

Surgical control of severe hepatic trauma: Patients selection and how I do it!

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 Prof. Dr. D. Candinas, Bern
 PD Dr. B. Schnüriger, Bern

Contents

Beat Schnüriger (5'):

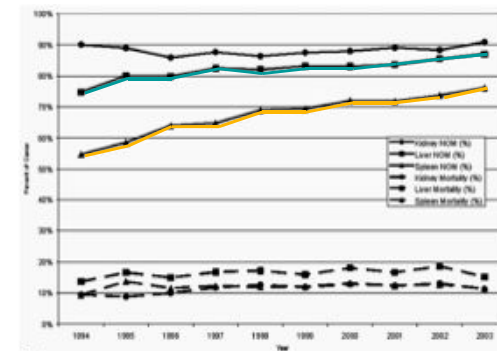
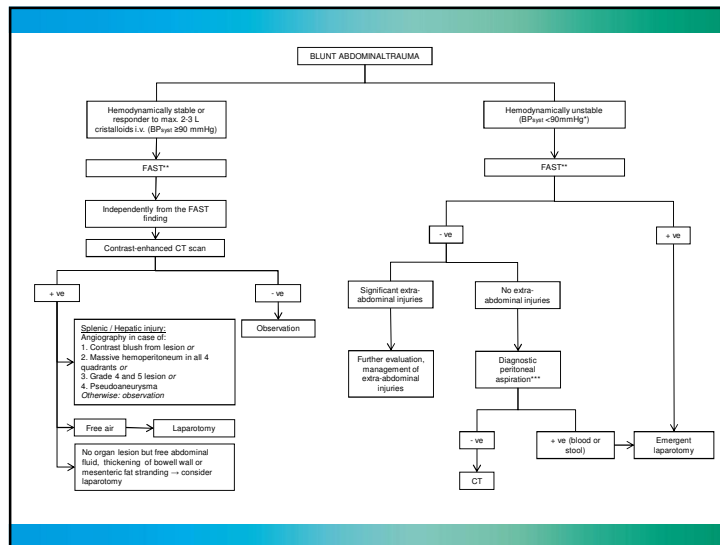
- Selection for operative management

Daniel Candinas (15'):

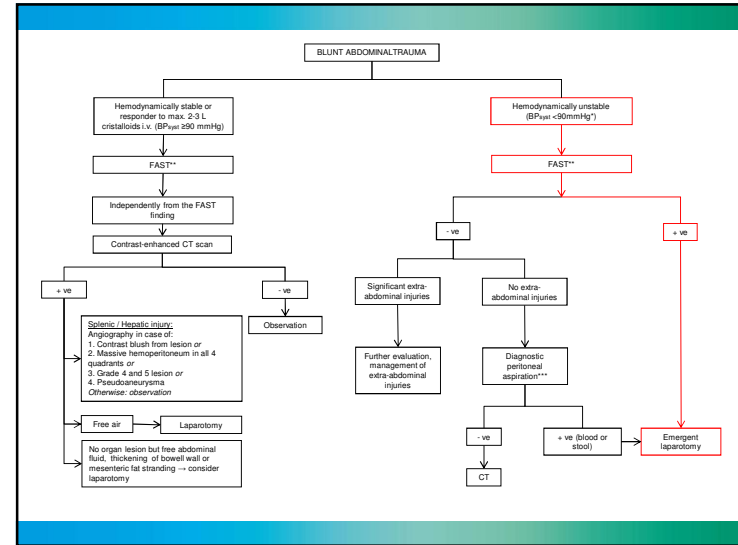
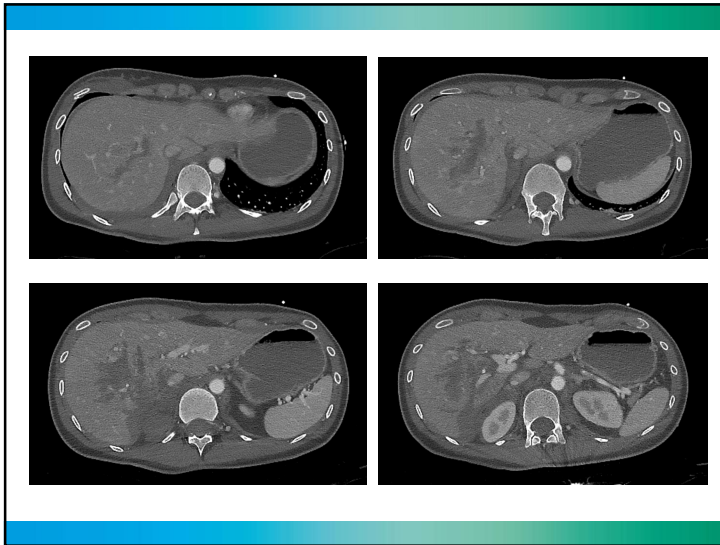
- Damage control of the liver based along an anatomical street view

