

The Technical Aspect of the Gastroepiploic Artery Graft Skeletonization with the Harmonic Scalpel: The Samurai Technique

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ABSTRACT

A novel skeletonization technique using the scissors-type harmonic scalpel (Ethicon Endo-Surgery, Cincinnati, OH, USA) is presented. This “samurai technique,” which uses the harmonic scalpel by frequently turning over the scissors, facilitates the handling of the gastroepiploic artery, enlarges the caliber size, and allows easy skeletonization without any vessel injury.

INTRODUCTION

The gastroepiploic artery (GEA) has become popular as an alternative conduit for coronary artery bypass grafting. The use of the GEA has been increasing with the recent trend toward off-pump coronary artery bypass grafting with the aorta no-touch technique, which avoids the manipulation of the aorta to reduce the risk of stroke during the operation. Since the year 2000, we have been using our originally developed skeletonization technique using the scissors-type harmonic scalpel (Ethicon Endo-Surgery, Cincinnati, OH, USA) to facilitate the handling of GEA and enlarge its caliber size. With this samurai technique that uses both sides of the curved blades of the harmonic scalpel by frequently turning over the scissors, the GEA can be easily skeletonized. We report here this unique technique in detail from a technical aspect.

TECHNIQUE

After making a small subxiphoid skin incision or extending the sternotomy incision by 5 cm, we open the peritoneal cavity. The GEA is inspected and palpated to confirm whether it is a suitable conduit with good pulsation and

without remarked atherosclerosis. At first, the GEA is harvested as a wide pedicle including the artery, vein, and fat, using the scissors-type harmonic scalpel with curved blades (Figure 1). With our samurai technique, not only is this harmonic scalpel used for cutting, but surrounding tissues of the artery are peeled off with the back of the blades, like the Mineuchi technique that strikes the opponent with the back of the Japanese Katana sword. After we administer 1.5 mg/kg of heparin, the distal site of the GEA is cut and the pedicled GEA is pulled out from intraabdominal space (Figure 2). This procedure makes further manipulation very easy. Olprinone hydrochloride (5 mg of olprinone in 100 mL of normal saline) is administered into the GEA intraluminally. The pedicled GEA is pulled and straightened to give it tension. Facies anterior to the pedicled GEA are cut open using the harmonic scalpel with the pad side facing down, and the body of the GEA is exposed (Figure 3). Then the harmonic scalpel is turned over so the ultrasonic side is facing down, and the scalpel is moved over the surface of the GEA as though sweeping it with the ultrasonic part (Figure 4). After this sweeping procedure, the surrounding fat is aspirated, and accompanying veins are separated from the GEA. After the completion of these procedures, small branches of the GEA rise to the surface and became visibly clear. Then, the harmonic scalpel is turned over again so the pad side is facing down, and these branches are nipped with the harmonic scissors and then completely cut off (Figure 5). By repeating the manipulations mentioned above, skeletonization of the GEA is easily achieved without any bleeding or need of metallic clips.

In our experience, mean harvesting time for the right GEA was 12 ± 3 minutes. With our technique, in most cases the caliber size and the length of the GEA were increased after skeletonization. We used only the portions of the GEA with diameters larger than 2.0 mm and abandoned the distal narrow parts. Nevertheless, the graft length of the GEA reached approximately $18 \text{ cm} \pm 5 \text{ cm}$.

COMMENTS

With increasing interest in multiple arterial revascularization and off-pump coronary artery bypass grafting with the aorta no-touch technique” the GEA has been more fre-

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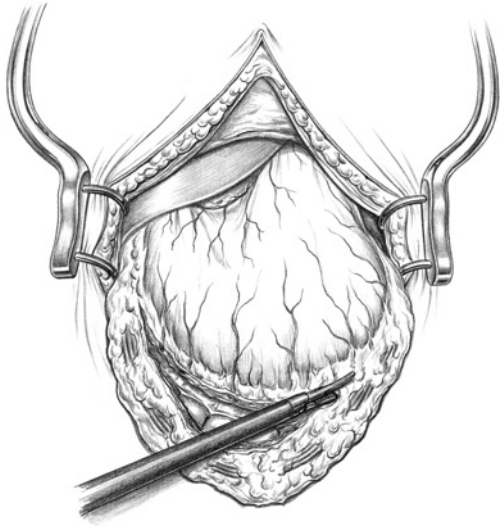


Figure 1. At first, the gastroepiploic artery is harvested as a wide pedicle.

quently used as an alternative graft material [Chavanon 2002, Takemura 2003]. However, many surgeons have been concerned over the GEA's proclivity to spasm and the flow competition between the native coronary artery and the GEA [Yasuura 2000, Ochi 2001]. In a theoretical analysis of GEA

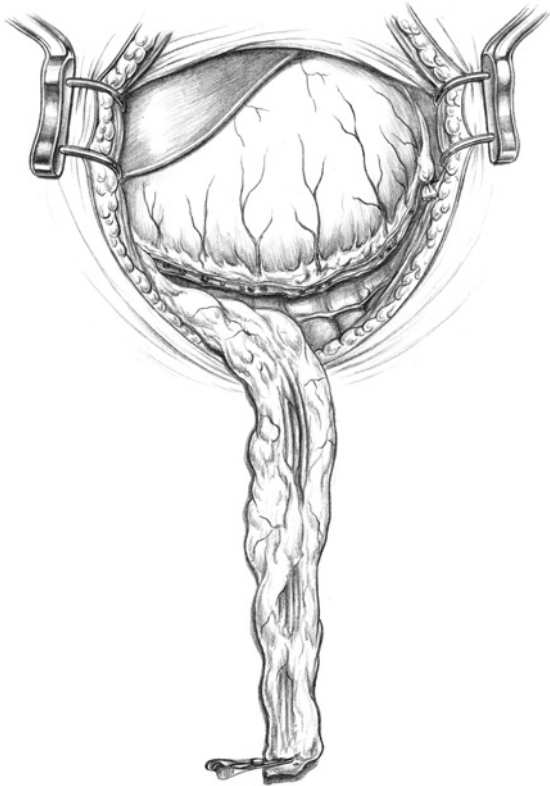


Figure 2. The distal site of the gastroepiploic artery (GEA) is cut and the pedicled GEA is pulled out from intraabdominal space, making further manipulation very easy.

