



VASC-ALERT ACCESS SURVEILLANCE CASE STUDY

PATIENT PROFILE

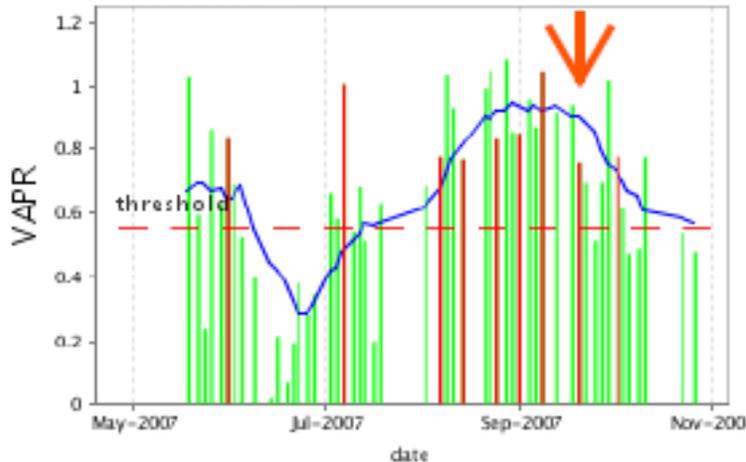
27 year old male
 Primary cause of ESRD:
 Dialysis start date:
 Dialysis access: Right upper arm brachiocephalic arteriovenous fistula
 Dialysis access placed: 7/9/89
 Treatment time: 3.25 hours/195 minutes 3 times per week
 Ordered BFR: 350 ml/min
 Kt/V result at time of intervention:

The patient had consistent alerts since transferring to his new dialysis unit several months ago. There were no other clinical signs or symptoms that were indicative of access dysfunction or stenosis until approximately two weeks prior to intervention when the patient began to have prolonged bleeding post dialysis. The patient also had acceptable flow monitoring results as indicated by the table below:

Date	Time	Δt (min)	Mode	Access Type	Text
9/21/07	5:34	151	Access flow	Fistula	AF=1210 mL/min. MAP: 74 (112/55)
9/21/07	5:32	149	Access flow	Fistula	AF=1080 mL/min. MAP: 74 (112/55)
9/21/07	5:30	147	Access flow	Fistula	AF=1480 mL/min. MAP: 74 (112/55)
9/21/07	5:27	143	Recirculation	Fistula	No access recirculation.
9/21/07	5:23		Session		Treatment began: 9/21/07 3:03 AM. Pump flow: 300 mL/min. Measured flow: 305 mL/min. Weight: 43 kg
7/20/07	5:39	119	Access flow	Fistula	AF=1260 mL/min. MAP: 89 (113/64)
7/20/07	5:37	116	Access flow	Fistula	AF=1120 mL/min. MAP: 89 (113/64)
7/20/07	5:35	114	Access flow	Fistula	AF=1350 mL/min. Repeat: Release more saline. MAP: 89 (113/64)
7/20/07	5:31	110	Recirculation	Fistula	No access recirculation.
7/20/07	5:27		Session		Treatment began: 7/20/07 3:40 AM. Pump flow: 300 mL/min. Measured flow: 305 mL/min. Weight: 44 kg
7/9/89			Initial	Fistula	Fistula right forearm.

VASC-ALERT DATA

Venous Access Pressure Ratio



This patient had multiple high readings and alerts issued by Vasc-Alert. In the above VAPR graph the vertical green and red lines indicate the average VAPR for the dialysis session. The vertical red lines occur on dates where an alert was issued. The horizontal red dashed line is a pre-set threshold value. The blue line is a moving average which is used to visualize the trend of the graph more easily. The red arrow indicates when an intervention took place. The dates on the graph are in month/year format. Gaps in data are typically due to a lack of source data (missed treatment or hospitalization) or incomplete source data. For example, calculations may not have been made due to missing access type, needle gauge or blood pressure data.

HISTORY AND EXAM

Reason for Presentation: Firstly, he is having elevated pressure ratios on Vasc-Alert studies that have been going on for a couple of months now. Secondly, he has had a couple of episodes of prolonged bleeding, about 20 minute's duration, after needle removal over the past couple of weeks.