Andrew Peitzman (15'):

- Advanced operative techniques in the management of complex liver injury



Michael Hurtuk et al. Trauma Surgeons Practice What they preach: The NTDB Story on Solid Organ Injury Management. J Trauma 2006



„Golden tickets to the OR“

- Hemodynamic instability and positive FAST examination
- Peritonitis (CAVE: evaluable patient?)



Stop that bleeding!



Start with manual compression

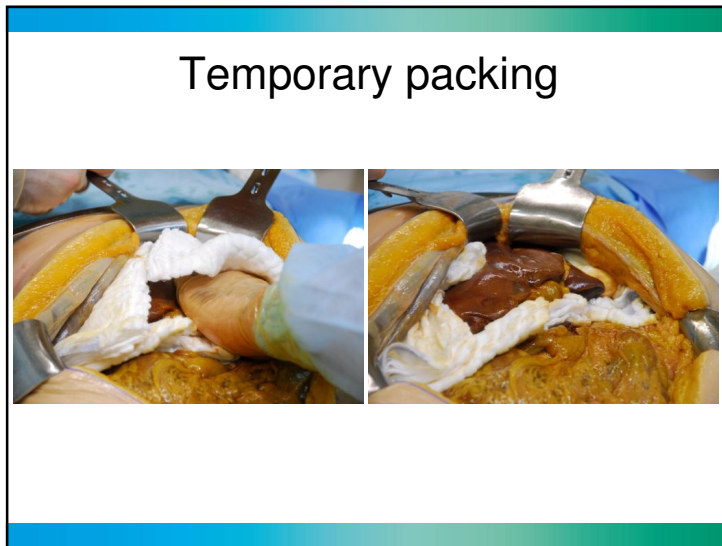
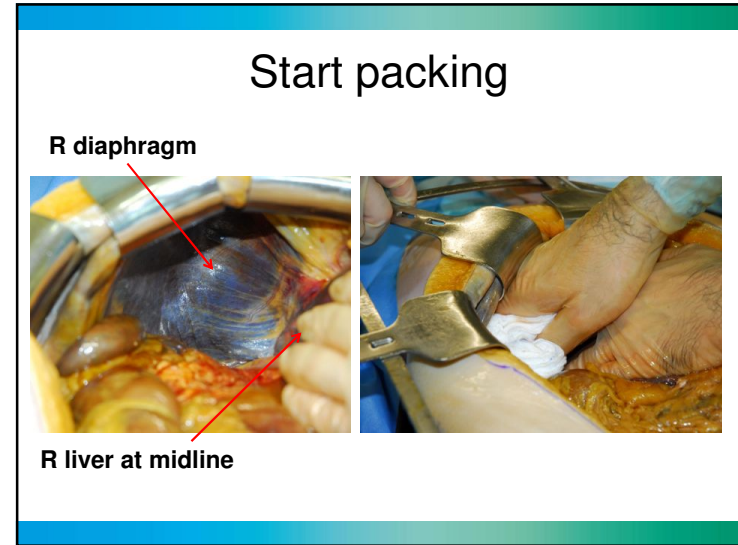
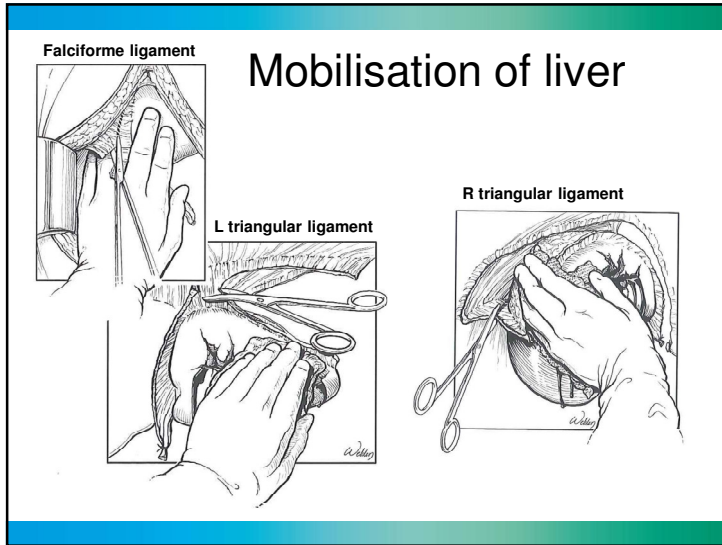


