaneus and its deposition with ossification on the granulation tissue due to an inflammatory reaction.

The clinical features are quite distinct and need no description. The condition is usually finally diagnosed by an X-ray examination and in some cases in spite of its presence, it may not be revealed probably due to poor calcium content. It may be possible that the condition has been clinically diagnosed early, i.e. before ossification could occur.

The usual treatment described consists of removal of the septic focus if one can be detected. The patient is put to bed and hot fomentations applied. Proper shoes are prescribed after the pain and tenderness has disappeared. The height of the heel may have to be raised by half an inch or so. Instead of hot fomentation, infra red ray exposures or short wave diathermy application may be useful. If no relief is obtained by this method operative treatment

may have to be done though opinion on this is not unanimous due to equivocal results.

No reports on the efficacy of deep x-ray in the relief of this condition could be traced in the literature; at least it is not an accepted procedure.

Method and Material

Nine cases of calcaneal spur attending the S. N. Hospital, Agra, were the subject of this study.

Dose and Method of Application of Deep X-ray

Deep X-rays at 200 K.V., 15 ma., 75 mm. cu. + 1mmAl filter and 50 f. s. d. were used. The rays were applied through two fields, one medial and the other lateral to the heel. Each field was 7×7 cms. in size. 600r was given in each field, resulting in a mid-line dose of 750r. Exposures in both the fields were given on the same day, and no further treatment was necessary.

Observations

1. *Symptoms.*—The only symptom all patients complained of was pain while walking and standing for a long time which was relieved by resting. The duration of symptoms varied from 6 months to 2 years.

2. *Clinical Examination.*—Nothing abnormal was detected on clinical examination except localised tenderness on deep palpation on the ball of the heel.

3. *Radiological Examination.*—It was usually seen that there was an exostosis growing from the under surface of the calcaneus

near its tuberosity. It is broad posteriorly and narrow anteriorly. The size of the spur varied and it was noticed that it had no relationship with the severity of the symptoms. Some people with a small protuberance complained of terrible pain while others in whom it was quite large measuring about half an inch, the pain was insignificant.

4. *Effect of Treatment.*—There was no local or any other reaction following the treatment, but the relief of pain was immediate in all except in one.

5. *Follow up.* In all except one case (eight out of nine) relief of pain was observed. The relief was noticed after eight days of the treatment, and no recurrence two years after it, has come to our notice. In one case no relief was obtained.

Discussion

It is generally agreed that Deep x-ray therapy in inflammation of joints and bursae is effective. Baird (1941), Borak (1945), Brewer & Zink (1943) and several others have reported good results of Deep X-ray therapy in the treatment of shoulder bursitis. Phole has observed its efficiency in the treatment of tenosynovitis.

The efficiency of deep x-ray therapy in chronic tubercular lesions is well established to need any further comments.

Since it has been suggested that real cause of a calcaneal spur is some form of fasciitis or fibrositis of chronic nature, we thought of applying deep x-ray therapy to allay the symptoms by effectively controlling

the inflammatory process. We have been rewarded in this endeavour by the cure of eight out of nine spurs thus treated.

The general method of application of deep x-ray has been a dose of about 1000 repeated the other day in chronic infections of Bursae, fasciae and synovial sheath. The total dose reaching as much as 2000 units measured in air.

We fail to understand the necessity of fractionating such a small dose into smaller fractions. In this series, we have employed a single dose of 750r in the mid-line without any untoward effect. We therefore advocate this treatment in a single session in calcaneal spur. It is admitted that the series is rather small but encouraging results have prompted us to record these observations to stimulate further intensive work in this direction.

Summary

- (1) Eight cases out of nine calcaneal spur are presented.
- (2) Treatment of the condition by conservative and surgical means has been reviewed.
- (3) Results of Deep X-ray therapy in single session to a dose of 750r has been recommended.
- (4) Results of Deep X-ray therapy has been described.

Acknowledgements

I gratefully acknowledge my thanks to Dr. L. P. Agarwal, M.S., D.O., D.C.M.S., Eye Surgeon to the Hospital, for encouraging me to record these findings.

REFERENCES

- (1) Baird, L. W., *Radiology*, 35, 416, 1941.
- (2) Borak, J., *New York State J. M.*, 41, 275, 1945.
- (3) Brewer, A. A. & Zink, O. C., *J. A. M. A.*, 120, 2000, 1943.
- (4) Phole, L. A., *Clinical Radiotherapy*, 1946.
- (5) Kaplan, *Clinical Radiotherapy*, 1949.

All-India Radiological Conference Symposium on Tumours of the Lungs*

9th February 1958

BY

Dr. B. B. BHATTIA, M.D., F.R.C.P. (Lucknow.)

Medical Aspect of the Tumours of the lungs

Tumours of the lungs are suspected by the Physicians, diagnosed by the Trio of Radiologists, Surgeons and Pathologists and treated jointly by the Radiologists and Surgeons.

It would thus appear that the Physicians play a minor role in the drama of lung tumours; nevertheless their role is very important because if they fail to suspect these tumours, patients will pass into that stage when no treatment will be able to save their life or even relieve their suffering.

The discussion on the medical aspect therefore centres round the consideration of these signs and symptoms which will enable the Physicians to suspect such lesions. I would like to divide those signs and symptoms in the following 3 heads.

- (1) General and Constitutional.
- (2) Remote and Skeletal.
- (3) Local.

General and Constitutional

Symptoms may usher the onset of malignant tumours, which are far more common than the benign tumours. Benign tumours develop the general symptoms when they are invaded with secondary infection. The General symptoms comprise, loss of appetite, loss of weight, general weakness, fever, malaise, lethargy and anaemia. In some

cases of bronchogenic carcinoma these may precede for several weeks the onset of local symptoms. As these general symptoms can take place in so many other conditions: their presence alone will not enable the Physician to suspect Lung Tumours; but if every such case is thoroughly investigated then x-ray of the chest may reveal the existence of a new growth. In my experience, early diagnosis was made in one case, whose wife died of Pulmonary Tuberculosis and the patient on his own, went to have an X-ray done, fearing that he might have caught the infection. X-ray did not reveal Tuberculosis but a small area of atelectasis, which on further investigation turned out to be bronchogenic Carcinoma.

Remote

Signs and symptoms comprise referred pains such as those in the shoulder joints and along the arms in malignant tumours of the upper lobe of the lung (Pancoast Tumour). Similarly referred pains may be in the side of the chest or back due to pressure on the intercostal nerves or even in the epigastrium and shoulder due to pressure on the Phrenic nerve.

In recent years a new set of remote signs and symptoms have been described in association with the bronchogenic carcinoma of the lungs. These are called the neurological manifestations and they comprise the following four groups.

