THE RISK OF ANESTHESIA AND SURGICAL OPERATION IN PATIENTS WITH HEART DISEASE

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The internist frequently is called upon by his surgical colleagues for an opinion concerning the risk of anesthesia and a surgical procedure in a patient who has organic heart disease. The opinion given must be based on several considerations, for the request carries with it a number of implied questions. The most important of these questions are:

1. Will the anesthesia and surgical operation increase the demands upon the heart beyond the limits of the cardiac reserve and therefore precipitate congestive heart failure?
2. Does the heart require treatment before operation?
3. Is the prognosis of the heart condition so grave that operation should be avoided if possible or limited to an emergency or palliative procedure?
4. Is the heart condition such that it carries with it the liability to sudden death during anesthesia and surgery?
5. What bearing does the state of the heart have on the choice of the anesthetic?
6. What, if any, cardiovascular complications are to be anticipated during the operation and postoperative period?

The information necessary to answer these questions usually can be obtained from the clinical history and physical examination alone without resorting to more elaborate forms of investigation.

It is still quite commonly believed that during anesthesia and surgical operation the heart is subjected to a considerably increased demand for work. There is no evidence, however, that such is actually the case. The two greatest dangers to which a patient is exposed during an operation under general anesthesia are anoxia and shock. If these are avoided by proper anesthesia, minimizing of blood loss, and careful manipulation of tissues, even prolonged and extensive surgical procedures do not increase the load on the heart as much as does moderate physical exertion. Competent anesthesia is seldom attended by cyanosis or more than slight alterations in respiration, pulse rate, or blood pressure; and changes of this kind are encountered no more frequently in patients who have organic heart disease with a satisfactory myocardial reserve than in normal individuals. It therefore may be taken as a rule with few exceptions that patients with organic heart disease who have been able to

carry on normal daily activities without experiencing symptoms of myocardial or coronary insufficiency can tolerate general anesthesia and surgery with no more risk than a normal person.

In estimating the risk of anesthesia and surgery in a patient who has heart disease, careful inquiry as to the occurrence of dyspnea or substernal pain on effort is of much more importance than are the cardiac findings on physical examination. Certain findings, however, such as cardiac enlargement, murmurs indicative of valvular damage, gallop rhythm, and important disturbances of cardiac rhythm, may make it advisable to requestion the patient in order to be certain that the questions have been understood and truthfully answered. The same consideration applies to the great majority of electrocardiographic abnormalities. With few exceptions, an abnormal electrocardiogram in an individual who has been able to carry on normal daily activities without cardiovascular symptoms does not indicate an increased risk from anesthesia and surgery.

Patients with organic heart disease who present symptoms and signs of myocardial failure offer a more difficult problem. In this group, a period of preoperative treatment is advisable, and the intensity and duration of treatment will be determined by the degree of failure and the urgency of the surgical condition. A surgical emergency, such as acute appendicitis or a perforated gastric or duodenal ulcer, will allow no delay, and the risk of immediate operation must be accepted. If congestive failure is present in such a patient, and the patient has not been receiving digitalis, it is best to administer ouabain or a suitable digitalis preparation by intravenous injection before beginning the anesthesia. If ouabain is employed the initial dose usually is 0.5 mg. Additional injections of 0.1 to 0.25 mg. may be given at intervals of four hours after the operation until a total of not more than 1 mg. has been administered. If there is no need for great hurry in obtaining the maximum therapeutic effect of digitalis, the process of digitalization may be completed after operation by intramuscular administration of one of the preparations designed for this purpose.

In patients who have mild or moderately severe congestive failure and in whom operation can be delayed for a few days, rapid digitalization can be accomplished by oral administration of digitalis or digitoxin. Tablets of digitalis leaf may be given in doses of 0.3 Gm. (4½ grains) every eight hours for three doses or 0.2 Gm. (3 grains) three times a day for two days. If digitoxin is employed, an initial dose of 0.8 mg. followed by 0.4 mg. six or eight hours later is recommended. When one of these schedules has been completed, the decision as to whether or not the maximum therapeutic effect of the drug has been obtained must rest upon the judgment of the observer. Certain patients may require added

