Endovascular Stent Insertion for Abdominal Aortic Aneurysm

POSE D'ENDOPROTHÈSE VASCULAIRE POUR ANÉVRYSME DE L'AORTE ABDOMINALE POINT DE VUE DE L'INFIRMIÈRE

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Le traitement conventionnel d'un anévrysme de l'aorte abdominale (AAA) comprend une chirurgie abdominale ouverte. La nouvelle alternative à cette intervention chirurgicale est la pose d'endoprothèse vasculaire (*endovascular stent insertion : EVSI*). L'endoprothèse vasculaire est un matériel en forme de tube qui soutient le vaisseau afin de prévenir toute fuite ou rupture de celle-ci et qui ne demande qu'une chirurgie avec effraction minimale. Cette intervention peut être une opération chirurgicale urgente ou non urgente. La chirurgie urgente est indiquée lors de la fuite ou de la rupture de l'anévrysme.

ENDOVASCULAR STENT INSERTION FOR ABDOMINAL AORTIC ANEURYSM
A Nursing Perspective

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The traditional treatment of an Abdominal Aortic Aneurysm (AAA) is an open aortic abdominal repair. The new alternative to the open surgical intervention is endovascular stent insertion (EVSI). An endovascular stent is a minimal access tube like device used to support the vessel to prevent leaking or rupture of the vessel. This intervention is either an elective or an emergency surgery. Emergency surgery is indicated when the aneurysm is either leaking or ruptured.

ANATOMY AND PHYSIOLOGY

The aorta, the largest vessel in the body, extends from the heart to abdominal branches, the renal arteries, mesenteric arteries, lumbar arteries, and divides into the right and left iliac arteries then extends down each leg as the femoral arteries .[1]

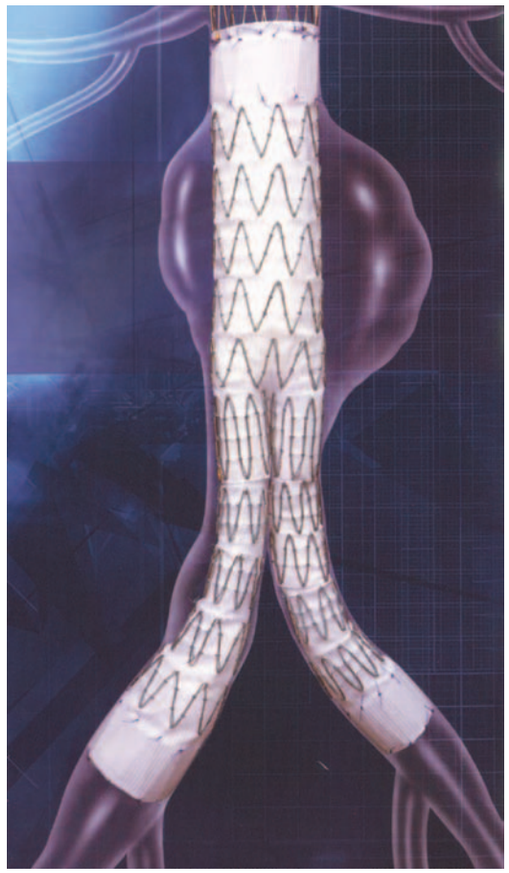
DEFINITION

An aneurysm is a bulging or ballooning that forms in a weakened area of the vessel.[1] An abdominal aortic aneurysm usually occurs below the renal arteries. [1,3,4].

ENDOVASCULAR VS. OPEN PROCEDURE

The decision to repair the AAA endovascularly, versus with an open procedure is primarily based upon the patient's health status. Determining this status involves a thorough history and physical as well as establishing the patients cardiac, renal, pulmonary, and vascular status.

A major consideration for endovascular stent insertion is the anatomy of the vessels themselves. If the arterial system is very tortuous it may be exceedingly difficult, if not impossible to pass the required devices up to secure them in position. Those patients with severe medical conditions, who are unable to withstand the effects of an open surgical procedure and/or the effects of a general anaesthetic, and who will live at least two years are candidates for endovascular stent insertion.



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AAA Endovascular Graft

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Endovascular Stent (cont.)

At St. Paul's Hospital in Saskatoon, Saskatchewan, these procedures are carried out in the Angiography Suite, unlike the open aortic abdominal procedures that are performed in the operating room.

ANAESTHETIC CONSIDERATIONS

The anaesthetic considerations are based on the medical status of each patient and his/her anaesthetic wishes. The procedure is performed under a variety of anaesthetics, preferably epidural anaesthesia. The patient has five lead E.C.G., SaO_2 monitor, arterial line, peripheral lines and an indwelling urinary catheter connected to an urimeter as they would with an open approach. Appropriate sedation is also given by the anaesthetist to help reduce the patient stress during the angiographic procedure.

STAFFING REQUIREMENTS

Due to the combined angiographic/surgical requirements the staffing in St. Paul's Hospital comprises perioperative nurses, a radiology nurse, and two medical radiation technologists.

The radiology nurse's duties include the preparation of the table and tray, preparation of Heparinized saline solution (500 mL NS IV with 5,000 units of 1:1000 Heparin), and preparation of various guide wires and catheters. She/he also prepares the endovascular devices (the main body of the graft and limb grafts if they are to be used). The size of the sheath that houses the device is dependent upon the graft size and can range from 16 French to 22 French. The radiology nurse assists the interventional radiologist with the femoral artery punctures, placement of guide wires and catheters into the abdominal aorta, and finally, the endovascular stent.