*Paper read at 12th Indian Congress of Radiology

- (1) Sensory neuropathy.
- (2) Mixed polyneuritis.
- (3) Sub-cortical cerebellar degeneration.
- (4) Myopathies.

The signs and symptoms of nervous complications present evidence of lesion at several levels. Whenever a Physician sees a nervous case of a "bizzare type" he must keep in mind the possibility of bronchogenic carcinoma. The following 2 cases illustrate such manifestations.

Case No. 1

About five years ago a man aged 60 consulted me for severe pain in the chest and limbs. The pains used to come for a short time and then disappear. As there were no positive signs and the patient was extremely worried and emotional, the diagnosis of psychogenic pains was made; as the sedative line of treatment failed to give him relief, further investigations were done; x'ray of the vertebral column revealed the presence of osteoarthritis. It was then thought that his pains were due to pressure on the posterior nerve routes. A few weeks later he started showing marked constitutional symptoms and some mental changes and also developed cough and dyspnoea. X'ray of the chest was done and revealed a suspicious lesion. A few weeks later secondary deposits appeared in his liver and it left no doubt, that the patient was one of Bronchogenic Carcinoma. We learnt from this case that sensory neuropathies may be predominant in some cases and may precede the local signs and symptoms by several weeks.

Case No. 2

Was that of a female patient aged about 45 years who presented sensory neuropathies as well as signs of cerebellar lesion and having had the experience of the

we were able to suspect immediately bronchogenic carcinoma, which was confirmed on further investigations.

The other remote signs may be in the bones in the shape of Localised pain and tenderness, which on x'ray examination may turn out to be secondary deposits. Similarly secondary deposits may be found in the Lymph nodes or Liver.

Local

Signs and symptoms consist of cough, which may be paroxysmal or persistent which is usually dry in the beginning but in the later stages may be productive and purulent particularly when secondary infection has taken place; wheezing which may simulate Bronchial asthma.

Haemoptysis may be present in a few cases. Pain in chest; hoarseness of voice, dysphagia are some of the other local symptoms which may be present in some cases.

Every physician begins to suspect such tumours when local symptoms are present but I would like to take this opportunity to emphasize that in some cases general and remote symptoms may precede the local symptoms and every effort should be made to thoroughly investigate the case even before the occurrence of the local symptoms.

After the history is taken a thorough physical examination should be made starting from the eyes where one should look for the Horner's syndrome which consists of enophthalmos and a smaller pupil on the affected side. One should look for the puffiness of the face, cyanosis, enlargement of lymph nodes, in neck and axilla, enlargement of jugular veins, prominence of the chest veins, areas of diminished movements, impaired resonance and diminution of breath

sign (Venous Hum over the sternum; d'Espine sign (Whispering Voice heard over the 5th and 6th dorsal spine).

If some of these signs and symptoms are present, suspicion of Lung tumours is aroused. One should then undertake x'ray investigation, bronchoscopic examination and the examination of sputum for malignant cells. If pleural effusion is present exploratory aspiration should be done and the fluid examined for the presence of malignant cells.

I have said that the majority of tumours are malignant. Amongst the malignant tumours majority of tumours are bronchogenic carcinoma. It is believed that the incidence of the bronchogenic carcinoma has greatly increased in recent years. It is stated that in England and Wales in 1900 there were 8 such cases per million. In 1925 there were 20 such cases per million and in 1952 there were 321 such cases per million (Doll 1953). Some people also believe that the incidence of bronchogenic carcinoma is greater amongst the tobacco smokers; and also in the male sex; the ratio being 7 male to 1 female (Doll).

Non malignant tumours account only for a small proportion of the tumours of the lung. In the anterior mediastinum, besides persistent Thymus, Retro-sternal goitre; the common tumour is teratoma; in the posterior mediastina, is neurofibromata. An outstanding case of which I would like to describe.

A man aged about 48 years complained of substernal pain which was suspected to be myocardial infarction; on further observation the diagnosis of myocardial

infarction was given up and it was thought that he had cholecystitis; a few months later he complained of pain in the right shoulder and epigastrium. He was again treated for cholecystitis but did not get any relief. He got himself x'rayed and the radiologist reported a radio-opaque shadow at the right base, but as the patient was relieved of his symptoms he did not consult any doctor. A few months later he started getting dyspnoea, doctors now diagnosed him as a case of pleural effusion and started antitubercular treatment. As he was not getting any relief he consulted me. On exploratory aspiration I could not get any fluid and diagnosed him as a case of tumour lung. He was operated and a tumour weighing nearly 10 pounds and undergoing cystic degeneration was successfully removed. On histological examination it turned out to be neurofibroma. If the radiologists had taken a lateral view also, he would have been able to say, that there was a tumour, growing from the posterior mediastinum and would not have given the vague report of a radio-opaque shadow at the base of the right lung.

This brings me to the most important aspect of my talk and that is of an appeal for closer cooperation between the radiologists and the Clinicians. Radiologists are no longer mere technicians. They form a very important component of the diagnostic team; they must acquaint themselves with the history of the case and should take every opportunity to discuss the diagnosis with the Clinicians.

If your annual meeting succeeds in developing such a cooperation, it will do a great service to the medical profession and the suffering humanity of this country.

Cancer of the Lung*

Surgical Aspect

BY

Dr. C. B. SINGH, F.R.C.S.,

Head of Department of Surgery, G. S. V. M. Medical College, Kanpur.

A. Etiology

Cancer of the lung has been steadily increasing during the past forty years or more. The increase is both apparent and real. It is partly due to better clinical diagnosis, partly to improved radiological diagnosis and partly to better pathological diagnosis, but careful study has conclusively proved a real increased incidence and mortality, although no satisfactory explanation is coming forth. Recently a few workers have put forward statistical study showing that the increased incidence is associated with smoking, but it has not been conclusively proved and further studies are necessary to establish this relationship. A number of other factors have been associated but none have been proved so far.

Cancer of the lung, unlike carcinoma of the stomach and colon, which has a lower incidence in the wealthier members of the population, recognises no social or material consideration, recognises no social or material consideration. It affects labourer as commonly as the white collar worker.

The lung is now one of the common sites of cancer in the male having a ratio of 5:1 with females. It is commonly seen between the ages of 40-70 years, but cases are not infrequent in the twenties and thirties.

B. Pathology

Most cancers arise in the epithelium of mucous glands of the larger bronchi. An

exception is the cancer which develops in the scar of healed tuberculosis.

