Vascular Complications Of Anterior Spine Exposures: How To Avoid Them And How To Treat Them If They Occur

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William P. Robinson, III MD
Professor and Chief
Division of Vascular and Surgery
Southern Illinois University School of Medicine
Springfield, IL

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Disclosures

- None

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Why is this Important?: Lumbar Fusion Explosion

- Increase in fellowship-trained spine surgeons
- Growth of anterior instrumentation for anterior fusion
- Limitations of posterior approaches not overcome
- Aging population with degenerative spine disease
- Co-morbidities of older patients not considered prohibitive

50,000 ALIF per year (200,000 Total Lumbar Fusions)
vs.
4,000 open AAAs per year (45,000 Total AAAs)

Rates of Vascular Complications

- Vascular Injury: 0-18%
- "Major" Vascular Injury: 1-3%
  - Most common is Left Common Iliac Vein
  - Arterial: iliac artery occlusion related to retraction / plaque disruption
- DVT: 1-5%
  - Related to prolonged retraction or narrowing of vein with repair
- Does not vary significantly between approaches

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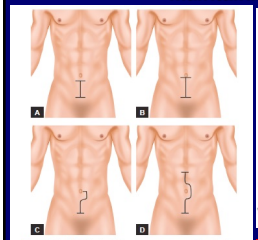
Avoiding Vascular Injuries through Limited Incisions: Maintaining an RP Exposure



Figs 2A to D: Skin incisions for exposure of the lumbosacral spine. (A) Exposure of the L5–S1 disk; (B) Exposure of the L4–L5 disk; (C) Exposure of the L3–L4 disk; (D) Exposure of the L2–L3 disk

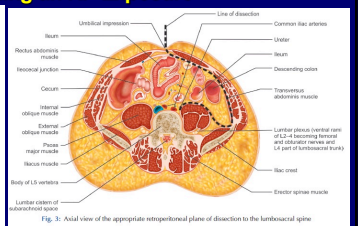
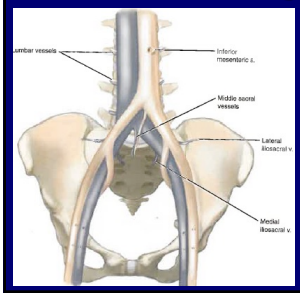
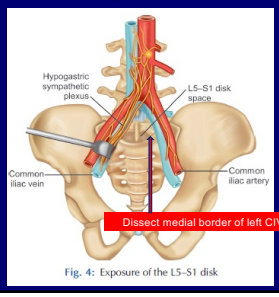


Fig. 3: Axial view of the appropriate retroperitoneal plane of dissection to the lumbosacral spine

Don't get discouraged by small tears in peritoneal sac. Stay RP!

Understanding Anatomy: L5-S1

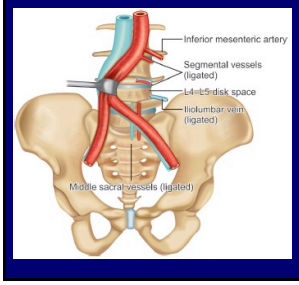




Dissect medial border of left CIV

Fig. 4: Exposure of the L5–S1 disk

Understanding Anatomy: L4- L5



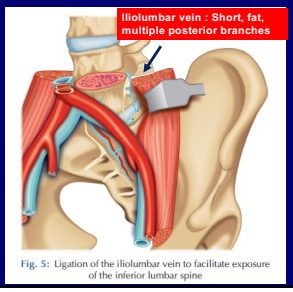
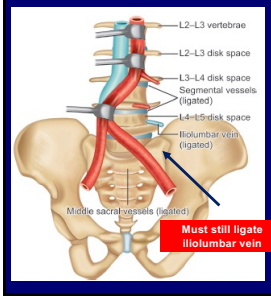
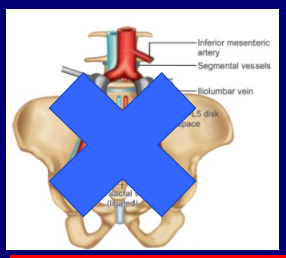


Fig. 5: Ligation of the iliolumbar vein to facilitate exposure of the inferior lumbar spine

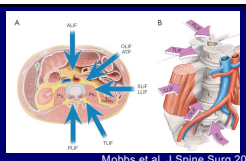
Understanding Anatomy: L2-L4





OLIF / XLIF

- Increasing trend toward OLIF
  - Including L5-S1
  - "mini open" lateral incision
  - Allows posterior screw placement without changing position
- Same rates of injury
- *Smaller Incision*
- *Less visualization*
  - *Low threshold for extension*

