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Vasc-Alert Statistics

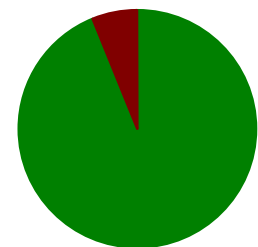
The following data was collected at the Ball Memorial Hospital dialysis centers in central Indiana, which are part of National Renal Alliance. There were 154 patients being reported on from July 2006 through February 2007, and the statistics are based on the patients that were referred for study based 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

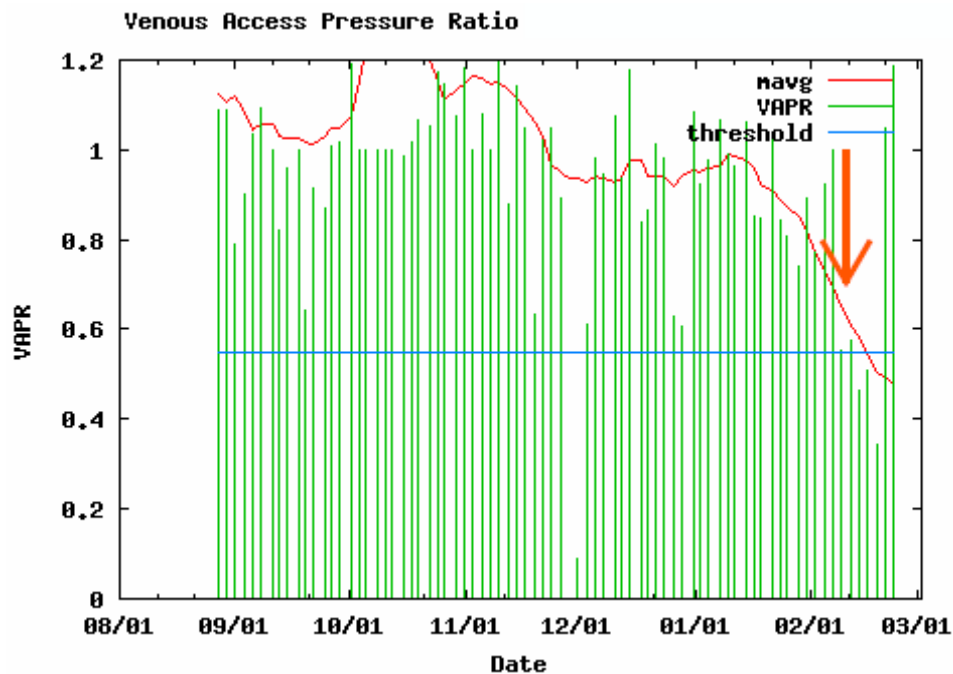


VASC-ALERT ACCESS SURVEILLANCE CASE STUDY

PATIENT PROFILE

59 year old male
Primary cause of ESRD: Type 2 Adult Onset Diabetes
Dialysis start date: 3/27/06
Dialysis access: Left upper arm arteriovenous fistula
Dialysis access placed: 6/29/05
Treatment time: 3.5 hours/210 minutes 3 times per week
Ordered BFR: 500ml/min
Kt/V result at time of intervention: 1.2

VASC-ALERT DATA



This patient had multiple high readings and alerts issued by Vasc-Alert. In the above VAPR graph 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 extremely high VAPR results. The patient was sent for a fistulogram on 2/7/07 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 fistula is accessed near its presumed origin near the antecubital region. Through this, contrast is injected and multiple images of the fistula are done including the major draining veins of the left upper extremity. The same approach is used for angioplasty of a lesion described below.

FINDINGS

There is a well-developed brachial basilic fistula without excessive collateral formation. Inflow appearance is stable and widely patent with free reflux to the distal brachial artery.

There is recurrent, tight narrowing at the fistula outflow to the upper brachial vein near the left axilla with 90% concentric narrowing. This lesion is redilated to native caliber of the fistula (9mm) with improved flow and caliber but there is some residual narrowing suggesting elastic nature of this abnormality.

The left axillary, subclavian and innominate veins are normal.

IMPRESSION

1. Recurrent, tight, concentric constriction of fistula outflow to the upper brachial vein near the left axilla.
2. Above narrowing dilated to native caliber including high pressure technique with some residual elastic narrowing but flow is improved angiographically.
3. 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 90% that was treated by angioplasty. Shortly after intervention the patient's VAPR results returned to normal and fell below the threshold.

