Above, the perirenal fascia includes the suprarenal gland, a fact proved by the almost simultaneous filling of the renal and suprarenal loculi in the experiments (Fig. 5). This showed further that the fascial layer between the two organs is incomplete, or so tenuous in parts as to present no significant barrier to the spread of fluid. The anterior and posterior layers of perirenal fascia become fused above the suprarenal gland and gain attachment to the fascia on the under aspect of the diaphragm (Fig. 5), a union which is usually very firm, as Southam has emphasized. Laterally the two layers unite at a short distance from the outer renal margin, forming a vertical ribbon-like fascial condensation which merges with the transversalis fascia (Fig. 4). Southam states that this well-marked band is constantly present, but this is not so, either in infants or in adults; nor is the union laterally between the two layers always as firm as he asserts, for in some experiments the barium escaped without great difficulty from the perirenal pouch on the outer side. Inferiorly, as most writers state, the two layers remain discontinuous, the anterior gradually fading into the extraperitoneal tissue in the lumbo-sacral region, and the posterior blending with the iliacus fascia (Fig. 5).

FIG. 5.—A sagittal section through the renal region showing the arrangement of the perirenal (renal) fascia.

Summary and Conclusions

A description is given of the spread of fluids: (a) from the perinephric space, included between the two layers of the perirenal fascia; and (b) from the paranephric space, lying between the posterior layer of perirenal fascia and the fascia overlying the muscles behind the kidney and the suprarenal gland.

The experiments detailed proved that there is no complete barrier separating renal and suprarenal fascial compartments.

It is shown that the spread is strictly limited to one side until a late stage, and that extension to the opposite side invariably occurs in the lower lumbar region.

Sometimes extension occurred downwards relatively early in the loose periureteral tissue, and invasion of the pelvis often took place with almost surprising ease. There was a tendency to upward spread along the lower part of the inferior vena cava, but no sign of invasion of the thorax through any opening in or behind the diaphragm.

The experiments proved that there is no continuity between the anterior layers of perirenal (renal) fascia on the two sides, and that these anterior layers, contrary to the usual description, gain a direct attachment to the lumbar vertebrae and intervertebral disks.

The experimental findings are correlated with those found at subsequent dissections, and a brief description of the arrangement of the fascia in the retroperitoneal regions is given.

I am indebted to Emeritus Professor A. Low and Professor R. D. Lockhart for permission to use the x-ray equipment in the anatomy department of Aberdeen University; and to Dr. Middleton Connon, radiologist to the department, for help in the interpretation of the skiagrams. The expenses of the investigation were defrayed by the Medical Research Council.

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ADVANTAGES AND DISADVANTAGES OF ENDOTRACHEAL ANAESTHESIA*

BY

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This is a subject with which anaesthetists are familiar. We cannot pretend to add anything new except our point of view. Endotracheal anaesthesia has had a vogue. Within recent times it might even be said that in some quarters it had become fashionable and was used where simpler methods might have been equally efficient. There are surgeons who welcome endotracheal anaesthesia even when it is far from essential. And there are surgeons who are content, and even prefer, to work amid difficulties to themselves and dangers to the patient rather than have intubation anaesthesia. Both enthusiasm and prejudice have long been equally powerful impediments to the progress of medical science.

We consider that the routine application of the same anaesthetic agent or the same method of its administration in a series of surgical cases without regard to the condition of the patient or the work of the surgeon is quite wrong and cannot be defended on scientific grounds. From the anaesthetist's point of view there is a definite group of surgical cases in which endotracheal anaesthesia is essential to the safety of the patient.

Advantages of Intubation

It is our intention merely to note some of the advantages that specially appeal to us in endotracheal anaesthesia. By means of intubation the anaesthetist is, once and for all, rid of the dead space of mouth and pharynx, as well as the essential factors in reflex respiratory spasm—the glottis and anoxaemia. As a result of intubation we have the perfect airway which is not affected by the mechanics of the dead space. Thus we have at all times absolute control of the depth of anaesthesia with the expenditure of a minimum of anaesthetic agent.

In the surgery of the upper abdomen and of the pelvis the advantages of intubation anaesthesia are often very

* Read in the Section of Pharmacology, Therapeutics, and Anaesthetics at the Annual Meeting of the British Medical Association, Aberdeen, 1939.

conspicuous. The patient and the operation table, except the operation area, are completely covered with sterile sheets. The respiration is shallow and the recti are completely relaxed. The expenditure of energy by the patient is reduced to a minimum, and in prolonged operations, such as gastrectomies, splenectomies, and hysterectomies, strength can be maintained by artificial respiration with oxygen until transfusion of blood or gum saline has been accomplished. We are convinced that in prolonged and difficult operations with severe surgical shock and loss of blood many patients can be saved and others protected against a stormy convalescence by means of endotracheal anaesthesia.

