Postoperative Vascular Surveillance
Capstone Project

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Introduction & Background

- The vascular surgery department at CentraCare Health has grown within the last year. With that growth, it was determined by the multidisciplinary team that a standard protocol be established to ensure proper surveillance after vascular procedures.
- Patient education was needed to inform patients regarding the importance of adhering to a follow up schedule.
- The goal for surveillance after vascular surgery is to detect potential complications and follow with appropriate interventions to maintain patency before the patient becomes symptomatic.
- Standard surveillance will provide better long term results and enhance patient outcomes.
- The multidisciplinary team chose four procedures for protocol design.

Aim

- Develop an evidence-based protocol for postoperative vascular procedures to provide standardization and enhance patient outcomes.

Project Design

Consensus was developed among the multidisciplinary team to develop protocols for carotid stenting, endovascular abdominal aortic aneurysm repair (EVAR), lower extremity bypass, and, lower extremity angiogram with intervention. The protocols were based on recommendations from the Society for Vascular Surgery.

Changes Made

- Protocols were developed for the named vascular procedures.
- Protocols revised with end decisions at the surgeon's discretion regarding additional intervention.
- Standardized imaging was agreed upon within the department.
- Patient teaching tools were created to educate patients on the importance of follow up.

Next Steps

- Implement protocols after vascular procedures
- Collect and analyze data regarding surveillance
- Evaluate protocols and make necessary changes with input from the multidisciplinary team
- Evaluate patient understanding regarding follow up
- Monitor patient outcomes after implementation of surveillance protocols

Results: Vascular Protocols

Vascular Surveillance Protocol for Endovascular Aneurysm Repair (EVAR)

- CT scan Abdomen/ Pelvis with contrast at 1-month post EVAR procedure
  - 1-month CT scan is stable without endoleak or sac enlargement
    - Follow up with CT scan at 12 months
      - 12-month CT scan is stable without endoleak or sac enlargement
        - Follow up at 12-month intervals with color duplex ultrasound
      - 12-month CT scan shows endoleak or sac enlargement
  - 1-month CT scan is not stable and demonstrates an endoleak or sac enlargement
    - Follow up with CT scan at 6 months with contrast
      - 6-month CT scan shows endoleak or sac enlargement
        - Follow up with CT scan with contrast in 6 months
          - Follow up with CT scan with contrast in 6 months
            - Surgeon to determine follow up and intervention based on patient symptoms
      - 6-month CT scan is stable without endoleak or sac enlargement
        - Follow up with CT scan in 6 months
          - CT scan is stable without endoleak or sac enlargement
            - Surgeon to determine follow up either with CT scan or color duplex ultrasound

Vascular Surveillance Protocol for lower extremity bypass procedures

- Surveillance to include duplex ultrasound (DUS) and or ankle-brachial index (ABI)

Prosthetic bypass graft

- 1-month post procedure ABI with or without DUS
- 1-month follow up is stable related to ABI and or DUS
- Follow up with ABI and or DUS at 6 months
- 6-month follow up is stable related to ABI and or DUS
- Follow up with ABI and or DUS at 12 months
- 12-month follow up is stable related to ABI and or DUS
- Follow up annually with ABI and or DUS

Vein bypass graft

- 1-month post procedure ABI and DUS
- 1-month follow up is stable related to ABI and DUS
- Follow up with ABI and DUS at 3 months
- 3-month follow up is stable related to ABI and DUS
- Follow up with ABI and DUS at 6 months
- 6-month follow up is stable related to ABI and DUS
- Follow up with ABI and DUS at 12 months
- 12-month follow up is stable related to ABI and DUS
- Follow up at least annually

Vascular Surveillance Protocol for lower extremity angiogram with endovascular therapy (EVT)

- Surveillance to include duplex ultrasound (DUS) and ankle-brachial index (ABI)
  - 1-month post procedure DUS and ABI
    - 1-month follow up is stable related to ABI and DUS
      - Follow up with ABI and DUS at 3 months
        - 3-month follow up is stable related to ABI and DUS
          - Follow up with ABI and DUS at 6 months
            - 6-month follow up is stable related to ABI and DUS
              - Follow up with ABI and DUS every 6 months
    - 1-month follow up is not stable related to ABI and DUS
      - Follow up is determined by the surgeon

