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Laparoscopic Omental-Cerebellar Pedicled Graft Harvest

Constantine T. Frantzides, MD, PhD, FACS, Atul K. Madan, MD, R. Lawerence Ferguson, MD, and Nakka V. Aruna Kumari, MBBS, CSA, PA

Summary: The minimally invasive technique has altered our approach to many surgical diseases. Laparoscopic surgery is performed on a variety of abdominal organs. One such organ, the omentum, traditionally has been harvested via a laparotomy. The omental harvest now has been attempted successfully laparoscopically, although usually for reconstructive efforts. Here we describe the first case of a laparoscopic omental-cerebellar pedicled graft harvest. **Key Words:** Omentum—Laparoscopic surgery—Omental-cerebellar graft—Cerebrovascular accident.

The optimal method of managing occlusive disease of the intracranial circulation is still controversial. Medical management as well as a variety of surgical options are available. The surgical options can be divided into two categories: high flow (saphenous vein extracranial and intracranial bypass) or low flow (superficial temporal artery-middle cerebral artery, omental, or muscle graft). While all high-flow grafts are considered vasculogenic, low-flow options can be either vasculogenic or angiogenic. The decision on the type of graft is based on multiple factors, including anatomy and duration of symptoms.

The first omental-cerebral graft in a patient who experienced a cerebrovascular accident (CVA) was performed in 1979 (1). In fact, one report has demonstrated a long-term beneficial neurologic effect of an omental-cerebral transposition in a patient after a CVA (2). An obvious disadvantage of any omental graft is the requirement of a laparotomy. Below we describe the first reported case of laparoscopic harvesting of an omental-cerebellar pedicled graft.

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From the Departments of Surgery (CTF, NVAK) and Neurosurgery (RLF), Rush University, Chicago, Illinois, and the Department of Surgery (AKM), University of Tennessee-Memphis, Memphis, Tennessee, U.S.A.

Address correspondence and reprint requests to Dr. Constantine T. Frantzides, MD, PhD, Department of Surgery, Rush University, 1725 West Harrison Avenue, Suite 818, Chicago, IL 60612. Address electronic mail to Constantine_T_Frantzides@rush.edu

CASE REPORT

A 49-year-old right-handed man with history of hypertension and a myocardial infarction 6 years previously presented with basilar artery occlusion. He previously had two CVAs. His first CVA occurred 6 months previously. His symptoms included right-sided weakness, slurred speech, and loss of balance. After his first CVA, a cerebral angiogram demonstrated basilar artery stenosis. The patient continued to have episodes of loss of balance and diplopia. His most recent cerebral angiogram demonstrated complete occlusion of the basilar artery at the vertebral basilar junction (Fig. 1). There was reconstitution of the distal third of basilar artery via collateral flow from the posterior inferior cerebellar through the anterior inferior cerebellar arteries. There was retrograde flow into the superior cerebellar arteries from the posterior inferior cerebellar arterial territory. Also, retrograde filling of the posterior cerebral arteries bilaterally was noted from the anterior and middle cerebral branches.

Based on the patient's anatomy and blood flow requirements, an omental-cerebellar pedicled graft was offered. The minimally invasive approach was also offered as a more attractive option. After general anesthesia was initiated, the patient's abdomen and chest were prepared in standard surgical fashion. An infraumbilical port was placed via an open Hasson technique. Three other ports were placed in the right lower quadrant, left lower quadrant, and upper midline (Fig. 2). The omentum was dissected off the transverse colon using the Harmonic