Distribution

Right upper lobe	33
Right lower lobe	35
Left upper lobe	31
Left lower lobe	30

As these figures show and as might be expected from the slightly larger size, the right lung suffers rather more commonly than the left. The commonest site is the bifurcation of the main bronchus, because ulceration, infection and haemorrhage are common here. Commonly two types are met with. The *alveolar* and the *papillary* form, the latter is less common. Those arising from secondary bronchi are more invasive than the central ones.

Nodular growths projecting into the lumen tend to produce early bronchial stenosis. Flat growths tend to spread in the submucosa without alteration.

Spread

Direct invasion.

Lymphatic permeation.

Subserous lymphatic spreading at the periphery.

All the bronchial carcinomas tend to invade the lung tissue and it is because of this property which may involve a larger area without a significant increase in its

original size that the surgeon is baffled most. A small bronchial tumour may pass unnoticed if a huge mediastinal mass dominates the clinical picture.

Early and palpable lymphatic spread to neck, axilla or abdomen may antedate the pulmonary symptoms and in such cases the metastasis is mistaken for a primary.

Lymphatic spread to the glands in relation to the neck or first rib may give rise to the so-called "superior pulmonary sulcus tumour of Pancoast", where an origin in the remnants of the fifth branchial cleft was suggested by Pancoast, but most thoracic Surgeons recognise this tumour as an extension of an apical carcinoma.

It may be mentioned here that three histological types are recognised

— Squamous cell type.

— Columnar cell or adenocarcinoma.

— Oat cell tumour or Anaplastic carcinoma.

But Ewing and Sante have described an alveolar type, highly malignant which rapidly converts the lung into a solid mass.

Distant metastasis occur in many organs. Metastasis to the brain is frequent and such cases have been operated upon in the belief that a primary brain tumour is present. The skeleton, liver, adrenals, kidneys, pancreas, spleen and ovary may also be effected.

C. Clinical Features

The majority of cases, when first seen have symptoms definitely related to the respiratory tract.

Cough, dyspnoea and haemoptysis, especially if associated with pain in a middle aged person should suggest cancer of the

lung. The onset is usually insidious, often with chest colds, asthma or Bronchitis.

15th of all cases present no chest symptoms but have loss of weight, weakness, anorexia, night sweats, thirst and fatigue. Clubbing of the fingers may be manifested within a few weeks of the development of other symptoms, and before there is onset of cyanosis it disappears as quickly after the removal of the tumour. Dyspnoea occurs early if there is atelectasis. Sometimes the first symptoms are from extrinsic pressure on nerves, veins or oesophagus.

Metastasis from Bronchial carcinoma is the cause of most superior caval obstruction.

The physical signs may be those of atelectasis, Bronchiectasis, pleural effusion or solid tumour. The actual signs of a tumour mass are elicited only if the growth is peripheral.

— Sometimes the only physical signs are those of gross enlargement of mediastinal glands.

Swelling in the supraclavicular region.

— In the later stages the recurrent nerves, the phrenic nerves or the sympathetic nerves or superior vena cava may be compressed.

— The tumour may so contract the lung that the intercostal spaces may be depressed the supraclavicular fossa deepened and the trachea deviated to the affected side.

The Contralateral lung may be hyperresonant. Great delay in diagnosis may take place if the primary is silent and if the presenting symptom is a metastatic swelling or if the first signs are the nervous effects of a brain secondary.

*Paper read at 15th Indian Congress of Radiology.

D. Diagnosis

Diagnosis is difficult in early cases and not easy in some advanced cases but since early carcinoma can be cured by surgery, and as the life of the patient depends on a correct diagnosis it is very essential for us that we should aim at prompt action. Difficulties may rise in connection with pulmonary tuberculosis, fibrosis and gumma of the lung, aneurism, pericardial and pleural effusion and enlargement of mediastinal glands due to Hodgkins disease or tuberculosis but the aids that follow should be able to help us to a great extent in arriving at the diagnosis of the case. The Pancoast tumour may give rise to special difficulty. It has to be differentiated from Syringomyelia, cervical rib, apical pulmonary tuberculosis and secondary carcinoma.

X-ray

may show

- well defined tumour shadow.
- or an area of collapse.
- or even a fluid level like an abscess.
- or pleural effusion.

Sometimes there is no detectable evidence of a tumour:

- enlarged Bronchial glands.
- Paralysis of diaphragm-showing the tumour is inoperable.

Fluoroscopy

- after lipoidal infiltration may show.
- Rattail appearance.
- a silent area at the site of tumour.
- or may render obvious secondary bronchiectasis.

Tomography

Is important for detecting and defining the tumour and with barium swallow a deflected oesophagus may make evident an undetected mediastinal mass.

Bronchoscopy

Is the quickest and surest method of establishing the diagnosis of Bronchial carcinoma to which the tumour is usually accessible, any suspicious lesion found by radiology should always be referred for Bronchoscopy.

It may show as an

- endobronchial protrusion.
- Ulcer.
- Peribronchial thickening of wall.
- Extrabronchial distortion.
- Local bulging suggests enlarged paratracheal glands.
- a wide long curve suggests atelectasis on the side of Convexity.

the carina may be broadened or distorted if Blood is seen at Bronchoscopy it may be followed to the tumour.

Tumours in the upper lobe are difficult to see, unless aided by a mirror, retrograde bronchoscope and in some cases artificial pneumothorax may have to be done to allow the tumour to fall nearer the Bronchoscope for visualisation.

Bronchoscopy may also determine the operability of the tumour if the other larger bronchus are free when the bronchus carrying a certainty be amputated clear of the tumour.

Bronchoscopic Biopsy is usually possible.

Laryngoscopy

should not be omitted.

A left laryngeal paralysis suggests that there is a tumour under the arch of aorta.

—A right paralysis may be an effect of the tumour is limited to one lung any extension is a contra indication for example:

- (i) Pleural and distant metastasis.
- ii) Secondary involvement of mediastinal or supraclavicular glands.
- iii) Paralysis of recurrent laryngeal or phrenic nerves.
- (iv) Broadening of carina.
- (v) Distorsion of trachea locally.
- (vi) Pancoast Syndrome.

Diagnostic Pneumothorax

Serves to distinguish a hilar cancer from a mediastinal tumour.

Paracentesis of pleural exudate for demonstrating cancer cells has occasionally proved of value.

Sputum examination for clumps of cancer cells.

Thoracoscopy may be employed to demonstrate pleural metastasis.

Not infrequently the suspicion that symptoms are due to cancer of the lung cannot be clinically confirmed and the ultimate diagnostic measure, exploratory thoracotomy may be undertaken on suspicion alone.

E. Course and Prognosis

It is a progressive disease. Patient usually loses weight and dies from cachexia or intercurrent disease.

