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Proceedings of the Thoracic Society

The Spring Meeting of the Thoracic Society was held on 25 and 26 February 1966 at the Royal College of Physicians, London. There were 16 short papers, a photographic demonstration, a film, and a symposium. Summaries follow.

IMMUNO-FLUORESCENT STUDIES IN LUNG BIOPSIES

M. TURNER-WARWICK said that lung biopsies from patients with interstitial pulmonary fibrosis had been studied by immuno-fluorescent techniques to identify tissue-fixed immuno-globulins using conjugated anti-human Ig G, Ig A, and Ig M and anti-Bic (anti-complement).

Various types of extracellular and intracellular fluorescence had been observed in seven out of eight specimens examined; these were described and their significance was discussed, comparing them with five biopsies taken from patients with other pulmonary disease. Intracellular fluorescence was particularly prominent in plasma cells and certain macrophages using Ig A. Extracellular fluorescence was seen in relation to germinal follicles using Ig G and Ig M. In three cases of special interest bright fluorescence of the alveolar wall was seen using conjugated anti-complement suggesting intramural deposition of antigen/antibody complexes.

UNUSUAL ASPECTS OF BRONCHIAL CARCINOMA

H. SPENCER (introduced by N. R. BARRETT) discussed some problems raised by three forms of lung cancer, the nature of 'giant-cell' carcinoma, the origin of 'oat-cell' lung cancer, and the nature of pulmonary blastomas, and their importance in connexion with the embryology of the lung.

A rare variant type of lung cancer, the giant-cell carcinoma, was briefly presented. The active phagocytic activity shown by the tumour cells and the occasional occurrence of haemolytic anaemia in this disease cast some doubt on the nature of this tumour, and raised the possibility that it may be a form of pulmonary sarcoma.

The origin of 'oat-cell' carcinoma cannot yet be regarded as by any means settled, and the view is advanced, based on macroscopic, microscopic, electron microscopic, and humoral similarities that this tumour may be closely related to bronchial carcinoids, some tumourlets, and the bronchial epithelial 'clear' cells.

A small group of pulmonary blastomatous tumours was presented. These tumours both clinically and macroscopically are confused with ordinary lung cancers but form a distinct group. Their structure and possible origin sheds doubt on the commonly held view of the origin of the whole lung from the division of the laryngo-tracheal endodermal bud and favour a dual mode of lung development.

LUNG FUNCTION IN CONNECTIVE TISSUE DISORDERS

IN SCLERODERMA AND DIFFUSE INTERSTITIAL PULMONARY FIBROSIS

D. T. D. HUGHES (introduced by K. M. A. PERRY) discussed serial changes in pulmonary function in scleroderma (systemic sclerosis) and chronic diffuse interstitial fibrosis.

Forty patients with scleroderma had been studied. Of these a significant reduction of the diffusing capacity was present in 26 patients, restriction of lung volumes in 20, and airways obstruction in three. Three patients had normal lung function. Ten patients had serial measurements made over periods of between three months and five years. All the patients received steroids. In only three patients, however, was there any improvement in function. Two of these showed a marked rise in diffusing capacity, and the third almost doubled his vital capacity. In most cases there was a slowly progressive deterioration in function which was not surprising in view of the extensive lung damage found at necropsy.

Fifteen cases of diffuse interstitial fibrosis of unknown aetiology were also studied, all of whom had reduced lung volumes and diffusing capacity. In ten of these, serial studies of up to four years had been possible and only two of this group had not received steroids. Of the eight treated cases, four had responded dramatically to steroids, particularly as regards their diffusing capacity, which was quadrupled in two instances. Steroids seemed more effective in the more acute cases, presumably before extensive fibrosis was established.

IN A GROUP OF PATIENTS

M. CATTERALL and N. ROWELL said that 95 patients suffering from connective-tissue disorders had undergone investigations of the respiratory system. These included clinical and radiological examinations and measurements of the components of the lung volumes, resting and forced ventilation, and the transfer factor.

