ANSWERS: MCQs with answers in red font dated May 19, 2025

1. In general, the incidence of symptomatic steal from a distal radial artery-based AV access is:
    a. >33%
    b. Between 15% and 33%
    c. Between 5% and 15%
    d. <5%

2. You are handed a BLUE colored sheath. The diameter of the sheath is:
    a. Depends on the manufacturer.
    b. 7F
    c. 8F
    d. 6F

3. The most common cause on an upper limb graft thrombosis is:
    a. Arterial anastomotic stenosis
    b. Venous anastomotic stenosis
    c. Central venous stenosis
    d. Intra-graft Stenosis

4. An upper arm brachio-cephalic AVF has developed a large aneurysm. The most likely contributing and most important cause of this phenomenon is:
    a. Outflow stenosis commonly at the cephalic vein arch
    b. The patient's poorly controlled hypertension
    c. Lack of access cannulation skills
    d. The ubiquitous use of anticoagulants in the patient

5. The best location for a covered stent to land in the venous outflow tract is
    a. In a small vein to dilate it open
    b. Right at a valve to tack the valve leaflets open.
    c. In the nearest larger than stent diameter vein
    d. Does not matter if you are in the outflow tract.

6. A patient presents with increased bleeding and pulsatile fistula in the left upper arm brachio-basilic AVF. The patient has no arm swelling. On angiography there is a >80% stenosis of the proximal venous swing segment and a 60% stenosis of the innominate vein without large collaterals present. You should angioplasty:
    a. The innominate vein stenosis only
    b. Both the innominate vein and basilic vein stenosis
    c. Neither the innominate nor basilic vein stenosis
    d. The Basilic vein stenosis only

7. You have a choice to place either a human cryopreserved femoral vein or a bovine femoral artery in a patient for their AV access. What is the risk regarding increasing the patient's PRA (Percent Reactive Antibody):
    a. There is no risk in using either conduit.
    b. The human vein can increase PRA while the cow artery will not.
    c. The cow artery can increase PRA while the human vein will not.
    d. Increasing a patient's PRA is not a concern of an access surgeon.

8. You have constructed a right upper arm straight AVG under regional anesthetic. In the recovery room, the patient describes excruciating pain in the distal extremity after the block has worn off and has ulnar nerve distributed dysfunction, but a warm hand with a good radial pulse. The most likely cause of this situation is:
    a. Nerve irritation from the regional anesthesia which will resolve.
    b. Mild access associated steal which will get better with exercise.
    c. Significant steal which requires immediate access banding
    d. Ischemic monomelic neuropathy which requires immediate access ligation.

9. An example of a paradoxical embolus during thrombectomy procedure in AV access is:
    a. The arterial plug embolizing through patent foramen ovale to the middle cerebral artery
    b. The arterial plug embolizing distally to the junction of the radial and ulnar arteries
    c. The access thrombus embolizing into the lung
    d. The arterial plug embolizing retrograde into the proximal brachial artery.

10. A 75-year-old right-handed diabetic male who underwent CABG using his left radial artery has a creatinine of 3.0. (Of the options presented, what is the best access site for this patient:
    a. Left forearm ulnar-basilic AVF.
    b. Left upper arm at the antecubital fossa brachio-cephalic fistula.
    c. Left upper arm loop graft.
    d. Right arm access

11. The incidence of high bifurcation of the brachial artery is:
    a. >50%
    b. <5%
    c. 10%-20%
    d. 30-40%

12. The nerve that traverses in the upper arm adjacent to the basilic vein is:
    a. The median nerve
    b. The ulnar nerve
    c. The radial nerve
    d. The median antebrachial cutaneous nerve

13. All these procedures are treatments of arterial steal EXCEPT:
    a. Coil embolization of fistula collaterals
    b. MILLER procedure
    c. DRIL procedure
    d. Arterial Anastomosis Proximalization (PAI procedure)

14. After placing an AV access based in the antecubital fossa, the patient is unable to flex his index and middle finger and unable to oppose his thumb. The most likely nerve involved is:
    a. The ulnar nerve
    b. The radial nerve
    c. The median nerve
    d. The 12th cranial nerve

15. A fistula may be considered suitable for cannulation at 6 weeks if it has all of the properties EXCEPT:
    a. >5mm diameter
    b. >500ml/min flow
    c. >3inches of usable vein>10mm deep to the skin
    d. 2 aneurysms with normal skin cover

16. The optimal site to band an AV fistula for arterial steal is:
    a. near the arterial anastomosis
    b. at the midpoint of the fistula
    c. at the furthest point away from the arterial anastomosis as possible
    d. There is no optimal point, perform ligation.

17. You are asked to place a dialysis catheter in a patient. Of the choices provided, as a basic rule which is the worst site:
    a. Right Internal Jugular vein
    b. Left Subclavian vein.
    c. Left Internal Jugular vein.
    d. Right subclavian vein

18. A patient-initiated dialysis in hospital 2 weeks ago through a right dual lumen catheter. You have been asked and can place an upper arm AV fistula. On

admission, the patient's platelet count was 430,000/cc; it is now 55,000/cc. Your concern is:

a. none – it is transient due to starting dialysis.
b. the patient is hemorrhaging and needs a work-up.
c. the patient has developed leukemia and needs a work-up.
d. the patient has developed HIT and needs a work-up.