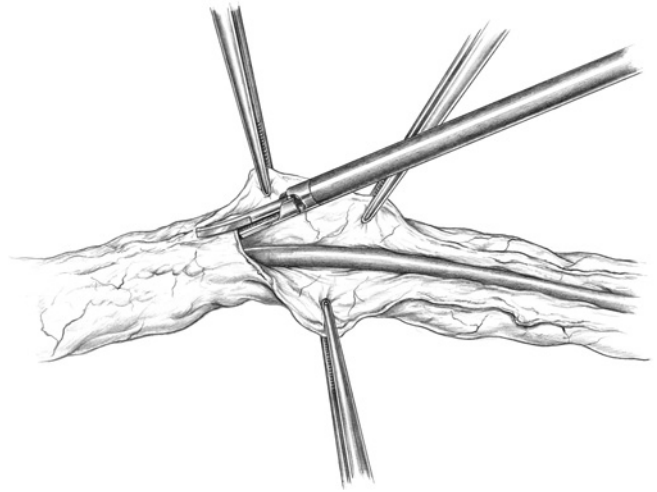


Figure 3. Facies anterior of the pedicled gastroepiploic artery (GEA) are cut open using the harmonic scalpel with the pad side facing down, and the body of the GEA is exposed.

grafting, Yasuura et al [2000] recommended that the caliber size of the GEA as an in situ graft material should be 0.5 mm greater than that of the native coronary artery to avoid flow competition, and Ochi et al [2001] emphasized that the GEA should have a large luminal diameter (2 to 3 mm) at its anastomotic point to generate adequate perfusion pressure. Both studies indicate that the problem of flow capacity of the GEA graft can be solved if a spasm-free GEA graft with greater caliber size can be obtained. On the other hand, it is well known that skeletonization of arterial grafts increases the caliber size, resulting in an increase of the free flow, and this procedure has become popular for the harvesting of the

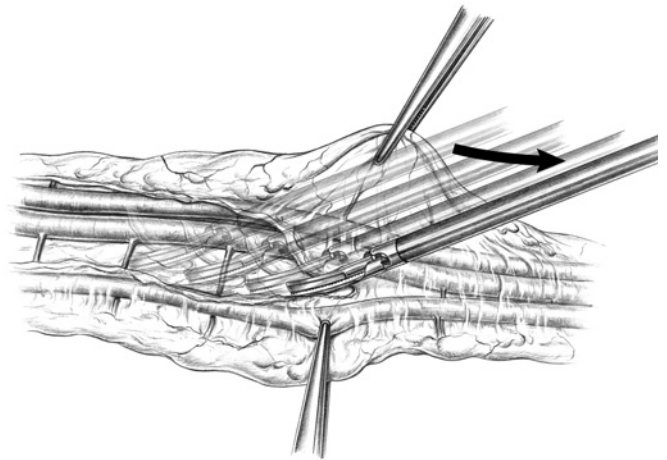


Figure 4. The harmonic scalpel is turned over so the ultrasonic side is facing down, and the scalpel is moved over the surface of the gastroepiploic artery as though sweeping it with the ultrasonic part.

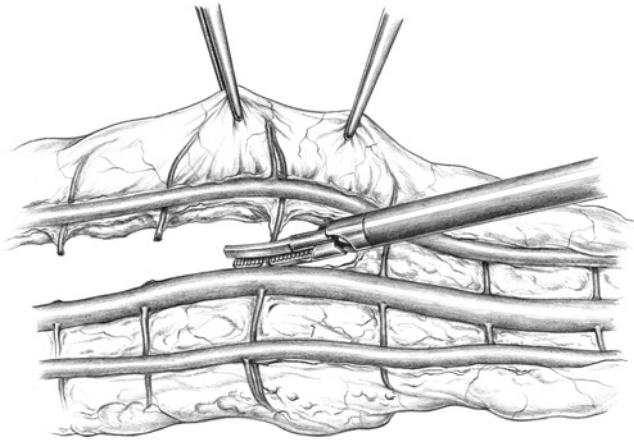


Figure 5. The harmonic scalpel was turned over again so the pad side is facing down, and these branches were nipped with the harmonic scissors and then completely cut off.

internal thoracic artery. Wendler et al [1999] reported that the free flow of the skeletonized left internal thoracic artery was approximately 34% greater than that of the pedicled graft. Such studies seem to suggest that skeletonization is also suitable for the GEA graft; however only a few reports have been published regarding the issue.

Using our samurai technique, full skeletonization could be easily and quickly achieved, and we have observed that the caliber size and free flow of the GEA graft increased remarkably. We consider that the major advantage of skeletonization

over harvesting techniques is that our technique requires no direct handling of the artery, and as a result, spasm or any injury of the GEA can be avoided. Moreover, all small side branches can be visualized with our technique, resulting in definite hemostasis. Although long-term follow-up is required, we propose that the GEA can be more frequently used as an alternative arterial conduit when harvested with our technique.

In conclusion, using our novel samurai technique, skeletonization of the GEA graft can be performed easily and safely with maximal dilation of the GEA. Based on our experience, we believe that skeletonized GEA harvested with our alternative method has advantages over pedicled GEA.

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