ENDOVASCULAR PROCEDURE

The surgical instrumentation utilized is a Cross-Femoral set-up and includes a minor vascular set (the instruments are used on peripheral areas) as listed in Table 1. A specific supply cart has been set up for use in the Angiography Suite giving the perioperative nurses access to OR related supplies (i.e. packs, ties, sutures) that are not stocked in the Angio Suite.

Table 1

MINOR VASCULAR SET

6 Vascular Clamps
2 Long Kelly Clamps
2 Small Sponge Sticks
2 Kockers
2 Allis Clamps
2 Mosquitos with shods
12 Mosquitos
Kelly Clamps
Abdominal Suction
4 Tonsils
4 Right Angles
2 Paediatric Right Angles
8 Needle Drivers
12 criles
Irrigating Cannula
9 Vessel Dilators
2 Mini Iris Tissues
2 Toothed Iris Tissues
Beaver Handle
Spencer Coronary Artery Tissue
Spring Scissor
2 Self Retaining Claws
Small Mastoid Retractor
2 Baby Richardsons
2 Langenbachs
2 Small Langenbachs
2 Potts Scissors
2 - 7" Metz
5" Metz
Straight Stabismus Scissor
Curved Strabismus Scissor
Steven's Tenotomy Scissor
2 - #10 Blades
2 Toothed Waughs
2 Toothed Ramseys
2 Toothed Gilles Tissues
2 Short Debakey Tissues
2 – 8" Debakey Tissues
15 Spring Debakey Clamps
6 Bulldogs
Caliper
4 – #3 Scalpel Handles
2 Nerve Hooks
2 Frazier Suctions with Stillette

Endovascular Stent (cont.)

The perioperative nursing staff set up the back table as if in the operating room. A count, consisting of sharps and sponges is carried out. A weak heparin solution, heparin 1:1000 units / 1 mL. in 200 mL of normal saline (IV) is used to help prevent clotting in the vessel.

Prior to the patient being placed on the Angio table a ruler is placed under the mattress to assist with the stent placement. The patient is surgically prepped with a Betadine solution from nipple line to knees and draped as per the surgeon's requirements – usually from umbilicus to knees thereby exposing the groins.

There are usually two vascular surgeons involved in the procedure so the Femoral Arteries are exposed in tandem. Incisions are made in the right and left groins. Dissection is carried out to the femoral artery using cautery to coagulate any bleeding vessels. The common, superficial and deep (profunda) femoral arteries are exposed with the use of vessiloops or umbilical tapes (these are string-like devices that can retract or constrict the arteries, as required, without damaging them). These major vessels may also be occluded with vascular clamps to help decrease blood loss and aid visualization for the stent insertion.

Arteriotomies (incision into the artery) are carried out with a #11 scalpel blade and Potts scissors. The vessel is incised enough to allow the passing of the stent.

The radiologist then passes a guide wire through the femoral arteriotomy, up the external and common iliac arteries,and in to the aorta. The angio catheter-sheath is passed over the guide wire and, with the use of dye the vessels are visualized. The ruler under the mattress, along with the markings on the stent, are used to determine the correct insertion and placement of the stent.

The stent may be either bifurcated or straight. The sheath and stent (that is threaded up over the guide wire with the use of angiography) is positioned approximately 1mm below the lowest renal artery. Once positioned, to the satisfaction of both the vascular surgeon and the interventional radiologist, the stent is deployed. The insertion device is removed and over the guidewire an angiographic balloon is advanced to the upper portion of the stent. Once in position the balloon is inflated 2 or 3 times until the graft is secure. There may be circumferential rows of small hooks that attach the upper portion of the stent to the intima and media of the vessel, or it may be held in position by radial force alone without the hooks.

The main body of the graft (if bifurcated), once secured in position, looks like a pair of trousers with one long leg and one short leg. The ipsilateral side is the long leg. The contralateral side is the short leg. The second portion of the stent is threaded up the contralateral vessel and positioned so the short section of the main body of the stent overlaps that this, then the graft is secured in position with the angiographic balloon. Once the angiographic sheath and balloon are removed from the artery, the artery is back bled to remove any possible blood clots that may have formed.

The femoral artery is anastamosed by the surgeon using a vascular stitch and the vessiloop and clamps are removed. Protamine is given by the anaesthetist to reverse the effects of the Heparin. The suture line is checked to ensure there is no further bleeding and, if it is satisfactory, primary closure is carried out. Upon finishing the skin closure the vascular surgeon checks the popliteal and posterior tibial pulses as well as color and temperature of the limbs. This is to ensure circulation has not been impaired (i.e. thrombosis).

Mepore dressings are applied to the operative sites and the patient is transferred off the radiology table and onto the patient bed and then transported to PACU.

In the unlikely event of a complication during the procedure (i.e. rupture of aorta) there is a sterile major abdominal aortic aneurysm set up in the operating room. The patient may go to ICU, post-procedure, for an overnight stay but often just goes to an observation unit nearby on the surgical floor.

ADVANTAGES AND DISADVANTAGES

The advantages to the patient of Endovascular Stent Insertion include a decrease in blood loss, lack

Endovascular Stent (cont.)

of abdominal incision, and a shortened hospital stay (usually forty-eight to seventy-two hours). [2]

The potential disadvantages or complications of this procedure are similar to the open abdominal procedure and include emboli, aortic perforation, anaesthetic complications, and higher risk of fatality.

CONCLUSION

In conclusion, the use of Endovascular grafts will only increase in the future. The stent is very expensive but the cost is off-set by the reduction in ICU time and a shortened hospital stay, not to mention the physical and cosmetic benefits to the patient.

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