Brief Physical Exam: The exam of the right upper arm reveals an AVF, brachial artery to cephalic vein. There are two regions of large aneurismal dilations from prior cannulations. There is a palpable thrill at the anastomosis and there is also a palpable thrill near the deltoid head. The fistula is somewhat firm and pulsatile in its early portions.

PROCEDURE

Patient was brought to the Procedure Room and placed on the procedure table supine with the left arm draped laterally over the radiolucent arm board. The left arm was prepped from chest wall to finger tips with Provadone and draped in the usual sterile manner. After 1% Lidocaine local infiltration, the fistula was cannulated with a 21-gauge needle 3 cms above the anastomosis. There was excellent return and the micropuncture wire advanced without resistance. The needle was exchanged for a 5-French sheath over the wire and the introducer and the wire were removed intact. The sheath aspirated and flushed with saline.

Following this, serial overlapping digitally subtracted angiographic images were obtained of the AVF as well as the venous outflow to the level of the heart. The fistula was also occluded above the level of the sheath and contrast injected in a retrograde fashion so as to view the early portion of the fistula as well as the anastomosis and feeding artery.

It was determined there would be angioplasty required in the region of the mid-upper arm as described. A Bentson wire was initially advanced via the 5-French sheath into the fistula. The 5-French sheath was exchanged over the Bentson wire for a 7-French sheath after a small nick was made in the skin with an 11-blade. The introducer was removed intact. The tip of the Bentson wire would not traverse properly through the cephalic vein as it was traversing the clavicular space. A Selective imaging catheter was advanced over the wire and the wire was removed intact. Contrast was injected directly into the subclavian vein to more specifically view that region and to make sure that we were not missing any stenoses. The region was widely patent but simply had a very tortuous flow with a lot of collateral flow towards the neck and also towards the chest wall. It was decided, therefore, to use a Zip nimble type wire. The hydrophilic wire was advanced via the Selective catheter and advanced into the subclavian vein. The Selective catheter was removed over the wire and the sheath was left in place. By steering the wire at the level of the sheath and advancing it we were able to advance the tip of the wire into the innominate and then SVC. The tip of the wire was parked at the juncture of the SVC and right atrium.

The Bard Conquest balloon was prepared and advanced over the guide wire and centered upon the stenotic regions. The initial inflation to full effacement required 21 atm and there was a significant waisting noted in route to effacement. Once the balloon effaced it was immediately deflated. The fistula was examined and found to have widely patent flow with no evidence of

hematoma. The balloon was reinflated and easily effaced and advanced to the full 20 atm and pressure maintained for 1 full minute. The balloon was deflated and the inflation was repeated for one more 1 minute inflation. At this point, the balloon was deflated and withdrawn over the wire intact. Post-angioplasty angiography revealed total resolution of the stenotic region but there was noted a region of spasm downstream. We could not 100% ascertain that this was not stenosis that we had missed as it had exactly the same appearance of the stenosis that we treated and so the balloon was advanced to this region and inflated and it effaced at 2 atm; it was, therefore, determined that indeed this was simply spasm and not true stenosis. The balloon was therefore deflated at this point. We wanted to make absolutely certain that there was not stenosis at the clavicular notch so we did advance the 7 mm diameter balloon to that region inflated and again, effacement was easily achieved at 2 atm. Inflation was, therefore abandoned and the balloon was deflated and withdrawn and removed intact. Post-angioplasty angiography revealed no extravasation of contrast.

Because of the patient's substantial cardiac risk factors including ESRD, hypertension and long standing dialysis dependence, he was deemed appropriate cardiac risk to warrant EKG monitoring, which was undertaken throughout the case. The patient remained stable throughout and in sinus rhythm. Incidentally, this patient did not require any sedatives or analgesics to appropriately perform his angioplasty procedure and remained stable and was discharged in stable condition.

FINDINGS

There was a 2 cm long segment of 90% stenosis in the mid-upper arm just above the region of the aneurismal dilation basically at the lower margin of the deltoid head. This was treated with angioplasty using a 7 X 40 Bard Conquest balloon. Final result was 0% residual stenosis. There was some spasm downstream from the treated stenosis. We did briefly angioplasty there but there was no evidence of any waisting of the balloon and so we did not continue to angioplasty this region. There were no complications.

SUMMARY

The patient was sent for access angiography and found to have a hemodynamically significant stenosis that was treated by angioplasty. Shortly after intervention the patient's VAPR results decreased.