Forty-eight patients suffered from scleroderma, 12 from systemic lupus erythematosus, two from dermatomyositis, and one each from polyarteritis nodosa,

Wegener's granuloma, and diffuse fibrosing alveolitis. Eight patients had cutaneous arteritis, three Sjögren's syndrome, and 27 had rheumatoid arthritis.

Forty-two (44%) showed some evidence of lung involvement. The chest radiograph was abnormal in 21 cases (22%), the vital capacity was low in 16 (17%), the maximum voluntary ventilation was low in 12 (13%), and the transfer factor was low in 33 (35%).

Whereas only two patients had normal lung function in the presence of abnormal radiographs, 19 (20%) had abnormal lung function but normal chest radiographs. In 17 the transfer factor was the sole abnormality.

The lung function tests gave useful information, which was not always available from the chest radiograph, and they provided a more sensitive assessment of involvement of the lungs. Progressive systemic sclerosis, systemic lupus erythematosus, cutaneous arteritis, and rheumatoid arthritis were the diseases most frequently associated with lung changes.

RADIOLOGICAL DIAGNOSIS OF EMPHYSEMA

R. N. JOHNSTON, R. S. MCNEILL, D. H. SMITH, C. PICKARD, and F. FLETCHER reported that the radiological diagnosis of emphysema had been assessed independently by four observers examining selected radiographs of 112 patients suffering from chronic bronchitis. Emphysema had been measured in life from factors derived from the total lung capacity and the pulmonary diffusion coefficient. Against these standards comparisons had been made with each reader assessing reduction in number and calibre of peripheral pulmonary arteries, lung volume, 'visual impression' of emphysema, and studies of tomograms. They had found considerable observer variation and questioned the value of individual assessments of emphysema unless this condition is far advanced.

DIAGNOSIS OF EMPHYSEMATOUS AND BRONCHIAL TYPES OF OBSTRUCTIVE LUNG DISEASE

ASSESSMENT OF EMPHYSEMA PATHOLOGICALLY

B. E. HEARD and J. S. WOOTLIFF said that emphysema had been studied in a selected series of lungs obtained at necropsy and prepared by pressure-fixation and barium sulphate impregnation. The amount of emphysema was assessed by means of the dissecting microscope and measured according to its severity and extent out of a maximum score of 18 units. Readings were made by two pathologists independently and without reference to the clinical data.

RELATION OF CLINICAL AND PHYSIOLOGICAL FINDINGS TO ANATOMICAL SEVERITY

C. M. FLETCHER, B. BURROWS, and N. L. JONES reported that the necropsy findings in the lungs of 31 patients with chronic airways obstruction previously included in standardized prospective studies had enabled clinical and physiological findings to be related to the grade of anatomical emphysema. Severe emphysema was related to a relatively low sputum volume, an attenuated vascular pattern on the radiograph, a low transfer factor for CO, and a relatively low P_{CO_2} (type A patients). Mild or absent emphysema was associated with a large sputum volume, chronic inflammatory changes in the radiograph, normal or low total lung capacity, a relatively normal transfer factor, and relatively high P_{CO_2} (type B patients). Improved diagnostic criteria for estimation of the severity of emphysema were proposed.

THE ORIGIN OF WHEEZING

P. FORGACS (introduced by P. D. B. DAVIES) presented a series of tape recordings from patients with airways obstruction to illustrate the mode of origin of wheezing. The pitch of these sounds bears no relation to the length of the tubes in which they arise and remains constant when the air in the lungs is replaced by helium. These observations, supported by experiments with excised lungs, showed that airways generating a musical sound must be on the point of closure and that the linear velocity of the air flow is the main factor determining the pitch. The airways in question must be communicating with a large enough reservoir of air to start and sustain the sound. This sets a limit to the bronchial division beyond which wheezes cannot arise. The mode of origin of expiratory and inspiratory wheezing and the clinical value of these signs were discussed in the light of these observations.