19. The nominal pressure for an angioplasty balloon is:

a. 0-3atm
b. 3-5atm
c. 5-10atm
d. >10atm

20. **A dark color skin patient develops white skin overlying a cannulation zone over an aneurysmal area in an upper arm fistula. (pictured below) This is caused by:**

a. Depigmentation and is not concerning if skin is healthy.
b. Squamous cell cancer
c. Skin breakdown and it is the fistula wall.
d. This does not occur in African patients.

21. Placing a covered stent in a cannulation zone of an AV graft to exclude a pseudo aneurysm is:
    a. The treatment of choice and can be done without concern.
    b. A treatment option but must be done considering the loss of the cannulation zone.
    c. Can never be done due to risk of infection of the pseudo-aneurysm.

d. Should be done only if a bare metal stent is used instead.

22. A patient with a forearm fistula for 7 years notices an increase in the prominence of the veins in his forearm for 1 month. He has no bleeding issues and his urea clearance is good. On angiography, he is found to have an occluded cephalic vein above the elbow with retrograde flow into the forearm and deep brachial system. You should:
    a. do nothing further and follow patient for development of future problems.
    b. perform a fistula turndown procedure into the brachial vein system at the elbow.
    c. perform a side-to-side jump graft with 6mm PTFE between the fistula and the deep brachial system.
    d. attempt to pass a wire through the occluded cephalic vein and if successful angioplasty the vein open all the way to the cephalic arch.

23. During a thrombectomy procedure of an upper arm graft, the patient loses a previously present radial pulse. The likely cause is:
    a. The re-establishment of flow in the AVG shunting blood from the distal arterial tree
    b. An arterial plug embolus that will need to be removed through open or endovascular technique.
    c. An arterial plug embolus will resolve on its own after heparin administration.
    d. A transient small intra-graft embolus which will resolve on its own after heparin administration.

24. During an angioplasty of a tight brachiocephalic vein or innominate vein stenosis, you see on follow-up angiography significant contrast extravasation. You:
    a. Remove wire and observe patient for 10 minutes for symptoms.
    b. Perform immediate thoracotomy.
    c. Perform immediate median sternotomy.
    d. Perform immediate covered graft stenting of the innominate vein.

25. A patient presents 6 weeks after placement of a left upper arm AV fistula with a 1-week history of left-hand pain and numbness. His hand is warm, and he has a good radial pulse. The best treatment course is:
    a. ligation of fistula for monomelic neuropathy
    b. DRIL procedure for arterial steal
    c. Angiogram for possible subclavian artery stenosis
    d. EMG evaluation for possible carpal tunnel syndrome or swelling induced neuropathy exacerbation.

26. What does DSA mean?
    a. Direct Subtraction Angiography
    b. Digital Subtraction Angiography
    c. Distal Subtraction Angiography
    d. Diagnostic Subtraction Angiography

27. Where should your dosimetry badge be worn? Ask a radiologist or medical physicist for right answer.
    a. Collar level underneath lead
    b. Waist level outside lead
    c. Collar level outside lead
    d. Chest level outside lead

28. Using DSA gives off more radiation than continuous fluoroscopy when using a C-arm.
    a. True
    b. False

29. What are the primary means of eliminating or reducing radiation exposure?
    a. Time
    b. Distance
    c. Shielding
    d. All the above

30. Which Fluoroscopy setting is going to give off less radiation?
    a. Continuous
    b. 8pps
    c. 15 pulse per second
    d. 4 pulse per second

31. The patient is a 35-Year-old working engineer with PCKD; GFR 15 ml/min; Asymptomatic. Radial artery 3.9 mm; Cephalic vein diameter at wrist is 4.3 mm; No previous abdominal surgery. (This is a Tier 3 questions, require discussion and clinical judgement…)

a. What is the most appropriate immediate, effective, safe planning strategy for this patient at this time?
b. Wrist AVF radio-cephalic anastomosis ASAP
c. Peritoneal Catheter (PD), only
d. Wrist AVF and a PD catheter in the OR setting
e. AVF now and PD catheter at or about 4 weeks before dialysis starts if patient desires and approved by the PD unit
f. Pre-emptive Living Donor Kidney Transplant

32. This is a 35-year-old male with an Estimated GFR is 15 ml/min. He has had Type 1 diabetes for 27 years. Radial artery diameter 2.6 mm, calcified. Poor vision; Reads with magnifying glasses. No past abdominal surgery; excellent vein anatomy. Wife wants him to have Peritoneal Dialysis: “I will do it for him”. (This is Tier 3, discussion, and clinical judgement…)

What is the most appropriate immediate effective and safe planning strategy for this patient at this time?

a. Wrist Radio-Cephalic Fistula (AVF)
b. Brachiocephalic (BC) Upper arm
c. Peritoneal Catheter (PD)
d. Wrist AVF and PD catheter in the same OR setting
e. BC AVF and PD catheter about 4 weeks prior to dialysis initiation if patient's wife agrees and PD unit approves

33. Same patient as in previous question. This is a 35-year-old male with an Estimated GFR is 15 ml/min. He has had Type 1 diabetes for 27 years. Radial artery diameter 2.6 mm, calcified. Poor vision; Reads with magnifying glasses. No past abdominal surgery; excellent vein anatomy. The wife wants him to have Peritoneal Dialysis: "I will do it for him". He is now on dialysis using a R-IJ cuffed catheter for 8 weeks, that has been replaced once for exit site infection and positive blood cultures. Radial artery diameter 2.6 mm, calcified. Poor vision; Reads with magnifying glasses. No past abdominal surgery; excellent vein anatomy. Wife wants Peritoneal Dialysis: "I will do it for him".

