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## Vasc-Alert Statistics

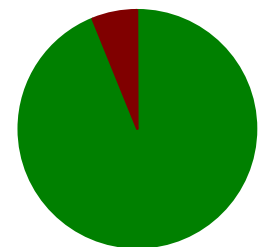
The following data was collected at the Ball Memorial Hospital dialysis centers in central Indiana. There were 154 patients being reported on from July 2006 through February 2007, and the statistics are based on the patients that were referred for study based on Vasc-Alert results.

Patients sent for angiography based on Vasc-Alert: 64

Patients requiring intervention: 60

Accuracy / True positive: 94%

False positive: 6%



■ True Positive ■ False Positive

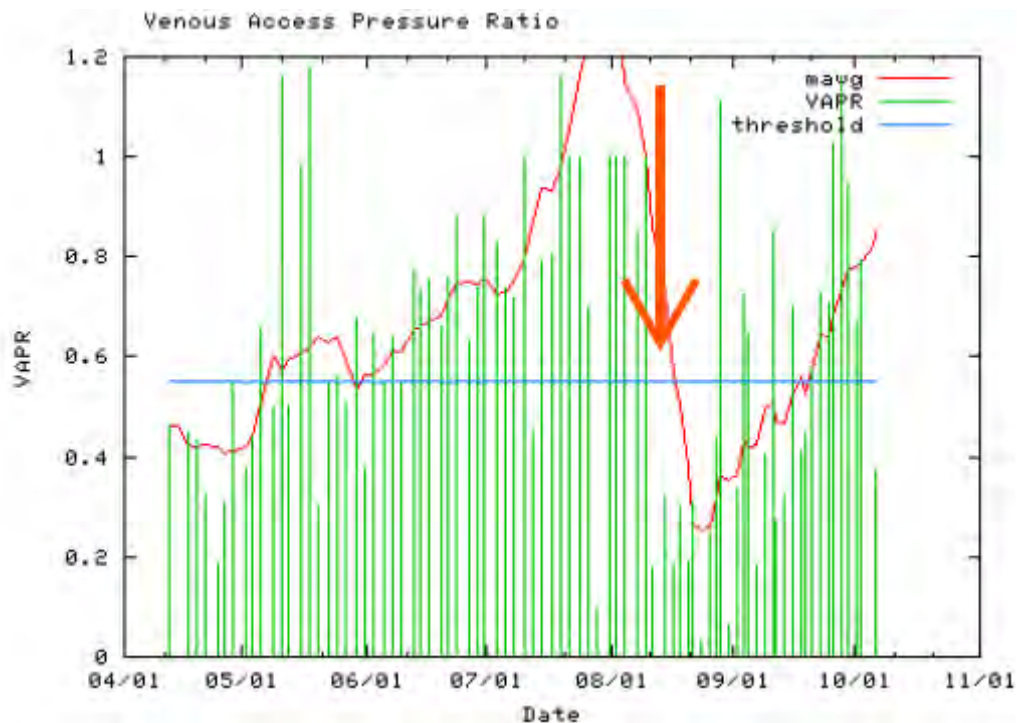


## VASC-ALERT ACCESS SURVEILLANCE CASE STUDY

### PATIENT PROFILE

76 year old female  
Primary cause of ESRD: Hypertension  
Dialysis start date: 5/09/02  
Dialysis access: Left upper arm arteriovenous fistula  
Dialysis access placed: 3/20/01  
Access revision: 1/17/07  
Treatment time: 3 hours/ 180 minutes 3 times per week  
Ordered BFR: 400 ml/min  
Kt/V result at time of intervention: 1.8

### VASC-ALERT DATA



This patient had multiple high readings and alerts issued by Vasc-Alert. In the above VAPR graphs each vertical green line indicates the average VAPR for the dialysis session. The horizontal blue line is a pre-set threshold value. The red 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/day format.

There were no clinical signs or symptoms that were indicative of access dysfunction or stenosis (e.g. no increase in venous pressure, no excessive bleeding, no decrease in blood flow, no difficulty in cannulation, no decrease in Kt/V), but the patient had consistent alerts and an increasing trend in VAPR results above threshold. The patient was sent for a fistulogram on 8/03/06 based solely on Vasc-Alert results and was determined to have significant stenosis, so an angioplasty was performed. The red arrow on the graph indicates the drop in VAPR values below the threshold immediately after a fistulogram and angioplasty.

## **PROCEDURE**

The patient's left upper arm dialysis fistula is accessed near its site of origin near the antecubital fossa. Through this, contrast is injected and multiple images of the fistula are taken, including the major draining veins of the left upper extremity. Using the same approach, fistula angioplasties are done of the abnormalities described below. Access catheter remains in place for use during hemodialysis, which is anticipated immediately following this procedure.

## **FINDINGS**

There is a patent and well-developed left upper arm dialysis fistula, which appears to be a brachial basilic fistula. There is no excessive collateral formation. No inflow restriction seen from the distal brachial artery.

There are two adjacent areas of tight concentric narrowing of the fistula at its outflow to the subclavian vein. One of these is 15 millimeters in length with 90% concentric narrowing. Immediately peripheral to this is an 8 millimeter 80% concentric narrowing.

Above narrowings are brought to native caliber (8 millimeters) using conventional techniques. Following this, there is reduction in pulsatility, and improvement in flow angiographically.

## **IMPRESSION**

1. Patent left upper arm brachial basilic fistula.
2. Two adjacent areas of tight concentric narrowing are seen at the venous outflow to the left subclavian vein.
3. Above narrowing is brought to native caliber using conventional techniques.
4. No central venous obstruction is seen with the subclavian and innominate veins normal.

