Vascular Repair Module

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(Performance and Closure of Longitudinal Arteriotomy)

I. OBJECTIVES

Cognitive

By the end of this laboratory session students should…..

1) Understand the rationale for performance of a longitudinal arteriotomy
2) Know what types and sizes of suture are appropriate for vascular repair
3) Understand and describe the proper technique for creation of a longitudinal arteriotomy and primary closure

Technical

By the end of this laboratory session students should be able to…..

1) Demonstrate proficiency for performance of a longitudinal arteriotomy
2) Demonstrate proficiency for performance of primary closure of a longitudinal arteriotomy

II. ASSUMPTIONS OF PRE-TRAINING SURGICAL SKILLS AND KNOWLEDGE

Students will have reviewed the appropriate reading material regarding the use of specific surgical instruments and suture in vascular surgery, techniques of vascular control and isolation, performance and primary closure of a longitudinal arteriotomy.

III. PREPARATION

1) Atlas of Surgical Operations 7th Edition. Zollinger Jr. R.M. & Zollinger R.M.. McGraw Hill Inc., New York, 1993

2) Atlas of Vascular Surgery-Basic Techniques and Exposures. Rutherford R.B., Ed.. W.B. Saunders, Inc., Philadelphia, 1993

3) Vascular Surgery 5th Edition. Rutherford R.B., Ed.. W.B. Saunders, Philadelphia, 2000.

4) Atlas of Vascular Surgery Operative Procedures. Ouriel K. and Rutherford R.B., Ed.. W.B. Saunders, Philadelphia, 1998

5) Anatomic Exposures in Vascular Surgery. Wind GG and Valentine RJ. Williams & Wilkins, Baltimore, 1991

6) Vascular and Endovascular Surgical Techniques, 4th Edition. Greenhalgh R.M., Ed.. W.B. Saunders, London, 2001

IV. ANATOMICAL CONSIDERATION

Students will have reviewed and committed to memory the relationship between blood vessel diameter and suture size considerations. A table detailing this information is shown below.

Blood Vessel	**Diameter**	**Suture size used**
Carotid Artery	5mm - 8mm	6-0, 7-0
Thoracic Aorta	> 20mm	3-0
Renal Artery	4mm – 7mm	6-0, 7-0
Abdominal Aorta	> 12mm	3-0, 4-0
Iliac artery	7mm – 12mm	4-0, 5-0
Femoral artery	5mm – 10mm	5-0, 6-0
Popliteal artery	4mm – 7mm	5-0, 6-0, 7-0
Tibial-Peroneal arteries	2mm – 3mm	7-0

V. DESCRIPTION OF LABORATORY MODULE

The assigned faculty mentor will give a presentation of the cognitive and technical objectives for this module. Following the presentation the faculty

mentor will provide a video and in-person technical demonstration of the module to all of the students as a single group. This demonstration will include performance of longitudinal arteriotomy and primary suture stitch closure of the arteriotomy.

Students will work in pairs. Students will be assigned their own individual W.L. Gore suture board to complete this module. W.L. Gore PTFE and/or Polyester tube grafts will be used to simulate a medium-large sized artery. It will be assumed for this module that the student is working on the patients right side and the vessel being repaired is the right common femoral artery.

Each student will serve as primary surgeon and as first assistant. The faculty mentor(s) will circulate around the surgical skills lab room offering support and guidance with immediate instructional feedback as required.

VI. MODULE INSTRUCTION, NARRATIVE DESCRIPTION, SKILL DESCRIPTION and TRAINING METHOD

SKILL	TECHNIQUE	RATIONALE

1) Longitudinal Arteriotomy and Primary Closure	1. Select appropriate location for creation of a longitudinal incision.. 2. Create initial longitudinal opening on the anterior surface of the vascular structure with the tip of the #11 blade scalpel at a 45 degree angle from the horizontal plane, taking care not to penetrate the back wall. The sharp edge of the scalpel should face upward. A single stab motion away and upward with the scalpel is used to create the opening. 3. Angled Potts scissors are used to further open the anterior graft wall longitudinally in either direction until an appropriate length of incision is created. The length of the arteriotomy for this module should be 5cm in length. 4. Select a 5-0 double-needle monofilament prolene suture or a CV-5PTFE suture for primary closure of the arteriotomy. 5. Pass both needles of each suture from inside to outside on the graft at the corners of the arteriotomy, taking care to visualize the needle pass through the intima in a perpendicular fashion. Tie each suture on the outside of the graft, making sure to place 4 square knots. Place a rubber-shod on the suture end not being used to perform the suture closure 6. When placing the continuous sutures the needle is passed through the graft wall in perpendicular fashion. The continuous sutures should be placed 2-3mm apart at each corner and then 5mm apart along the remaining incision. Each suture should be placed at a depth of 2-3mm. Attempt should be made to always visualize the needle pass through the intima. 7. The arteriotomy is closed coming from each end toward the middle by continuous running technique. If possible care should be taken to ensure that the two sutures are located on opposite sides of the arteriotomy when the final knot is tied. 8. The final knot is tied, taking care that 6 square knots are placed on the outside of the graft.	1.2.1 Technique minimizes injury to the back wall of the vessel. 1.3.1. Opens the arteriotomy in a controlled and accurate fashion. 1.3.2. Ensures adequate visualization of the vessel lumen. 1.4.1. Minimizes risk of infection, thrombosis or distal embolization. 1.5.1. Avoids creation of an intimal flap. 1.5.2. Secures suture to vessel wall. 1.6.1. Decreases bleeding from suture needle holes. 1.6.2. Minimizes risk of narrowing the vessel. 1.7.1. Allows for faster closure of the arteriotomy. Produces less ischemia time. 1.8.1. Secures suture to vessel wall. Maintains closure of the arteriotomy

For additional information please refer to the attached material from the Atlas of Vascular Surgery-Basic Techniques and Exposures.

VII. EQUIPMENT REQUIREMENTS and MATERIALS NEEDED

W. L. Gore Suture board
#11 blade scalpel
DeBakey tissue forceps
Potts scissors-angled
Suture scissors
Rubber-shodded mosquito clamps (3)
Scanlon needle holder
Ryder needle holder
4-0/5-0 double-needle monofilament prolene suture (2)
CV-4/CV-5 double-needle W.L. Gore PTFE suture (2)
8mm-10mm diameter PTFE graft (W.L. Gore)
8mm-10mm diameter Polyester/Dacron graft (W.L. Gore)

VIII. REFERENCES

IX. TIME LENGTH

1 ½ - 2 hours

X. APPENDIX