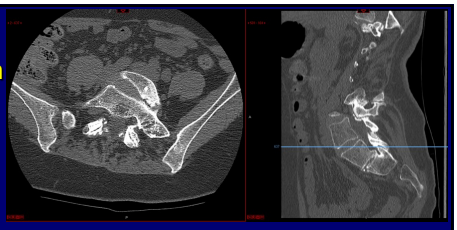


Mobbs et al, J Spine Surg 2015; 1(1): 2-

Patient Selection: Risk Factors

- BMI / Habitus
  - Want a gynecoid or platypelloid pelvis
- Previous Surgery
  - Spine Surgery (Anterior or Posterior)
  - Vascular Intervention (uncommon)
  - Ventral Hernia (Mesh)
  - Intra-abdominal (left colon and nephrectomy)
- Medical Conditions
  - Diverticulitis

Case Preparation



- Non-con CT or MRI is adequate
- Vessel position relative to level of fusion
- Osteophytes/ Instrumentation / infection / anomalies
- Can't judge size of patient on a lumbar spine CT !

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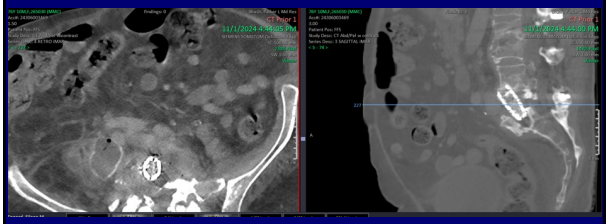
Recognize Difficult Anatomy

- Spondylolisthesis / extreme lordosis
  - Difficult exposure of anterior disk
  - Traction on vessels
  - Vessels stretched when spine aligned and disk-height is increased
- Cage insertion or removal
  - Need wider exposure of disk
- Infection

Very High Risk Cases
Infection with abcess: Stay with Left RP approach



Watch Your Spine Surgeon!

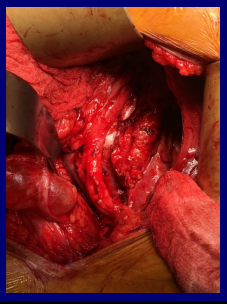
- Initially stay and assist during discectomy and fusion
  - Learn "how much space" they need
  - Implants and cages vary in profile
  - teach them how to retract the vessels and the limits of your vessel mobilization
- As gain experience, can leave case altogether or return for closure
- Develop trust – feel comfortable bailing out on hazardous exposures
- Selectively see high-risk patients for preoperative evaluation

Thoughts on Instruments and Techniques

- Hand-held Wylie retractor invaluable (7 in. and 10 in. depth)
  - "toe in"
  - Reverse lip protects vessels
- Newer systems with adjustable retractor blades

Thoughts on Techniques

- Wider mobilization of diseased vessels
- Give "retraction breaks" on long cases
- Use silk ties/sutures rather than clips
  - Clips disrupted by retractors / vein tears
- Straight and 90° medium and large clip applier for iliolumbar vein
- Check left EIA pulse and right CIA pulse before closure
- Check pedal pulses pre- and post

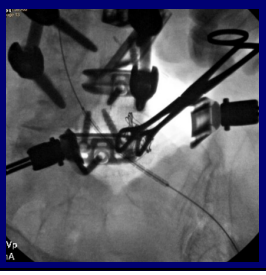


When Intraoperative Vascular Injuries Occur

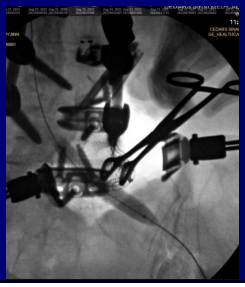
- Topical agents for minor vein injuries
- Injuries requiring operative repair
  - Sponge stick
  - 4-0 prolene on an RB-1
- Significant venous narrowing is rare
- Divide arteries to expose veins if needed
- Get vascular partner assistance
  - Other surgeons do not know how to "compress, expose, and suck"

Endovascular Bailout

Endovascular Bailout



Endovascular Bailout



Conclusions

- Injuries are rare but can be catastrophic
- Patient selection and preoperative preparation avoids most vascular complications
- Develop your technique for safe and consistent exposure
- Don't sacrifice safety for speed or a small incision
- Get good help when you need it

- Thank you
- Questions?

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