ANAESTHESIA IN GENERAL PRACTICE

This is one of a series of articles, contributed by invitation

DEPTH OF ANAESTHESIA FOR VARIOUS OPERATIONS

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It is frequently stated that the least possible quantity of the least toxic drug or combination of drugs should be administered to produce just sufficient depth of anaesthesia for any given operation. Like most generalizations this is only a half-truth. At first sight it appears most laudable to produce the lightest degree of narcosis which will enable the surgeon to perform his task, as it is evident that the less a patient inhales of a toxic drug the less there is to eliminate, and consequently metabolic changes will be minimized.

Operative Shock

In practice, however, a formidable difficulty arises. One of the causes of operative shock is the effect of traumatic stimuli on the central nervous system. This "reflex" type of shock was at one time thought to be due to exhaustion of the vasomotor centre from excessive stimulation. The modern view, however, is that there is a definite inhibition of the centre by certain afferent stimuli. Whatever the actual mechanism may be, this type of shock can be greatly diminished by deep general anaesthesia and practically abolished by suitable local analgesia which prevents the stimuli from reaching the central nervous system. A good example of the first method is afforded by the operation of osteoclasis for rickets. If the child is lightly anaesthetized he may show signs of severe shock immediately after fracture of the bones, but if he is deeply etherized the pulse rate and blood pressure may scarcely change. As examples of the protection afforded by nerve-blocking, a disarticulation through the hip-joint or a hind-quarter amputation may be cited. The immediate effect on a patient's condition may be almost unnoticeable under spinal analgesia. As a rule it is not possible for the general practitioner to perform combined methods of general and local anaesthesia, so that in this article it will be assumed that he only has the simpler forms of general anaesthesia at his disposal.

Abolition of Reflexes

The question of reflexes must next be considered. It is obvious that the normal response to stimuli must be abolished, but what of the protective cough reflex? If there is any possibility of liquid or solid material reaching the air passages during the performance of the operation either the anaesthesia must be kept sufficiently light to preserve the protective cough reflex, or adequate provision must be made to prevent aspiration, such as by endotracheal anaesthesia, with packing, suction, etc. It is possible for the operation to induce inconvenient reflexes unless anaesthesia is extremely deep. For example, if an inflamed bladder is distended with fluid before cystoscopy straining will occur unless the narcosis is carried to a very deep plane.

In certain cases a light anaesthesia may be more dangerous than a deep one. For instance, if chloroform or a mixture containing it is being used there is an increased risk of

primary cardiac failure if the patient is incompletely anaesthetized, the most dangerous period being at the end of the second stage. In most prolonged operations there are times when the anaesthesia can be appreciably lightened without detriment to the surgeon's work, and a careful anaesthetist who takes advantage of these periods may save his patient much unpleasantness afterwards by a quicker recovery and freedom from after-effects.

Lastly, we have to remember that deep anaesthesia is not always accompanied by complete muscular relaxation. Straining may actually occur during overdosage if the airway is partially obstructed. Conversely, the anaesthetist who is always careful to maintain a perfectly clear airway will find that he can obtain adequate relaxation at a surprisingly light level of narcosis.

Passing next from the general to the particular, we have to consider the depth of anaesthesia necessary for certain common operations.

Minor Operations

Small surgical proceedings, such as circumcision, myringotomy, the incision of whitlows, the removal of superficial tumours, etc., do not give rise to an appreciable amount of shock and can consequently be performed under the lightest anaesthesia which will prevent reflex movements. The only proviso is that no chloroform or mixture containing it may be employed.

Dental Extractions

The removal of teeth does not require muscular relaxation provided that a prop or gag has been inserted in the mouth before anaesthesia. In children the single-dose ethyl-chloride or di-vinyl ether technique is usually adequate. It sometimes happens that the depth of anaesthesia is such that the cough reflex is abolished. It is always wise, therefore, to insert a sponge or pack to obviate any chance of the inspiration of fragments of teeth. For short extractions in adults gas or nasal gas and air is the usual method. Although the cough reflex is generally unimpaired it is prudent to employ packing as an additional safeguard.

If a long dental operation is proposed the patient should, if possible, be removed to a hospital or nursing home and anaesthesia be conducted by the nasal endotracheal route, with packing. This is the only safe method of securing a smooth anaesthesia for an indefinite period. A plane of light third-stage narcosis will suffice for this type of operation. The actual techniques are discussed in another article.

Removal of Tonsils and Adenoids

The rapid guillotine method of tonsillectomy in children is as a rule performed under the single-dose ethyl-chloride or di-vinyl ether technique, preceded where possible by oral nembutal or rectal paraldehyde. Unfortunately the majority of such operations are performed upon out-patients and adequate premedication is impossible. A rather deeper anaesthesia is needed than for dental extractions, as the pharyngeal reflex should be abolished. Immediately after the removal of the second tonsil the child should be turned on to his side and allowed to come round until the cough reflex returns before the adenoids are

scraped. If any solid matter should then slip off the curette and be inhaled it will be immediately coughed up.

