

Proceedings of the Thoracic Society

The Summer Meeting of the Thoracic Society was held on 9 and 10 July in the Memorial Hall, the Town Hall, Sheffield. Summaries of the symposium and papers follow.

SYMPOSIUM ON COMPUTERS IN MEDICINE

PRINCIPLES

L. C. PAYNE said that management, whether of a hospital, the health and welfare of a community, or of patients, involves information regarding the hospital, the community, and the patients. It involves reference information about disease, its incidence and manifestations, about drugs, their doses, toxicities, and interactions, about the multiplicity of medical measurements and their interpretations, about the aetiology and epidemiology, and so on. It involves current information of what is going on while it is going on, for no manager will respond to any element in a developing situation of which he is unaware, and moreover not do so with all the confidence of not even knowing he does not know. The computer is the most versatile information engine ever contrived; it can store knowledge on a scale commensurate with what is known rather than what a single human mind can absorb. It can enable more complete and up-to-date information to be gathered on developing situations, and it means that the computer-aided doctor is going to be a more effective doctor than one who relies on human faculties alone, whether he is concerned with diagnosis, prognosis, or therapy, with epidemiology or surgery, with patient care or administration. The paper explained some of the basic principles and concepts, so that this prospect would be more evident.

IN MEDICAL RECORDS AND EPIDEMIOLOGY

W. W. HOLLAND considered that electronic computers are particularly suitable for handling a large amount of data and for performing calculations. Epidemiological investigations usually involve the collection of a large number of facts on many individuals. Handling this data on conventional punch-card machinery or manual sorting is tedious. The use of electronic computers in evaluating the effect of environment and smoking on chronic respiratory disease in surveys in this country and in the United States was illustrated. Medical records are a further possible application for the use of computers. Large amounts of data are collected which require prolonged storage with immediate availability. The deficiencies of present methods of keeping patient records were revealed by a study of their content and handling. Attempts to utilize an electronic computer to cope with these problems were described.

IN A RENAL FUNCTION SURVEY DURING OPEN-HEART SURGERY

J. C. A. RAISON said that some data of renal function during extracorporeal circulation were used in a pilot study to illustrate the possible use of a hospital board computer which had been installed originally for finance control. The subject and material provided examples of the theoretical advantages of a computer system for clinical research, incorporating multiple procedures, complex tabulation, multiple calculations, correlation of accumulating data from different sources, and prediction as 'off-line' features, while 'on-line' facilities might allow ultimately for therapeutic control. The acknowledged difficulty of communicating with a machine was heightened by that of communication with a non-scientific programmer, who spent an uneconomic amount of time preparing too limited a programme. The Fortran programme desired seemed almost as great an obstruction to the clinician. Without a computer-conversant biomedical specialist available, the clinician with definite but occasional computer problems may best hope for the production of 'package-deal' programmes dealing with the simple mathematical and statistical enquiries which he will most often require, and the occasional use of a small on-line machine to which he can pose his questions directly.

IN MEDICAL BIBLIOGRAPHY

M. M. CUMMINGS said that the explosive growth of the published biomedical literature has exceeded the ability of medical libraries to organize and disseminate it effectively. The United States National Library of Medicine has developed a mechanized medical literature analysis and retrieval system (MEDLARS) which permits efficient bibliographic control of the literature by providing computer-produced monthly indexes of the world's biomedical literature as well as selected current awareness services (recurring bibliographies) and one-time demand searches of individual medical subjects. These new modalities of information handling are proving to be of great assistance to teachers, students, researchers, and practitioners who have need for ready access to the medical literature.

