Surgical Technique

The Use of the Gastroepiploic Artery for Coronary Artery Bypass Graft: Another Alternative

Abdulla A. Attum, M.D.

The right gastroepiploic artery was successfully used for coronary artery bypass graft (CABG) in two patients whose saphenous veins were unavailable for grafting. One internal mammary artery was used in each patient. Because the gastroepiploic is an arterial pedicle, it is expected to have a good long-term patency rate and should be considered as an alternative conduit. (Texas Heart Institute Journal 1987; 14:289-292)

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The internal mammary artery is the best choice for myocardial revascularization. However, its limited length decreases its applications, and some patients simply have no available saphenous vein. The gastroepiploic artery is a good alternative. It is an arterial pedicle, so good long-term patency can be expected. Here I report the successful use of the gastroepiploic artery for CABG in two cases.

CASE REPORTS

Case 1
A 65-year-old female was admitted on 18 February 1987 with angina occurring at rest, nocturnally, and upon minimal exertion. She had diabetes mellitus, hypertension, and bilateral varicose vein stripping. On admission, she had left carotid bruits and good peripheral pulses. Cardiac catheterization showed good left ventricular function and three-vessel disease.

On 20 February, the patient underwent triple CABG. The left internal mammary artery was anastomosed to the extensively diseased LAD artery. The right gastroepiploic artery was grafted sequentially to the posterior descending branch of the right coronary artery and the posterior lateral marginal branch of the circumflex artery.

The patient was on a respirator for four days. Post-extubationatelectasis of the left lung was treated by bedside bronchoscopy and suctioning. The patient used a nasogastric tube for six days, and feeding was started on the seventh post-operative day. She vomited once (100 cc) on the 10th day, but otherwise had an uneventful recovery and was discharged on the 13th post-operative day. She has had no angina since and has returned to her normal activities.

Case 2
A 63-year-old male was hospitalized with angina on 1 May 1987. He was obese, had diabetes mellitus, and had undergone CABG in 1978, with reoperation in 1983. On admission, he continued to have anginal pain despite nitroglycerin infusion and intravenous morphine. Cardiac catheterization showed a 35% ejection fraction, a patent saphenous-vein-to-LAD graft with 90% stenosis, and the anterior oblique branch of the circumflex with a 70-80% stenosis. The circumflex coronary artery itself was totally

From the Humana Heart Institute International, Humana Hospital-Audubon, One Audubon Plaza Drive, Louisville, Kentucky.

Address for reprints: Abdulla A. Attum, M.D., Humana Heart Institute International, One Audubon Plaza Drive, Louisville, KY 40217.
Fig. 1 Anatomy of the gastroepiploic artery. Left arrows indicate its origin and right arrows indicate junction of right and left gastroepiploic. Between the two sets of arrows is the section of the artery used for grafting.

Fig. 2 Incision extends from a point just below the suprasternal notch to about 2.5 cm above the umbilicus.

Fig. 3 Dissection of the gastroepiploic artery from the stomach and omentum.

Fig. 4 Positioning the gastroepiploic artery for anastomosis with the posterior descending branch of the right coronary artery and the posterior marginal branch of the circumflex artery. The gastroepiploic is transected 3-4 cm from hilum of spleen, passed behind the pylorus through the lesser sac, then anterior to the liver and through an opening in the membranous part of the diaphragm.
The left occluded distal oblique.

He had respiratory support for 48 hours and a nasogastric tube for five days. On the 10th postoperative day, the patient had an episode of hypertension (220/140 mm Hg) associated with chest pain and with electrocardiogram (ECG) changes in the anterior lead that indicated ischemia. The chest pain and ECG changes disappeared with control of blood pressure. Otherwise, the patient had an uneventful recovery. His incisions healed well, and he was discharged on the 14th postoperative day. He has had no angina since.

**ANATOMY OF THE GASTROEPIPLOIC**

The right gastroepiploic artery, whose origin is posterior or just inferior to the gastric pylorus, is a branch of the gastroduodenal artery. It runs parallel to the greater curvature of the stomach and communicates with the left gastroepiploic artery. It gives off anterior and posterior branches to the stomach and omentum, the first few of which are relatively large. Its proximal portion is 2-2.5 mm in diameter as it approaches the left side of the greater curvature—then it tapers slightly, but remains greater than 1.5 mm in diameter (Fig. 1).

**OPERATIVE PROCEDURE**

Under general endotracheal anesthesia, a midline sternotomy was performed. This incision extended through the linea alba to 2.5 cm above the umbilicus (Fig. 2). The right gastroepiploic artery was dissected from its point of origin to a point 3-4 cm from the hilum of the spleen (Fig. 3). The patient was heparinized, and the right gastroepiploic was ligated and divided at the distal end. It was then passed posterior to the gastric pylorus through the lesser omentum. In Case 1, the artery was then passed through an opening in the membranous part of the diaphragm into the pericardial sac and anastomosed side-to-side with the posterior descending branch of the right coronary artery, using 7-0 Prolene continuous sutures. Then the end of the gastroepiploic was anastomosed to the posterior lateral marginal branch of the circumflex (Figs. 4, 5). In Case 2, the gastroepiploic was passed anterior to the diaphragm and anastomosed end-to-end with the LAD artery (Fig. 6).

**COMMENT**

In patients with no available saphenous vein, the options for bypass conduit can be limited. Arm or prosthetic veins are rarely used due to poor long-term patency. In patients with diabetes mellitus (particularly of several years’ duration), the use of bilateral internal mammary arteries is
associated with higher incidence of sternal wound dehiscence and infection. In addition, the internal mammarys will not reach the posterior wall of the heart, so they cannot be used to graft coronary arteries that are far apart, e.g., a posterior descending branch of the right coronary and a marginal branch of the circumflex. Harvesting the gastroepiploic artery is simple and almost bloodless, so in patients with blood dyscrasias or with no saphenous veins it may be a good alternative to the internal mammary artery.

The gastroepiploic artery is long enough for bypass of any of the coronary arteries. In the rare event that additional length is needed, the superior pancreaticoduodenal artery can be ligated and severed. Also, pancreatic branches numbers 2-6 from the gastroduodenal artery can be severed, and the gastroduodenal artery then dissected up to its origin at the hepatic artery. If the need for additional length is anticipated, it is wise to do an arteriogram before surgery due to the possible anomalous origin of the gastroepiploic artery at the superior mesenteric artery.*

Important advantages of using an arterial pedicle for bypass graft are that it retains its lymph, blood, and nerve supplies, and can enlarge over a period of time. Moreover, because of the similarity in its size and nature to the coronary arteries, the gastroepiploic artery is expected to have good long-term patency.

One disadvantage of using the gastroepiploic artery for CABG is that it requires extending the sternal incision into the upper part of the abdominal wall. Another possible disadvantage could be a preferential flow to other hepatic artery branches subsequent to operation, with reduced flow to the gastroepiploic, though this has never been documented. Angiographic demonstration of the gastroepiploic artery, following its anastomosis to the coronary arteries, requires threading the angiography catheter into the hepatic artery. Still unknown is the long-term patency of the gastroepiploic artery. The theoretical similarity of its patency to that of the internal mammary artery needs to be documented by further clinical trial.

*Personal communication with NL Poirier, M.D., Mount Victoria Hospital, Montreal, Canada.

REFERENCES


Fig. 6 For anastomosis of the gastroepiploic artery with the LAD coronary artery, the gastroepiploic is passed behind the pylorus, through the lesser sac, anterior to the liver. A small incision might have to be made in the anterior diaphragm for better positioning.