ANAESTHESIA FOR CHEST SURGERY

ESSAY
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(ANAESTHESIA)

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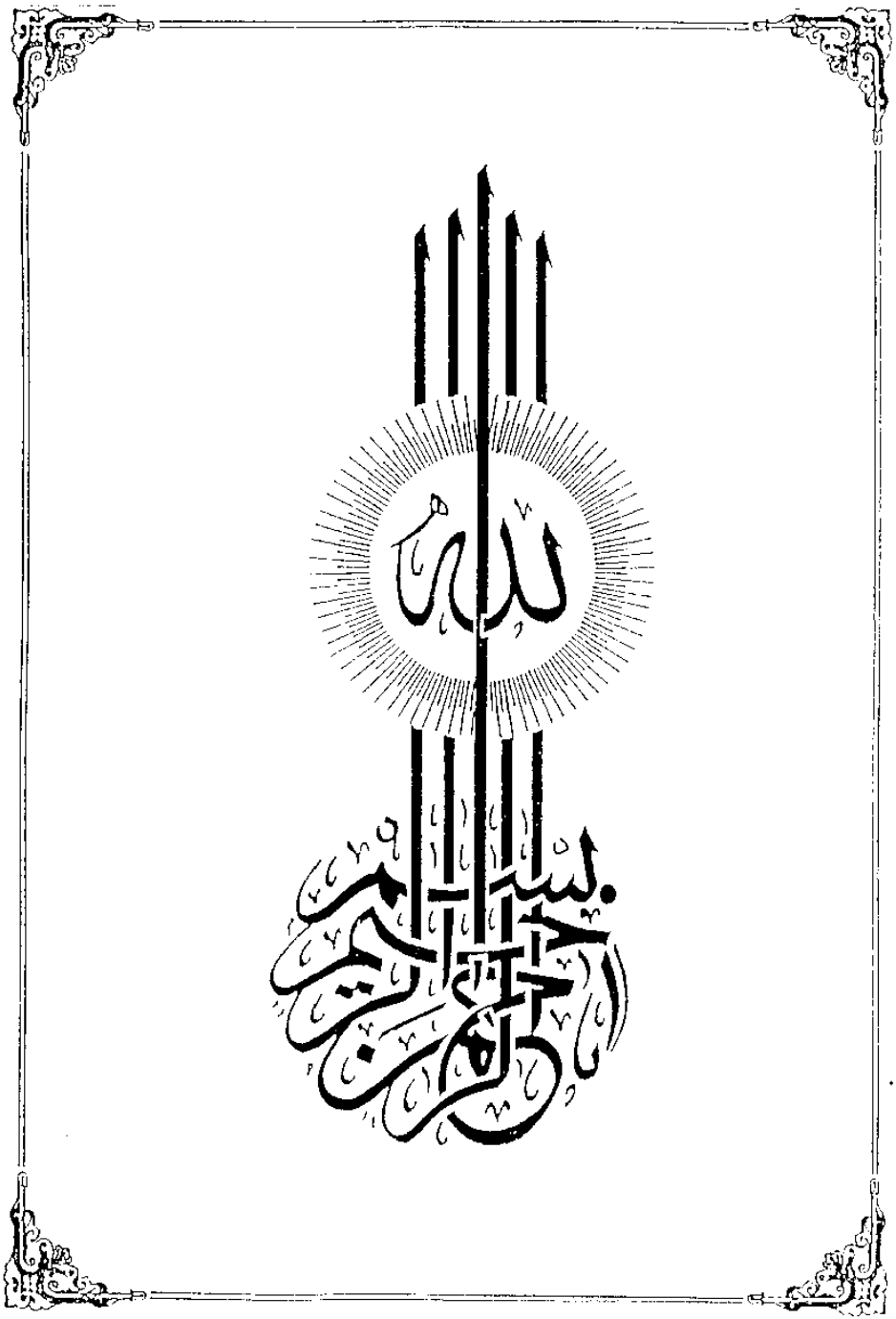