RUPTURE OF THE TRACHEA AND BRONCHI BY CLOSED INJURY

J. T. CHESTERMAN reported that the causative type of injury is one of sudden severe compression of a

wide area of the upper anterior chest wall. This produces lateral widening of the chest with distraction of the carinal region which is made greater when the lungs are inflated, the glottis is closed, and from the backward displacement of the heart. A few cases are produced by shearing, and a few by a 'blow out' laceration of the posterior wall of the trachea and larger bronchi. The symptomatology is as suggestive as the type of injury, but it must be noted that 10% show no clinical features. Bronchoscopy is urgently needed to establish the diagnosis in any suspected case. Conservative surgery gives excellent, if not perfect, results in suitable cases, otherwise resection is indicated.

MEASUREMENT OF THE TRANSFER FACTOR

J. E. COTES said the transfer factor or diffusing capacity of the lung is usually measured by the single breath carbon monoxide method; this has been developed successively by Marie Krogh, Forster, Ogilvie, Roughton, Jones and Meade, and others. In its present form the test provides information on lung volumes, uniformity of distribution of inspired gas, diffusing capacity of the alveolar capillary membrane, and volume of blood in the alveolar capillaries. The procedure is simple and acceptable for the subject, but technical difficulties have so far limited its application. Some of the difficulties and the ways in which they can be overcome, including the use of a new apparatus, were discussed.

SELECTIVE BRONCHIAL AND INTERCOSTAL ARTERIOGRAPHY IN LUNG DISEASE

C. S. DARKE and N. A. LEWTAS considered the technical aspects in the light of experience gained from a specially selected group of patients. The procedure can be accomplished without undue difficulty or risk to the patient. Tumour circulation arising from systemic vessels, either bronchial or intercostal arteries, can be demonstrated in primary bronchogenic neoplasms. It provides a new approach to the investigation of solitary peripheral shadows in the lung and may have diagnostic value. Bronchiectasis receives a much increased flow of blood from dilated and tortuous bronchial arteries. Visualization of these channels is feasible, and on occasions a pre-capillary shunt from the bronchial arteries to the pulmonary arteries can be recognized. The dye may travel in a reverse direction up the pulmonary arteries. The physiological implications of this phenomenon were discussed with particular reference to strain on the left ventricle.

SAN JOAQUIN VALLEY FEVER

F. S. NORTH described San Joaquin Valley Fever (coccidioidomycosis) as a systemic fungus disease which is caused by the mould *Coccidioides immitis*. It is endemic in the arid regions of the south-western

United States. In many ways coccidioidomycosis resembles tuberculosis, with the important exception that it is non-contagious. Clinically, coccidioidomycosis produces two types of illness, a primary benign form and a serious disseminated form with a high mortality. Treatment, when necessary, is rather unsatisfactory, consisting of the toxic drug amphotericin B, which must be given intravenously for prolonged periods, and surgery. Illustrative cases were shown.

TRACHEOSTOMY OR ENDOTRACHEAL INTUBATION IN THE POST-OPERATIVE MANAGEMENT OF CARDIO-THORACIC PATIENTS

D. S. ROBERTSON compared and contrasted a survey of experience of the management of respiratory problems in the post-operative period with his own current management.

The indications for tracheal intubation were discussed; the place of endotracheal intubation was particularly encouraged against the background of the morbidity of tracheostomy.

Particular emphasis was placed on the value of intermittent positive pressure ventilation via an endotracheal tube for the first 24 to 48 hours post-operatively. The commoner indications for such treatment are respiratory inadequacy following mitral valvotomy and after thoracotomy for bronchial carcinoma. Its place was considered as a supportive measure following open heart surgery, particularly where prolonged perfusion has been a feature.

NEUROLOGICAL INVOLVEMENT IN SARCOIDOSIS

C. E. C. WELLS described neurosarcoidosis as a disorder of the central, peripheral, and autonomic nervous systems, of the meninges and of muscle. Acute and chronic phases could be distinguished from one another. This distinction provides a rational basis for therapy, and is preferable to the traditional classification on anatomical and regional lines. Examples of both acute and chronic neurosarcoidosis were described with illustrations, and the place of A.C.T.H. and steroid therapy was discussed. The plight of patients with chronic disease was emphasized and contrasted with the infrequent mention of neurosarcoidosis as a cause of death in epidemiological studies. The diagnosis is made clinically and is confirmed by orthodox biopsy techniques and by the Kveim test. The lowered sugar content of spinal fluid is a valuable clue to diagnosis in obscure cases.