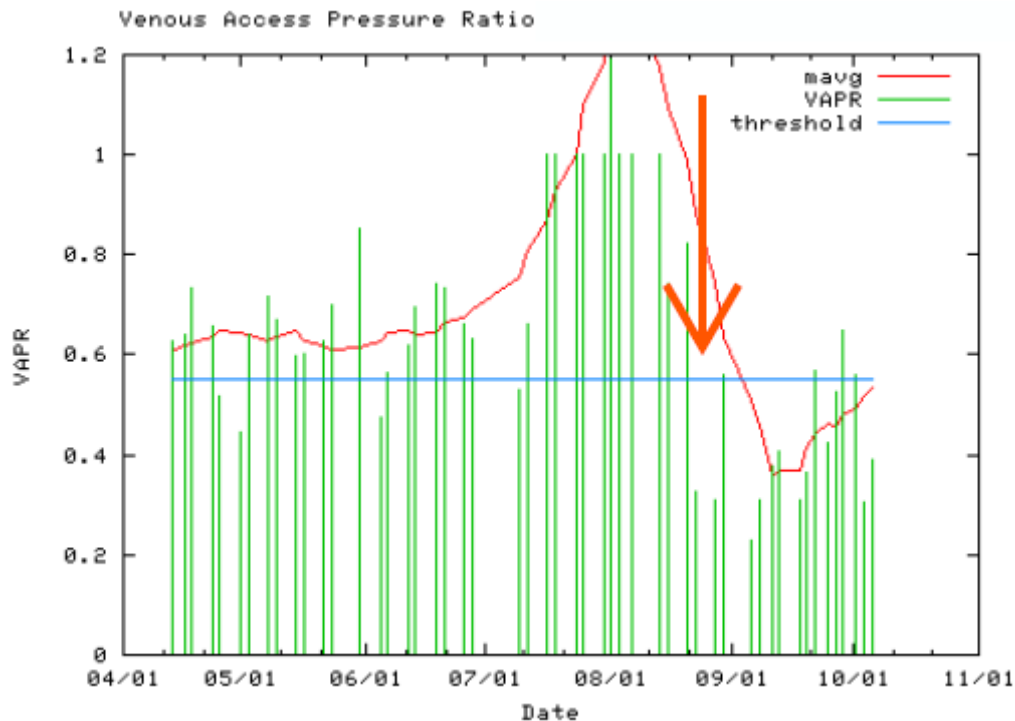


VASC-ALERT ACCESS SURVEILLANCE CASE STUDY

PATIENT PROFILE

75 year old female
Primary cause of ESRD: Hypertension
Dialysis start date: 2/01/03
Dialysis access: Left upper arm arteriovenous fistula
Dialysis access placed: 3/12/04
Treatment time: 3.5 hours/210 minutes 3 times per week
Ordered BFR: 400ml/min
Kt/V result at time of intervention: 1.5

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 8/23/06 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 left upper arm dialysis fistula is accessed near its presumed origin near the antecubital region. Through this, contrast is injected and images are done of the fistula as well as the major draining veins of the left upper extremity. Using the same approach, a lesion at the venous outflow is dilated using conventional techniques and balloon venotomy.

FINDINGS

There is a well-formed arterialized vein which appears to be a brachio basilic vein. There is no excessive collateral formation. There is no evidence of inflow restriction on this examination. There are two, adjacent, tight narrowing at the venous outflow with 90% concentric narrowing each. One of these is at the peripheral end of an indwelling stent placed within the draining vein, the axillary vein in the left axillary region. Second stenosis is within the stent itself, having a typical appearance for intimal hyperplasia.

The remainder of the central veins including the remainder of the axillary vein, subclavian vein and innominate veins are normal.

Above narrowings are obliterated with a combination of conventional angioplasty and balloon venotomy through the area of intimal hyperplasia to native caliber (6 - 7 mm).

Completion shuntogram shows improvement in flow and reduction in fistula pulsatility. Mild residual narrowing seen within the old stent.

IMPRESSION

1. Two, adjacent, tight outflow narrowings of a left upper arm fistula to the left axillary vein.
2. Above narrowings are obliterated using conventional techniques - please see above description.
3. 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 90% that was treated by angioplasty. Shortly after intervention the patient's VAPR results returned to normal and fell below the threshold.

