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Surgical Removal of an Aortic Foreign Body

by
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Summary
In this report, a case involving surgical removal of an aortic foreign body will be presented and a review of vascular surgery will be discussed. The main objective of vascular surgery is to restore the circulation to normal function in the tissues where the blood supply has been interrupted or obstructed. Vascular surgery can be relatively simple and rewarding if some basic principles are recognized and adhered to.

Introduction
Vascular surgery deals with traumatic injuries, acute and chronic arterial obstructions, and aneurysms. Surgery to repair or reconstruct the arterial channels has been accomplished with success by those who chose to undertake such a procedure. Every procedure varies according to the vascular lesion presented and distinct limitations exist. Vascular surgery when applied to arterial trauma is the least limited and influenced only by the factors of time and the severity of the injury involved. In acute and chronic arterial obstructions, time is the most important limitation due to the relationship of a thrombus. The extent of the thrombus and the size of the vessel involved will determine the success of the procedure. Those lesions which are involved with the major vessels and a localized area are the most successfully resolved. Aneurysms are dangerous and very progressive which makes their repair essential in all cases. A major obstacle to performing vascular surgery is the trepidation and lack of confidence the surgeon has in his ability to open and suture blood vessels.

Case report
A 2-year-old male poodle mix was presented on the afternoon of June 13, 1972, with the history of being unable to walk with its hind legs. The dog had been gone for two weeks and had just appeared in the owner's driveway trying to drag himself to the house.

The dog was emaciated, unable to use its hind legs, and was in shock. The femoral pulse was almost absent and both legs felt cold on palpation.

Blood and urine samples were obtained, and the dog was administered 500 cc. Ringers lactate and 50 mg. of Solu-Delta-Cortef.

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Lab results were: PCV 36%, WBC 19,200 per cu. mm., with 20% lymphocytes, 77% segmented neutrophils, 3% band neutrophils, BUN 46 mg%, SGPT 40 SF units. Urinalysis results were: dark color, pH 6.0, blood +++, sugar negative, acetone negative, bile trace. A fecal flotation was positive for hookworms and whipworms.

On the following day, June 14, 1972, ventrodorsal and lateral radiographs were taken of the abdomen (figs. 1 and 2). The radiographs revealed a dense radio-opaque object, resembling a bullet, located in the sublumbar area. A tentative diagnosis of kidney trauma and secondary infection resulting from a bullet wound was made. A thorough examination of the animal for the entry site of the bullet was unsuccessful. Surgical exploratory and removal of the bullet was recommended. A prognosis of fair to good was given.

Surgery was performed the next day, June 15, 1972. The dog was administered atropine sulfate subcutaneously and anesthetized with Surital and maintained with halothane. Throughout the surgical procedure a continuous I.V. drip of Ringers lactate was administered.

A ventral midline incision was made from the umbilicus to the brim of the pelvis. The abdominal viscera were packed off with saline soaked sponges to facilitate a thorough examination of the sublumbar area. Surprisingly no damage to the sublumbar muscles or surrounding area was found. Palpation of the abdominal aorta indicated the bullet to be located at the bifurcation of the external iliac arteries. The bullet was easily manipulated and moved anteriorly within the aorta. Examination of the abdominal viscera and abdominal wall for any injury or site of entry of the bullet was unrewarding.

Figure 1. Lateral radiograph of the abdomen.
The terminal aorta was exposed by incising the parietal peritoneum. The aorta was occluded anteriorly with ¼ inch umbilical tape threaded through a ¼ inch piece of sterile rubber tubing and secured with a hemostat. Both external iliacs were also occluded at this time by the same method to prevent reflux hemorrhage.

A 1 cm, stab incision was made in the aorta about 2–3 cm. anterior to the bifurcation of the external iliacs with a number 10 Bard Parker blade. The bullet, a .22 caliber, was removed with thumb tissue forceps. Upon removal it was noted that no thrombus had formed around the bullet or in the aorta. The ¼ inch umbilical tape occlusion, anterior to the incision site, was slightly released to allow a free flow of blood to express any possible thrombi anterior to the bullet. There were no thrombi and the aorta was occluded once more. The incision was closed with interrupted sutures of 4–0 chronic catgut on a ⅛ circle atraumatic swaged needle. Since vascular surgery was not anticipated, 5–0 silk was not made available for the procedure.

Pressure was then released from the external iliac arteries and the terminal aorta. There was some leakage but this was con-
trolled by using a \( \frac{1}{2} \times \frac{1}{4} \) inch piece of Surgicel placed over the incision line and seepage was subsequently stopped. Blood flow returned to normal and a strong femoral pulse could then be palpated.

The abdominal incision was closed in two layers with simple interrupted sutures using 1–0 chromic catgut. The skin was sutured with horizontal mattress sutures using medium Vetefil.

