

Lipectomy Technique as a Second-stage Procedure for Primarily Matured, Deep Outflow Vein in Obese Individuals

Abstract

Prevalence of obesity is growing in the general population as well as among end-stage renal disease (ESRD) patients requiring dialysis. Obesity often leads to a situation when a mature outflow vein is located deeper than 6 mm and is difficult to cannulate. These obese patients usually require additional procedures to be able to successfully cannulate the fistula. The available surgical options include: outflow vein elevation, liposuction, and lipectomy. We present a case of a 57-year-old obese female with ESRD and matured, deeply running, inadequate for cannulation arteriovenous fistula. We present a technique of lipectomy with wide resection of adipose tissue from superior and lateral surfaces of outflow vein. Postoperatively, the skin without the underlying adipose tissue collapses allowing easy cannulation of the long segment of outflow vein with two needles. Lipectomy of mature but deeply located outflow vein is a second-stage elective procedure. Wide resection of adipose tissue helps create easy to access cannulation zone in obese individuals.

Keywords: Arteriovenous fistula, end-stage renal disease, hemodialysis, lipectomy, obesity,

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Introduction

Patients with end-stage renal disease (ESRD) on hemodialysis require adequate vascular access and the access of choice is arteriovenous fistula (AVF).^[1-3] Also, the prevalence of obesity is growing and is twice as common in the dialysis population as compared to the general population.^[4] Vascular accesses created in obese individuals are complex and have a higher failure rate.^[4] Obesity itself does not preclude AVF creation, but achieving recommended <6 mm of depth for outflow vein is often difficult.^[4-6] In obese ESRD patients, a matured outflow vein with the adequate flow is often located deeper than 6 mm and is difficult to cannulate. A surgical superficialization of a matured outflow vein is often needed for easy cannulation for dialysis.^[7] The superficialization techniques may be applied in each case, when the existing outflow vein is located under the thick layer of subcutaneous tissue and is too deep for cannulation, irrespective of AVF location.^[4,8,9] The various surgical options available include: outflow vein elevation, liposuction, and described below lipectomy.^[1-3,8]

We present technique of lipectomy emphasizing the necessity of wide resection

of adipose tissue not only from superior but also from lateral surfaces of outflow vein. This wide dissection ensures a wide cannulation segment including front along with side walls of the outflow vein.^[8]

Case Report and Presentation of Lipectomy Technique

We present a case of a 57-year-old obese female (H.M.) with ESRD and brachio-cephalic AVF on her left arm. Her matured outflow vein was located 11 mm beneath the skin surface and was not possible to cannulate. Following previous surgery, not associated with current treatment, a long scar remained along the entire medial surface of the left arm [Figures 1-4]. She was offered lipectomy to minimize the risk of injury to the matured outflow vein what may follow the preparation of a whole circuit of the vein required for vein elevation.^[4,8] Before surgery, the outflow vein was assessed using color Doppler ultrasound. The depth (11 mm), diameter (7–8 mm) as well as the flow volume (about 850 ml/min) were evaluated. The course of the vein was marked on the skin surface. The procedure was performed under local anesthesia with 1% lidocaine, electrocardiographic monitoring, and ultrasound guidance.

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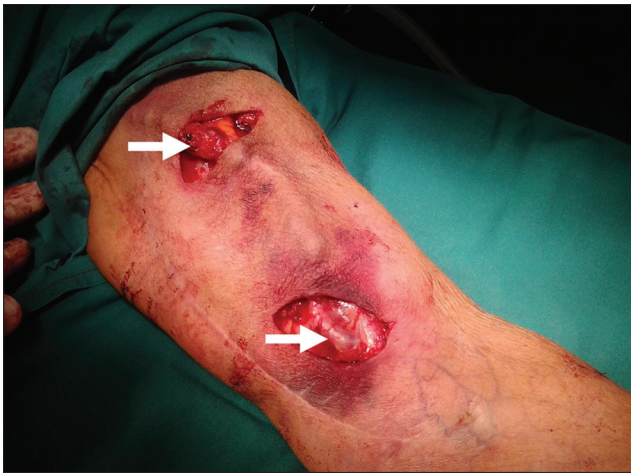


Figure 1: Crosswise skin incisions (15 cm apart) in the left arm. The matured outflow vein is exposed (arrows) and the overlying adipose tissue had been excised

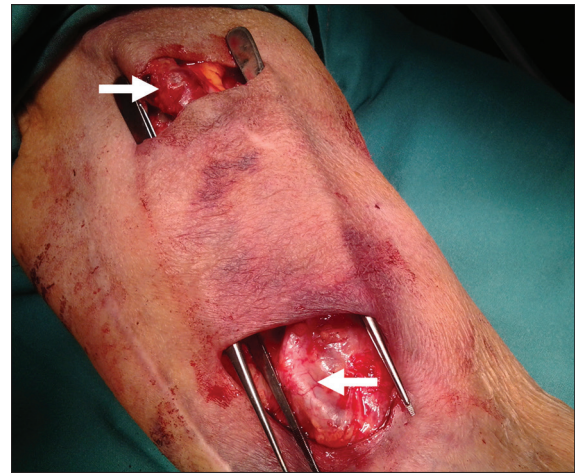


Figure 2: The outflow vein is exposed (arrows). The forceps introduced subcutaneously show the width of subcutaneous tissue dissection on both sides of outflow vein