Mobilisation of liver

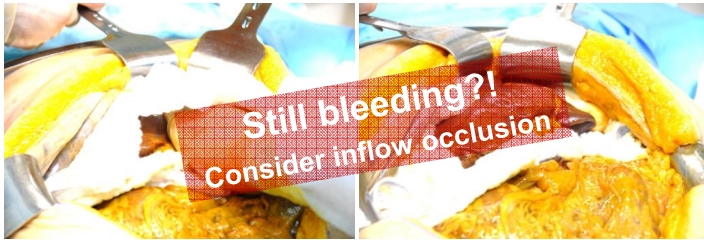


Mobilisation of liver





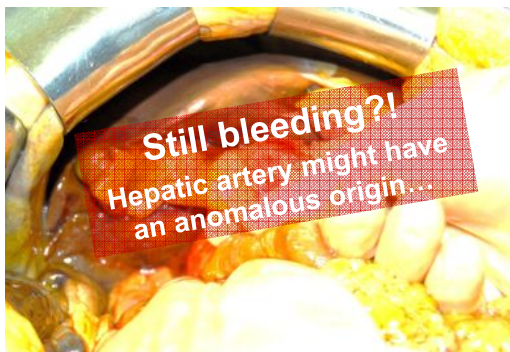
Packing



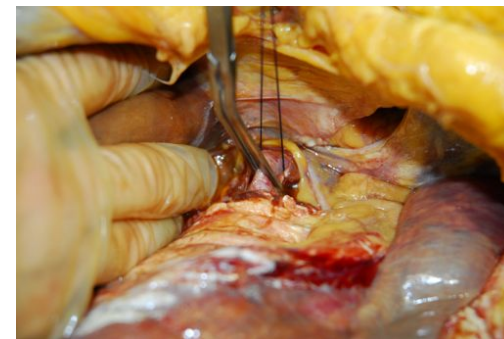
→ Pringle maneuver



Pringle maneuver



→ temporary aortic clamping



«Packing plus»

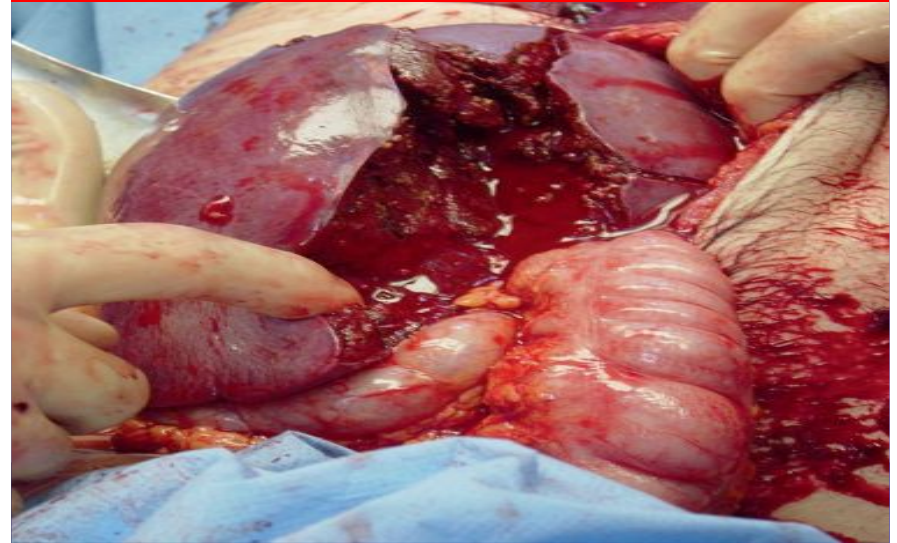
- If packing has achieved hemostasis - don't remove packs...
- *Immediate postoperative angiography with embolization as an adjunct to effective packing*

Complex hepatic injuries: what we do in Pittsburgh

Swiss Trauma Day,
Berne
February, 2014



You are on call, you take a hemodynamically unstable patient to the operating theater, +FAST, and you find this.....