AMYLOIDOSIS OF THE MAIN BRONCHI

A. G. NORMAN reported three cases of amyloidosis of the main bronchi. This variety of amyloid disease is a primary localized abnormality within the respiratory system. There is no evidence of amyloid disease

elsewhere in these patients and no amyloidosis in the lung itself. All three cases were in middle-aged men, and were thought at first to represent carcinoma of the lung, as they presented by blockage of a bronchus, with resulting clinical syndrome. At bronchoscopy in two, abnormal mucosa was seen in the main bronchus, but it was not recognized as amyloid disease. The diagnosis rested solely on the histological report. The histology was so definite that it was considered that a sure diagnosis could be made. There has not been any great progression of the disease in these three patients while they have been under observation. No satisfactory treatment has been found, apart from bronchoscopic debridement in one man.

SEALS OF THE FARNE ISLANDS

A. G. OGLIVIE said that the colony of seals established on the Farnes, a group of rocky islands off the coast of Northumberland, dates back at least to St. Cuthbert's day (seventh century), and is the only colony of the Grey or Atlantic Seal on the east coast of the United Kingdom. The ecology of the grey seal is influenced by delayed implantation of the fertilized ovum, so that parturition is followed in three weeks by mating, which occurs annually. The mortality in the nursery at the Farnes has risen with the increase in the size of the colony, but no adequate study of the mortality or morbidity of the grey seal has been made there or indeed anywhere. He was able to make a study himself by the post-mortem examination of 38 out of 75 dead calves in 1958 and a rather fuller study of morbidity in the following year. He concluded that most seal calves who die, die of starvation, and that serious morbidity is uncommon. Conjunctivitis and traumatic sepsis (staphylococcal in all cases when swabs were taken) were the usual findings. The causes of, and trends in, mortality and morbidity in the grey seal nurseries cannot be finally determined until a complete study has been made.

A NEW APPROACH TO THE MEASUREMENT OF VENTILATION/PERFUSION INEQUALITY

R. W. B. PENMAN and P. HOWARD said that separate estimates of the unevenness of pulmonary ventilation and of blood flow had been obtained in 12 normal subjects and 22 patients with chronic bronchitis by a method which describes gas exchange in terms of the fractional ventilation and perfusion of a three-compartment model lung. The method is based on estimates of the effective gas tensions, alveolar dead space, and blood shunt ratios. In the patients, both ventilation and blood flow were abnormally uneven, although the latter was improved during voluntary hyperventilation. The distribution of pulmonary ventilation was most uneven in those patients with congestive cardiac failure, whereas blood flow was most uneven in patients with electrocardiographic or radiographic evidence of right heart

enlargement. Thus, patients who had all of these features had the greatest reduction in effectively ventilated and perfused lung. There was no evidence of an association between the radiological features of emphysema and the degree of unevenness of pulmonary ventilation or blood flow.

LEFT VENTRICULAR HYPERTROPHY IN CHRONIC COR PULMONALE

T. LODGE and J. J. DALY said that in a series of 28 necropsy cases of cor pulmonale nearly 50% had heart weights above 500 g. in the absence of hypertension or valvular or ischaemic heart disease. In a further series of 34 cases of chronic bronchitis, by radiological investigation using barium swallow and anterior oblique views, the degree of posterior displacement of the left ventricle was assessed. In a number of patients who died in this series the necropsy evidence of increased heart weight, left ventricular thickness, and left ventricular weight correlated with the radiological findings. These observations provide evidence for the occurrence of left ventricular hypertrophy in some cases of chronic cor pulmonale.