## **SUMMARY**

The patient was sent for access study based on Vasc-Alert results and found to have two hemodynamically significant stenoses of 80 and 90% that were treated by angioplasty. Shortly after intervention the patient's VAPR results returned to normal and fell below the threshold.

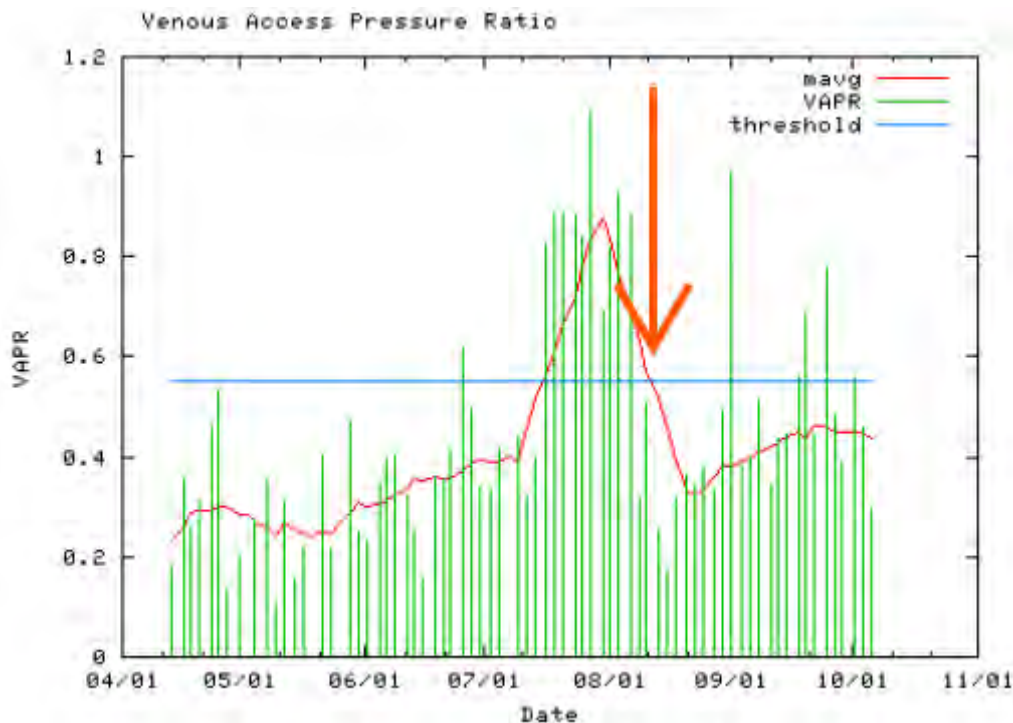


## VASC-ALERT ACCESS SURVEILLANCE CASE STUDY

### PATIENT PROFILE

42 year old female  
Primary cause of ESRD: Type 2 Diabetes  
Dialysis start date: 1/31/03  
Dialysis access: Left upper arm arteriovenous fistula  
Dialysis Access placed: 11/19/02  
Treatment time: 4 hours / 240 minutes 3 times per week  
Ordered BFR: 400 ml/min  
Kt/V result at time of intervention: 1.8

### VASC-ALERT DATA



This patient had multiple high readings and alerts issued by Vasc-Alert. In the above VAPR graphs each vertical green line indicates the average VAPR for the dialysis session. The horizontal blue line is a pre-set threshold value. The red 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/day format.

There were no clinical signs or symptoms that were indicative of access dysfunction or stenosis (e.g. no increase in venous pressure, no excessive bleeding, no decrease in blood flow, no difficulty in cannulation, no decrease in Kt/V), but the patient had consistent alerts and an increasing trend in VAPR results above threshold. The patient was sent for a fistulogram on 8/11/06 based solely on Vasc-Alert results and was determined to have significant stenosis, so an angioplasty was performed. The red arrow on the graph indicates the drop in VAPR values below the threshold immediately after a fistulogram and angioplasty.

## **PROCEDURE**

The patient's left upper arm dialysis fistula is accessed near its presumed origin near the antecubital fossa. Through this, contrast is injected and images are taken of the fistula, arterial inflow, venous outflow and the major draining veins of the left upper extremity. Same approach is used for conventional angioplasty of venous outflow obstruction described below.

## **FINDINGS**

There is a well developed brachiobasilic fistula consistent with a basilic vein transposition. Its diameter for the majority of its length is 18 - 20 mm.

There is some irregularity and tapering of the arterial inflow from the distal brachial artery which shows relative narrowing to a diameter of 2 - 3 mm for its initial 2 cm.

There is 90 degree angulation at the venous outflow to the proximal brachial vein (the deep draining vein). Also, there is web-like narrowing with 90% narrowing at this site.

The major draining veins including the axillary, subclavian and innominate veins are normal to superior vena cava.

The outflow narrowing described above is dilated up to 8 mm (native caliber of the deep outflow vein) with moderate improvement in caliber and flow but a significant residual narrowing.

## **IMPRESSION**

1. Status post basilic vein transposition. Well developed arterialized vein peripherally without excessive collateral formation.
2. Moderate concentric narrowing to 3 mm diameter of the initial 17 - 18 mm of the fistula.
3. Acute angulation and concentric narrowing of the outflow to the deep, proximal brachial vein providing outflow obstruction as suspected clinically.
4. Outflow obstruction dilated to native caliber of the deep draining vein with only moderate improvement angiographically.
5. No central venous obstruction seen.

## **SUMMARY**

The patient was sent for access study based on Vasc-Alert results and found to have a hemodynamically significant stenosis of 80% that was treated by angioplasty. Shortly after intervention the patient's VAPR results returned to normal and fell below the threshold.