In the repair of a cleft palate where a pharyngeal ridge has been prepared in an attempt to close the nasopharyngeal space from the oropharyngeal space during speech it is essential that an endotracheal tube should be passed through the glottis either before or after operation, and should be left *in situ* for twelve to twenty-four hours to tide the patient over the period in which acute oedema of the glottis may occur. Some cases have been lost on account of supervening oedema and others have been saved by an immediate tracheotomy. The presence of an endotracheal catheter in the glottis for twenty-four hours does not necessarily render the patient free from the danger of oedema of the glottis, but in the vast majority of cases in our experience this protection has been adequate. Intubation is the ideal type of anaesthesia for oral surgery, and with a gauze pack saturated with liquid paraffin forms an effective barrier against foreign bodies or septic material reaching trachea or bronchi.

In cardiac surgery generally, but particularly in such proceedings as cardio-omentopexy, intubation anaesthesia with differential pressure is a very great advantage to the patient and to the surgeon. A pressure of 10 mm. Hg is kept up until the phrenic nerve has been crushed, when the pressure is allowed to drop to 5 mm. Hg. This fall in pressure allows the paralysed leaf of the diaphragm to come into view. As soon as the omentum is coupled to the heart muscle and the incision in the diaphragm closed the intrapulmonary pressure is raised to 10 mm. Hg, and this pressure is maintained to the end of the operation.

In cervical sympathectomy where an accidental pneumothorax may occur, and in excision of the oesophagus, the use of some kind of intrapulmonary pressure is essential. It is a great advantage in such cases to be able to maintain positive intrapulmonary pressure for several hours after the patient has returned to bed. This can be done by means of a stream of oxygen through the endotracheal tube left *in situ*, and helps to prevent the very considerable risk of post-operative atelectasis. Intubation permits of a highly efficient method of artificial respiration in cases of sudden collapse on the operation table.

Disadvantages of Endotracheal Anaesthesia

Certain sequelae may occur as the result of the passage of a tube through the glottis into the trachea. Granulomata on the vocal cords are not very uncommon and have been reported by R. J. Clausen (1932) and by Blair Gould (1935). Tracheitis may result from a hard tube impinging for a period on the same area of the tracheal mucous membrane, and this is aggravated by a constant stream of irritating anaesthetic vapour on this area. Laryngitis and tracheitis are apt to occur if for any reason the tracheal tube is left *in situ* for several hours after the operation. Trauma to the nasal passages as evidenced

by haemorrhage followed by adhesions and scarring is not so very infrequent. Laryngitis with loss of voice in some degree arises in a number of cases, and instances have been reported by Dawkins (1936). Is there anything that we anaesthetists can do to prevent these complications? They occur more often in nasal than in oral intubations. Coughing and spasm of the glottis following the passage of a tracheal tube result in most cases from an insufficient depth of preliminary anaesthesia, local or general, and may cause damage to the glottis.

We are of the opinion that blind intubation should be done only in the rare cases where direct vision cannot be employed because of deformities of the neck, lips, tongue, teeth, or pharynx. Blind intubation was used in the majority of reported cases of trauma to the nose and of laryngitis and granulomata of the cords. We consider that blind intubation should never even be attempted if direct vision can be employed, because it is a haphazard method of performing an operation which can be done with precision. We are convinced that oral intubation is the route of choice even in cases of oral surgery, provided the tracheal tube does not seriously hamper the work of the surgeon, and that in nasal intubation the catheter should be picked up in the pharynx with a forceps and passed through the glottis under direct vision.

The tendency in the modern teaching hospital is for a still larger proportion of the surgical cases to be done under expert methods of anaesthesia. The demands of patient and surgeon for the anaesthetic agent and the method of its administration at once safest, most efficient, and least likely to disturb convalescence or in any degree to initiate post-anaesthetic complications are opposed to the claims of the undergraduate. It is essential that the medical student, in his own interests as well as those of the public, should be taught methods of efficient anaesthesia which require simple apparatus and portable agents. There can be no doubt that a considerable percentage of the anaesthetic mortality of to-day can be traced to the inexperience of the administrators. Neither the patient, the surgeon, the undergraduate, nor the science of anaesthetics need be wholly sacrificed. Our own practice (Mackenzie, 1932) has been as follows. If the condition of the patient or the nature of the operation demands expert methods of anaesthesia, then the undergraduate must not be considered; but a balance is struck in his favour in all surgical cases in which simple and portable agents, such as ether, or ethyl chloride and ether, or even chloroform, can be used with safety to the patient and comfort to the surgeon.

Reports of sequelae would appear to have deterred both anaesthetists and surgeons from subjecting their patients to endotracheal anaesthesia. An analysis of 1,253 cases of endotracheal anaesthesia with Magill's rebreathing tube at this school during the past eighteen months—1,103 in adults, 150 in infants and children—shows that convalescence is uniformly good and compares favourably with that following other methods of anaesthesia. None of the cases has exhibited any of the sequelae which have been reported.

We believe that certain precautions in the technique of administration will do much to prevent these sequelae. These precautions are: (1) Suitable length and bore of endotracheal tube for the individual patient. The tube must not reach near the bifurcation of the trachea lest it enter either bronchus, with consequent collapse of the other lung. The bore of the tube should be such that it will not be in constant contact with the vocal cords. (2) Lubrication of the endotracheal tube with sterile paraffin wax or with a 10 per cent. percaïne base ointment.

