CAROTID LIGATION FOR INTRACRANIAL ANEURYSM

A FOLLOW-UP STUDY OF 54 PATIENTS

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A method of treatment for intracranial aneurysms is ligation of the carotid artery in the neck. This appears to be effective when the aneurysm is situated on the internal carotid artery itself, but is of less certain value when the aneurysm is situated on the circle of Willis or one of its distal branches. Black and German, from their study of the hemodynamic stresses operating upon an aneurysm do not advocate ligation in the neck for aneurysms other than those of the carotid. It is stated that aneurysms arising at the junction of the internal carotid and posterior communicating arteries may be effectively treated by ligation of the carotid artery. In a review of the literature by Rowe et al. comparing results of direct attack with results of carotid ligation, it is concluded that ligation in the neck carries a much lower immediate mortality than intracranial attack but may permit a higher late mortality from recurrent hemorrhage. Long-term follow-up of a large series of patients in whom definite operations have been performed on arterial aneurysms, has not been reported and it is difficult to judge the efficacy of these procedures at the present time. The time of ligation of the carotid or direct attack on the aneurysm is important in the results obtained. In about 40 per cent of fatal cases of ruptured aneurysms, death occurred in the first 36 hours after rupture. It should be pointed out that in a few of this group there had been second and third hemorrhages.

The purpose of this paper is to report a 1- to 13-year follow-up study of 53 cases of intracranial aneurysm treated by ligation of the carotid artery in the neck, and 1 case of aneurysm of the internal carotid in the neck which was excised. In these 54 instances carotid ligation was a primary procedure and was not the result of a hemorrhagic complication occurring during an intracranial operation.

MATERIAL

The aneurysms were diagnosed by angiography in every instance. The percutaneous technique of angiography under general anesthesia was used most frequently. Experience indicates that both carotid and basilar artery distributions should be visualized to rule out multiplicity of aneurysms and to check the adequacy of collateral circulation. Angiography was performed

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as soon as possible after the patient’s admission to the hospital, unless the patient was moribund. Daily digital compression of the carotid artery to be ligated was done, gradually increasing the time of compression to 10 minutes. This gave information concerning the adequacy of the cerebral circulation as well as the presence of an irritable carotid sinus. Electroencephalographic-electrocardiographic compression tests showed 3 patients to have sensitive carotid sinuses and bradycardia with syncope. The reflex was abolished with atropine and ligation was carried out without complication. In 1 patient numbness and weakness of the opposite extremity developed during the first 2 minutes of carotid compression and only a partial carotid ligation with fascia lata was performed. A previous publication discusses further the significance of carotid compression prior to ligation of the carotid artery.

The ligation of the common carotid artery is done with local anesthesia to allow early detection of any paralysis that may ensue. The proximal carotid artery and the carotid bifurcation are exposed to permit the introduction of a No. 15 needle, through which a No. 100 polyethylene tube is inserted into the internal carotid artery. The needle is withdrawn, leaving the catheter in place. The tube is connected to a strain gauge and a Sanborn recorder is used to record the pressure before, during and after occlusion of the common carotid artery with a vascular clamp. Pressure is recorded for 1 to 2 hours while the patient is watched for complications. There was never any need to remove the clamp because of complications during this initial period. The clamp is then removed and two ¼-inch umbilical tapes are tied around the common carotid artery, 1 to 2 inches below the bifurcation and ½ to ¾ inch apart. The ends of the tapes are sutured with silk to prevent them becoming untied and to insure permanent ligation in continuity. In 27 cases the internal carotid artery pressure was recorded before and after ligation (Table 1). In most cases a Tycos sphygmomanometer was used. It was attached over an air trap to a water column which communicated with the artery through an 18-gauge needle. In 8 instances the pressure was recorded by the Sanborn recorder continuously for 1 to 2 hours after occlusion of the artery. No correlation was noted between the level of the postligation pressure and the complications.

Of the 54 patients, 32 were females and 22 were males, most commonly in the 5th decade. Ages varied from 23 to 73 years (Table 2).

Table 3 shows the location of the 54 aneurysms. Multiple aneurysms were found in 10 patients, with 5 of these bilateral. Most were found upon repeated angiography, but 1 was found at autopsy. Of the 54 aneurysms, 30 were on the right side and 24 were on the left side.

The interval between onset of patient’s symptoms and time of ligation is important. Many who survive the initial hemorrhage have recurrent hemorrhage 3 to 4 weeks later. In this series some were suffering from their second or third attack of hemorrhage (Table 4).

Five patients had partial ligation with fascia lata prior to the present