Except in early cases where complete removal is possible by pneumonectomy, the prognosis is hopeless, death occurring in a few weeks or being delayed for 2 to 3 years. The possibility of a successful pneumonectomy is more favourable with the histologically differentiated than with the undifferentiated types of growth. The younger the patient the more malignant the disease tends to be.

F. Treatment

The treatment of choice is Total Pneumonectomy but the operation is performed only if

Localised extension to the chest wall is no contra indication. Some experts advise preliminary pneumothorax with maintenance of 40% collapse until cyanosis and dyspnoea are compensated.

The anaesthesia of choice is cyclopropane and oxygen with controlled respiration by closed circuit.

The figures for exploration, operability and survival in lung cancer are improving.

20 to 25 percent 5 yr. survival in cases which are resected.

Lobectomy

It is performed for peripheral tumours in older age groups, whose vital capacity is impaired and for whom post operative difficulties of aeration might be predicted by preliminary respiratory exercise. It is also performed when diagnosis is still doubtful or if the lesion is small and peripheral or if the disability of pneumonectomy is likely to be great.

Non-surgical treatment

Radiotherapy may be useful by diminishing localised pressure and relieving symptoms but cure by this method is rare.

Margeret Tod advised deep x-ray treatment for cancer of the lung even if secondary deposits were known to be present in the lymph nodes. She used 6000r units over a period of six weeks.

Palliation of radiotherapy particularly in relieving haemoptysis has also been praised by Brooks.

Nitrogen Mustard

Has been employed in the treatment of lung cancer but conclusive records of its use are not available. Tumour masses may however regress in size and the patient may feel better.

Symptomatic treatment

Useless cough should be checked by Sedative lozenges or a linctus. Dyspnoea due to pleural effusion may be relieved by tapping with or without air replacement but the fluid often reaccumulates rapidly. Pain should be relieved by analgesic drugs and in later stages by opium and its alkaloids.

Abstracts of Radiological Literature

Röntgenologische Darstellung eines Processus retromastoideus. (Radiological demonstration of a retromastoid process). By H. Schmidt, (Fortschr. Geb. Roentg., Vol. 88, 1, P. 67-69, Jan. 58).

The retromastoid process is a small bony prominence from the lateral aspect of the squama of the occipital bone between the inferior and superior nuchae line near the insertion of the oblique capitis superior tendon. Though extremely rare amongst Europeans it seems very common amongst the indigenous population of some Polynesian islands where it has been reported by anatomists to occur in two-thirds of all skulls, unilateral or bilateral. So far it has never been observed during lifetime.

The author found a right-sided retromastoid process in a European patient as co-incidental finding. They could visualise it in routine p. a. and axial views of the skull. In occipito-frontal view it was seen medial to the mastoid process.

The bony excrescence did not represent a paracondyloid process as the latter only occurs in association with an occipital vertebra which could be ruled out by tomograms.

3 radiographs of the retromastoid process and 2 photographs of anatomical specimens reproduced from previous anatomical publications.

P. H. Kronenberger, Bombay.

Über die lokale Chemotherapie der Pleuracarcinose und ihre Kombination mit Röntgenbestrahlungen. (Local chemotherapy of pleural carcinosis and its combination with X-ray therapy). By S. Piller, (Fortschr. Geb. Röntgenstr., Vol. 88, 1, P. 76-83, Jan. 58).

The author tried in pleural carcinosis an intrapleural administration of the cystostatic Cealysin* consisting of Trimethylolmelamin, to which they add an equal amount of Sodium sulphite to prevent the formation of the occasionally irritating Formaldehyd. After aspiration of the pleural effusion they inject 0.3 to 0.6 cc. of Cealysin twice a week, preferably 10 times. In the majority of cases this treatment is followed by a course of tangential deep therapy.

Amongst the 13 patients they treated in the last 4 years, 12 had secondaries of a mamma tumour and 1 metastasis of a colon carcinoma. Impressive results were achieved in 10 out of these 13 cases. The pleural effusion sometimes subsided after 5-6 instillations. In 8 patients, some of them treated as long as 4 years ago, the condition improved and there were no signs of recurrence upto now. The average time of survival known as 4.3 months with deep therapy amounted to 13.4 months in their series of cases.

They recommend the following procedure:

(1) If the microscopic examination of the pleural exudate reveals no tumour cells and the radiographs no large secondaries, they start with intrapleural injections of Cealysin.

*Produced in the Laboratory of applied chemistry Dr. F. Kohler, Alsbach.

(2) If the pleural effusion still relapses in these cases and the histological findings remain positive, combination with deep therapy is indicated.

(3) If the X-ray examination discloses extensive masses of pleural secondaries, the local administrations of Cealysin are of no benefit and irradiation is the only treatment of choice, usually deep therapy or, in cases of single superficial secondaries, electron therapy.

So far the number of patients treated is still rather limited and the time of observation comparatively short, but the initial results of local chemotherapy are definitely encouraging and seem to suggest that it may be able to arrest this incurable affliction.

8 radiographs.

P. H. Kronenberger, Bombay.

Die Röntgendiagnostik des Lungenemphysems. (The radiological diagnosis of pulmonary emphysema). By W. Frik, R. Hesse and R. Zeilhofer, (Fortschr. Geb. Röntgenstr., 88, 2, P. 125-133, Feb. 58).

For a long time the radiological symptomatology of the pulmonary emphysema appeared well established. More recently, however, critical radiologists and physicians caution against categorical statements of emphysematous chest, particularly in cases where the features are less pronounced. The authors therefore try to evaluate the different radiological signs in comparing a conventional p.a. radiograph and fluoroscopy of 100 chests of normal cases with 100 cases of pulmonary emphysema. The diagnosis of pulmonary emphysema was ascertained by spirometric tests. They found

that the various symptoms of the thoracic cage, such as "barrel-shape chest", horizontal course of ribs and wide intercostal spaces cannot be relied-on as they were also occasionally observed under normal conditions. An impression of increased translucency depends, in their opinion, on several extraneous conditions, such as diameter of thorax, thickness of superimposed soft tissue, presence of fibrosis, exposure time, development and film material, and was therefore considered as of limited diagnostic value. The lack of illumination of lung fields on inhalation requires at least 2 radiographs at different stages of respiration and can, therefore, not be detected in the usual routine examination with a single film. Bilateral rarefaction of pulmonary arteries—a very important symptom in emphysema—can only be observed by stereography or tomography, but not in the conventional film.

They attach greater importance to the radiological symptoms of the diaphragm. In particular, they noticed that the combination of decrease of the height of the diaphragmatic dome to less than 4 cm. a diminution of respiratory excursions to less than half of an intercostal space and increase of a costo-phrenic angle of more than 45° is practically diagnostic for pulmonary emphysema.