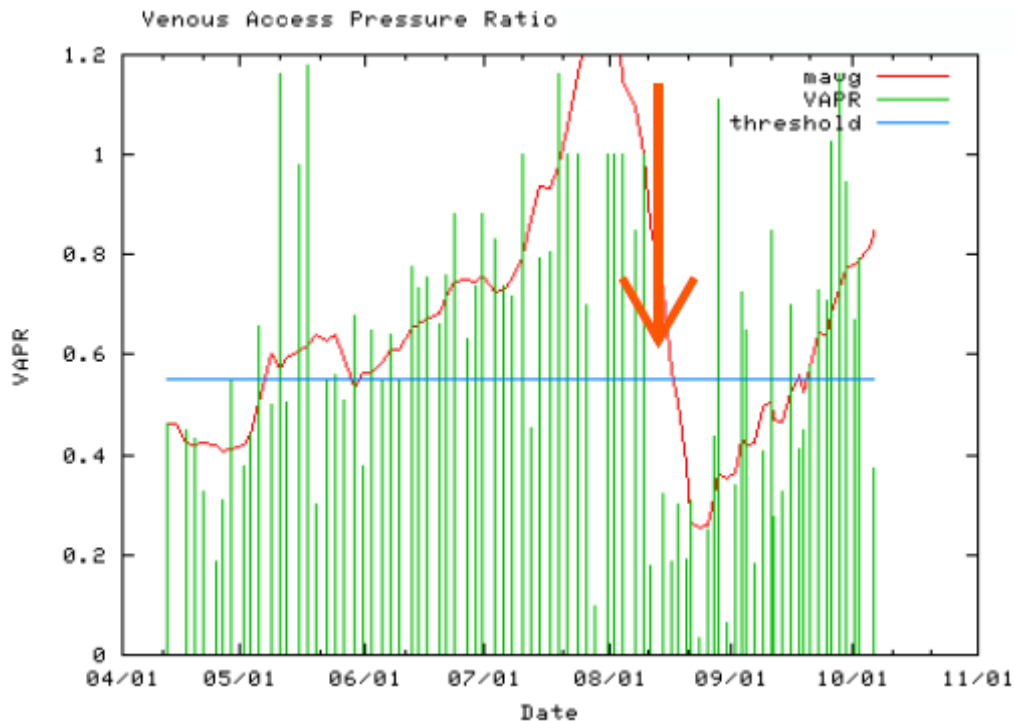


VASC-ALERT ACCESS SURVEILLANCE CASE STUDY

PATIENT PROFILE

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.

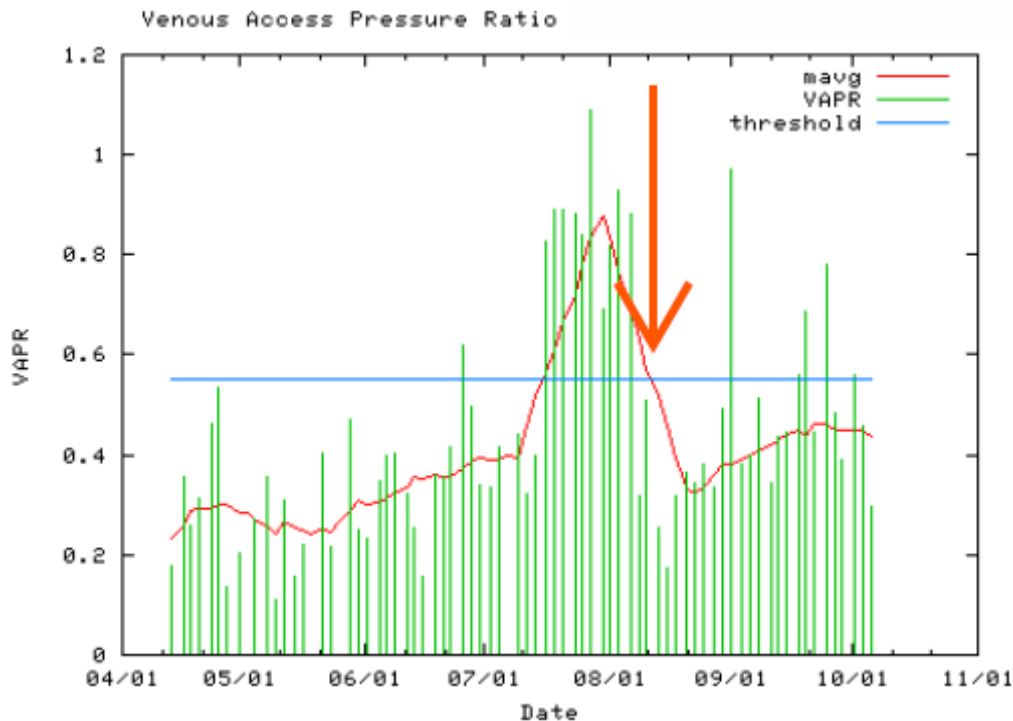


VASC-ALERT ACCESS SURVEILLANCE CASE STUDY

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.