PULMONARY VASOCONSTRICTION AND GAS TENSIONS IN THE PULMONARY ARTERIAL BLOOD

GWENDA R. BARER reported that in experiments on cats, hypoxia, hypercapnia, and acid infusions all caused a rise in pulmonary arterial pressure (pulmonary blood flow was kept constant). The mean increase was 55% while breathing 10% O₂, 50% while breathing 10% CO₂, and 30% during lactic acid infusions which caused a similar fall in blood pH to hypercapnia. Hypoxia and hypercapnia caused pulmonary vasoconstriction through local mechanisms, which may be different for the two stimuli. The effect of hypoxia was abolished by catecholamine inhibitors but not by inhibitors of serotonin or histamine (Barer, 1963). Hypercapnia continued to cause pulmonary vasoconstriction after the effect of hypoxia had been abolished by phenoxybenzamine. The rise in pulmonary arterial pressure during hypercapnia could be abolished by alkaline infusions.

REFERENCE

Barer, G. R. (1963). *J. Physiol.*, **169**, 102P.

ROLE OF CATECHOLAMINES IN OPEN-HEART SURGERY

J. A. THORNTON said that plasma catecholamine activity had been studied in 17 patients undergoing cardio-pulmonary bypass for the correction of congenital and acquired intracardiac defects. In all the patients halothane was the primary anaesthetic agent employed for the maintenance of anaesthesia; moderate degrees of hypothermia were employed during

perfusion. The blood levels of catecholamines were comparable with the findings of previous workers. The evidence suggested that sympathetic activity is maintained throughout prolonged perfusion despite hypothermia. There was no correlation between plasma levels and blood-pressure.

	Before Bypass	During Bypass	After Bypass
Mean level of nor-adrenaline ($\mu\text{g. l.}$)	0.9	0.4	0.7
Mean level of adrenaline ($\mu\text{g. l.}$)	0.9	1.8	1.7

There appears to be no contra-indication to the use of halothane as an anaesthetic agent on the evidence of this study.

INFLUENCE OF PULMONARY HYPERTENSION ON CARDIAC SURGERY

D. S. TAYLOR said that in a series of 400 closed mitral valvotomies there were 44 in which the pulmonary artery pressure exceeded 75 mm. Hg. There were six hospital deaths in this group, giving a mortality of 13%. Of the remaining 356 cases, the mortality was 3.5%. One-fifth of the hypertensive survivors had been catheterized one year after operation, and all showed a marked reduction in pulmonary artery pressure. In a group of 80 atrial septal defects, there were 13 of primum type and 67 of secundum type. Two of the secundum type defects had pulmonary artery pressures in excess of 75 mm. Hg. Five of the

primum defects had pressures over 75 mm. Hg, and in this group there were two deaths. Operative treatment on a small series of patent ducts and ventricular septal defects showed that, in the former group, pulmonary hypertension of the severest degree was not associated with mortality, but in the latter group there was a significant increase. Post-operative cardiac catheterizations in general showed a considerable long-term reduction in pulmonary artery pressure, but there were exceptions. Despite successful closure, pulmonary artery pressure remained at the pre-operative high level.

PULMONARY ARTERY BANDING FOR SEPTAL DEFECTS

D. VEREL, R. G. GRAINGER, and D. G. TAYLOR said that septal defect had been diagnosed by cardiac catheterization in 60 children under the age of 3 years. In 48, pulmonary artery banding with ligation of patent ductus arteriosus and excision of coarctation, where necessary, was performed. These children had been followed for nine to 54 months. There had been 18 deaths. Successful pulmonary artery banding relieves cardiac failure and allows the child to thrive. Cyanosis may occur after an interval as a result of either the development of Eisenmenger reactions or inadequacy of the orifice in the pulmonary artery. Despite these complications and the relatively high mortality from intercurrent infection, when the progress of the 12 unbanded infants was considered, the procedure appeared to be a life-saving measure for certain children.