Liver injury: the facts

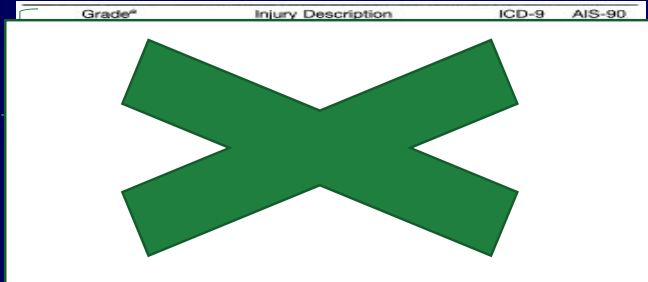
- Grade 5 liver injury is quite uncommon, even at the busiest trauma centers (2-4/yr)
- When you are operating on a high grade liver injury, it is an uncommon event, **the patient is trying to die**, and **you really don't know what to do**
- What we have taught you for 30 years has failed to change operative mortality for grade 4 and 5 liver injury: **65-100% for retrohepatic caval injury; 50-85% for Grade 4,5**

Liver injury: the facts

- Mortality is higher for blunt than for penetrating liver injury
- 85% of liver injury is grade 1-3
- 85% of blunt liver injury can be managed nonoperatively
- **15% of liver injury requires operation, generally grade 4 or 5, usually a hemodynamically unstable patient**

Organ injury scale: liver

85%

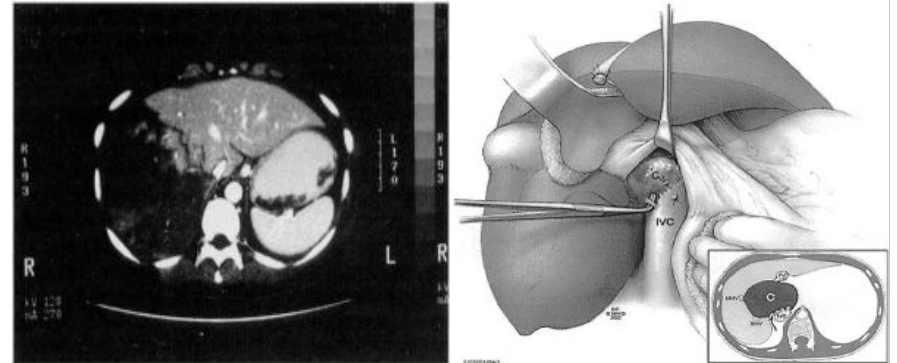


Grade*	Injury Description	ICD-9	AIS-90
IV	Laceration Parenchymal disruption involving 25–75% of hepatic lobe or 1–3 Couinaud's segments within a single lobe	864.14 864.04 864.14	4
V	Laceration Parenchymal disruption involving >75% of hepatic lobe or >3 Couinaud's segments within a single lobe		5
	Vascular Juxtahepatic venous injuries; i.e., retrohepatic vena cava/central major hepatic veins		5
VI	Vascular Hepatic avulsion		6

* Advance one grade for multiple injuries, up to grade III.

15%

Grade V injuries: juxtahepatic injuries vs. intraparenchymal injuries



•65-100% mortality for retrohepatic injury.

Role of liver resection for hepatic injury

- Cogbill et al (1988), Beal et al (1989) reported 55% mortality with resection for hepatic injury→

never do anatomic resection

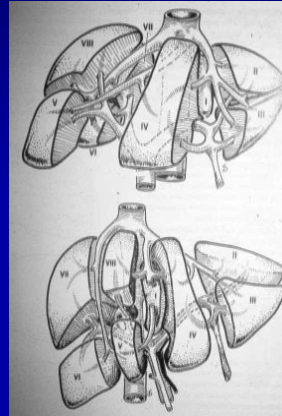
On the other hand.....