    a. Of the options presented below, what is the most effective planning strategy for this patient?
    b. Wrist AVF radio-cephalic anastomosis ASAP
    c. Peritoneal Catheter (PD), only ASAP
    d. Brachiocephalic (BC) Upper arm transposition
    e. Upper arm brachio-cephalic (BC) AVF and PD in the same OR setting if patient and his wife so desires and PD unit approves.
    f. Pre-emptive Living Donor Kidney Transplant

34. The lady pictured below was presented 65-year-old female. She has a right IJ cuffed dialysis catheter. BMI 52. (145 Kg). She is a current smoker. Both hands are cold. Two months ago, failed forearm loop graft from "STEAL". She has had coronary artery bypass of four vessels. There is a colostomy from diverticulitis. She has been diagnosed with CHF. Short of breath! Duplex report: RA=1.8 mm; some calcifications. No palpable pulse. Cephalic vein diameter is 3 mm at wrist, and 5 mm at shoulder; 6 – 10 mm deep along entire arm. Basilic vein (4 mm) joins brachial vein (6 mm) upper third of arm. Cephalic vein at antecubital fossa is 6 mm with a median cubital vein of 5 mm

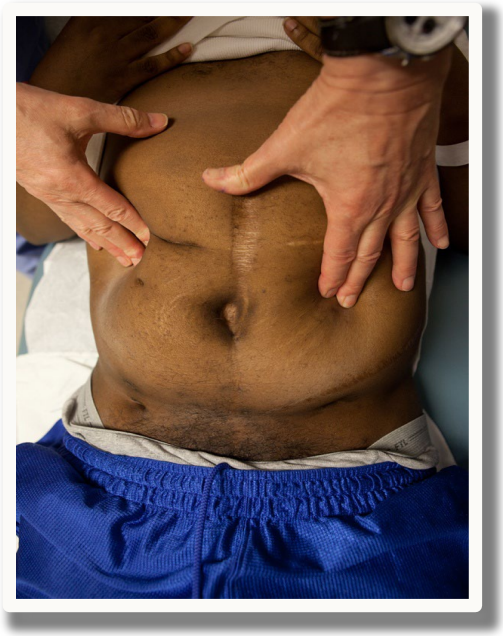
a. Peritoneal Dialysis Catheter
b. Cephalic Vein Transposition (CVT) upper arm
c. CVT and PD in the same OR setting
d. Basilic/Brachial vein Transposition upper arm
e. PTFE upper limb loop graft with arterial anastomosis to the proximal brachial artery

35. Female 35 years old. BMI 51; DM-2; HTN; Right IJ catheter x 7 months. No previous abdominal surgery. Duplex: Radial artery diameter 2.1 mm. Cephalic vein patent 3 mm at wrist 4-5 mm at shoulder; 4-5 mm at elbow level, with a median cubital vein (MCV) and a diving perforating branch; >6-15 mm deep; Basilic vein joins brachial vein at mid upper arm; Diameter 4 mm at elbow; 7 mm in axilla. Brachia artery diameter at bifurcation at the antecubital fossa is 4.1. Axillary artery is 4.6 below or at the axilla. (Tier 3)

a.
b. What is the most appropriate and effective planning strategy for this patient at this time?
c. Peritoneal Dialysis Catheter
d. Cephalic Vein Transposition (CVT) upper arm
e. Basilic/Brachial vein Transposition upper arm

f. PTFE Loop Graft upper arm (anastomosis in the axilla)
g. Forearm loop graft

36. Male 22 years old. Living Donor kidney from mother at age 5. The transplant is now failing. GFR 16 ml/min; Drains urine by self-catheterization. Previous two times PD catheter as an infant. Several episodes of peritonitis. No "prolonged" (>1-2 days) peritonitis) Duplex US: Left Basilic vein joins brachial vein mid upper arm (Diameter 4-7 mm). Only remaining useable native vein. All other peripheral veins "used up." Attends school



a. What is the most appropriate and effective planning strategy for this patient currently?
b. Peritoneal dialysis catheter only
c. Left Basilic- brachial (BVT) vein transposition, only.
d. Peritoneal Catheter (PD), with left upper arm BVT as backup in the same OR setting
e. Preemptive Urgent Re-transplant
f. Place a HeRO

37. 48 Years male; DM-1for 38 years; Blind; Diseased donor kidney transplant 14 years ago by one of the examiners; Patient states: "Doctor I want to live". Most fingers amputated; Left BKA; Right AKA; Superior vena cava syndrome.

Percutaneous Trans-hepatic Vena Cava Dual Lumen Catheter last 4 months, working satisfactorily. Left saphenous vein 6 mm for 2 cm from takeoff. Left Femoral vein open. Common Iliac vein per US also patent. Femoral artery patient with moderate calcification; Diameter 6mm. Denied access at three other vascular access centers.

What is your suggestion?

a. Stay on catheters for life.
b. Left groin PTFE graft.
c. Tell patient and nephrology: ”We are out of real options.”
d. Take him off dialysis.
e. None of the above; something else

38. This patient is in the medical ICU in Private hospital. She is bedridden with contractions. Does not speak. Estimated GFR is less than 10 ml/min. The patient has had several strokes in the past. Family wants to do “everything for mother”.

What would be the right thing to do?

a. Do absolutely nothing!
b. Turn off your beeper and talk with the family.
c. Femoral percutaneous dialysis catheter
d. IJ cuffed dialysis catheter
e. Tell nephrology that we are wasting taxpayers' money.