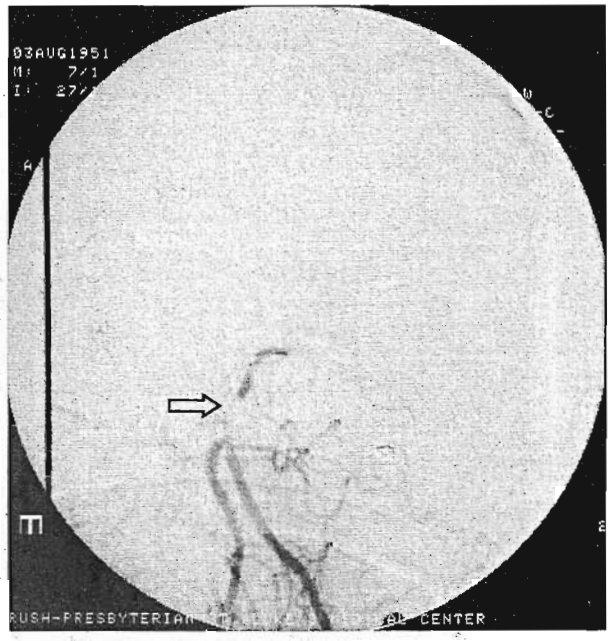

FIG. 1. Cerebral angiogram. A complete occlusion of the basilar artery at the vertebral basilar junction is noted at the arrow.

scalpel (UltraCision Ethicon Endosurgery, Cincinnati, OH; Fig. 3). Carefully preserving the gastroepiploic arteries, the omentum was dissected off the stomach (Fig. 4). The right gastroepiploic artery was left in continuity with its blood supply from the gastroduodenal artery (Fig. 5). The omentum was exteriorized through an upper midline 5-cm incision that was extended from the subxiphoid port. The omentum was then divided to lengthen

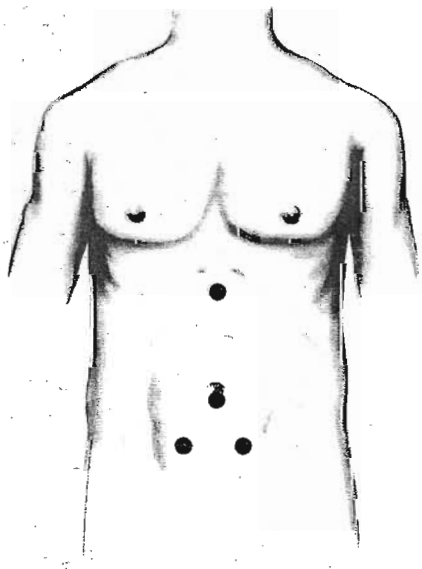

FIG. 2. Port placement. The diagram depicts the position of the four ports used for the laparoscopic harvesting. The subxiphoid port was later extended to exteriorize the omental graft.

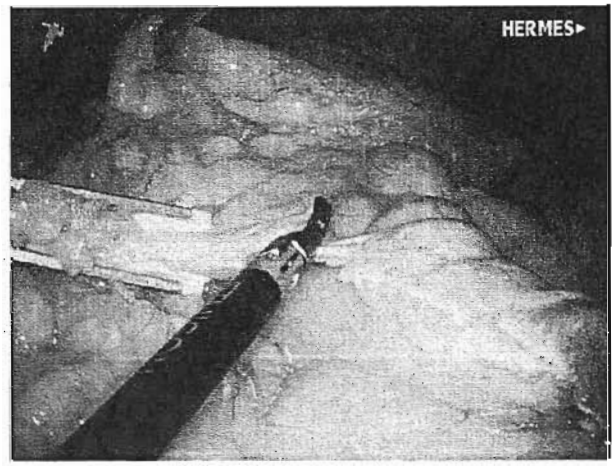

FIG. 3. Dissection of omentum from the colon. The omentum was carefully dissected off the colon utilizing the harmonic scalpel.

the graft (Fig. 6). The left side of the omentum was supplied via the distal collaterals of the omentum. After lengthening the omentum, there was no difficulty in extending the omental graft to the head of the patient (Fig. 7). A generous tunnel was made to an incision on the anterior chest at the level of the right clavicle. The omentum was tunneled with a cellophane bag. The fascia was partially closed at the upper midline incision so that the omental pedicle was not strangulated. An excellent pulse was palpated in the omental graft. After repositioning and reprepping, a posterior fossa craniotomy was performed where the graft (through another tunnel) easily reached without undue tension. The graft was placed on the arachnoid and sutured to the dura.

