ABDOMINAL VASCULAR TRAUMA

Brief Syllabus—August, 2023

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INCIDENCE

In urban centers up to 20-25% of patients undergoing a laparotomy for a gunshot wound of the abdomen have an injury to a major named abdominal vessel. (Feliciano DV, Burch JM, et al. Abdominal gunshot wounds. An urban trauma center's experience with 300 consecutive patients. Ann Surg 1988; 208: 362-370).

UNIQUE PROBLEMS WHEN MANAGING ABDOMINAL VASCULAR INJURIES (PRESENTING AS HEMATOMA, HEMORRHAGE, OR BOTH).

Lack of tamponade (especially pelvis and mesentery after gunshot wounds)
Difficulty in exposure (overlying organs and location in retroperitoneum)
Presence of multiple other intra-abdominal injuries
Associated gastrointestinal contamination
Surgeon's lack of experience with open abdominal vascular surgery

ABDOMINAL VASCULAR INJURIES (HEMATOMA, HEMORRHAGE, OR BOTH) OCCUR IN A VARIETY OF AREAS

Three Zone Classification—Zone 1 Central-medial retroperitoneal hematoma; Zone 2—Flank retroperitoneal hematoma; Zone 3 Pelvic retroperitoneal hematoma

Five zone Classification (Condensed to Four in Recent Publications by Combining Midline Supra-mesocolic and Infra-mesocolic)—Midline supra-mesocolic (midline suprarenal aorta, visceral arteries); Midline infra-mesocolic (midline infrarenal aorta, midline IVC, superior mesenteric vein); Lateral perirenal (renal artery and vein); Lateral pelvic (iliac artery and vein); Portal (portal vein, hepatic artery, retrohepatic vena cava).

HEMATOMA VS. HEMORRHAGE—OPERATIVE APPROACH

Penetrating Hematoma—"ALL" are explored (with the exception of lateral pericolic and, in some surgeon's minds, deep pelvic without expansion)

Blunt Hematoma

**Midline/Portal---Open
**Perirenal/Pelvic—Do not open (if unruptured, not pulsatile, not expanding)

COMBINED VASCULAR-GASTROINTESTINAL INJURIES

If Vascular Injury Presents with Hematoma
- GI control and repair
- Irrigate and change surgeon's gloves and drapes around incision
- Vascular control and repair

If Vascular Injury Presents with Hemorrhage or Hemorrhage-Hematoma
- Vascular control and repair if simple injury
- GI control and repair
- Irrigate and change surgeon's gloves and drapes around incision
- Complex vascular repair

ARTERIAL INJURIES

Control Hemorrhage

- Laparotomy pad compression
- Manual control—"the grab", particularly applicable to exposed iliac artery injury
- Proximal and distal control with vessel loop or vascular clamp
- Balloon catheter tamponade

Repair

- Lateral arteriorrhaphy
- Patch angioplasty—especially for abdominal aorta
- Temporary intraluminal shunt—especially for SMA injury in Fullen Zone l, Il, +/- Ill AND for injury to common or external iliac artery
- Resection followed by end-to-end anastomosis or insertion of interposition graft
- Bypass graft around thrombosis
- Extraanatomic bypass graft

VENOUS INJURIES

Control Hemorrhage (Same as for an injured artery)

- Spongestick compression

Repair/Ligation

- Lateral venorrhaphy
- Patch venoplasty—especially for IVC
- Temporary intraluminal shunt—especially for SMV injury or injury to common or external Iliac vein

- Resection followed by end-to-end anastomosis or interposition with ringed PTFE
- Ligation - any abdominal vein except suprarenal IVC (though there have been numerous survivors) or suprahepatic IVC