- Strong et al. Surgery, 1998.
 - 11% mortality for hepatic resection for trauma
- Tsugawa et al. World J Surg, 2002.
 - 24% mortality for hepatic resection for trauma
- Polanco et al. J Trauma, 2008
 - 7% mortality for hepatic resection for trauma
 - 25% mortality for retrohepatic injury

LIVER RESECTION PATIENTS

Type of Resection

Resectional Debridement:	23
Anatomic segmentectomy:	21
Left Lobectomy:	3
Right Lobectomy:	8
Hepatectomy+OLT	1
TOTAL:	56



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Why?



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What do the textbooks recommend for grade V liver injury (retrohepatic caval injury) ?

- Heaney maneuver
- Veno-venous bypass
- Atrial caval shunt
 - More authors than survivors



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In Pittsburgh, for trauma, we don't use...

- Atrial caval shunts (never)
- Veno-venous bypass (once)
- Extension of midline to thoracotomy or sternotomy (Heaney maneuver) (rarely)



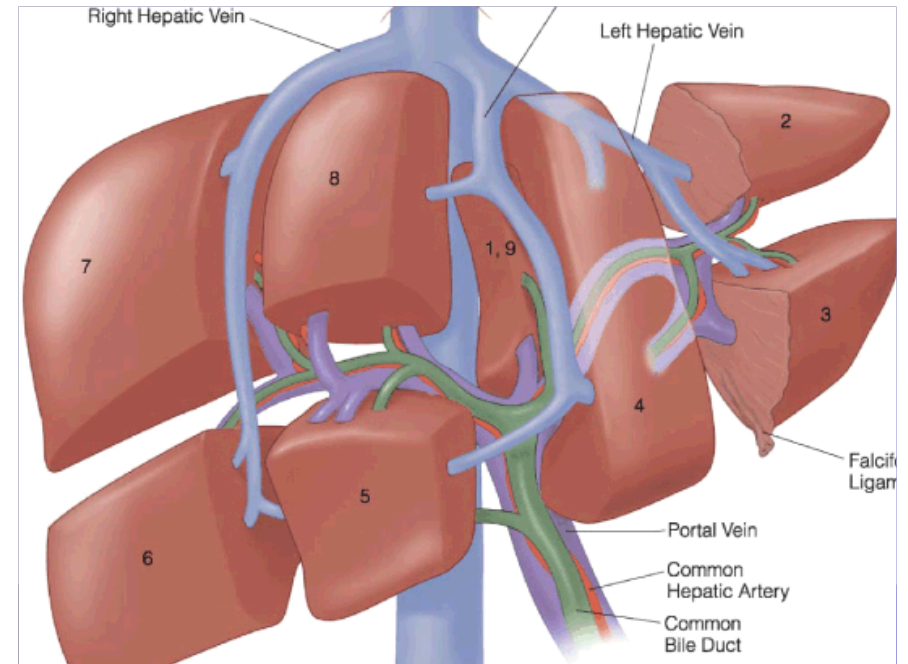
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If we really understand hepatic anatomy and operative exposure...

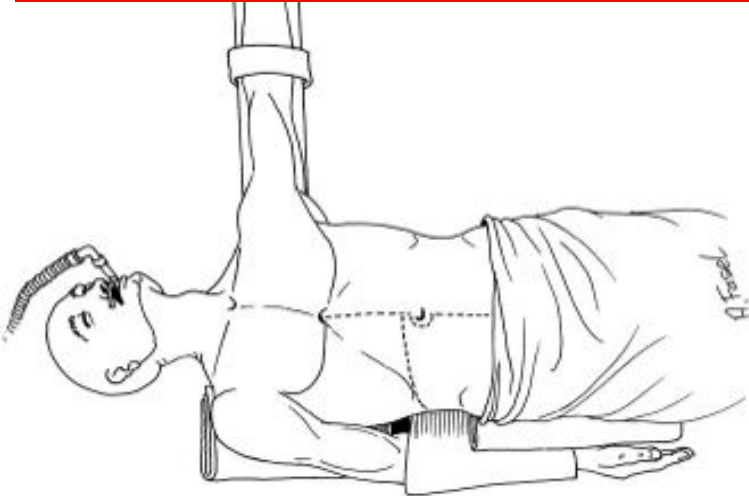
- Those techniques are almost never necessary