Postoperatively, the patient did well and had no problems. He was discharged and seen in follow-up with no evidence of any hernias.

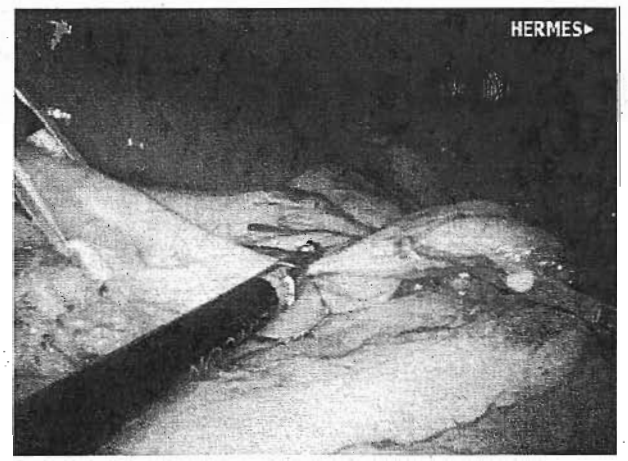

FIG. 4. Dissection of omentum from the stomach. The omentum was dissected off the stomach. The gastroepiploic artery was preserved in the omental graft.

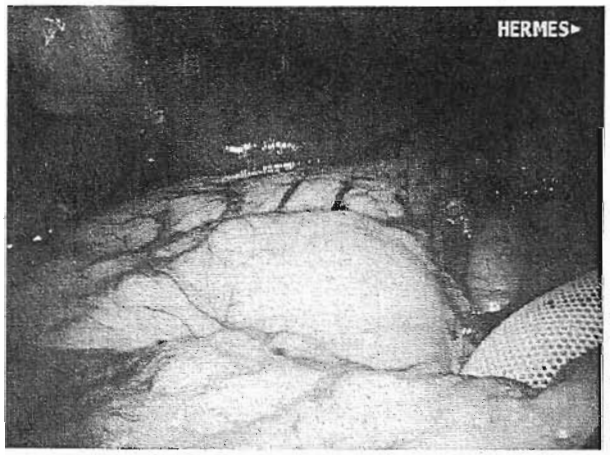

FIG. 5. Omental graft. The omental graft receives its blood supply from right gastroepiploic artery as demonstrated.

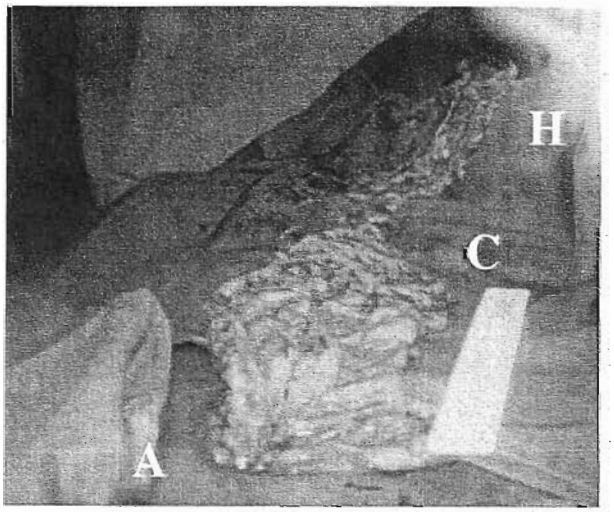

FIG. 7. Exteriorization of the graft. After the graft was exteriorized, it easily reached the head of the patient. (H, head of patient; C, clavicle of patient; A, abdomen of patient.)