HISTORY

Surgical access to the lungs involves making a comparatively large opening in the chest wall upon whose integrity normal respiration depends. In an effort to prevent collapse of the lung, therefore, saverbruch (1904) did his early thoracotomies in an airtight cabinet in which the pressure was 0.93 K Pa (7 mmhg) below atmospheric while the anaesthetist and the patient's head remained outside. Brauer (1904) reversed this arrangement, placing the patient's head in a box maintained above atmospheric pressure. Such methods did not provide adequate ventilation, and despite the many efforts of the pioneers of thoracic anaesthesia (well reviewed by Mushin and Rendell. Baker, 1953) the management of the open pneumothorax remained controversial and the mortality of such cases high. By the late 1940s following the important papers by Guedel (1940) and Nosworthy (1941) controlled respiration or intermittent positive pressure Ventilation (IPPV) had become standard practice in British anaesthesia. The introduction of muscle relaxants made the use of deep general anaesthesia Unnecessary (Gray, 1948). Though manual Ventilation of the lungs by bag squeezing continued to have its adherents, the use of mechanical ventilators become the norm during the 1950s. Surgeons

soon found it easier to work with the regular movement produced by the machine. More important, however, was the fact that the regular ventilation produced by good machines made it possible to stabilize the physiological parameters of respiration during thoracic surgery to a degree not previously achieved.

Much of the early surgery was concerned with treatment of tuberculosis and bronchiectasis. Its aim was to remove or collapse those parts of the lungs which by producing quantities of infected secretions gave use to a chronic cough and the risk of spreading infection. The problems encountered in these "wet-lung" cases played an important part in the development of thoracic anaesthesia and led to the development of a variety of techniques which have in turn made better surgery possible.

Modern standards of pre-operative preparation by physiotherapy. Postural drainage and antibiotics make it possible to ensure that most patients coming to operation are comparatively dry.

Non-irritating anaesthetic agents also play a part in reducing the volume of secretions produced

during surgery, while any which remain are usually removed by bronchoscopic aspiration before operation.

In practice secretions could be dealt with either by drainage or by isolating the affected part of the lung with some form of blocker, usually embodying a tube for drainage. Alternatively endobronchial tubes, either single or double lumen provide a means of protecting the sound lung which can then be selectively ventilated, allowing the surgeon to continue his work unhampered by respiratory movements. The adoption of double lumen tubes to control the spread of secretions (Bjork and carlens, 1950) soon led to the development of improved techniques of bronchial closure (Bjork, Carlens and Crafoord, 1952) and it was found that life could be saved in the largely unpredictable, Though rare, event of sudden haemorrhage into the bronchus from a tumour (Bjork, Carlens & Trilery, 1953.

CHAPTER I

PRE-OPERATIVE ASSESSMENT

An important aspect of preoperative assessment before pulmonary surgery is consideration of the likely effect of surgery on lung function. Prominent among the beneficial effects of pulmonary surgery are procedures to reduce secretion and purulent exudates. This the principal aim of lobectomy for bronchiectasis and drainage of a lung abscess. It may also be the cause of appreciable improvement of over all lung function after resection for a bronchial carcinoma.

Removal of non-functional lung tissue may well cause an improvement or at least no deterioration of lung function. However resection of functional lung tissue may cause an appreciable and sometimes critical reduction in ventilatory capacity. The normal pair of lungs have a very large functional reserve. Nevertheless sacrifice of functioning tissue must be avoided whenever possible. Although the spread of neoplasm frequently makes wide excision essential.

Assessing the ability of a patient to withstand pneumonectomy can involve difficult decision. If ventilatory function is reduced, much will depend on whether the lung to be resected makes an appreciable contribution to the total ventilatory capacity. If

unilateral lung function studies in a patient with border line respiratory function show that ventilation is equally divided between the two side. Then clearly pneumonectomy is likely to precipitate ventilatory failure. The difficult decisions arise when bronchial carcinoma coexist with chronic obstructive airway disease and also in advanced cases of pulmonary tuberculosis. One lung is normally able to take the entire pulmonary circulation. Even during exercise, without causing pulmonary hypertension.

There are many forms of cardiac and pulmonary shunts in which venous blood reaches the left heart, causing arterial hypoxaemia. Resection of pulmonary shunts (such as neoplasms), like closure of intracardiac shunts, may be expected to improve the arterial oxygenation.

PRE-OPERATIVE PREPARATION

One of the commonest problems encountered by anaesthetists on their pre-operative rounds is the patient with chronic airways obstruction due to chronic bronchitis or emphysema.

Adequate pre-operative assessment of these and other patients with respiratory disease is important in order to identify those at risk so that they may be given adequate pre-operative treatment, special care during anaesthesia and adequate treatment post operatively, including artificial ventilation when indicated,only very rarely will assessment mean a decision not to operate.