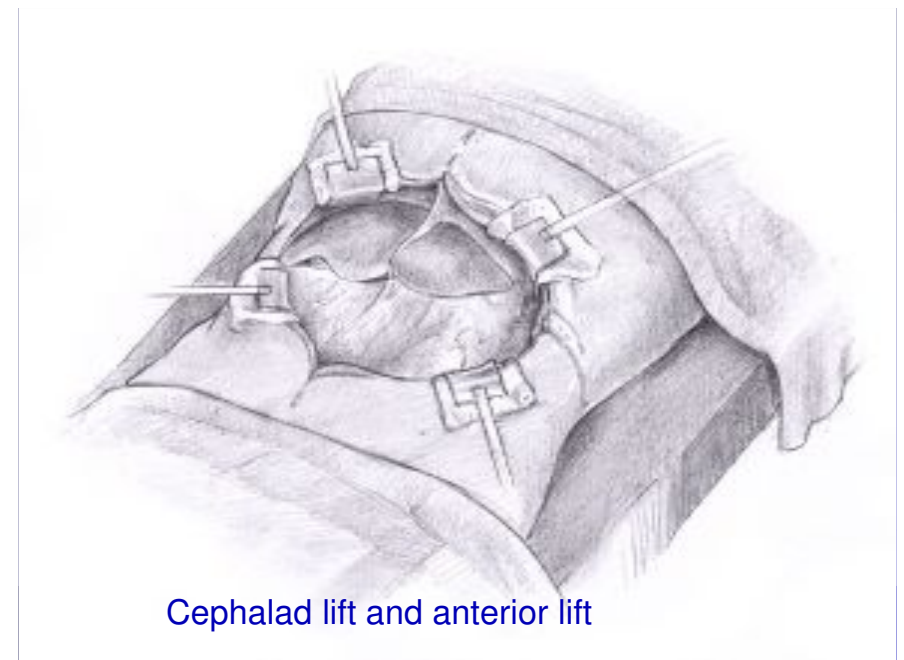
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Good exposure, excellent help, rapid infusion system



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Cephalad lift and anterior lift

Remember: you can mobilize the liver to make it a midline structure

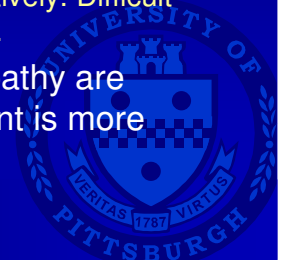


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Major hepatic injury: operative decisions

- Decide upon your treatment plan EARLY
- **be a minimalist if you can:** if minor interventions stop the bleeding (packing), be happy. If they don't, quick change toward debridement, oversew or rarely resection
 - Do no more than necessary operatively. Difficult problems can be made impossible.
- Once hypothermia and coagulopathy are established, salvage of the patient is more difficult