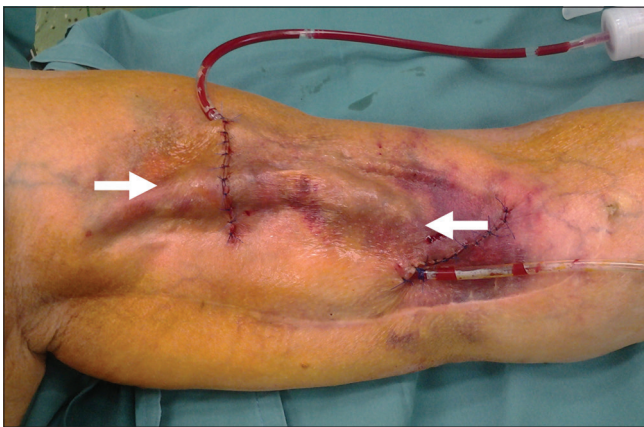


Figure 3: Wounds closed with suction drainage. The outflow vein (arrows) lifts a thin layer of skin above



Figure 4: Left arm arteriovenous fistula after long term use. The arrows mark the postoperative scars following lipectomy. The outflow vein is superficial and is can be easily seen, palpable, localized, and punctured. Arrowheads mark the border of collapsed skin without the adipose tissue beneath

We used two transverse incisions across the vein at the proximal and distal region of the outflow vein [Figure 1], although one incision in the middle of such vein segment may be applied in some cases. The goal was to obtain access to about 10–15 cm long segment of outflow vein. The subcutaneous tissue was gently separated from the skin to minimize the risk of skin contusion. The skin flap was elevated [Figure 2] and adipose tissue was dissected from the above and lateral sides of the vein and finally excised, to superficialize the outflow vein. A wide dissection ensures a long and superficial cannulation segment [Figure 2]. Adequate hemostasis was necessary to avoid hematoma formation. The incisions were closed with two suction drains along both sides of the vein [Figure 3]. Postoperatively, the skin without underlying adipose tissue collapsed [arrowheads in Figure 4] allowing an adequate cannulation with two needles during hemodialysis.

Discussion

The increasing incidence of obesity poses a challenge to treat ESRD patients with dialysis.^[4,6] Among obese ESRD

patients, a matured but deeply located outflow veins are often observed leading to difficult cannulation despite adequate flow and venous diameter. Various types of surgical procedures are needed to facilitate easy cannulation of otherwise inaccessible dialysis vascular access.^[7] KDOQI recommends “the rule of 6 s” (6 weeks after AVF creation the vein diameter should be at least 6 mm, the vein depth from the skin surface should not exceed 6 mm and the flow should be >600 mL/min). Facing this rule is increasingly rare. One of the reasons is increased incidence of obesity among patients with ESRD.^[5]

Lipectomy has been described as an alternative technique for superficialization. There are several advantages of lipectomy technique, for example, it minimizes the risk of fistula failure during a surgical intervention since preparation of the posterior surface of the vein is avoided and risk of vein injury reduced. The outflow vein is left on the surface of the fascia, which preserves its primary course and minimizes the probability of postoperative kinking

and subsequent AVF failure.^[4,8] Lipectomy technique is mostly addressed to patients with matured, deeply running vein under a thick layer of adipose tissue, but straight, not circuitous.^[4,8,9] A transverse or oblique incision [Figure 1] is preferred over a lengthwise incision to minimize the fibrous healing in the cannulation area. In our lipectomy technique, the subcutaneous tissue superior and lateral to the vein is dissected. The forceps introduced subcutaneously [Figure 2] shows the width of the subcutaneous tissue excision. Postoperatively, the skin without the adipose tissue beneath collapses and the vein is superficialized [Figure 3] and can be easily palpated and localized for cannulation during dialysis without ultrasound guidance [Figure 4]. This technique ensures a wide and long segment of outflow vein adequate for cannulation [Figures 3 and 4].

In our opinion, suction drainage [Figure 3] is necessary to prevent the formation of hematoma and keep the skin depressed over the previous AVF. Although necessary, drains may increase the risk of infection.^[8,10] We use one or two drains along each side of matured outflow vein.

We did not notice any skin necrosis following this procedure although there is a risk of such a complication.^[10] When skin necrosis occurs additional procedures (i.e., necrectomies or skin flaps) are required, delaying AVF cannulation and in rare cases abandonment.^[10]

Lipectomy provides better outcomes in comparison to prosthetic access devices.^[9] It should be considered as one of the alternatives for obese patients with an ESRD who require dialysis with adequate artery and vein diameter for AVF creation, but deep lying vein for future cannulations.^[8,11]

The disadvantage of lipectomy as well as similar procedures is permanent limb disfigurement as a consequence of adipose tissue resection and collapsing of the skin. Lack of subcutaneous tissue allows cannulation but can change the shape of the limb [Figure 4].^[4,8]

Conclusions

Lipectomy technique is a second stage elective procedure, performed when AVF has matured but remains too deep to cannulate. It avoids major surgical mobilization of the vein preventing damage and preserves primary course of the vein. It results in superficialization of the outflow vein allowing easy access for cannulation.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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