In their opinion these criteria permit a fairly reliable diagnosis of advanced cases of substantial emphysema, whereas early cases with less than 50% residual volume are better disclosed by spirometry. This latter investigation is, however, inferior to the radiological examination in localised forms of emphysema.

1 Illustration.

P. H. Kronenberger, Bombay.

Direkte Angiokardiographie und retrograde Aortographie mit dem Elema-Gerat bei angeborenen Herzfehlern. (Direct angiocardiology and retrograde aortography by means of the Elema-equipment in congenital cardiac malformities). By G. Burgemeister and W. Porstmann, (Fortschr. Geb. Röntgenstr., 88, 2, P. 145-154, Feb. 58).

The authors report their technique and results in direct angio-cardiology. They mention the following advantages of the Elema-equipment:

- (1) High frequency of exposures.
- (2) Wide range of regulation of the exposures between 12 exposures per second and a single exposure within 10 seconds.
- (3) Simultaneous exposure of films in two planes.
- (4) Optimal visualisation of details in angiographs of original size.
- (5) Lesser amount of exposure of the patient to irradiation than in indirect serial or kinematographic angiocardiology.

A disadvantage of the Elema equipment is its high price and the considerable cost of film material which, in their opinion, is however compensated by the optimal results.

They demonstrate in 3 cases how important it is to select the adequate method of examination.

1st Case.—Complete transposition of big vessels combined with atrial and septal defects and infundibular pulmonary stenosis. The ventricular septal defect was well visualised in the a.p. angiocardigrams, but the connection between aorta and right ventricle and that between the hypoplastic pulmonary artery and left ventricle could only be recognised by lateral angiocardiology.

2nd Case.—Combination of Fallot's pentalogy with a persistent left superior vena cava which entered the left atrium. The 2nd of the two abnormalities was detected in the intravenous angio-cardiology and the first in the subsequent selective angiocardiology of right ventricle by catheterisation.

In the 3rd case, an open ductus arteriosus, retrograde aortography disclosed the exact localisation of the shunt and served to rule out the co-existence of an aorto-pulmonary defect or fistula, conditions which may produce similar clinical symptoms and similar findings in cardiac catheterisation as an open ductus arteriosus. They consider retrograde aortography indispensable in all cases of suspected open ductus arteriosus.

13 Illustrations.

P. H. Kronenberger, Bombay.

Zur Asymmetrie der Lungenarterien. (Asymmetry of pulmonary arteries). By H. Schmitz and P. Thurn, (Fortschr. Geb. Röntgenstr., 88, 2, P. 133-145, Feb. 1958).

The authors discuss the findings in 30 cases of asymmetry of the pulmonary circulation due to unilateral hypoplasia of pulmonary arteries.

This condition occurred congenital either as an isolated developmental abnormality (2 cases) or associated with other cardiovascular malformities (20 cases). In 7 instances it resulted from an emphysema or silicosis, in one case it followed thrombosis of the left branches of the pulmonary artery.

Typical cases of unilateral hypoplasia of pulmonary arteries are easily detected in conventional p.a. films and still better in p.a. tomograms of the chest. Constant characteristics are: considerable narrowing

of peripheral vascular markings and increased translucency of the affected lung field. Inconstant symptoms are: narrowing of the affected side of the hemithorax and an ipsolateral displacement of the mediastinum.

In the congenital forms the narrowing involved the central as well as the peripheral pulmonary arteries. If this unilateral hypoplasia is found in Fallot's disease, it means that the surgeon has to perform the anastomosis at the opposite side. In cases of uncomplicated pulmonary stenosis it indicates the presence of supra-valvular narrowing in addition to the valvular or infundibular abnormality.

If the pulmonary hypoplasia was produced by unilateral emphysema the following features were observed: presence of emphysematous bullae, low position of diaphragm and occasional displacement of the mediastinum to the opposite side. Whereas the central pulmonary arteries were always narrow in congenital hypoplasia, they were normal or increased in width if it was secondary to the emphysema.

Unilateral narrowing of central as well as of peripheral vascular markings was also found in silicosis and in one case as a sequel to inflammatory thrombotic changes of the pulmonary arteries, associated with thrombophlebitis of both legs. In silicosis the authors assume a direct effect on the central pulmonary arteries as the bronchography ruled out a co-existent abnormality of the bronchial tree. In the post-thrombotic condition cardiac catheterisation and selective pulmonary angiography revealed hypertension in right ventricle and pulmonary artery and an obstruction of its left branch.

21 illustrations including conventional films, 3 tomograms, 3 angiograms, 1 bronchogram and 1 kymogram.

P. H. Kromenberger, Bombay.

John W. Hope, Eugene B. Spitz, Harry W. Slade. The early recognition of premature cranial Stenosis. *Radiology*. August 1955. 65 : 183-193.

Untreated premature cranial synostosis is often accompanied by serious sequelae such as mental retardation, convulsive seizures, papilledema, headaches, vomiting, failing vision, optic atrophy and blindness, palsy of the 3rd, 4th, 5th and 6th nerves, occasional involvement of the 1st and 8th cranial nerves and deafness, and a bizarre appearance.

Eighty percent of the entire growth of the brain is completed within the first 3 years of life. The cranial sutures normally fuse long after the growth of the brain is complete. Only the metopic suture closes at birth or shortly thereafter, the others remaining open until the age of 50 or 60 years.

Clinically an abnormal shaped head, a palpable ridge over the closed suture, and exophthalmos are frequent signs of cranial stenosis. Radiologically the suture which will close prematurely is very narrow with dense bone margins, and the head shows an abnormal contour. Once a suture has closed prematurely, growth will take place wherever sutures remain open. Later on compensatory expansion taking place becomes inadequate, and cerebral growth then causes increasing intracranial pressure, which causes thinning of the cranial vault and a great increase of convolutional markings. The orbital plates are depressed resulting in exophthalmos.

Because of the rapid growth of brain during the first year of life, a preventive operation in which a strip of bone 2 cms.

suture is removed, should be performed, before 6 months of age, and preferably at about 3 months of age.

5 cases are reported, 9 radiographs.

S. N. Deboo, Bombay.

J. L. G. Thomsen. Enlargement of the Sella Turcica. A report on 27 cases, *Br. Jour. Radiol.* September 1955. 28 : 454-461.

The author reviews the literature on the subject and reports 27 cases of enlargement or apparent enlargement of the sella Turcica, and emphasises the difficulties of dogmatic diagnosis on the plain x-ray films alone and that differentiation between intrasellar, suprasellar and remote lesions on the appearance of the sella alone is hazardous. That there are many conditions which may cause sella enlargement and that it is often impossible to distinguish them on plain films alone.

