SP615

4 STEP SURGICAL TECHNIQUE TO CONTROL EXCESS VASCULAR ACCESS BLOOD FLOW

Kiyoshi Ikeda, Toru Yasuda

Ikeda Vascular Access Dialysis and Internal Medicine Clinic

Background

The number one cause of death in Japanese dialysis patients is heart failure which is 26.9% according to current data from 2013. Shunt Blood Flow is a serious burden on the heart, which has been evidenced to cause valvular disease and arrhythmia. This burden can be reduced through the appropriate blood flow control operation.

Aim

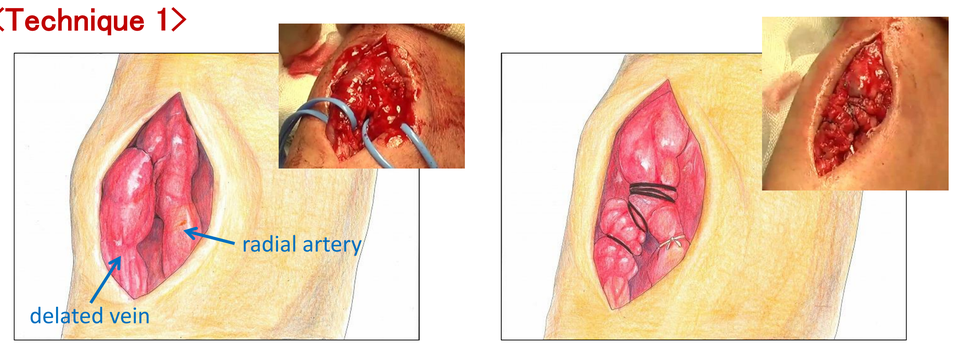
Using blood flow control techniques to reduce or eliminate these symptoms in vascular access patients with shunts.

Subject & Methods

In the event that a patient shows signs of arrhythmia, shortness of breath or both combined it is determined to operate using the 4 Step Technique. The number of patients was 6 (4 men, 2 women) including those introduced to our clinic. (Postoperative 6 months)

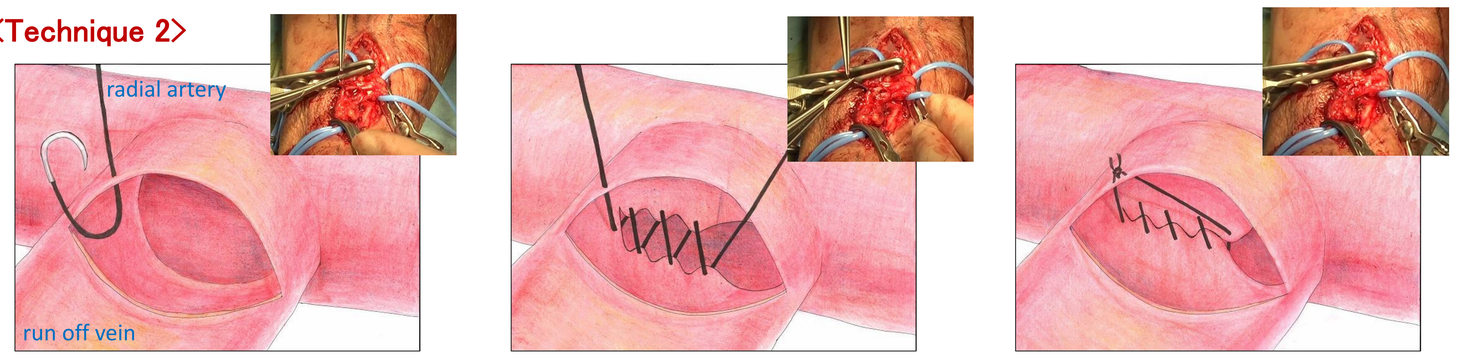
1. Binding the radial artery at the peripheral site. 2. Reducing shunt diameter. 3. Attaching an ePTFE graft at the center site (approx. 4cm) to limit artery expansion. 4. Changing graft or attaching EPTFE graft (approx. 4cm) at expanding vein point. Ultrasound was used to measure upper arm artery blood flow during operation to reduce blood flow rate to approx. 600ml/min.