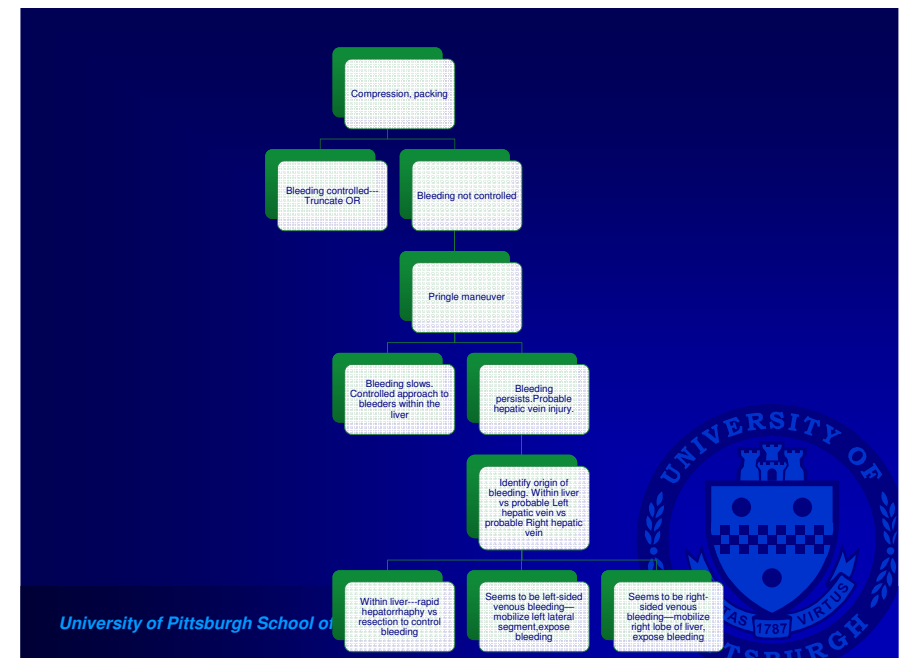
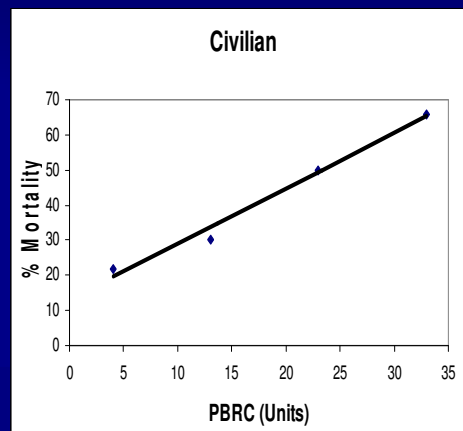
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Goals in the operating room for major hepatic injury

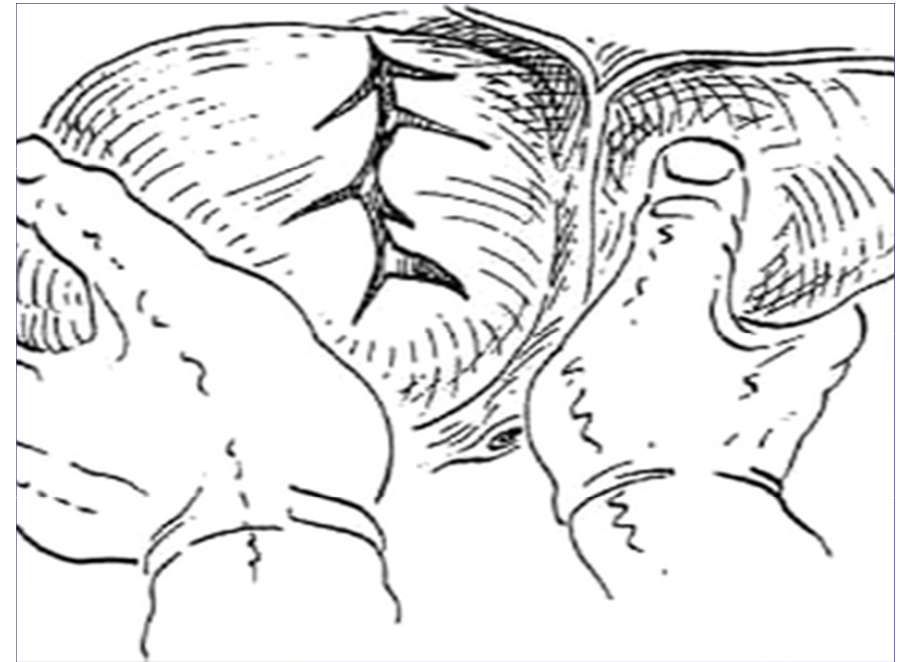
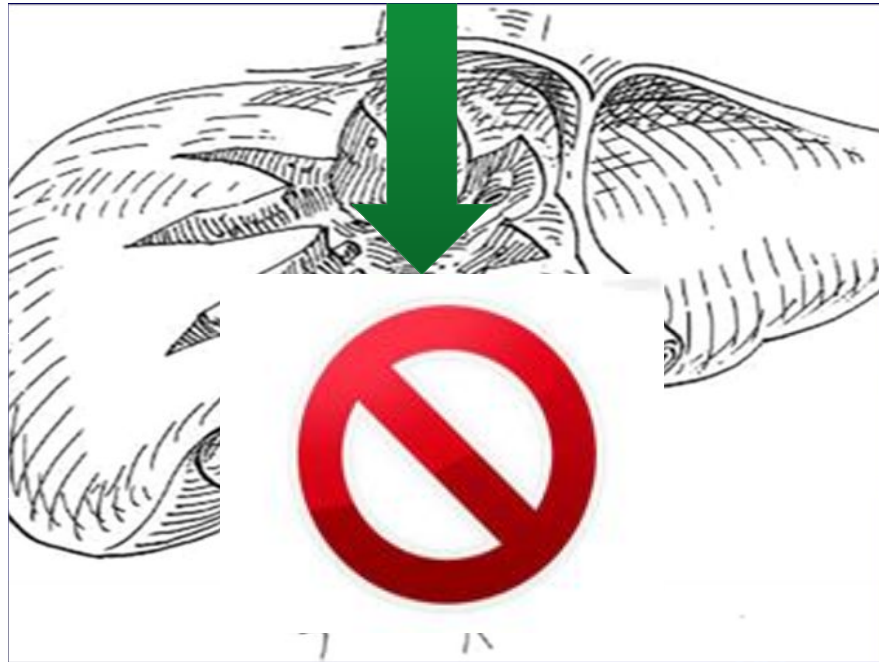
- Control hemorrhage
- Control bile leak
- Debride dead liver tissue
- Drainage
- **At the first operation, the ONLY goal is hemorrhage control-DAMAGE CONTROL**