amounts of the drug. If auricular fibrillation is present, the ventricular rate furnishes a helpful guide; sufficient digitalis or digitoxin is given to reduce the rate, in the absence of hyperthyroidism, to approximately 70 beats per minute. In patients with hyperthyroidism and auricular fibrillation, however, it frequently is impossible to reduce the rate to below 90 or 100 beats per minute. After digitalization has been accomplished, this state should be maintained by adequate daily amounts of the drug. The presence of pulmonary congestion and peripheral edema calls for strict limitation of the sodium chloride content of the diet and may make it advisable to administer one of the mercurial diuretics. Operation should be postponed, if at all possible, until all evidence of congestive failure has disappeared. If this is done, the patient usually can be expected to tolerate anesthesia and operation satisfactorily, whereas if delay is impossible and adequate treatment cannot be carried out, anesthesia and operation may result in a considerable increase in the degree of failure.

Regardless of the adequacy of the preoperative treatment, patients who have had congestive failure before operation must be watched closely during the period after operation. Postoperative complications, such as pulmonary embolism, atelectasis, pneumonia, and abdominal distention, are not well borne and may be responsible for a return of or an increase in the signs of failure. Postoperative mortality related to these complications is considerably greater in patients who have had congestive failure before operation than it is in normal individuals or in those who have organic heart disease with little or no impairment of myocardial reserve.

Digitalis should also be administered before operation to individuals who do not have congestive heart failure but who have experienced dyspnea on moderate exertion and who present such abnormal findings as enlargement of the heart, evidence of valvular disease, auricular fibrillation, auricular flutter, frequent premature beats, or electrocardiographic changes indicative of ventricular strain or coronary artery disease. Although these patients can be expected to tolerate anesthesia and operation satisfactorily, the added strain of unforeseen postoperative complications may be sufficient to precipitate congestive heart failure. The preoperative use of digitalis will improve the ability of the heart to withstand such added strain so that postoperative mortality in this group should not be significantly greater than in individuals who have a normal myocardial reserve. The amount of the drug given should be sufficient to accomplish theoretical digitalization, while the dosage schedule will be determined by the time available.

Digitalis should usually be administered before operation to patients who have enlargement of the heart due to hypertension, even though

there have been no symptoms of diminished myocardial reserve. This does not imply that congestive heart failure is liable to develop in these patients during anesthesia and operation. The enlarged heart in hypertension, however, is an abnormal heart whose efficiency can be increased by digitalis, and the use of the drug in these patients constitutes an effort to attain the best possible cardiac status before operation. The presence of hypertension without cardiac enlargement does not call for the use of the drug.

There is no evidence that digitalis is of benefit in the preoperative care of elderly patients who do not have a diminished myocardial reserve. Occasionally, however, an elderly individual is encountered who has been experiencing dyspnea on exertion and yet presents no objective evidence of cardiac or pulmonary disease. In such patients, the preoperative use of digitalis appears advisable on the assumption that the dyspnea may well be of cardiac origin, even though no proof is available.

The presence of serious heart disease may influence the surgeon considerably in deciding upon the type of operation to be performed. The average life expectancy, for instance, in patients who recently have had acute coronary thrombosis or who are suffering from angina pectoris or Adams-Stokes seizures is such that only unavoidable operations are performed, and the surgical procedure elected is the simplest one which will accomplish the desired result. As an example, the repair of abdominal or inguinal hernias should be postponed in such patients as long as the condition can be controlled reasonably well by mechanical means. Myomata of the uterus should be treated by radiation and not by surgery. Cholecystostomy is to be preferred to cholecystectomy, and gastroenterostomy to more extensive procedures for intractable peptic ulcer. The aim of the surgeon, in cases of this kind, should be to do as little as possible and still insure the relative comfort of the patient for the remainder of a limited life expectancy.