Clinical assessment examination:

In clinical examination of a patient undergoing chest surgery. Important points have to be included like the presence of actual or impending ventilatory failure, inability to clear secretions loss of ventilatory response to co_2, hypoxemia and its causes.

Historytaken:

The basic essentials in pre-operative assessment are a complete history and a physical examination, for chest patient. The essential questions are:

Do you have a cough?

Do you bring up sputum (or phlegm)?

Do you get short of breath when walking uphill?

Do you smoke?

If any of the first three questions produces an affirmative answer, further questions should be put to find out how severe and of what duration is the cough. Sputum and breathlessness. Patients with chronic bronchitis tend to minimize their symptoms and disability. They frequently deny any cough in answer to the first question. But they will often admit to being lifelong smokers and then will allow that they do have a smoker's cough. They may deny breathlessness but later agree that they get puffed going upstairs and assume that this is natural for their age. During the brief history taking. Note will be taken of any breathlessness at rest and of the ability to complete a sentence in one breath.

Anaesthetic History:

As in all cases. A special concern must be given to the patient's anaesthetic history including adverse family anaesthetic experience. His recent drug therapy, and those features revealing compromised function of the vital organs and systems. These points significantly affect the choice and dose of anaesthetic agents and adjuvants and the method of their administration.

Prior Drug Therapy:

The type and quantity of drugs a patient has been receiving are important to the anaesthesiologist. Generally the use of drugs for the control of a serious pathophysiologic process should be continued up to the time of operation, with doses adjusted appropriately for the operative period. There is little validity in discontinuing drug therapy and letting the basic diseases run rampant. The continuation of therapy in the diabetic, cardiac, hypo-or hyperthyroid, bronchitic, or asthmatic patient, or the patient having adrenal insufficiency is no longer questioned. When antihypertensive drugs first become available, the consensus was that since substances interfered with the management of anaesthesia and led to hypotension their use should be discon. Tinued pre-operatively. Most anaesthesiologists, as noted by Hickler and Vandam (1970). Now prefer to continue medications, such as the rauwolfia compounds, up to the operative day, provided the drugs and amounts used are known.

History of Associated diseases:

a- Heart Disease

Underlying cardiac disease is one of the greatest contributors to anaesthetic and operative mortality and morbidity. Arkins, Smessaert, and Hicks (1964) as well as Topkins and Artusio (1968) have reported operative mortality in the first six weeks following a myocardial infarction is substantially increased with a mortality rate of about 40 percent, which then drops to a stable 10 percent after a period of six months, but this is ten times the surgical mortality in healthy patients.

b- Diabetes

The basic defect in diabetes mellitus is a deficiency of metabolically effective circulating insulin resulting in an elevation of blood glucose level caused by inadequate peripheral utilization of glucose. The diagnosis and adequacy of treatment are made from studies of the blood and urine glucose levels. Diabetes mellitus is associated with an increased rate of complicating diseases. The ones causing the most concern are those characterized by

chronic degenerative changes vascular disease particularly of the coronaries and arteries of the extremities. Intercapillary glomerulosclerosis, and diabetic neuropathies. Risk in these patients is associated with the complicating disease rather than with the diabetes. Thus determination of blood sugar, blood urea nitrogen, serum electrolyte values, and urinalysis as well as an electrocardiogram are important.

The signs of insulin shock or diabetic ketosis and coma are concealed by general anaesthesia, hence, management of the diabetic patient during anasthesia consists in preventing these exetremes from occurring. Many protocols are advocated to maintain satisfactory blood glucose levels on the operative day, but their common foundation is the administration of insulin and intravenous glucose, with the effects followed, as necessary, by determination of blood and urine glucose levels. Some administer the daily maintenance insulin dose, others decrease this dose usually by half and still others advocate swit-ching to regular insulin, which is

particularly recommended for the brittle diabetic. Most agree that the use of oral hypoglycemics be discontinued and insulin substituted.

Marble and Steinke (1963) have stressed the point that the regimen selected is affected by the type of diabetes, the stability of the blood glucose, and the nature of the operation and anaesthesia- particularly as they affect the resumption of regular oral intake.

c- Myasthenia Gravis

Myasthenia gravis is of particular interest to thoracic surgeons and anaesthesiologists. The management of these patients may be complicated, requiring a medical team familiar with management of the disease along with the facilities for extended ventilatoy management. When thoracic procedures such as thymectomy or other major procedures are indicated, relaxation may be obtained by withdrawing anticholinesterase medication when this is done. Foldes and McNall (1962). Recommend that ventilatory support be planned well into the post operative