39. The "rule of 6" regarding hemodialysis access is:
    a. A volume flow of at least 500- 600 ml/min, access must be less than 6 mm deep under the skin and be of at least 5-6 mm in diameter and at least 4-6 inches of useable cannulation length.
    b. A volume flow of 6000 ml/min, is less than 6 mm deep under the skin and be of at least 6 mm in diameter.
    c. A volume flow of 6000ml/min, at least 6 mm deep under the skin and be no more than 6 mm in diameter.
    d. A volume flow of at least 600ml/min. a sticking segment of at least 6 cm and access diameter of at least 6 mm.

40. PD is preferred over hemodialysis because.
    a. Residual kidney function is chronically preserved, increased patient self-control and quality of life, and kidney transplant initially works better.
    b. Residual kidney function is often preserved for a few years, increased patient self-control and quality of life and kidney transplant wait-time is shorter.

c. Residual kidney function is often preserved for a few years, there is increased patient self-control and quality of life, and a future kidney transplant will have less delayed function.
d. Residual kidney function is preserved for a few years, increased patient self-control and quality of life and is more expensive to society

41. Peritoneal Dialysis (PD) is under-utilized in many parts of the world because:
    a. Lack of curriculums for nephrology in training institutions.
    b. Vascular surgeons performing dialysis access surgery do not emphasize PD options.
    c. Economic forces shift emphasis towards hemodialysis.
    d. All the above
    e. None of the above

42. Laparoscopic placement of PD catheters is preferred because.
    a. Shorter Operating Room Time
    b. It is less expensive.
    c. It is technically easier.
    d. Minimally invasive as well as able to perform the procedure is a clearly visualized manner.

43. Laparoscopic PD catheter surgery is preferred when.
    a. Reposition of malfunctioning PD catheter.
    b. Past abdominal surgery when adhesions are expected.
    c. Additional intra-abdominal procedures can be performed.
    d. All the above
    e. None of the above

44. The patient's choice of mode of dialysis is influenced by
    a. Patients' socioeconomic status and education
    b. Distance to hemodialysis unit
    c. Patient visual impairments and manual dexterity
    d. Surgeons' skill training in access procedures, the nephrologist's level of comfort with Hemodialysis vs. Peritoneal dialysis
    e. All the above

45. When patients and their families are informed and educated about dialysis options how many will choose the PD modality
    a. 8-10 %
    b. 15-20%

c. 30-40%
d. 70%-90%

46. The great variation in PD rate is likely caused by
    a. patient socio-economic status,
    b. nephrologist's preference,
    c. surgeon's skill set,
    d. healthcare reimbursement policy,
    e. all the above

47. The expected function of PD catheter at one year as per the ISPD (International Society of Peritoneal Dialysis) is:
    a. 55%
    b. 60%
    c. 70%
    d. 80%
    e. 90%

48. The reported one year of PD catheter function at one year is (Singh et al J Vasc Access 2010):
    a. 8.8%
    b. 43%
    c. 70%
    d. 84%
    e. 93%

49. Peritoneal dialysis fluid exchanges can start immediately after placement if:
    a. Patient is mobilized and can be up and ambulating without leaking fluid.
    b. If using a PD fluid exchange prescription protocol with small exchange volumes (500 – 1000 ml) laying down and patient ordered not to ambulate with fluid in the abdomen for 7-14 days.
    c. Only if the PD Catheter was placed with laparoscopic technique.
    d. Only if the surgeon approves of early PD initiation.
    e. Early fluid exchanges must never be attempted.

50. About What percentage of patients start dialysis with a temporary central vein dual lumen catheter in most countries?
    a. 8-10 %
    b. 20-30%
    c. 40-50%
    d. 60-80%
    e. 90-99%

51. DRIL is an abbreviation for
    a. Double Revascularization, Interval Ligation
    b. Distal Revascularization, Interval Ligation
    c. Distal Revascularization, Internal Ligation
    d. Dual Revascularization, Internal Ligation

52. What is/are feature(s) of patients prone to develop “steal” is:
    a. A Female, Older than 60
    b. Has a Cigarette Smoking history
    c. Symptomatic peripheral arterial disease
    d. All the above
    e. None of the above

53. Treatment options of “steal” may include.
    a. DRIL
    b. PAI
    c. Banding
    d. Ligation of radial artery
    e. All the above

54. “Steal” is most common with the following arterial anastomosis site:
    a. Radial artery
    b. Distal brachial artery
    c. Brachial artery below the axilla
    d. Proximal radial artery
    e. None of the above

55. The first time PD catheter should ideally be placed on the left side because:
    a. Most patients are right-handed and it’s easier to manage fluid exchanges.
    b. The first kidney transplant will be technically easier to do on the right side.
    c. The catheter will not interfere with the right-side caecum.
    d. All the above
    e. None of the above

56. In cases of high brachial artery bifurcation in the upper arm:
    a. The deeper ‘ulnar’ artery uniformly has a larger diameter.
    b. The superficial ‘radial’ artery usually has a larger diameter.
    c. The deeper radial artery is larger.
    d. The superficial ‘ulnar’ artery is larger.
    e. None of the above is true.