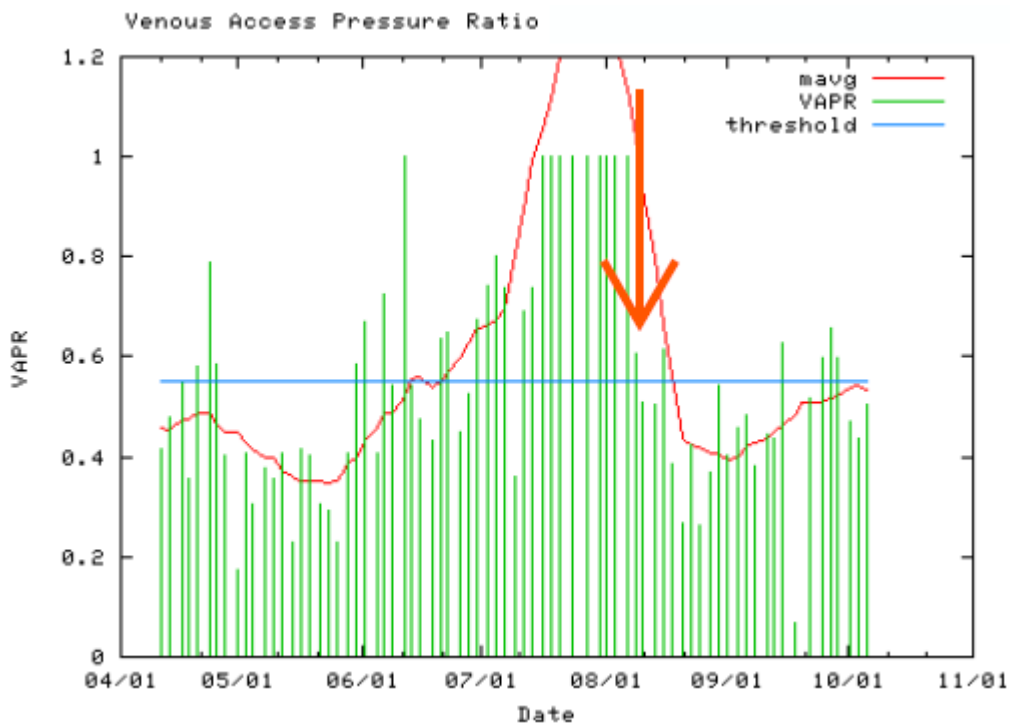


VASC-ALERT ACCESS SURVEILLANCE CASE STUDY

PATIENT PROFILE

60 year-old female
Primary cause of ESRD: Type 2 Diabetes
Dialysis start date: 10/07/05
Dialysis access: Left upper arm arteriovenous fistula
Dialysis access placed: 8/30/02
Treatment time: 3.5 hours / 210 minutes 3 times per week
Ordered BFR: 450 ml/min
Kt/V result at time of intervention: 1.49

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 8/04/06 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 region. Through this, contrast is injected and images are taken of the entire fistula and the major draining veins of the left upper extremity. The same approach is used for fistula angioplasty in the outflow region described below.

FINDINGS

There is a well formed brachio basilic fistula. No excessive collateral formation is seen. There is an irregular narrowing where the fistula drains to the axillary vein near the left axilla with 80% eccentric narrowing here.

No inflow restriction is seen with rapid reflux of contrast and washout from the distal brachial artery.

The major draining veins of the left upper extremity including the axillary, subclavian and innominate veins are normal.

The outflow narrowing of the fistula is obliterated with the use of conventional angioplasty necessitating high pressure technique. This is brought to near-native caliber (9 millimeters). Caliber inflow is improved following angioplasty.