RESPIRATORY TOXIC HAZARDS OF EVERYDAY LIFE

W. S. S. LADELL considered the mechanism of respiratory toxicity and said that the old military classification is misleading; certain respiratory poisons act directly on the lungs, causing irritation and eventually pulmonary oedema, but in general inhaled poisons act in the same way as poisons taken in by any other route, specifically on various organs or tissues within the body. In everyday and industrial life there are a multitude of toxic adulterants in the air we breathe, ranging from lead to industrial solvents, and from pesticides to ozone. Various examples were quoted in detail, the risks were defined, and the effects described. Breathing in the modern world is a hazardous occupation.

ELECTRON MICROSCOPY OF SMALL BLOOD VESSELS

J. E. FRENCH said that the greater resolving power of the electron microscope had provided much new information about the detailed anatomy of the small blood vessels and had led to attempts to correlate structure at different sites with the known permeability

characteristics of the vascular membrane. Much of the work, which was reviewed briefly, had been concerned with different vascular beds in the systemic circulation. Although special factors apply in the pulmonary circulation, at least some of the general principles may be relevant to the properties of the pulmonary vessels and of the blood/air barrier in the lung.

THE ART OF OESOPHAGOSCOPY AND GASTROSCOPY

With short additional film demonstrating the Gastroscope

D. BARLOW showed a film on this subject. The film opened showing a cadaver sectioned longitudinally to illustrate the stresses and strains involved in the passage of a rigid tube down the oesophagus into the stomach. Various instruments were shown. On the living subject the technique of oesophagoscopy and gastroscopy was demonstrated both in the vertical position under local anaesthesia and in the inclined position under general anaesthesia. The author then oesophagoscoped himself. This was followed by details of a new gastroscope in close-up pictures.

TUBERCULOSIS OF THE RIGHT MIDDLE LOBE AND SIMPLE PNEUMOCONIOSIS

R. H. ELLIS (introduced by P. D. B. DAVIES) said that eight coal-miners with simple pneumoconiosis developed symptoms such as haemoptysis, chest pain, increased cough and sputum, and unilateral wheeze, leading to the diagnosis of tuberculosis of the right middle lobe, after an average of 42 years in the pits of the Forest of Dean.

The bronchoscopic appearances were those of active endobronchitis in five and smooth stenosis in three, and tubercle bacilli were cultured from bronchial aspirates or sputum in all cases.

It was suggested that right middle lobe disease in the presence of simple pneumoconiosis should be regarded as tuberculous, unless bronchial biopsy or sputum cytology confirm malignancy.

BRONCHOSCOPY

P. STRADLING gave an excellent photographic demonstration of bronchoscopic appearances.

SURVEY OF SPONTANEOUS PNEUMOTHORACES IN THE ROYAL AIR FORCE

I. CRAN (introduced by A. RUMBALL) reviewed 994 cases of spontaneous pneumothorax which had occurred in R.A.F. personnel over a period of 22 years. They were analysed in relation to age, side of occurrence, activity at the time of onset, and seasonal occurrence. Some clinical and radiographic findings were presented and the incidence of recurrences was described (the possible association with emphysematous bullae was mentioned). Methods of treatment were discussed and those found most suitable for the special requirements of R.A.F. personnel were described. Spontaneous pneumothorax is thought to be more commonly diagnosed now, and the increasing incidence in the R.A.F. in recent years was demonstrated.

TUBERCULOSIS IN MADRAS

J. J. Y. DAWSON discussed the tuberculosis problem in India in general and in Madras in particular. He also described the Tuberculosis Chemotherapy Centre with particular reference to the five-year follow-up of the original comparison of home and sanatorium treatment.

He dealt in particular with the problem of relapse, the significance of isolated positive cultures, the relative merits of bacteriological and other assessments in following treated cases, and the results of retreatment of therapeutic failures.

He concluded that, despite very adverse surroundings, it is possible in South India to treat patients with pulmonary tuberculosis very satisfactorily at home; after five years 90% had bacteriologically quiescent disease.