57. Which statement is most likely associated with a history of dialysis access spontaneous bleedings between dialysis sessions:
    a. Only occur with an aneurysms present
    b. Only occurs with thin skin coverage on aneurysms.
    c. Often associated with scab formation of top of a poor skin quality
    d. Venous out-flow obstruction is not a contributing factor.
    e. None of the above

58. Surgeons should select access mode i.e. Hemodialysis vs Peritoneal dialysis based on:
    a. What the referring doctor orders you to do
    b. Maximizing the reimbursement by smart coding strategy
    c. Select access based on patient need, desire, and your best judgment to maximize short and long-term outcome.
    d. Select access based on patient need, desire, and your best judgment, including referring doctor's suggestions and patient desire to maximize short and long-term outcome.
    e. Body mass index (BMI) being the most important considering factor.

59. The following statement is correct:
    a. A native vein AVF shout be attempted at any price.
    b. Native vein AVFs never gets infected.
    c. Grafts should be the last resort for all patients as they seldom work and frequently get infected.
    d. Native veins seldom develop aneurysms.
    e. None of the above

60. A forearm loop graft is a reasonable option when:
    a. No other forearm veins nor antecubital veins are present.
    b. Not ever a consideration
    c. No superficial veins present in the forearm of an obese patient, but there are antecubital veins (Cephalic, median cubital vein, a perforating vein), present and >5 mm in diameter
    d. Failed wrist radial artery AVF
    e. Specifically requested by referring nephrologist

61. Dialysis access short and long-term outcome is greatly influenced by
    a. Loss of superficial arm vein from recent IV needle punctures for blood draws
    b. Timey referral patterns to nephrology and surgery for dialysis access evaluation

c. Effective information and education of patients and family of treatment options.
d. Patient denial
e. All the above

62. 43 years old lady with DM-1 x 22 years; bilateral BKA. Tesio catheter x 12 Months; One cuff has migrated outside; Six prior IJ catheters; Grafts left and right forearms and both straight grafts upper arm failed. Brachial artery in both axilla 4.5 mm, with one of the three brachial veins >6 mm in the sub-axillar area. Basilic veins joins brachial veins in mid upper arm. Left central veins are patent with a 60% stenosis in the innominate vein.

What are the realistic and safe options for 'permanent' access in this unfortunate patient?

a. Cephalic Vein Transposition (CVT) upper arm
b. Basilic/Brachial vein Transposition upper arm
c. PTFE Loop Graft upper arm (anastomosis in the proximal brachial below the axilla
d. Femoral artery to axillary vein graft
e. A HeRO device

63. With 27 surgical sites and as many patient variables the potential statistically workable surgical options-solutions:

a. 54
b. 100
c. 300
d. >500
e. 1000

64. Symptomatic venous hypertension of the hand is associated with
    a. Side-to-side anastomosis of cephalic vein to radial artery
    b. Venous outflow obstruction at the elbow level with flow going distally in the forearm into the hand returning through cephalic or Basilic system with or without arm swelling.
    c. Backflow in a side (dorsal) branch of cephalic vein to the hand usually the thumb region.
    d. All the above
    e. None of the above

65. Duplex ultrasound vascular mapping is considered key in dialysis access evaluation because:
    a. It is noninvasive and painless and without radio-contrast.
    b. When Surgeon directed it is an instant decision-making tool
    c. Inexpensive
    d. Can be used intra-operatively.
    e. All the above

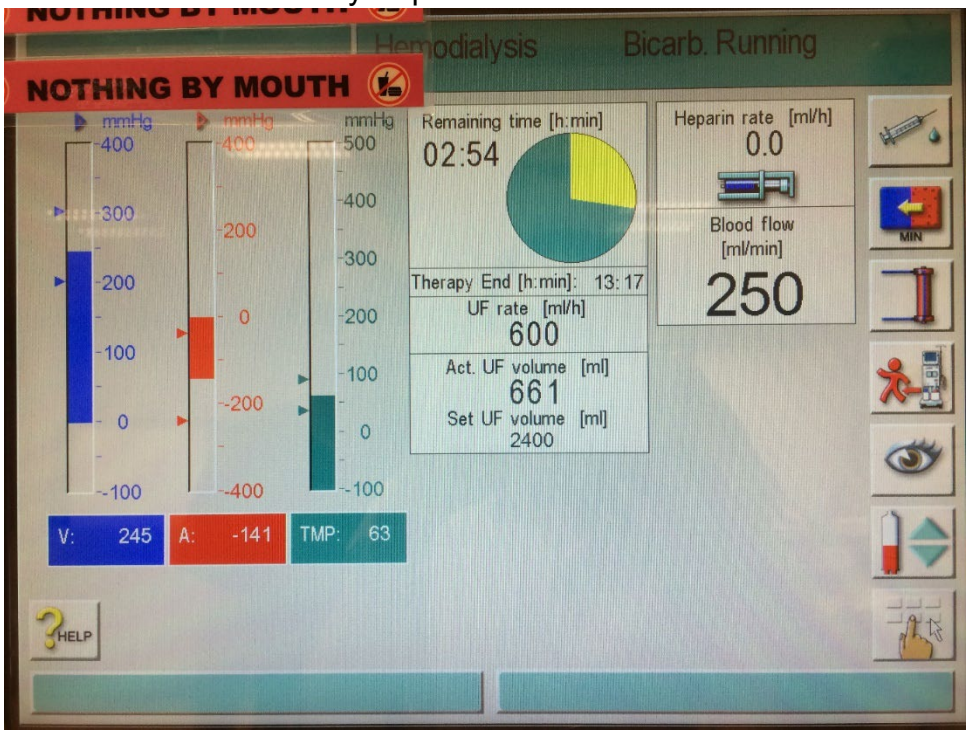
66. The wide variation in successful functional vascular access creation reflects
    a. Poor Selection and lack of sound preoperative thoughtful evaluation
    b. Not using preoperative ultrasound vascular mapping
    c. Poor surgical technique
    d. Access surgery having low surgical status.
    e. All the above

