Abdominal Vascular Injuries: A Unified Approach

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The Basics

- Penetrating Trauma → Hemodynamic Instability → OR
- Midline Laparotomy
- Pack all 4 Quadrants
- Arterial Injury → Local Pressure

Infrequent Indications for Transthoracic Aortic Cross Clamp for Abdominal Injury

- Cardiac Arrest
- Previous Long Midline Abdominal Incision
- Aortic Injury at level of Diaphragmatic Crura

Proximal Control

- Supra- or Infra-Mesocolic Hemorrhage?
- Options for Supra-Mesocolic Proximal Control
  - Cross Clamp the Thoracic Aortic
  - Cross Clamp Aorta at Diaphragmatic Hiatus
Control of the Aorta at the Diaphragmatic Hiatus

Exposure of the Supra-Coeliac Aorta

Massive Bleeding from Lesser Sac of base of transverse colon mesentery?

Consider Peri-Pancreatic Portal Vein Injury

Location of Portal Vein Injuries
Technical Maneuvers to Facilitate Portal Venorrhaphy

- Repair the posterior wall of a “thru and thru” injury through the anterior wall
- Divide and ligate the inferior mesenteric vein to increase mobility of the portal vein and improve exposure
Infra-Mesocolic Hematoma

- Midline?
- Lateral?
- Pelvic?

Midline Infra-Mesocolic Hematoma

- Vena Caval Injury

• Right Medial Visceral Rotation

Midline Infra-Mesocolic Hematoma

- Aortic Injury

• Approach as Leaking AAA
• Retract small bowel to right
• Open retroperitoneum
• Dissect out aorta to level of left renal vein
• Left renal vein may be divided for exposure (rarely necessary)

Exposing the entire Infra-Duodenal Retroperitoneum—Cattell-Braasch Maneuver

Tricks to Control the IVC

• Sponge stick Control—“The Compressive Circle”

Repair the Posterior Wall of the IVC through an extended anterior venotomy

The Special Problem of a Thru and Thu IVC Injury at the Level of the Renal Veins

• Sling the Cava Proximally and Distally
• Early Control of Both Renal Veins
• Sneak up with proximal and Distal Control to control lumbar bleeding
• If necessary, mobilize right kidney to rotate IVC

Tricks to Control the

• Intraluminal Foley Balloon Tamponade
• Control anterior wall of IVC with Allis Clamps
• Repair the Posterior Wall of the IVC through an extended anterior venotomy
If all else fails

*LIGATE THE CAVA!!*

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**Lateral Infra-mesocolic Hematoma**

- Size?
- Expanding?
- Palpable Thrill?
- Functioning Contra-lateral Kidney?
  - Single shot IVP (1cc Renograffin/Pound)
  - Palpation
- Controversy
  - Mandatory Exploration?
  - Conservative Management?
    - Angioembolization
    - Drainage

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**Exsanguinating Unstable Patient with Severe Renal Injury**

- NEPHRECTOMY
- Incise Gerota’s Fascia and mobilize the kidney as you would the spleen
- Control the hilum with your fingers temporarily and remove the kidney

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**If you must explore the kidney in a Stable Patient**

- Find Renal Vein at Base of Mesentery and Sling
- Retract caudad to Identify Left Renal Artery and Sling
- Find and Sling Right Renal Vein off IVC
- Right Renal artery posterior to Right Renal Vein

This takes Time for the Average Surgeon!!
Remember!!

An ill advised or inexpert exploration of a stable perinephric hematoma can convert a salvageable kidney with conservative management into a nephrectomy

Pelvic Infra-Mesocolic Hematoma

• Arterial Hemorrhage ??
  – Cross clamp Aorta above the bifurcation
  – Mobilize Sigmoid Colon to Expose Left CIA
  – Open Retroperitoneum to Expose Right CIA
  – Repair usually straight forward
    • Arteriorrhaphy
    • PTFE interposition Graft
  – Venous Hemorrhage— We have a BIG problem!

Tricks to Control Iliac Vein Injuries

• GET MORE HELP—EXPOSURE IS A PROBLEM
• Control hemorrhage with packs
• Use the Compressive Circle of Sponge Sticks to get proximal control and advance your vascular clamp as you continue the dissection to “sneak up” on the injury
• Distal Control may be very challenging

Tricks to Control Iliac Vein Injuries

• Use an intraluminal Foley balloon to control distal bleeding if you can identify the hole
• If necessary, make a counter incision possibly including dividing the inguinal ligament to get distal control and “sneak up” distal to the injury with your clamp
• Exsanguinating patient and you’re not having a good day—Ligate the Vein!!
The Special Problem of a Thru and Thru Injury at the Confluence of the Iliac Veins

Deep Pelvic Hemorrhage

• Pack
• Angioembolization

Summary

• Recognition of Major Vascular Injury—Get Extra help, particularly with a fat patient, you’re going to need it for exposure!
• Proximal and Distal Control—often easier said than done!
• These are infrequently encountered problems—Proper Prior Preparation Prevents Poor Performance!