(3) Application to the nose and pharynx of a 10 per cent. or 20 per cent. cocaine spray combined in equal parts with ephedrine. (4) Careful lubrication of nasal passages with sterile liquid paraffin. (5) Intubation to be done, apart from exceptional cases, by direct vision.

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A PLEA FOR BETTER ENDOSCOPIC TRAINING*

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Great advances have been made in the field of thoracic surgery within the last few years, and the operative risk is being reduced to a minimum. There is now a possibility of eradicating malignant disease of the lung, but operative measures must fail unless the disease is recognized early. The clinical diagnosis of primary carcinoma of the lung lies in the hands of the bronchoscopist.

For the last five years the records in the department under my charge in the Royal Infirmary, Edinburgh, and my own private records for the same period, include thirty-four cases of malignant disease of the lung diagnosed bronchoscopically, and of these one patient is alive over a period of two years and three over a period of one year. In every case the final diagnosis was made too late for operative intervention. The implantation of radium and radon seeds has been tried without success. X-ray therapy has as yet failed to cure, although it has in some cases retarded the progress of the disease. During the same period in the surgical and medical wards of the Royal Infirmary, Edinburgh, 182 cases (apart from those mentioned above) have been diagnosed as carcinoma of the bronchus, either clinically and radiologically or after a post-mortem examination. None of these was referred to the bronchoscopist for confirmation of the diagnosis. Operative intervention was not considered possible. X-ray treatment was tried in many cases without any cure.

It would seem either that there is a lack of co-operation between the physician and the bronchoscopist, or that patients are too late in reporting to the physician for treatment. Early symptoms may be overlooked, but if there is a suspicion of the presence of malignant disease reference should be made to the bronchoscopist for diagnosis. The physician in the past has tended to rely for confirmation on x-ray findings. A commencing carcinoma of the bronchus which could be revealed on bronchoscopic examination may show clinically only as an occasional haemoptysis and not at all on the x-ray film. To wait for a shadow on an x-ray plate before completing the diagnosis may be rendering operative eradication of the disease impossible. Thus the onus of early diagnosis rests with the bronchoscopist to whom the case is referred. Is our endoscopic training sufficient to justify this responsibility?

* Read in opening a discussion in the Section of Oto-rhinolaryngology at the Annual Meeting of the British Medical Association, Aberdeen, 1939.

The Advance of Endoscopy

Twenty years ago the possibility of examining the inside of the lung was unknown to many. When Chevalier Jackson spoke at a meeting at Bath in 1925 only a few laryngologists possessed the necessary armamentarium for bronchoscopy and still fewer had the experience. The science of endoscopy has advanced rapidly. It is recognized by the physician as a definite practical means of diagnosis, but yet it seems that this form of diagnostic examination has not been developed on wide enough lines.

In America endoscopy has been established as a branch of laryngology, but has also been developed on lines apart from its mother specialty. There is a bronchoscopic clinic attached to a great many of the larger hospitals where cases can be referred for diagnosis and treatment. In this way operative training can be obtained, as well as the practical experience necessary for efficient diagnosis. Many from this country have taken advantage of the training offered in these clinics and have afterwards developed a specialty of bronchoscopy on their own lines, but always as a part of oto-laryngology. Cases referred for bronchoscopic examination have to take their turn with all the other cases of a busy oto-laryngological department.

Establishment of Central Endoscopic Clinics

Financially the establishment of similar clinics in this country is impossible until State medicine presents a Utopia where work would be the first consideration—the State supplying the means to live. It might be possible, however, for the several oto-laryngological departments, say in one town or in one area, to combine to form a central endoscopic clinic to which cases could be referred direct on specified days. This would allow of the segregation of the endoscopic from the purely oto-laryngological cases. More time could be given to these cases, and those working in that department would therefore gain more experience and obtain a better training. The necessary armamentarium could be enlarged instead of being so often a bare minimum, and special beds might be available.

A precedent for such clinics already exists in the formation of orthopaedic clinics and neurosurgical clinics in the department of surgery. In some centres thoracic surgery is being established as a specialty. There it might be possible to develop endoscopy and thoracic surgery side by side. The need for early and efficient diagnosis no longer allows of a place for the occasional bronchoscopist.

Unfortunately in this country we are unable to establish training centres such as exist in America and Paris, where operative technique can be taught on the cadaver and living animals, such as dogs. Here we can learn to pass the bronchoscope on the cadaver; but owing to various Home Office regulations we can only pass a bronchoscope on living animals under licence, using a general anaesthetic. If we employ a local anaesthetic we lay ourselves open to outside criticism, although it has been demonstrated that the bronchoscope can be passed without pain or harm to the living model.

There can be no doubt, however, that greater experience could be obtained and teaching be benefited if we had specialized centres instead of numerous small clinics. We have a great opportunity for the organization of endoscopic centres in the hospitals given over entirely to diseases of the chest (apart from phthisis). In these hospitals the physician carries out his own bronchoscopy