Duplex ultrasound (DUS) and ankle brachial index (ABI) threshold criteria

High risk velocity criteria DUS: >300 cm/s ratio >3.5 / High risk ABI: change is >0.15

Low risk velocity criteria DUS: <180 cm/s ratio <2.0 / Low risk ABI: change is <0.15

****Note: at any time if DUS or ABI is not stable, follow up is determined by the surgeon**

Vascular Surveillance Protocol for Carotid Artery Stenting (CAS)

- Carotid doppler ultrasound at one-month post procedure. Measurement to include peak systolic velocity (PSV) and internal carotid artery (ICA) and common carotid artery (CCA) ratios. Baseline study
  - Baseline study shows acceptable ICA/CCA ratio
    - Follow with carotid ultrasound at 6 months
      - 6-month carotid ultrasound shows acceptable ICA/CCA ratio
        - Follow with carotid ultrasound every 6 months for 2 years. If stable at 2 years, follow annually
  - Baseline study shows ICA/CCA ratio >/=2.7
    - Surgeon to determine follow up or intervention

Velocity Criteria

PSV >/=150 cm/s and ICA/CCA ratio >/= 2.15

PSV >/=220 cm/s and ICA/CCA ratio >/=2.7

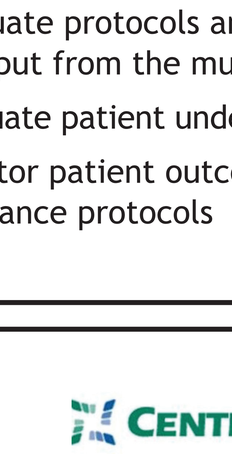
PSV >/=340 cm/s and ICA/CCA ratio >/=4.15

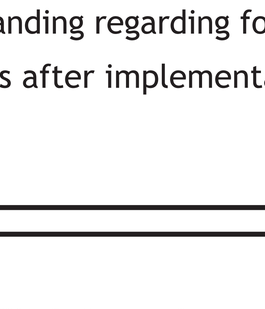
References

1. Zierler, R., Jordan, W., Lal, B., Mussa, F., Leers, S., Fulton, J., Pevec, W., Hill, A. and Murad, M. (2018). The Society for Vascular Surgery practice guidelines on follow-up after vascular surgery arterial procedures. Journal of Vascular Surgery, 68(1), pp.256-284.

CENTRACARE Health

- You are scheduled for an angiogram. This is a procedure that will help to clear the blockage in your artery with a balloon or a stent
- You will have an ultrasound and an appointment with the surgeon 4 weeks after the procedure
- You will be scheduled for a follow up ultrasound about every 6 months to be sure the artery stays open
- Please call us at 320-255-5855 if you have questions



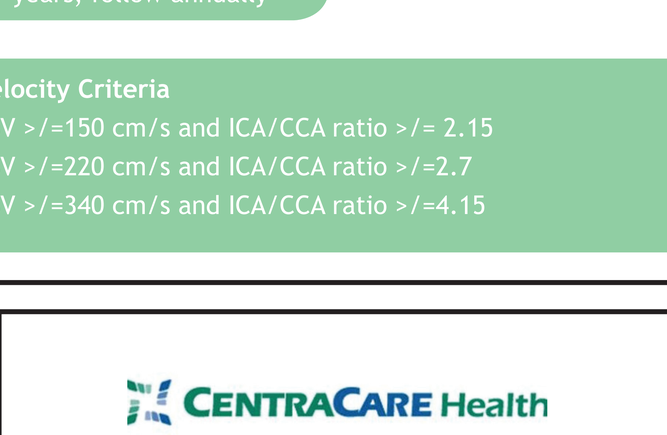


Balloon (opens the blockage) **Stent** (holds the artery open)

Patient Teaching Sheet

CENTRACARE Health

- You are scheduled for an aneurysm repair
- This procedure will fix the artery in your stomach area
- You will have a follow up appointment four (4) weeks after the procedure with the surgeon. You will have a CT scan the same day
- After the surgeon reviews the 6-month CT scan results, you will be scheduled for another CT scan or ultrasound every 12 months
- It is very important to have the follow up tests done at Centracare so the surgeon can see if there are changes between testing



Patient Teaching Sheet