The cases reported show clearly that the sella may be normal even in the presence of a large tumour, or it may be extensively enlarged or destroyed, that the anterior clinoid processes may be normal or destroyed, that the floor of the dorsum sella may be preserved or destroyed. It is only by air studies that the true size of the tumour be appreciated, and that a large pituitary tumour can be present in spite of a normally looking sella.

Extrasellar tumours also fail to produce any constant changes, enlargement of the third ventricle may fail to produce a wide range of appearance from preservation of the contour to complete destruction.

From the survey, only four features showed any constancy.

(1) Ballooning of the sella with intrasellar tumours.

(2) Foreshortening of the dorsum sella with suprasellar tumours.

(3) Depression of an anterior clinoid process with a suprasellar tumour.

(4) Elevation of an anterior clinoid process with an intrasellar tumour.

It is therefore stressed that the clinical signs and air or arteriographic studies are the surest ways of assessing sellar changes.

26 radiographs, 2 diagrams.

S. N. Deboo, Bombay.

H. W. Schmidt. The behaviour of the Pial vessels during and after the intracarotid injection of roentgen contrast media. *Acta Radiologica*. August 1955. 44 : 100-107.

Disturbances during cerebral angiography such as paralysis and convulsions are frequently related to vascular injury and cerebral angiospasm after the injection of contrast media.

The behaviour of the living pial vessels after the injection of roentgen contrast media were studied by means of microscope. After intracarotid injection of various contrast media on rabbits and cats under urethane anaesthesia, the cerebral vessels were studied. It was found that after the injection of Thorotrast, Ioduron 30 percent, Perabrodil 45 per cent and Urograffin 40 per cent, no angiospasm of the intact pial vessels were observed. On the other hand, there were marked disturbances in the blood flow after injecting high percentage solutions like Perabrodil 80 per cent, Joduron 70 per cent and Urograffin 76 per cent. Such disturbances were also found after injecting concentrated Kollidon-Periston solution. These disturbances were

accompanied by convulsions and respiratory disturbances such as acute dyspnoea. In isolated cases, especially after Joduron generalised convulsions occurred during or immediately after the injection of highly concentrated solutions of contrast media.

These circulatory disturbances are therefore attributed to other physical properties (possibly viscosity) with simultaneous decrease of blood pressure and they are regarded as the real cause of various complications occurring in cerebral angiography.

2 photomicrographs.

S. N. Deboo, Bombay.

W. Whitaker, A. Black, and A. J. N. Warrack. Pulmonary ossification in patients with mitral stenosis. *Jour. Fac. Radiologists*. July 1955. 7: 29-34.

The authors present 7 cases, wherein 5 cases, pulmonary ossification was visible on routine radiological assessment of the mitral valve disease. Clinically the patients showed dyspnoea on exertion, haemoptysis, clinical evidence of pulmonary hypertension and E. C. G. evidence of right ventricular hypertrophy.

Radiologically multiple dense opacities were visible in both lungs, mainly confined to the lower zones, with apices clear, and more numerous in the right lung. All patients showed abnormally high pulmonary artery blood pressures amounting to a moderate degree of pulmonary hypertension.

Pathologically palpation of the lungs showed multiple hard foci, and on histological examination the palpable radio-opaque foci consisted of bone.

The opacities which these nodules of bone produce on radiological examination must be differentiated from those of pneumoconioses, miliary tuberculoses, sarcoidoses, leukemia, Hodgkin's disease, lymphangitis carcinomatosa, but once the presence of mitral stenosis is recognised, there is no difficulty in recognising the condition, since the association of these other conditions with mitral stenosis is rare.

All patients had abnormally high pulmonary vascular pressures, but, since such pressures are common in patients with mitral stenosis while pulmonary ossification is rare, it is apparent that factors other than these must be involved in the production of bone. There is a coincidental relation between pulmonary ossification and pulmonary haemosiderosis, since both occur in patients with abnormally high pulmonary vascular pressures.

3 radiographs, 1 photograph, 1 photomicrograph.

S. N. Deboo, Bombay.

Ronald G. Grainger, and John B. Hearn. Intrapulmonary septal lymphatic lines (B Lines of Kerley). Their significance and their prognostic evaluation before mitral valvulotomy. *Jour. Fac. Radiologists*. July 1955. 7: 66-70.

B lines of Kerley are 1-3 cms. long, of a hair calibre thickness, and are usually transverse without branching, are bilateral and number upwards of 4 to 6 cms. on either side, and are seen to terminate peripherally or close to the pleura, and are best visible in the costophrenic angles. They may be seen in any case in which there is impairment of pulmonary lymphatic drainage, such as in mediastinal reticuloses, and mediastinal sarcoidosis, and are commonly seen in mitral stenoses.

Anatomical, pathological and theoretical evidence is presented to determine the causation of B Lines seen on chest radiographs. They are caused by an increase in the radioopacity of the septa between the peripheral pulmonary secondary lobules, usually due to oedema and lymphatic dilatation.

The authors reviewed 134 patients with mitral valve disease, who had subsequent cardiectomy. After a minimal period of 6 months, the patients were re-assessed for disability and radiographs examined for B lines. B Lines were found in patients with high pulmonary vascular pressures, the critical pressures being 22-25 mms. Hg. capillary and 25 mms. diastolic pulmonary artery pressure. The higher the pressure reading, the more likely were B lines to be present. It was found that disability for effort is in no way related to the presence or absence of B lines, which occur with approximately equal frequency in all grades of effort disability. Patients with mitral stenoses having preoperative B lines improve after valvulotomy with greater frequency than those without this radiographic feature. 92 per cent of patients with B lines improved as against 61 per cent of patients whose preoperative films did not show these lines.

These B lines are therefore a guarantee of postoperative improvement in patients selected by the cardiologist as likely to benefit. This is not to state that patients without B lines should not be operated upon.

7 radiographs, 5 figures.

S. N. Deboo, Bombay.

Howard L. Steinbach, Theodore E. Keats, Glenn E. Shelton. Appearance of pulmonary veins in heart disease. *Radiology*. August 1955. 65: 157-168.

The pulmonary veins can be demonstrated in plain x-rays of the chest, the examination consisting of a posteroanterior, a heavily exposed posteroanterior, both obliques and left lateral projections. In the posteroanterior films, the veins of the right lower lobe are easily seen. The veins from the upper lobe of the left lung are not demonstrable. The mediastinal shadow obscures the medial portions of the veins on both sides. An assessment of their size may aid in the x-ray diagnosis of cardiac or great vessel disease of either the congenital or acquired type. The size of the veins correlates well with the amount of pulmonary blood flow.