DISCUSSION

The omentum as a vascular graft has been used for a variety of purposes. An omental graft for reconstructive surgery was first described in 1926 (3). Its mobility, vascularity, pliability, and rich lymphatic supply make the omentum an ideal organ to enhance the healing of wounds or filling of complex defects. In 1979, Goldsmith et al. (1) described another use of the omental graft in patients with aphasia after a dominant hemisphere stroke. Although the omental graft has been described as an option to increase blood supply to ischemical areas of the cerebrum and cerebellum by others, this case represents the first laparoscopic harvest of an omental-cerebellar pedicled graft. Our technique provides not only a minimally invasive method to harvest the omentum but also a method to lengthen the graft without compromising its viability.

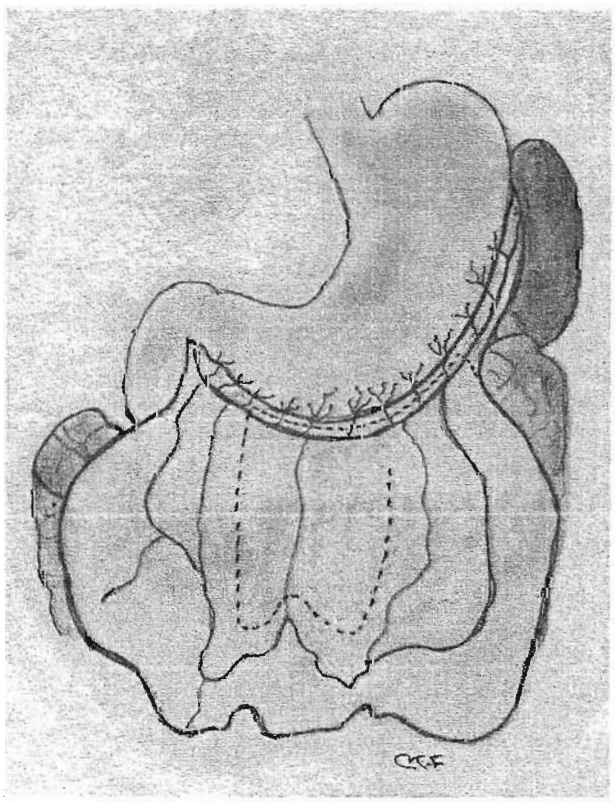

FIG. 6. Technique to lengthen the graft. The diagram depicts the incision that was used to lengthen the omental graft. The blood supply for the left side of the omentum was made available via omental collaterals.

Few reports have described the laparoscopic approach to harvest the omentum in general (4–7). In 1993, Saltz et al. (4) reported developing and refining the laparoscopic harvest of an omental free flap in an animal model. The same report described a clinical case using this flap in a patient with a large wound on his lower extremity with excellent results. Corral et al. (5) described a bipedicle omental flap for a chest wall defect mobilized via the laparoscopic approach. Their patient did well, except that 6 months later, she experienced a hernia at the site where the omentum exited the fascia. This hernia was repaired without any difficulty in their case. Another report described the laparoscopic approach to obtain an omental flap for reconstruction after a sternotomy complicated by mediastinitis and osteomyelitis of the sternum (6). The pedicle in the case was based on the left gastroepiploic artery. As demonstrated by our case and others, the laparoscopic approach can be used to perform an omental graft based on either or both gastroepiploic arteries.

The minimally invasive approach to harvest an omental graft seems to be a safe option when the omentum is needed either as a free graft or a pedicled graft. This method appears to have all the usual advantages of laparoscopic surgery, including less risk of infection and smaller incisions. The major disadvantage of the laparoscopic method is the requirement of advanced laparoscopic skills, especially since dissection is extremely close to both the transverse colon and greater curvature of the stomach. Also, extreme care must be taken in handling the omentum, which is a delicate tissue. Although at least one case report describes a hand-assisted technique to harvest an omental pedicle (8), we believe the utility of the hand-assisted technique decreases the benefits of lower risk of infection and smaller incisions.

This report is the first in the literature to describe laparoscopic omental-cerebellar pedicled graft harvest. This minimally invasive approach may help decrease the morbidity associated with laparotomy.

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Calendar of Events

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November 15–16, 2002
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