67. Evaluation of patients with hand pain only during hemodialysis suspect of 'hand ischemia' should include:
    a. Evaluation of patient's blood pressure during dialysis and consider withholding antihypertensive medication in the morning of dialysis treatment.
    b. Ask the patient to make 100 Hand-fists every hour with a soft ball to improve arm circulation.
    c. Check Duplex US volume flow of the access, and surgical anatomy.
    d. Check SpO2 level of each finger of the affected hand.
    e. All the above

68. Patients with access side hand pain presumably 'steal' should undergo:

a. Venogram to exclude central artery inflow stenosis.
b. Finger pressures with and without compression of the access to assess the ‘steal’ diagnosis
c. Refer to neurology to rule out carpal tunnel syndrome.
d. Wrapping the arm with hot blankets to improve circulation to the hand.
e. None of the above

69. What would be the likely problem(s) of a patients having left transposed brachio-basilic fistula with the hemodialysis parameter as shown above?

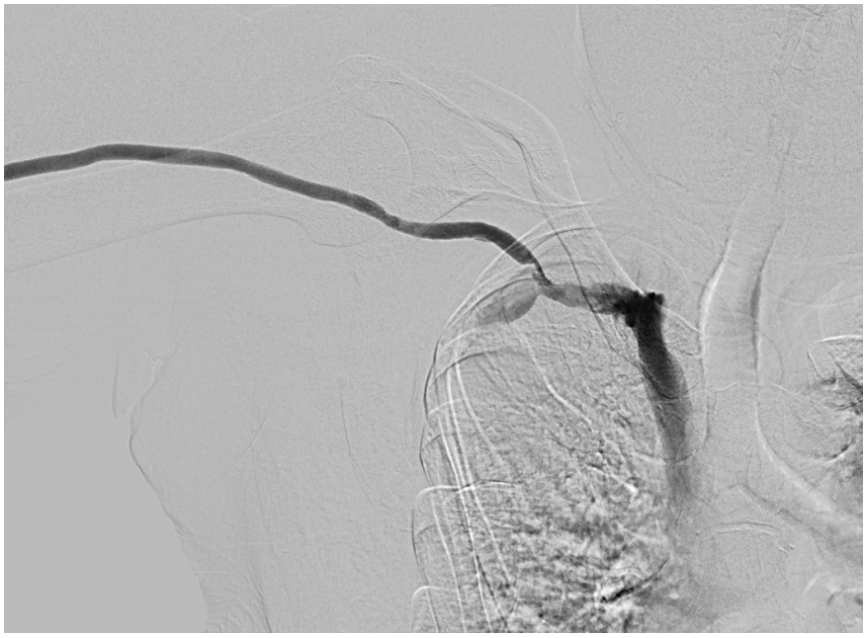
a. 

b. Fistula thrombosis
c. Outflow vein stenosis and juxta-anastomosis stenosis
d. Juxta-anastomotic stenosis only
e. Steal syndrome
f. Fistula with marginal diameter

70. The Dialysis Access Consortium (DAC) JAMA 2008, (299) 182164-2170) study showed a native vein fistula non-maturation at one year of:
a. 10-15 %
b. 20-25%
c. 30-35%
d. 45-50%
e. 60-65%

71. CRM used in high liability industries notably aviation stands for:
    a. Crew Resource Management
    b. Captain Resource Management
    c. Crew Respect Monitoring
    d. Command Resource Management
    e. Common Resource Management

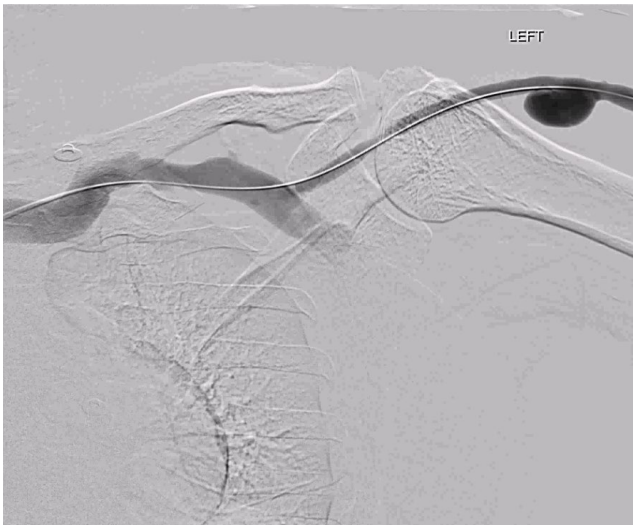
72. The fistulogram of this hemodialysis patients shows:

    a. 

    b. Brachial artery origin stenosis
    c. Cephalic arch stenosis
    d. Brachial artery to axillary vein AVG venous anastomosis stenosis
    e. Axillary vein thrombosis