The pulmonary veins are larger than normal when there is an increase in the volume of blood flowing through the lungs, as in the presence of intracardiac shunts with left to right flow, and in patent ductus arteriosus, and aortic pulmonary window. A survey of 100 cases showed that large pulmonary veins were seen in films in 71 per cent of cases of patent ductus.

Small pulmonary veins were demonstrated in the present study in patients with pulmonary stenosis, tetralogy of Fallot, tricuspid atresia and truncus arteriosus, and in pulmonary artery thrombosis.

In mitral stenosis, and in mitral stenosis and insufficiency, the pulmonary veins are normal and occasionally even smaller than normal, although the right ventricle, pulmonary artery and the left auricle show a definite enlargement.

18 radiographs, 11 figures.

S. N. Deboo, Bombay.

J. Schvarex. Fourteen cases of Carcinoma of the middle lobe bronchus. *Acta Radiologica*. August 1955. 44: 89-99.

The right middle lobe of the lung is said to be rare site for carcinoma. A material of 14 operatively verified cases of carcinoma of the middle lobe of the right lung is presented, and also verified histologically.

The matter is of interest as they are reported sometimes as being cases of middle lobe syndrome or encysted inter-lobe effusion. 2 x-ray methods are available to differentiate the carcinoma of the middle lobe bronchus from other conditions in or in the neighbourhood of the middle lobe. One is Tomography and the other method is bronchography.

To confirm the diagnosis of a tumour, bronchography is considered to be the most satisfactory roentgenographic method, as it demonstrates clearly the shape of the bronchus and the state of its lumen at the site of the occlusion.

The diagnosis of a growth of the middle lobe bronchus is established if on the bronchogram, the occlusion of the middle lobe bronchus is irregular and discontinuous, and if its occlusion is abrupt, transverse or funnelshaped. The bronchograms strongly suggest a tumour of the middle lobe bronchus when they show an occlusion and narrowing and crowding together of its branches.

16 radiographs.

S. N. Deboo, Bombay.

Nathaniel Finby and Israel Steinberg. Roentgen aspects of pleural mesothelioma. *Radiology*. August 1955. 65: 169-182.

2 groups of mesothelioma, localised and diffuse, are recognised. The diagnosis can

be made with certainty only after gross pathologic and histologic study.

Most localised mesotheliomas are benign, but in some cases, the localised may be the early stage of the diffuse malignant type. It is usually rare. The x-ray film shows a circumscribed, usually lobulated, intrathoracic mass in the plane of the pleura. Pleural effusion is not common, and there is no evidence of satellite tumour nodules, so that diagnostic pneumothorax is not helpful in the differential diagnosis. Angiocardiography aids differentiation from vascular tumours, and aids in demonstrating pericardial and great vessels involvement. Clinically osteoarthropathy is a common feature. Prognosis is good, and surgery with complete removal of the tumour may be curative.

The diffuse pleural mesothelioma, on the other hand, is always a malignant disease, and occurs more commonly. It spreads by contiguity into the lung, mediastinum, pericardium and chest wall. Distant metastases are uncommon, but mediastinal, axillary and supraclavicular lymph nodes are frequent. Clinically there is pleuritic pain, often severe and gnawing, with dyspnoea, weight loss, dry cough and fever. There may be recurrent laryngeal or phrenic nerve paralysis. It appears initially as a massive effusion. Relief of symptoms after thoracentesis is transient because of rapid reaccumulation of fluid. Pneumothorax after removal of the effusion shows nodular pleural densities and thereby aid diagnosis. Despite the large effusion there is usually little shift of the mediastinum. The pericardium may be invaded. Involvement of the chest wall may result in erosion of the ribs.

The prognosis is poor for patients with diffuse pleural mesothelioma. Surgery appears to be the primary therapy. Radiation therapy is only palliative as the tumour

is radioresistant. Radioactive isotopes have been used to decrease the formation of pleural fluid.

28 radiographs.

S. N. Deboo, Bombay.

H. P. Kent. Gas in the urinary tract. *Jour. Fac. Radiologists*. July 1955. 7: 57-65.

Pneumaturia as a radiological sign is rarely noted in the urinary tract on straight radiographs of the abdomen, partly because it may be missed. It may follow instrumentation of the urogenital tract, may result from renocolic, ileovesical, or uretero-recto-vaginal fistula, or it may result from fermentation with or without glycosuria.

By far the commonest of the urogenital tract fistulae are the vesicointestinal fistulae. 50 per cent are inflammatory, and of these two-thirds were due to diverticulitis of the colon. Next came the neoplasm followed by traumatic and congenital fistulae. Renovisceral and uretero visceral fistulae are uncommon. Spontaneous gas formation may occur in the kidney or bladder. In the bladder it is usually found in diabetic patients, but can also occur in non diabetic patients.

The pertinent literature, clinical aspects and pathology have been reviewed. Four case reports are given to illustrate the radiological aspects and problems arising from the finding of pneumaturia.

When gas is noticed in the urinary tract on a straight film of the abdomen, and if recent instrumentation has not been performed, further radiological investigation is called for. The first question is whether it is due to spontaneous gas formation or to fistula. Intravenous pyelography, retrograde pyelography, intestinal contrast studies both by barium meal and enema may be essential,

and in the case of the bladder, cystography may have to be carried out. It must not be assumed that a fistula is easily demonstrable. A *Diagnosis of Spontaneous* gas formation in any part of the urinary tract should be offered only if the diagnosis of fistula formation can be reasonably excluded.

Primary pneumaturia of the bladder has to be differentiated from cystitis emphysematosa, where the pathognomonic feature is the demonstration of the gas filled vesicles on cystoscopy, and a concentric ring of translucency outlining the bladder wall on a straight film of the abdomen.

9 radiographs.

S. N. Deboo, Bombay.

Ingmar G. Wickbom and Uno Rentzhog. The reliability of cholecystography. *Acta Radiologica*. September 1955. 44: 185-200.

The reliability of oral cholecystography is studied in 1340 cases, with practically every case in which the cholecystographic observations were interpreted as abnormal were subjected to operation the problem being to what extent cholecystography may be relied upon to detect disease of the gallbladder. 2 types of contrast medium were used, the old Tetraiodophenolphthalein called cholo-trast, and the more modern Bilitrast the equivalent of priodax. The more recent type of Telepaque was then not available.

