Cost Effective Endoscopic Radial Artery Harvesting

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Radial artery harvesting has been routinely performed by endoscopy. We present a reduced cost technique using a reusable retractor and thermal welding shears. The combination of reusable and disposable tools allows patients to benefit from endoscopic radial artery harvesting with decreased morbidity and favorable cosmetic results.

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Reproducible results with endoscopic radial artery harvesting for coronary artery bypass grafting have been previously reported [1–3]. We present a new application that is safe, efficient, and economical for endoscopic radial artery harvesting. This technique utilizes a Storz vessel retractor (Karl Storz, Culver City, CA), disposable Starion thermal ligating shears (Starion Instruments, Saratoga, CA), reusable endoscopic scissors, and suture endoloops. Total procedure cost is one-half that of currently available disposable systems. Minimal complications, acceptable harvest times, reduced direct costs, and excellent cosmetic results have made this the procedure of choice when harvesting radial arteries, regardless of preoperative anticoagulation, size of extremity, or urgency of operation.

Technique

From February 2003 through February 2005, 350 consecutive patients underwent endoscopic radial artery harvest for coronary artery bypass grafting with or without other concomitant procedures. All patients underwent preoperative confirmation of palmar arch patency using Doppler imaging or bedside Allen's test. Patient age ranged from 38 to 86 years with 70% being male and 32% having diabetes.

The Storz vessel retractor is a 2-cm wide, 35-cm long stainless steel retractor that can be re-sterilized. The retractor accommodates a 5-mm, 30-degree telescope with a rear mount camera (Fig 1). The Starion shears is a 35-cm, 5-mm, rotatable shafted thermal welding device consisting of a resistance heating alloy wire protected by two opposing silicone pads (Fig 2). A converter that has power settings from 1 to 8, with level 6 used for all harvests, supplies thermal energy controlled by a single "trigger finger" activation switch. Minimal heat and splatter is generated, eliminating repeated removal of the scope for cleaning as well as carbon dioxide insufflation.

Procedure time is approximately 20 minutes during which the internal thoracic artery harvest (sternotomy or robotic) is completed. Harvesting techniques are used as previously published [4]. A 2-cm parallel incision is made at the level of the wrist with direct exposure of the radial artery. The tunnel is created and the retractor is inserted with dissection carried proximal toward the antecubital fossa by dividing the overlying fascia and adventitia exposing the artery. The radial artery is harvested as a pedicle starting with lateral branches followed by medial branches from wrist to antecubital fossa. Proximal harvest limits are defined by crossing veins that lie in close proximity to the recurrent radial artery. Distal ligation at the wrist is accomplished with two medium hemoclips. Heparinized saline with papaverine is gently injected and a bulldog clamp is applied. Under endoscopic vision, two number 2 polydioxanone endoloop sutures (Ethicon, Somerville, NJ) are placed proximally at the level of the antecubital fossa and the radial artery is transected using reusable 5-mm endoscopic scissors. Sutures are ligated using Starion shears, avoiding damage to the endoscopic scissors. A 5-0 Monocryl suture (Ethicon, Somerville, NJ) is used to close the wrist incision, which is covered with a sterile bandage. Compressive dressings are placed and the arm is tucked at the patient's side.

No postoperative neurovascular complications or infections were noted. All arteries were harvested for their maximal length without injury. Pathologic examination of a segment was performed after the shears were intentionally applied to the side branch directly against the

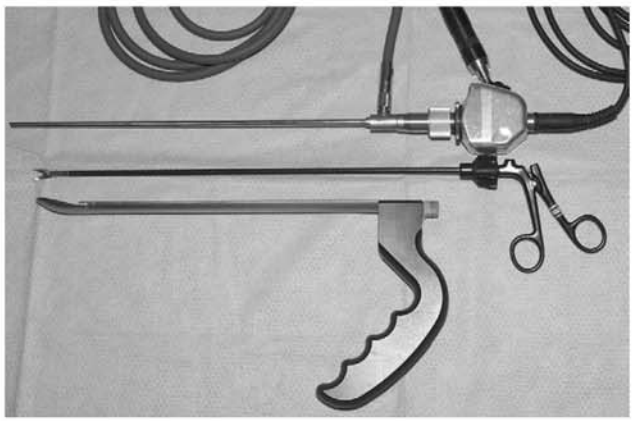

Fig 1. Storz retractor (Karl Storz, Culver City, CA), reusable scissors, and telescope with camera.

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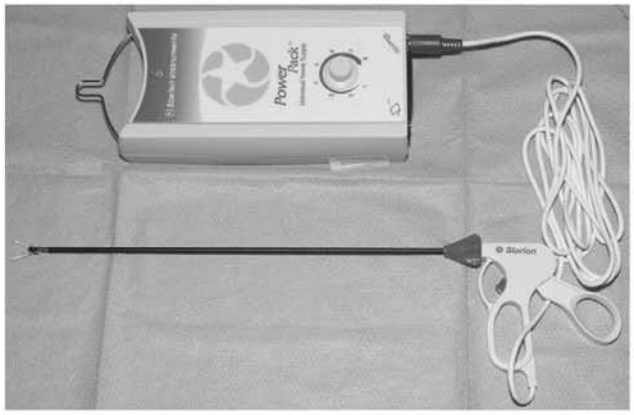

Fig 2. Starion thermal welding shears (Starion Instruments, Saratoga, CA) with power source.

lumen of the artery without thermal spread to the lumen on sectioning. Less than 5% of the patients had thenar dysesthesias, all of which resolved within 8 weeks. Increased tunnel heat and repeated removal of the retractor may have been responsible for an increase of this problem using other systems. Tunnel hematomas occurred in 5 patients requiring aspiration without recurrence. Three patients required conversion to two small step incisions secondary to excessive anticoagulation preoperatively with 300–600 mg Clopidogrel bisulfate (Bristol-Myers Squibb, New York, NY) and thrombolytics.

Comment

Endoscopic radial artery harvest is a safe, reproducible technique that can be performed economically in all institutions. Combination of reusable and disposable tools allows patients to benefit from endoscopic radial artery harvesting with decreased morbidity and favorable cosmetic results.

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