If the tonsils are to be dissected continuous anaesthesia is necessary. The simplest method is the pharyngeal insufflation of ether vapour through the tube on the tongue-depressor of a Davis gag. Anaesthesia must be sufficiently deep to enable the surgeon to exert traction on the tonsils without causing retching. With this plane of anaesthesia the cough reflex may be absent, so that blood must be prevented from reaching the larynx. This can be accomplished by suction and by the position of the patient. The latter varies with the individual surgeon, but is usually the "thyroid" position with extended head, or the lateral "Butlin" position with the head low. The only certain method of protecting the air passages from blood and debris is the nasal endotracheal technique with a gauze pack. Neither the tube nor the packing must be removed at the end of the operation until the cough reflex has returned.

Nasal Surgery

Short procedures such as antral puncture and turbinectomy can be done under a "single dose" anaesthetic technique.

In longer intranasal operations, such as sinus drainage or submucous resection of the septum, continuous anaesthesia is needed. Pharyngeal insufflation with a post-nasal pack or Shipway's ballooned airway is only safe if the cough reflex is preserved, since it is impossible to be certain that no blood will leak past the pack. Oral endotracheal anaesthesia with gauze packing or a ballooned tube is undoubtedly the method of choice, and an even level of narcosis can then be maintained with perfect safety.

Abdominal Surgery

Comparatively minor procedures such as operations for hernia and varicocele require little relaxation and can be performed under light third-stage narcosis. Extensive intra-abdominal operations, on the other hand, demand good relaxation. The nearer the incision is to the diaphragm the greater will be the respiratory excursion and consequently the greater the need for shallow respiration. The suturing of hollow viscera is both tedious and difficult if the suture line is moving over an extensive range. Furthermore, traction on the diaphragmatic attachments tends to cause reflex laryngeal spasm with consequent laboured breathing and poor relaxation. For these reasons an ordinary inhalation anaesthesia may not prove satisfactory for such operations as gastro-enterostomy, partial gastrectomy, and cholecystectomy. A thorough cocaineization of the glottis may help to obviate laryngeal spasm, but the only certain preventive is the passage of an endotracheal tube. In many cases it is possible to use this technique without additional apparatus by means of "blind" nasal intubation, the administration being continued as before with a mask. A "gas" mixture is naturally preferable if an apparatus is available.

Pelvic and lower abdominal operations, such as appendicectomy and hysterectomy, can generally be performed satisfactorily with a straightforward inhalation anaesthesia carried well into the third stage. Prostatotomy, if done under general anaesthesia, necessitates the absolute minimum of ether, as the patient is practically always a poor risk with damaged kidneys, and often suffers in addition from chronic bronchitis.

There are three stages in an intra-abdominal operation when a deep plane of narcosis is necessary. They are (1) on opening the peritoneal cavity, (2) during traction on

peritoneal attachments, and (3) on closing the peritoneum. The "sewing-up" must be anticipated by some minutes as it is impossible to deepen the anaesthesia suddenly, and straining at this stage is particularly trying. Similarly, a surgeon who without warning suddenly explores the gall-bladder, having finished an appendicectomy, may upset a lightly anaesthetized patient very badly. Renal operations performed through a lateral incision do not require such deep anaesthesia, as the peritoneum is not opened.

Thoracic Surgery

Minor operations upon the thoracic wall, such as the excision of breast tumours and the application of radium needles, can be carried out satisfactorily under quite light anaesthesia. A good technique is fairly heavy premedication followed by gas and oxygen.

Thoracoplasty can be performed by the same method if sputum is not excessive, but owing to the fact that the patients have a poor vital capacity and are lying on their sound sides an excess of oxygen should be used. This will necessitate the addition of small quantities of di-vinyl ether or, failing this, of chloroform. If cyclopropane is available and the diathermic cautery is not employed, an even better anaesthesia will ensue. The same remarks apply to the drainage of acute empyema if this is to be carried out under general anaesthesia.

Should a patient be coughing up an excessive amount of sputum (as in bronchiectasis) and an extensive thoracic operation be contemplated, the cough reflex must either be retained (as in high spinal or other local technique), or the fluid must be confined to the affected lung (as in intra-bronchial anaesthesia) or evacuated by tracheal or bronchial suction combined with endotracheal anaesthesia. These procedures are mostly outside the scope of the general practitioner and will not be considered further.

Thyroid Surgery

Operations for the relief of toxic goitre have recently become so frequent that some reference must be made to them. Since tracheitis is one of the most frequent sequelae the anaesthetic chosen must not aggravate it. Consequently the use of ether and the passage of tracheal tubes should be avoided unless respiratory obstruction is present. Since relaxation is not necessary a light level of narcosis is adequate, and the avoidance of toxic drugs such as ether and chloroform may just turn the scale in favour of an extremely ill patient. A good technique is heavy premedication or basal narcosis with avertin, followed by pure nitrous oxide and oxygen. The surgeon may prefer an additional infiltration with novocain and adrenaline or adrenaline solution alone (1 in 500,000) in order to separate tissue planes and minimize capillary oozing, but this is not essential. In total thyroidectomy for congestive heart failure cyclopropane is indicated, but for ordinary cases its employment causes excessive bleeding. (The depth of anaesthesia desirable in obstetrical practice is considered in another article of this series.)

The French Ministry of Public Health has instructed the venereal disease services to issue health passports to their patients. Each "carnet médical personnel" will be identified by a number instead of the patient's name and will contain the relevant data concerning diagnosis, clinical and laboratory findings, and instructions to be followed. When a patient leaves a venereal disease service this passport is to be given to him or to his new doctor.