

Minimally invasive radial artery harvesting for coronary artery bypass surgery

Koroner arter bypass cerrahisi için minimal invaziv radial arter hazırlanması

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Background: We aimed to harvest radial arteries for coronary bypass procedures with minimally invasive technique without any special instrument and endoscope.

Methods: For 25 patients (16 males, 9 females; mean age 64±5.2; range 50 to 72 years) who underwent coronary bypass surgery, radial arteries were harvested with two 3-4 cm longitudinal skin incisions. One of them was over the distal radial artery and the other was over the mid-forearm. After radial artery segment between these two incisions were harvested, proximal segment was prepared by using automatic retractor inserted proximally and the radial artery stump was occluded by hemoclips. This obviated the need for extra incision for harvesting the full length of the radial artery.

Results: The condition of the radial artery was controlled with blood flow. There were no complications such as hematoma, nerve damage, or delay in wound healing in the donor extremity. Patient satisfaction was better as well. Control angiographies showed no problem related to these grafts.

Conclusion: Minimally invasive radial artery harvesting can be easily performed through two small incisions without extra instruments.

Key words: Minimal invasive; radial artery.

Amaç: Bu çalışmada koroner bypass cerrahisi için, özel enstrüman veya endoskop kullanmadan minimal invaziv radial grefti hazırlanması amaçlandı.

Çalışma planı: Koroner arter bypass cerrahisi yapılan 25 hastada (16 erkek, 9 kadın; ort. yaş 64±5.2; dağılım 50-72) radial arter greftleri uzunluğu 3 ile 4 cm arasında değişen iki adet cilt insizyonu ile hazırlandı. İnsizyonlardan biri distal radial arter üzerinde diğeri ön kolun orta bölümündeydi. Bu iki insizyon arasındaki radial arter hazırlandıktan sonra, proksimal segment orta bölümdeki insizyona otomatik ekartör yerleştirildi. Proksimal stumf'un kliplenmesi ekstra proksimal insizyon ihtiyacını ortadan kaldırdı.

Bulgular: Radial arterin durumu kan akımına bakılarak değerlendirildi. Donör ekstremitede hematoma, sinir hasarı, yara iyileşmesinde gecikme gibi sorunlarla karşılaşılma-
dı. Hasta tatmini daha iyiydi. Kontrol anjiyografilerde bu greftlerle ilgili sorun görülmedi.

Sonuç: İki küçük insizyon yardımıyla özel alet kullanmadan minimal invaziv radyal arter hazırlamak kolaylıkla mümkün olmaktadır.

Anahtar sözcükler: Minimal invaziv; radial arter.

New antispasmodic agents and less traumatic harvesting techniques have caused revival of the radial artery use for coronary artery bypass grafting.^[1] In the last years, endoscopic radial artery harvesting techniques have been reported. We harvested radial arteries for coronary bypass procedures with two longitudinal 3-4 cm incisions instead of full forearm incision for patient satisfaction and wound healing in 25 patients. We didn't use special instruments and endoscope for this procedure.

PATIENTS AND METHODS

We used left radial arteries harvested by two mini-longitudinal incisions in the forearm for coronary bypass operations in addition to left mammarian artery and saphenous vein in 16 male and 9 female patients whose ages ranged between 50 and 72 years. The hand circulation was evaluated by the Allen test before the operation. In the radial artery preparation, we used hemoclips for radial artery side branches, electrocautery for soft tissue and fascia dissections. In these 25 patients, instead

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Fig. 1. Two 3-4 cm longitudinal incisions on the forearm for minimally invasive radial artery harvesting.

of 20-25 cm full forearm incision extending from wrist to elbow, first we made 3-4 cm skin incision over the distal radial artery between styloid process and flexor carpi radialis muscle tendon. From this incision, we also prepared additional 5 cm radial artery segment by the help of retractors inserted to the proximal end of this incision. Following the preparation of distal 8-9 cm of radial artery, a second 3-4 cm mid-forearm incision medial to brachioradialis muscle was made (Fig. 1). In this region, preserving lateral antecubital nerve, first we dissected all subcutaneous tissue 10-12 cm proximal to the upper end of this incision by the help of retractors pulled by an assistant. After opening the fascia between brachioradialis and flexor carpi radialis muscles, insertion of automatic retractor, arms opened under the skin, removed these muscles apart from each other over the proximal part of radial artery. Then, the side branches of