<Technique 1>



First central site ligation using silk thread. Second, at point of aneurism on radial artery, control banding is applied using nylon thread. Third at dilated vein point control banding is applied using nylon thread at two points.

<Technique 2>



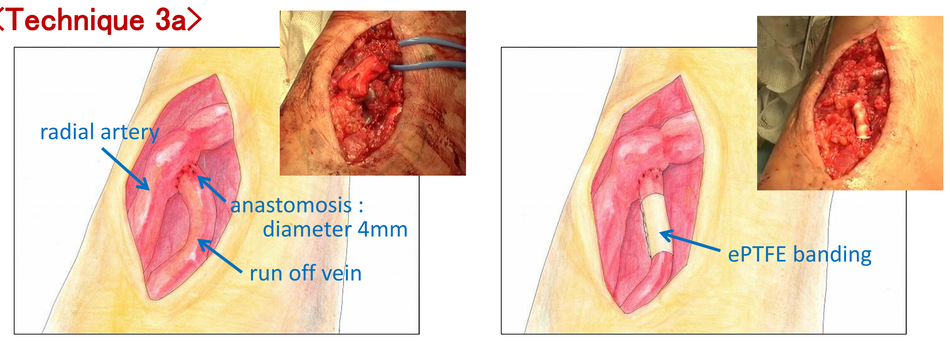
(Inner Window Suturing Technique)

Make the incision in the anterior wall of the vein side to the End to side anastomosis using outside passing technique with needle 6-0.

Anastomosis expansion is reduced by half as shown in Technique 2.

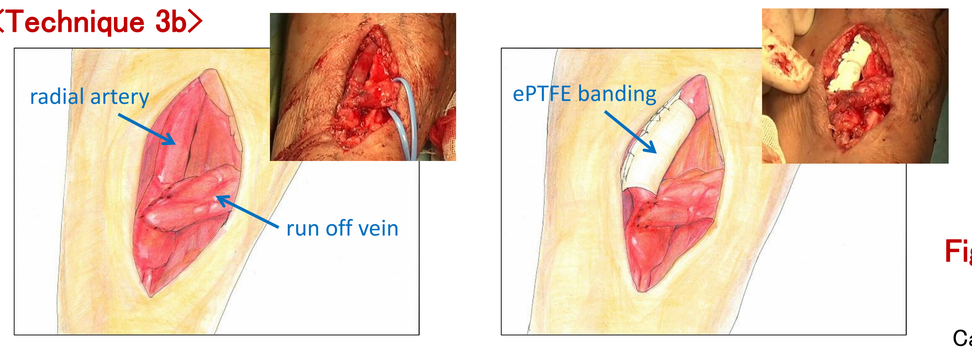
Large shunt diameter is the cause of excess blood flow, usually over 1500ml/min. This is a new technique using a variation of anastomosis to reduce shunt diameter. Through a small incision in the vein we can observe the shunt diameter. Using a bilateral needle we close the diameter of the shunt through the small incision by half using an outside inside suturing technique. After closing the small incision blood flow volume is measured. If the flow volume reduction is insufficient we use vein banding, artery banding or a combination of the two. 4cm banding graft is necessary. Thus we are able to control flow volume. In the event the flow volume is still too high radial arterial blood flow can be ligated.

<Technique 3a>



In cases when end to side anastomosis with diameter of 4 mm are performed and desired blood flow rate is not achieved, a 4cm ePTFE graft is then applied. (Technique 3a)

