A Case Study In Support Of Carotid Endarterectomy Under Local Anesthesia
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Citation

Abstract
In the last decade, there has been much discussion and a number of articles published regarding carotid endarterectomy performed under local (1,2,3,4,5,6,7,8,9) anesthesia. The controversy continues on its advantages vs. disadvantages. The following case study is, in my opinion, a significant, example of the advantage of carotid endarterectomy under local anesthesia as opposed to general anesthesia.

CASE HISTORY
This is a case report of an 85-year-old male who was admitted to the hospital with symptoms of unsteady gait and difficulty walking. These symptoms resolved in 24 hours. The patient was previously very active and intellectually sharp.

An evaluation of the brain by MRI showed no acute changes or stroke.

A carotid artery Doppler study showed occlusion of the rights internal carotid artery and severe stenosis of the left internal carotid artery. A carotid angiogram confirmed total occlusion of the right internal carotid artery with poor visualization of the right cerebral artery.

In addition, there was about 50% stenosis of the right subclavian artery and 80% stenosis of the left internal carotid artery. The left vertebral artery was large, patent with forward flow.

THE PROCEDURE
The patient was prepped and draped after the anesthesiologist started an arterial line and placed the patient on the monitor and IV antibiotics. In preparation for surgery, 2% Xylocaine was injected for most of the superficial area. A 1% solution was used for the deeper layers. The left carotid artery was exposed, noting calcification of the bulb of the artery. These arteries were isolated. The internal and common carotid arteries were clamped while talking to the patient. In about 5-10 seconds, the patient stopped talking and began to seize. Immediately, the carotid arteries, (internal and common), were unclamped. The patient responded in about 10-15 seconds. He was able to respond appropriately and follow commands. I continued to talk to the patient and, again, clamped the internal and common carotid arteries. Once again, in 5-10 seconds. (It is important to note that I kept the blood pressure slightly higher than the patient's normal blood pressure, i.e. 20-30 mmHg higher)

Due to the patient's response, it was too risky to attempt to open the stenotic area and place a shunt for continuation of flow. Therefore, I decided to close the incision and delay surgery in order to discuss the increased risks with the patient.

After all options were discussed with patient, he agrees to proceed further on surgery.

The patient was taken to operating room, and under local anesthesia the incision was open. Heparin was given to the patient. A #6 French catheter was inserted in the common carotid artery and connected to a #6 French catheter that was inserted in the internal carotid artery beyond the area of surgery. This provided an external shunt from the common carotid to the internal carotid beyond the area designated for arteriotomy. The patient remained stable with a blood pressure 20-30 mmHg higher than the initial blood pressure.

While talking to the patient, the internal carotid, common
carotid, and external carotid arteries were cross-clamped. Before performing the arteriotomy, I waited approximately two minutes to determine the patient's tolerance for the procedure. The patient was able to tolerate the clamping without deficit. The arteriotomy was completed. Another shunt, (outlying the inahara-pruitt shunt), was inserted through the lumen to the common carotid and internal carotid arteries. The patient was then on two shunts: one through the arteriotomy, and one beyond the area of arteriotomy from the common carotid to the internal carotid artery.

The patient remained stable, followed commands, and continued to converse.

The endarterectomy was performed without any problem. The area was flushed with no evidence of debris. The arteriotomy was closed over the shunt. The internal shunt was removed and the repair of the arteriotomy completed. The second shunt, (beyond the area of surgery), was removed and closed using a purse-string suture, (figure of 8), at the site. Hemostasis was obtained, incision closed. The heparin, as usual, was not reversed. The patient had received IV antibiotics before the start of surgery.

Postoperatively, the patient did not have any complications and was discharged.

It is now approximately four years after surgery. The patient remains stable with no complications, no deficits or gait disturbances. This confirms my belief that carotid endarterectomy can be done under local anesthesia in very high-risk patients.

SUMMARY

In the past six years, I have performed about 45 carotid endarterectomy, some bilateral with a 1-2 day interval, under local anesthesia with no incidence of strokes or transient ischemic attacks (TIA), and no local wound problem related to the procedure. Only one patient required and internal shunt due to asphasia from a previous stroke and total occlusion of the opposite side. If the local anesthetic agent to the incision is high due to high bifurcation of the carotid, the patient may have transient lip drooping which will recover after the local anesthesia effect resolves.