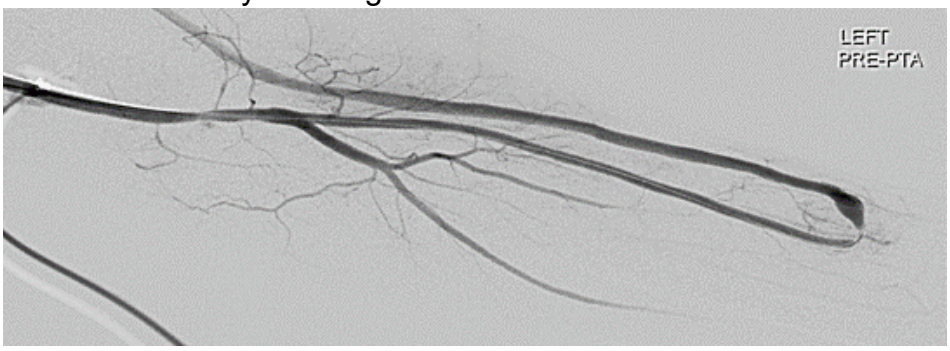
73. Which of the following statements is true?
    a. Elderly who go into renal failure generally do so slowly and therefore can wait longer for access to be placed than younger individuals
    b. Patients who start dialysis with a GFR of 5-10 ml/min have higher mortality than those who start with GFR between 10-15 ml/min.
    c. Patients with PCKD (Poly-Cystic Kidney Disease) should be advised against peritoneal dialysis because of inadequate intra-abdominal volume space,
    d. Umbilical hernia is a contraindication to Peritoneal Dialysis
    e. Spending 2-6 months' time on dialysis improves compliance with immunosuppressive drugs after a kidney transplant

74. Angiogram of Madam L left brachial artery to axillary vein graft shows:



a. Normal functioning AVG
b. Central vein obstruction
c. In-graft stenosis
d. Pseudoaneurysm of AVG

75. Angiogram of the fistula of a 38-year-old gentleman left forearm shows:

i. 

b. Left radio-cephalic juxta-anastomotic stenosis.
c. Left brachiocephalic juxta-anastomotic stenosis.
d. Left radio-cephalic anastomotic stenosis.
e. Left radio-cephalic outflow vein obstruction.

76. The dialysis machine blood flow in an adult during dialysis is typically between:
a. 150-200ml/min
b. 250-450 ml/min

c. 500-650 ml/min
d. 750-850 ml/min
e. 850-950 ml/min

77. Simulation practices are most closely associated with which of the following concepts?
    a. "See one, do one, teach one."
    b. "See many, do one, teach many."
    c. "See one, practice many, do one."
    d. “See many, teach many, and practice one."

78. A 54-year-old lady was presented with torrential bleeding from the right BC AVF after hemodialysis (bleeding site indicated by the arrow) and now just manage to stop the bleeding. How would you manage this condition?

    a. Communicate with hemodialysis center to ask the nurses to cannulate healthy part of the fistula.
    b. Plication of the bleeding site
    c. Excision of a segment of fistula including the bleeding point and interposition graft
    d. Rest the fistula for 2 weeks and insert a temporary central venous catheter to bridge the period.

79. A 77-year-old DM, HT, IHD (EF 40%) renal failure lady who already started using a tunneled central venous catheter (inserted over right internal jugular vein) for hemodialysis for 1 month. She is right-handed. Left brachiocephalic AVF was created 1 week ago in another hospital, and she presented to your hospital with left hand numbness and weakness. The ultrasound study showed diffuse severe calcification of her left upper limb arteries. The distal brachial artery measured

4mm. The proximal radial and ulnar artery both measured 2mm and even smaller over the distal forearm. The forearm cephalic vein was only 1mm and the basilic vein in the left arm measured 2mm. The superficial veins of the right upper limb are all small in caliber. What would be the most suitable treatment for her condition?

a. Hand exercise and keep warm.
b. Proximalization of arterial inflow
c. Revision using distal inflow.
d. Ligation of tributaries of the cephalic vein fistula in the arm

80. Regarding Cephalic Arch Stenosis (CAS), which of the following statements is TRUE?
    a. The cephalic arch is located between the pectoralis major muscle and the deltoid muscle and is covered by the delto-pectoral fascia approximately 50% of the time
    b. Initial treatment is surgical since nonsurgical treatment has a high failure rate.
    c. A possible cause of CAS is the increased number of valves seen in the cephalic arch compared to other areas of the vein.
    d. Stent grafts have no role in the treatment of cephalic arch stenosis.

81. A 57-year-old patient with Hypertension and Insulin Dependent Diabetes undergoing dialysis via a left arm brachiocephalic fistula placed 18 months previously. An aneurysm has developed in the mid portion of the fistula measuring 9mm. The overlying skin is intact. There is no sign of infection. There is no pending rupture of the aneurysm. The most appropriate course of action for this patient is:
    a. Watchful waiting if there is no sign of rupture.
    b. Advise the dialysis clinic to avoid sticking the fistula at the aneurysm sites and recheck the patient in 3 months.
    c. Surgical revision
    d. A fistulogram to rule out proximal stenosis.