IMPRESSION

1. Severe outflow restriction of a brachio basilic fistula near the left axilla. This is described in detail above.
2. Above narrowing obliterated with conventional techniques.
3. No inflow restriction detected on this examination.
4. No central venous obstruction is seen. 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 of the fistula are taken. Images are also taken of the major draining veins of the left upper extremity to superior vena cava. Using the same approach, angioplasty is done of an outflow narrowing described above.

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.

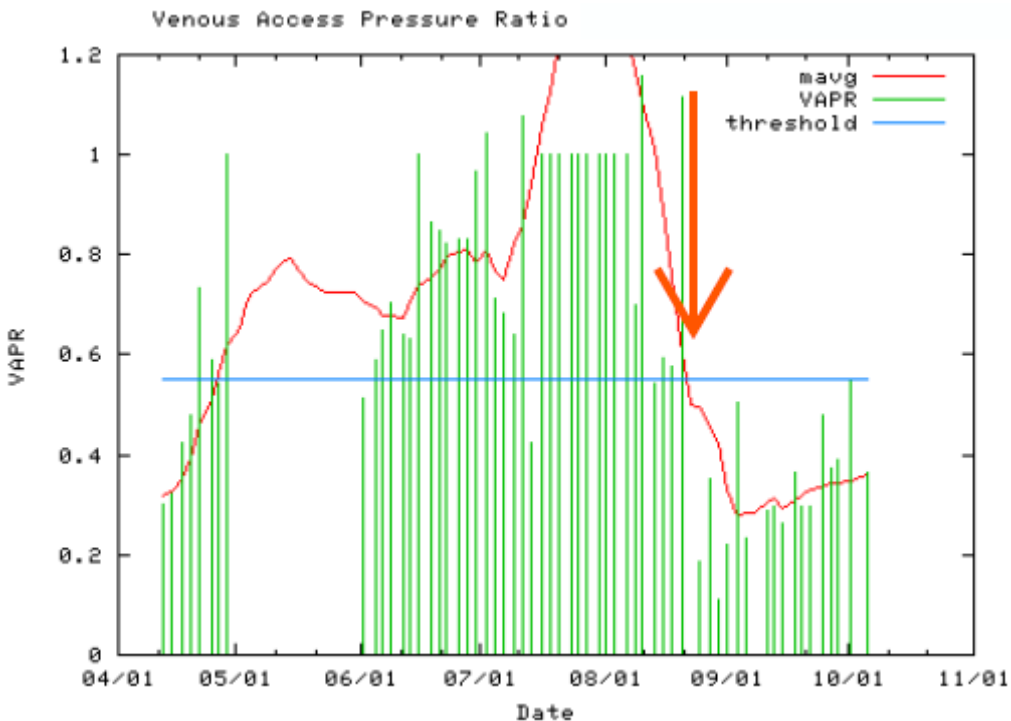


VASC-ALERT ACCESS SURVEILLANCE CASE STUDY

PATIENT PROFILE

69 year old male
Primary cause of ESRD: Type 2 Diabetes
Dialysis start date: 2/13/06
Dialysis access: Left upper arm arteriovenous fistula
Dialysis access placed: 11/22/05
Treatment time: 4.25 hours / 455 minutes 3 times per week
Ordered BFR: 400 ml/min
Kt/V result at time of intervention: 2.0

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 of VAPR results above threshold. The patient was sent for a fistulogram on 8/23/06 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 shunt is accessed near its presumed origin near the antecubital region. Through this, contrast is injected and images of the shunt are taken as well as the major draining veins of the left upper extremity. Using the same approach, imaging is done of the major draining veins of the left upper extremity. Using the same approach, angioplasty is done of an outflow lesion described below.

FINDINGS

The access shunt is patent with no stenosis but there is moderate deterioration of its mid portion with small umbilications at previous access puncture sites. There is tight narrowing at the venous outflow which is to the axillary vein with 80% concentric narrowing here.

Left axillary vein, subclavian vein and innominate veins are otherwise normal. There is no evidence of inflow narrowing on this procedure angiographically.

Patient is sent for hemodialysis immediately following this procedure. The outflow narrowing is dilated to native caliber (6 mm) using conventional techniques.

Completion sonogram shows elimination of stenosis, improvement in flow and elimination of collateral drainage pathways.

IMPRESSION

1. Tight concentric narrowing at the venous outflow of the graft to the left axillary vein.
2. Above narrowing obliterated with the use of conventional techniques.
3. No central venous obstruction seen.
4. Mild deterioration of the central portion of the graft, described above.

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.