(The full paper will be published in the *Bulletin of the World Health Organization* this year.)

MEDIASTINAL EMPHYSEMA

M. ZATOUROFF and J. C. CARR (introduced by D. G. JAMES) gave an account of six cases of mediastinal emphysema seen recently at the Royal Northern Hospital, three of spontaneous mediastinal emphysema, two following spontaneous perforation of the oesophagus, and one after operation on the neck.

In 69 reported cases (since 1935) of spontaneous mediastinal emphysema, there were 59 men (85%). In 57 (84%) cases the patient was under 30 years. They presented in 63 with chest pain (91%), which in a quarter was pleuritic in type and associated with breathlessness. The most reliable physical sign of mediastinal emphysema, subcutaneous emphysema, occurred in only 15 (22%), but Hamman's sign, mediastinal crunch, was found in 56 (81%). The pitfall of diagnosing mediastinal emphysema on the presence of this sign was stressed; many reported cases were probably only small left apical pneumothoraces with a noise. Radiological evidence of air in the soft tissues of the neck or mediastinum was seen in 36 (52%).

Serious complications did not occur in this series compared with the mediastinal emphysema occurring in association with respiratory disease. The differential diagnosis and radiological features were discussed.

A PRELUDE TO EMPHYSEMA

W. M. MCLEOD said that there are several diseases which lead to the development of emphysema. One

uncommon prelude to primary generalized emphysema was illustrated by the case histories of two patients who suffered from severe emphysema.

Both patients showed, with few symptoms, a reticular infiltration throughout both lungs on the radiograph. Some years later both developed severe airways obstruction with the clinical and radiographic picture of primary generalized emphysema. One patient died from lung failure. Necropsy confirmed the destructive emphysema and histology revealed collections of eosinophils and macrophages suggestive of preceding 'histiocytosis X'. The second patient survives but has shown radiological evidence of the same disease with large defects in the skull, pelvis, and femur.

It was suggested that on rare occasions 'histiocytosis X' may divert from its usual course, producing severe lung damage of the 'honeycomb' pattern and instead present the picture of generalized panacinar emphysema.

Without careful study this prelude may be overlooked.

SYMPOSIUM ON THE AETIOLOGY AND PATHOLOGY OF PEPTIC STRICTURE OF THE OESOPHAGUS

N. R. BARRETT (Convener) said that the aetiology and pathology of the benign stricture of the oesophagus caused by reflux of acid pepsin into its lower part is a subject that many experts believe they understand: but it is odd that they should hold such different opinions. Can they all be right?

He demonstrated two principal types of benign stricture in the lower oesophagus that are, in his opinion, caused by reflux. Both occur at the junction of the squamous epithelium that lines the oesophagus and the columnar epithelium that lines the stomach.

The first is a longitudinal inflammatory lesion situated in the oesophagus immediately above a sliding hiatal hernia. This lesion is surrounded by perioesophagitis with mediastinal adenitis. It is stony-hard to palpate, and it produces an obstructing mass that feels like a carcinoma. On longitudinal section one finds that it is not simply a mass of scar spreading out from an ulcerating mucosa. Passing from the lumen outwards, it consists of the following parts:

Intensive, obstructing inflammation of the mucosa and submucosa; inflammation of the muscularis mucosae that tends to remain intact until the major part of the gullet has been irreparably destroyed (this differentiates the lesion from a peptic ulcer in the stomach, in which the salient feature is early destruction of the muscularis mucosae); great hypertrophy of the circular muscle fibres, and in general much less inflammation in this layer than one would expect; a normal longitudinal coat, and much perioesophagitis. There are other changes such as perineural inflammation, oedema, and congestion. The fibrous tissue is concentrated around the lumen.

The clinical signs that such a stricture produces are not directly concerned with its histological structure. Some strictures, due to muscle hypertrophy, cause worse obstruction than those due to fibrous tissue.