Little sedation is used in preparation for surgery. I've continued to use 2% Xylocaine to start surgery, 1% Xylocaine at the deeper layers, and a small injection of Xylocaine in the carotid body. The patient's blood pressure is kept slightly higher than baseline, (20-30mmHg), by giving fluids, or Dopamine. If the patient becomes hypertensive, a Nitroglycerin drip at 3-5 micrograms per minute may be administered for blood pressure control. In addition, Nipride may also be used if needed.

Most patients remain in the ICU post surgery and transfer out of the unit the following day. If the patient remains stable after ambulation, he/she is discharged the next day.

This procedure under local anesthesia, as explained above, was developed due to patients who were too unstable for standard anesthesia. All were declined due to medical reasons including severe heart and respiratory problems or severe bilateral carotid stenosis. All were symptomatic. All patients, after complete discussion of risks and explanation of the surgery, opted for the procedure under local anesthesia.

After a few high risk cases were successfully performed, the procedure was expanded to most of my other patients. Forty-five cases have been done without complications.

Unfortunately, one patient developed a stroke approximately six hours after surgery on the non operative site. This was attributed to the complications of atrial fibrillation that returned after surgery. (This was most likely due to small emboli from the left side of the heart). One patient was operated on again due to partial kinking of the surgical area. A Gore Tex patch was placed, under local anesthesia, to eliminate the problem. One patient, beside endarterectomy, had a long ectatic internal carotid artery shortened to prevent kinking caused by head movement toward the same side.

DISCUSSION

After years of debate, carotid endarterectomy is considered the standard procedure for extra cranial occlusive disease (4). However, the controversy and debate continues. Therefore, several subjects should be considered when evaluating a patient for endarterectomy:

1. Should the procedure be done under local or general anesthesia?
2. Should a shunt be used?
3. Should a patch be used to complete the procedure?
4. Should the carotid stenosis be stented?

1. It has been accepted that the procedure of choice is carotid endarterectomy and in spite of several
monitoring systems, the level of consciousness or perfusion cannot be assessed well under general anesthesia. A better assessment can be performed when the patient remains fully awake, alert, and respond to verbal communication and commands. This is the most important reason and rationalization for local anesthesia (10,11,12,13).

2. The controversy over using or not using a shunt would be settled if the procedure is done under a local anesthesia. Tolerance of cross-clamping would be diagnostic for choice (11, 14).

3. The decision to patch or not to patch depends on the surgeon's preference. In most of my cases, the patients did not need to be patched as very little of the artery was used for arteriotomy repair.

4. Stenting should be reserved for cases of stenosis that result from radiated carotids, or ulcerated skin at the area which contraindicates surgery.

OTHER PROCEDURES
Other modalities, such as carotid angioplasty and stent placement, have been introduced. These are not without risk and morbidity. There is a 10% failure rate of unsuccessful guide wire insertion and inability to place a stent, (dependent on different series reports). Even with successful stent placement, there is a 2-10% risk of recurrence of stenosis of the stent site and the accompanying complications of thrombosis, emboli and higher rate of stroke. And, if it occurs, there is little that can be done in timely fashion. Resection of the area, removal of the stent, and thrombectomy, is a very challenging procedure and is sometimes impossible.

There is some research being done on inserting an “umbrella” beyond the area for angioplasty and stenting to prevent emboli. My question is what happens to the debris at the site when the umbrella has to be passed through the stenosis? Would not this insertion, by itself, release/push debris toward the brain?

Considering the low risk for emboli and complications by standard endarterectomy (which has passed the time honored test) should be attempted in almost all patients.

Angioplasty and stent placement should be reserved for patients with a radiated carotid artery with stenosis. It should also be reserved for those cases with skin and soft tissue ulceration or tumor in which the incision and repair would not heal well.

CONCLUSION
Carotid endarterectomy, under local anesthesia, is very safe and should be done in almost all cases (1,2,3,4,5,6,7,8,9,10). The neurological evaluation is instant when the patient is awake, conversing, and following commands (11). The patient's tolerance for cross-clamping provides information for the need for shunts. Patching, in my opinion, is the surgeon's choice but, probably not necessary in most cases. Angioplasty and stent placement should be used in a very small percentage of cases.

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