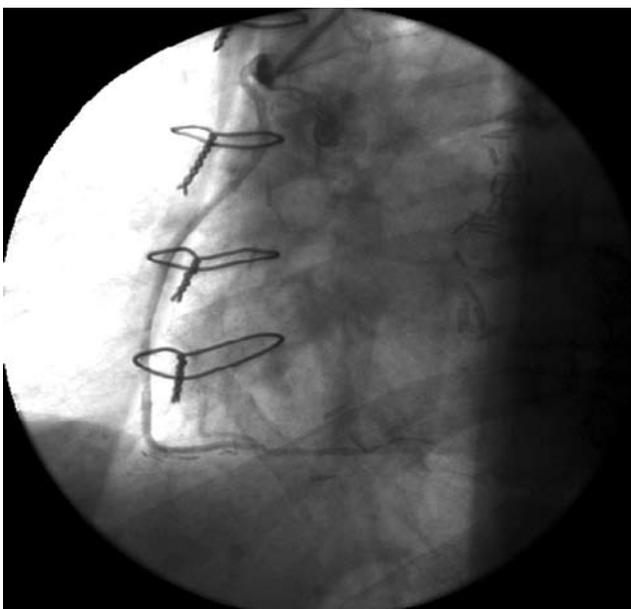


Fig. 3. Control angiography of a patient in whom radial artery was used for right posterior descending coronary artery.



Fig. 2. Distal and mid part of the radial artery was harvested through the mid-forearm incision.

the radial artery were clipped and cut. The radial artery was not manipulated. Following heparin injection, distal end of the radial artery was cut and brought to the mid-forearm incision and diluted papaverine was injected by a silastic cannula as in the same way in the open method (Fig. 2). Three minutes later, radial artery flow was controlled. Then, proximal end of radial artery was doubly clipped and cut from the mid-forearm incision. In the postoperative period, the patients were observed for hematoma, neurologic deficits and incisional healing problems in donor extremities. Control coronary angiographies were performed to check graft patency.

RESULTS

The radial arteries of 14 patients were used for revascularization of right coronary system, 11 for circumflex coronary system. No morbidity and mortality was seen. After coronary bypass operations, patients underwent control angiography. There was no problem such as local or diffuse stenosis in these radial arteries in 28 to 33-month follow-up (Fig. 3) Focal stenosis was seen in diagonal saphenous graft in one patient and dilated with balloon angioplasty in the same procedure.



Fig. 4. The appearance of longitudinal incisions two months after operation.

DISCUSSION

Recent increase in the frequency of coronary reoperations with their limited options for vascular conduits and good promising mid-term patency results stimulated an interest in radial artery grafts for coronary bypass surgery.^[2] The radial artery is generally prepared with open forearm incision from wrist to elbow nearly 20-25 cm in length. It takes nearly 20-25 minutes. Some surgeons used two transverse incisions of 2-3 cm in length and special instruments and endoscope for this procedure and their operation time is nearly 100 minutes.^[3,4] In our minimally invasive approach, we were able to prepare full length of radial artery with two separate 3-4 cm longitudinal skin incision, total incision changing from 6 to 8 cm in length; mean preparation time was 40 minutes. No neurologic sequela was seen and healing was better in these patients in comparison to harvesting with open incision (Fig. 4). We tested radial arteries with their blood flow after cutting the distal end. We thought microscopic examination of proximal and distal ends of the radial arteries would be meaningless because preparation of these parts were not different from the open technique. Although the follow-up ranged from 28 to 33 months, control angiographies showed no problem

related to radial artery grafts. In our minimally invasive procedure, though longitudinal incisions are 1 to 2 cm longer than transverse ones in total length, this obviates the need for special instruments and endoscope, and shortens the operation time. Another disadvantage of our technique is a need for an assistant for exposure. We think that by decreasing complexity of the operation, this technique helps the surgeons willing to harvest minimally invasive radial artery for coronary bypass grafting which is a worldwide procedure today.

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