The second type is commonly known as Schatzki's ring. This is a lesion whose existence has been proved, although some radiologists continue to believe that it is an artefact produced by tricks of radiological positioning. The stricture is a fibrous diaphragm through the centre of which is a small aperture. The fibrous tissue is situated in the submucosa as a ring, and it is covered with intact epithelium that shows little inflammation and no ulceration. It is sometimes impossible to be certain that such a stricture exists, except on oesophagoscopy or oesophagotomy. This stricture is also situated at the oesophago-gastric junction, and there is always a hiatus hernia below it. Some consider it to be the result of inflammation that has subsided leaving a scar, and others regard it as a congenital web.

Strictures of both types can occur above a lower oesophagus lined by columnar epithelium. In such circumstances the anatomical arrangement from above downward is: oesophagus, stricture, lower oesophagus lined by columnar epithelium, hiatus hernia.

IN INFANCY AND CHILDHOOD

R. BELSEY said that in a series of 55 benign oesophageal strictures in infants and children sufficiently intractable to demand resection and reconstruction, four of the strictures followed chemical trauma and 51 resulted from reflux oesophagitis. Of 1,500 cases of hiatus hernia, 10% were in children under 12; a third of these had strictures needing resection. In only one case was there any evidence of hypertrophic pyloric stenosis in addition to a congenital hiatus hernia to account for the reflux; no other aetiological factors could be discovered. Vomiting dated from birth or weaning in most cases, and severe stenosis was frequently present by the end of the first year. The earliest fibrous stricture observed was on the seventeenth day of life. In approximately 250 resected specimens of benign strictures from all age groups available for histological examination, two types of chronic oesophageal ulceration were encountered: (*a*) diffuse superficial with concentric fibrous infiltration; (*b*) localized penetrating combined with (*a*). Only the diffuse variety was seen in children.

IN ADULTS

H. W. BURGE considered that three conditions might be necessary for the development of peptic oesophagitis, and therefore of peptic oesophageal stricture: (1) an organic obstructive lesion in the duodenum (duodenal ulceration) or at the pylorus (pyloric channel disease); (2) an incompetent cardio-oesophageal sphincter (perhaps always associated with hiatus hernia); (3) a high fasting gastric acid.

To these it might be necessary to add genetic factors, which allow pyloro-duodenal disease to occur, and a congenital weakness at the hiatus, allowing herniation.

The papers by Winkelstein (1935) and Winkelstein *et al.* (1954) were now of even greater importance. Probably all their 25 patients had organic pyloro-duodenal disease; 85% had hyperchlorhydria, and in 35% the acid levels were very high.

In his own seven cases of oesophageal stricture, all had pyloric or duodenal disease, and very high fasting gastric acids were found in the two cases in which this examination was done.

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IN PREGNANCY

R. ABBEY SMITH discussed the aetiology and pathology of peptic stricture of the oesophagus following hyperemesis of pregnancy. The pathology was considered to be similar to the pathology of other examples of peptic stricture. Some features of the condition, occurring in five patients after vomiting of pregnancy, were presented.

IN GENERAL

A. LOGAN said that in a series of 180 cases of benign stricture of the lower end of the oesophagus there was one classical Schatzki's ring in a child of 3 years.

In patients with incompetence of the cardia, oesophageal ulceration and stricture formation are not closely related to the level of gastric acidity.

In cases of peptic stricture blood group O occurs in 58% against 47% in the normal population. Rapid relief of dysphagia after simple reduction in size of the hiatus suggests that most strictures have an element of spasm or oedema. Healing of the associated ulcer after the same procedure indicates that the lesion is not caused by the secretion of the supraphrenic gastric mucosa. Healing of Barrett's ulcer in the same circumstances suggests that gastric reflux is a factor in its production. In some specimens resected before it was appreciated that strictures could be managed conservatively, it was observed that up to 1·5 cm. of squamous epithelium lay between the stricture and the proximal limit of gastric mucosa.