Postoperative treatment consisted of daily injections of penicillin-streptomycin b.i.d. for five days. The dog made an uneventful recovery and was sent home on the sixth day walking normally.

Clinical case discussion

Some recommended changes from the above procedure would be:
1. Use 4–0 to 6–0 silk instead of chromic catgut due to the possibility of thrombus formation around the catgut.
2. Use a continuous over and over suture pattern.
3. Have on hand a special surgical pack set up specifically for vascular surgery containing the following items:
   a. fine silk or teflon dacron size 5–0 or 6–0 of the best quality with swaged on \( \frac{1}{2} \) circle atraumatic needles.
   b. four or five bulldog forceps or serrefine (rubber shod) forceps for clamping off vessels. The method of using the umbilical tape and rubber tubing, or choker, is also acceptable.
   c. Two halstead mosquito forceps for holding traction sutures.
   d. A pair of sharp small iris scissors for debriding vessels.
   e. A pair of small ophthalmic forceps for holding the vessel.
   f. Surgicel

There are two possible theories that could explain the pathway of the bullet. Either the .22 caliber bullet entered the thoracic cavity and penetrated the left ventricle of the heart or it passed through the lumbar areas, kidneys, and into the aorta. In the two-week period that the dog was gone, healing of the skin occurred.

The increased B.U.N. may have resulted from partial obstruction of aortic blood flow. Decreased flow of blood to the kidneys resulted in a reduced glomerular filtration rate, which raised the B.U.N.

The dog’s hematuria may have resulted from the bullet passing through a kidney on the way to the thorax. Likewise the increased B.U.N. may have resulted from renal trauma. It is also conceivable that if the bullet passed out the heart and down the aorta, renal ischemia may have occurred which could increase the B.U.N.

Surgical technique

Successful surgical technique used in treatment of a vascular lesion begins with the correct diagnosis and repair of the involved vessels. Some factors to be considered in the surgical technique are: (1) decontamination of the wound by debridement or excision, (2) adequate surgical exposure, (3) repair proximally and distally to the injured artery, (4) removal of all clots or thrombi, and (5) repair of the artery without constricting the lumen size.

When handling the vessel, and especially the intima, gentleness is of prime importance. Any unnecessary roughness can result in an area of weakness which may cause another lesion to occur in the future.

Before the vessel is sutured the adventitia must be stripped from the area so only the vessel will be included in the sutures. If any adventitia is included in the suture a site for a future thrombus may be formed within the vessel.

Cardiovascular silk or teflon-dacron should be used for suture material. The reason being that platelets do not adhere to the smooth surface of cardiovascular suture material. This will decrease the chances of a thrombus forming in the area of repair. Also only an atraumatic swaged-on suture needle should be used to lessen the chance of unnecessary trauma to the vessel wall.

The vessel is clamped both proximal and distal to the injury site with bulldog clamps or chokers. The incision or wound

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is then sutured with 5–0 or 6–0 silk with an atraumatic swaged-on needle using an over and over suture pattern. Repair of an irregular laceration or badly damaged vessel is slightly more complicated. The vessel is clamped proximally and distally as before. Then the damaged vessel segment is debrided or excised from both ends of the artery. The artery ends are then approximated with the bulldog forceps and two separate suture lines are started at opposite points on the vessel. The two sutures are then worked around the vessel and meet the other suture line. The over and over suture pattern is used and the sutures are place 1–3 mm. from the edge of the vessel and 1–2 mm. apart.\(^1\)

**Postoperative care**

Postoperative care should include systemic antibiotic therapy and a very close monitoring of the animal. The animal should be watched for any signs that a thrombus has formed in the repaired vessel. If this occurs the same clinical signs that were seen before repair or surgery will again reoccur. These signs include pain to the area, coldness of the area supplied by the artery, loss of function of the limb, absence of an expected pulse in the artery distal to the repair, and also any indication of a hematoma forming proximal to the repair site.

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**REFERENCES**


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**Glomerulonephritis in the Canine**

* (A Case Report) 

by 

Marvin P. Crawford, Ph.D.*  
Robert W. Carithers, D.V.M., Ph.D.†

**Summary**

The case report given shows some of the characteristic clinical and histopathological signs of glomerulonephritis. The clinical signs include proteinuria, elevated blood urea nitrogen and creatinine levels.

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The histopathology of the kidney reveals glomerular tuft proliferation, hyaline formation, and Bowman's capsule adhesions. The differentiation of the various renal disorders can be made early in their clinical course by renal biopsy with some degree of prognostication possible at that time. As the renal disease progresses toward chronicity the differentiation becomes more difficult and prognosis graver. In all cases symptomatic treatment is all that is available.