82. Regarding ischemic complications of dialysis access, which of the following statements is FALSE?
    a. Women have a higher incidence of Dialysis Access-related Steal Syndrome (DASS)
    b. Ischemic Monomelic Neuropathy (IMN) occurs ONLY after access surgery involving the brachial artery.
    c. Vascular steal occurs because the dialysis conduit is a high-resistance circuit relative to the native arterial bed.

d. Treatment options for DASS will vary depending on the flow in the access (High flow access vs Normal to low flow access)

83. Hemodialysis (HD) compared to Peritoneal dialysis (PD):
    a. HD is significantly more expensive than PD.
    b. HD is the preferred mode of dialysis because it is so much more effective.
    c. PD failure mode is predominantly peritonitis - PD has higher infective complication compared to HD.
    d. Both patient and access functional survival is better with HD compared to PD

84. A newly created access was imaged by Duplex ultrasound to assess its readiness for dialysis. The following results were obtained:
    a. Fistula size: 7 mm
    b. Blood flow: 800 mL/min
    c. Depth from skin: 4 mm

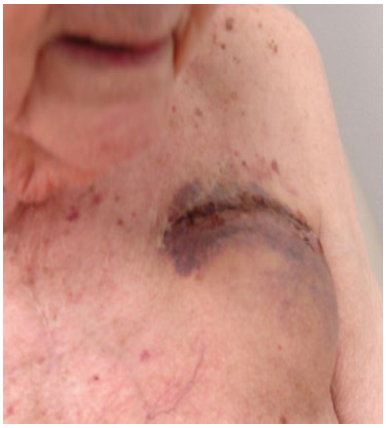
    d. Based on these findings only, the next best course of action is:
    e. elevate the fistula surgically; it is too deep.
    f. treat the central stenosis.
    g. perform balloon assisted maturation (BAM) because the fistula is too small to use.
    h. based on these numbers, the fistula is ready for use

85. Correct Access Cannulation:
    a. Buttonhole AVG
    b. Needle site rotation (step ladder method) AVF/AVG
    c. Same site area AVF
    d. Same site area AVG

86. An excessive negative arterial pressure (-150mmHg) recorded by the dialysis machine during hemodialysis could be due to:
    a. Juxta-anastomotic stenosis
    b. Direction of the “A” needle in a marginal size fistula
    c. High Qb (machine flow rate) value (400ml/min)
    d. Only a) and c)
    e. All the above

87. Cannulation through which type of stent is approved by the manufacturer:
    a. Flair
    b. VIABAHN
    c. Bare Metal
    d. None of the above

88. The elderly man pictured is 83-year-old. Pacemaker placed 10 days ago. Not yet on dialysis. Est GFR 5 ml/min. Tense hematoma at the surgical site. There is general edema, and he is short of breath. Mentally alert, but tired and ill looking. Takes Coumadin for atrial fibrillation.



You are the surgeon to which this patient was referred for permanent access placement. What is your best options managing this gentleman?

a. Call the nephrologist to take care of this patient's acute problems and refer when better.
b. Ask your nurse to page the referring nephrologist and the pacemaker cardiologist for you to discuss the case.
c. Send home, return two weeks when hematoma and acute symptoms have improved. Ask to see nephrologist suggest stopping Coumadin one week before surgery.
d. Admit to hospital, consult with nephrologist for acute dialysis initiation, consult surgeon who placed pacemaker.

89. The main concept of Crew Resource Management (CRM) in aviation industry is
a. Fully utilize resources of the whole team
b. Discourage command hierarchy and encourage team communication to ensure safety.
c. Practice in a simulation environment enhance training quality.
d. Team building in a non-familiar environment is more effective than in working conditions.

90. Which of the following statements regarding the vascular access technique is wrong?
a. Area cluster method associated with higher access complications.
b. Button - hole method associated with less infection risk compared to step ladder method.
c. The step ladder method preserve both AVF and AVG better than the area cluster method.

d. The buttonhole method is only applicable in native vein AVF.

91. What is the method of cannulation for the transposed basilic vein fistula shown below?

a. Area cluster
b. Buttonhole
c. Step ladder
b. Sequential cannulation

92. On average a hemodialysis patient will undergo how many procedures per year to maintain the access:
    a. <1 procedure per patient per year.
    b. 1 to 3 procedures per patient per year.
    c. 4 to 6 procedures per patient per year.
    d. >5 procedures per patient per year.

93. The most common failure mode of PD catheter is
    a. Peritonitis
    b. Cuff exteriorization with tract infection
    c. Catheter malfunction due to various technical issues
    d. Peritoneal membrane dysfunction

94. Dialysis Patients Safety during surgery is impacted by
    a. Pre-operative briefing also known as “Time Out”.
    b. Legal documents signed by patients.
    c. Insurance company policies.
    d. Having Family member available in the waiting area

95. Which of the following is an intrinsic motivation for doing the right thing in clinical practice?
    a. A sense of purpose
    b. Money
    c. A more desirable job
    d. Higher status in your clinic/institution

96. Mistakes in medicine are most frequently based on lack of which of the following?
    a. Skill
    b. Knowledge
    c. Communication
    d. Time

97. As a potential motivation for "doing the right thing" in clinical practice, Motivation 3.0 is best defined by which of the following?
    a. The motivation to survive.
    b. The motivation of extrinsic reward
    c. The motivation of extrinsic punishment
    d. The motivation of autonomy, mastery, and purpose

98. Which of the following fields provides a strong model of communication, which the medical field could potentially employ to enhance patient care and treatment success?
    a. Religion
    b. Marketing
    c. Aviation
    d. Manufacturing

99. Endovascular creation of AVF involves the following techniques.

    a. Fusion of an artery and vein by an energy source
    b. Using catheters inserted in arteries and veins of the arm.
    c. Using ultrasound and angiographic techniques to locate and define vessel anatomy.
    d. All the above

100. Which of the following statements is correct?
    a. Endovascular creation of AVF has replaced surgical technique in placing native vein AVFs.
    b. Endovascular placement of AVF is an innovation under development that is likely to be approved by the FDA.

c. Endovascular techniques for placement of AVF is an FDA approved procedure.
d. None of these statements are correct.