The cases were classified according to the degree of filling, and according to whether or not stones were visualized. In 72 per cent of the 590 cases in which the roentgen examination revealed stones in a contrast filled gallbladder, slight or no cholecystitis was found at operation. In 419 cases good filling was obtained, in all except 2 of these cases the x-ray diagnosis was confirmed at

operation. In 171 cases, the x-ray films showed poor filling and the presence of stones. The wall of gallbladder was diseased in 20 per cent of cases of normal filling and in 35 per cent of the cases of poor filling, so that there is greater likelihood of disease of the wall when the gallbladder is poorly filled, than when it is well filled. When the gallbladder did not fill well, although sufficiently to exclude the stones, the poor filling in itself was not considered abnormal: Only when the filling was so defective as not to permit the detection of stones, it was considered abnormal. The gallbladder did not fill in 722 cases, and in 22 per cent of these only the operation showed no signs of cholecystitis.

When the 1340 cases with x-ray evidence of abnormality of the gallbladder are considered, it is seen that the most common abnormality was lack of filling, occurring in 56 per cent of cases. It may be concluded therefore that cholecystitis of a moderated degree is seldom present if normal x-ray appearances are obtained with Bilitrast (priodax).

Whenever x-ray examination points to gallstones, the evidence may be relied upon almost completely. Failure of the gallbladder to fill with contrast medium is almost conclusive evidence of disease of the gallbladder, provided a correct technique is employed, and excluding extensive injury to liver parenchyma, abnormal conditions of biliary passages or adjacent tissues such as pancreas, or duodenal ulceration. A normal cholecystographic finding practically always excludes disease of the gallbladder.

S. N. Deboo, Bombay.

Maxwell H. Poppel, H. Adler, Harold G. Jacobson, J. Stein, and L. B. Lawrence. Mucous Colon. Radiology. July 1955. 65: 50-56.

17 cases of mucous colon are presented, in which the stool studies were consistently negative for ova and parasites, the sigmoidoscopic studies revealed no ulceration, and were either completely normal or showed only excessive mucus.

The patients generally complain of diarrhoea with mucus in the stool, frequently associated with abdominal pain, occasional vomiting, fullness and belching. The physical findings are tenderness in the region of the descending colon and a firm palpable tube-like descending colon.

Its etiology is not known, but it appears to be a form of psychosomatic disease. The condition bears no relation to ulcerative colitis.

Radiologically no abnormal structural changes are demonstrable, but certain functional abnormality may be observed. With barium enema studies, the mucous content of the colon is manifested by radiolucent defects in the barium column, and on post-evacuation, the films may show thickened mucosa with distorted folds. Barium meal studies frequently disclose evidence of considerable motor dysfunction.

11 radiographs.

S. N. Deboo, Bombay.

L. Campbell Tainsch and Geoffrey Medhurst. Demonstration and Pathology of Meckel's Diverticulum with report of a case. Br. Jour. Radiol. July 1955. 28: 351-354.

The history of the radiological demonstration of Meckel's diverticulum is described together with a brief review of reported

ABSTRACTS

When the Vitello-intestinal closure in the region of the gut is incomplete, there remains a sinus at the umbilicus, the result of an incomplete closure at the abdominal end, sometimes known as an "enterotoma". When there is closure at both ends only, a cyst may form in the intermediate part, "enterocystoma". Rarely a cyst is formed in the mesentry and is known as an "enterogenous" type of mesenteric cyst. Although the majority of the diverticula are a result of incomplete obliteration, some writers believe that the condition may be acquired.

The structure of the sac is similar to that of the ileum, and when all the layers are present, it is said to be complete. Linings of gastric, duodenal, ileal and colonic mucosa have been recorded, and heterotopic gastric mucosa is found in the diverticulum in 25 to 35 percent of cases, and cause haemorrhage and ulceration and perforation as a result of peptic ulceration.

Meckel's diverticulum assumes importance through its liability to various complications.

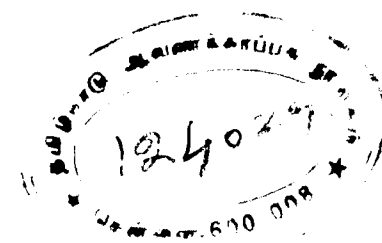
There are (i) acute inflammation, leading to abscess, gangrene, perforation and peritonitis. (ii) Acute intestinal obstruction following strangulation of the bowel by a cord from the sac to the umbilicus. (iii) Intussusception caused by an invaginated diverticulum (iv) haemorrhage as result of peptic ulceration in the secreting gastric mucosa. (v) new growths (vi) tuberculosis (vii) regional ileitis (viii) perforations of the diverticulum (intrauterine, into the bladder, into the appendix etc.)

If the condition is suspected, hourly or half-hourly films were taken with careful fluoroscopy, the dilatation of an ileal loop would be a suggestive finding. Although the majority of diverticulac have been detected after a barium meal, the barium enema has also been used in its demonstration.

Some observations on technique are made and a case is reported.

2 radiographs.

S. N. Deboo, Bombay.



X-RAYS DIAMOND JUBILEE SOUVENIR NUMBER

of

INDIAN JOURNAL OF RADIOLOGY

Official Organ of the

INDIAN RADIOLOGICAL ASSOCIATION

To commemorate the Diamond Jubilee of the Discovery of X-Rays

By **Dr. W. C. ROENTGEN**

The Indian Radiological Association is proud to publish this unique volume containing 700 pages of original articles on Radio-diagnosis, Radio-therapy, Radio-physics and Radio-biology contributed by eminent Radiologists and Radiophysicists from United Kingdom, Europe and U. S. A.

Printed on Art paper with Illustrations

Volume is ready for delivery.

Price : Europe	...	£ 2-0-0 postpaid
U. S. A. & Canada	...	\$ 5-00 "
India	...	Rs. 22/12/- "

For orders please write to :—

The General Secretary

INDIAN RADIOLOGICAL ASSOCIATION

48, HANUMAN ROAD, NEW DELHI-1.

Statement about ownership and other particulars about newspaper (INDIAN JOURNAL OF RADIOLOGY) to be published in the first issue every year after the last day of February.

FORM IV—(See Rule 8)

1. Place of Publication ... MADRAS.
2. Periodicity of its publication ... Quarterly.
3. Printer's Name ... R. Ravai Manickam (Ravai Press).
Nationality ... Indian.
Address ... 148, Big Street, Triplicane, Madras-5.
4. Publisher's Name ... Mr. R. Ravai Manickam.
Nationality ... Indian.
Address ... 148, Big Street, Triplicane, Madras-5.
5. Editor's Name ... Dr. K. M. Rai.
Nationality ... Indian.
Address ... Lake-side, 110, Mount Road, Madras-18.
6. Names and addresses of individuals who own the newspaper and partners of shareholders holding more than one per cent of the total capital. Indian Radiological Association.

I, Mr. R. Ravai Manickam, hereby declare that the particulars given above are true to the best of my knowledge and belief.

R. RAVAI MANICKAM,

Signature of Publisher.