There are certain heart conditions which, even under normal circumstances, are liable to result in sudden death of the patient. It is important that these conditions be detected because, in their presence, the development of even mild anoxia or shock during an operation may precipitate the changes in cardiac physiology which cause sudden death. The conditions include recent myocardial infarction, angina pectoris, aortic stenosis, syphilitic aortic insufficiency, and complete auriculoventricular block complicated by the Adams-Stokes syndrome. Aortic stenosis and syphilitic aortic insufficiency may have caused no symptoms prior to the operation, while the other conditions will have given rise to characteristic manifestations. In patients who have angina pectoris, aortic stenosis, or syphilitic insufficiency, the most common cause of sudden death appears to be ventricular fibrillation which may or may

not be preceded by a short paroxysm of ventricular tachycardia. The same fatal disturbance in rhythm may occur in patients who have suffered recently from acute myocardial infarction, but in these patients also a reduction in coronary blood flow due to shock resulting from hemorrhage or surgical trauma may precipitate further acute myocardial infarction. In complete auriculoventricular block, sudden death results from permanent ventricular standstill. The risk of anesthesia and surgery in patients who have any of the conditions belonging to this group must be recognized beforehand, and the surgical procedure must be as simple as possible.

Because a skillfully administered anesthetic does not increase the work of the heart to an important degree, the factor of heart disease is seldom of more than secondary significance in determining the choice of the anesthetic agent. The type of operation and the general condition of the patient are of much greater importance. The presence of one of those cardiac conditions which are liable to cause sudden death may make it desirable to proceed as far as possible with local anesthesia. The same conditions weigh heavily against the use of spinal anesthesia whenever the contemplated operation can be performed without greatly added difficulty under some other anesthetic agent. The reason for this is that spinal anesthesia causes a decrease in blood pressure and a consequent reduction in coronary blood flow. This reduction in coronary flow may initiate a fatal arrhythmia in patients who have aortic stenosis, syphilitic aortic insufficiency, angina pectoris, or recent myocardial infarction, and in patients with severe coronary disease it may also be responsible for the development of acute myocardial infarction.

Cardiovascular complications are uncommon during operations skillfully performed under competent anesthesia. Anoxia, shock, and a considerable drop in blood pressure may be responsible, however, for the development of premature beats even in patients who have perfectly normal hearts. When due to anoxia, the arrhythmia frequently can be abolished promptly by the administration of increased amounts of oxygen. In patients who have coronary artery disease, the same factors may precipitate an attack of angina pectoris from which prompt relief usually can be obtained by additional oxygen. Auricular fibrillation develops only rarely during anesthesia, but it occurs as a relatively unimportant postoperative complication in approximately 10 per cent of all patients subjected to thyroidectomy for hyperthyroidism. The arrhythmia in these patients generally begins within the first two or three days after operation and usually lasts for less than forty-eight hours. It seldom requires any special treatment, although it seems advisable to begin gradual digitalization with its onset. One of the serious complications to which patients who have mitral stenosis and auricular fibrillation

are subject is an embolic accident due to dislodgment of a portion of a mural thrombus in the auricles. There is no evidence, however, that an accident of this kind is more likely to occur during anesthesia and operation than at other times.

Summary

Anesthesia and surgical operations do not increase the work load of the heart to an important degree. Patients who have organic heart disease but who have been able to carry on normal daily activities without symptoms referable to the heart can be expected to tolerate anesthesia and operation without difficulty, provided that anoxia and shock are avoided. On the other hand, if there have been symptoms of a diminished myocardial reserve or if congestive heart failure is present, a period of preoperative treatment with rest and digitalis is advisable. The treatment should be as thorough as possible during the interval for which the operation can be safely delayed. With adequate treatment, patients who have had congestive failure can be expected to tolerate anesthesia and surgery without difficulty. Postoperative complications, however, such as pulmonary embolism, atelectasis, pneumonia, and abdominal distention, are not well borne and may be responsible for a return of decompensation.

In patients who have auricular fibrillation with or without congestive failure, digitalis should be given before operation in sufficient amounts to reduce the ventricular rate to a satisfactory level. The drug usually should also be administered before operation to patients who have enlargement of the heart due to hypertension, even though there have been no symptoms of diminished myocardial reserve. There are a few heart conditions which are liable to result in sudden death, and the presence of these calls for special care in preventing anoxia, shock, and a reduction in blood pressure during anesthesia and operation. In patients who have one of these conditions, it is desirable to avoid the use of spinal anesthesia, if possible, because of the effect of this type of anesthesia on systemic blood pressure and coronary blood flow.

THE SYNDROME OF THE AURICULOTEMPORAL NERVE

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Among the several atypical facial pains or pseudoneuralgias there occasionally occurs a peculiar disturbance of the auriculotemporal nerve when this structure becomes involved in parotid abscesses or