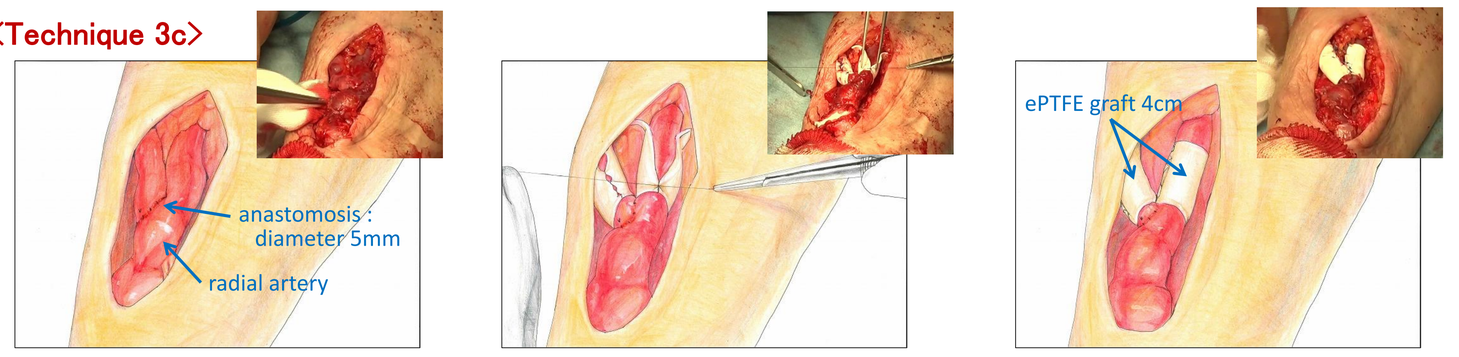
<Technique 3b>



After inner sewing is completed outer incision is then closed. Flow rate is then checked. In the event desired flow rate is not achieved ePTFE grafting combinations are then used.

In cases of Expansion of the proximal radial artery a 4 cm ePTFE graft is used in order to achieve a Blood flow rate of 700ml/min. (Technique 3b)

<Technique 3c>

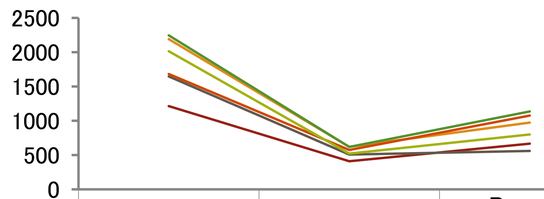


In cases where 5 mm diameter anastomosis are performed and both vein and arterial expansion are observed 4cm ePTFE grafts are used to regulate blood flow to 700ml/min. or less. (Technique 3c)

Fig 1. Comparison in Preoperative and postoperative 6 months

Case	Sex	Age	Flow Volume			CO		CI	
			Before	Post	Post six months	Before	Post six months	Before	Post six months
MS	F	46	2190	620	973	9.6	8.4	5.7	5.0
HS	M	46	1214	410	666	9.0	7.6	6.0	4.9
MK	M	75	1647	507	561	6.0	5.0	4.4	3.8
YI	F	58	2245	618	1136	6.5	7.2	5.1	5.6
RT	M	68	1681	575	1076	7.9	6.1	5.1	3.9
RH	M	52	2014	521	800	7.6	7.5	4.2	4.1
mean±SD		57.5 ±11.9	1831.8 ±392.6	541.8 ±80.0	868.7 ±230.5	7.8±1.4	7.0±1.2	5.1±0.7	4.5±0.7

Fig 2. Flow Volume



	Before	Post	Post six months
MS	2190	620	973
HS	1214	410	666
MK	1647	507	561
YI	2245	618	1136
RT	1681	575	1076
RH	2014	521	800
mean±SD	1831.8±392.6	541.8±80.0	868.7±230.5

<Technique 4>

(No photo)
Changing graft or attaching ePTFE graft (approx. 4cm) at expanding vein point.

Cardiac output in NiCAS had decreased in all cases except one. In this case an increase in blood pressure was observed after 6 months.

6 months after surgery, symptoms of general fatigue, palpitation and leg cramps were no longer present. In two cases there were no changes. In one case time needed for hemostasis decreased.

Results

Operation procedure reduced blood flow rate from 1831ml/min. to 541 ml/min. After 6 months the blood flow rate had increased to only 868 ml/min.

During operation heart monitoring 2 patients with arrhythmia returned to normal sinus rhythm. After operation 3 patient's shortness of breath improved and 4 patient's low blood pressure improved to acceptable levels. Remaining patients showed improvement of tachycardia within 6 months of the procedure.

Conclusion

Monitoring blood flow with ultrasound during the entire operation, we were able to use these 4 procedures in various combinations to reduce the blood flow rate to acceptable levels.

COI Disclosure
This presentation is not related to any company with a conflict of interest that should be disclosed.

52th ERA-EDTA Congress, May 30 2015, ExCel London