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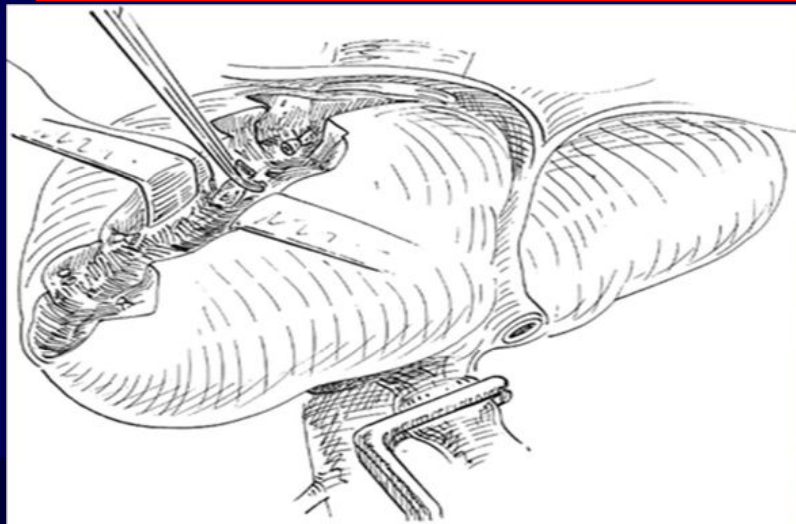


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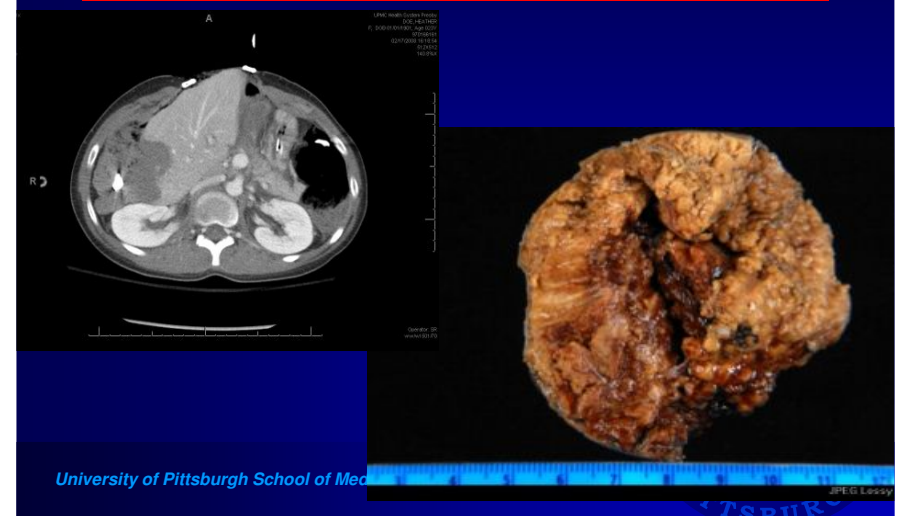


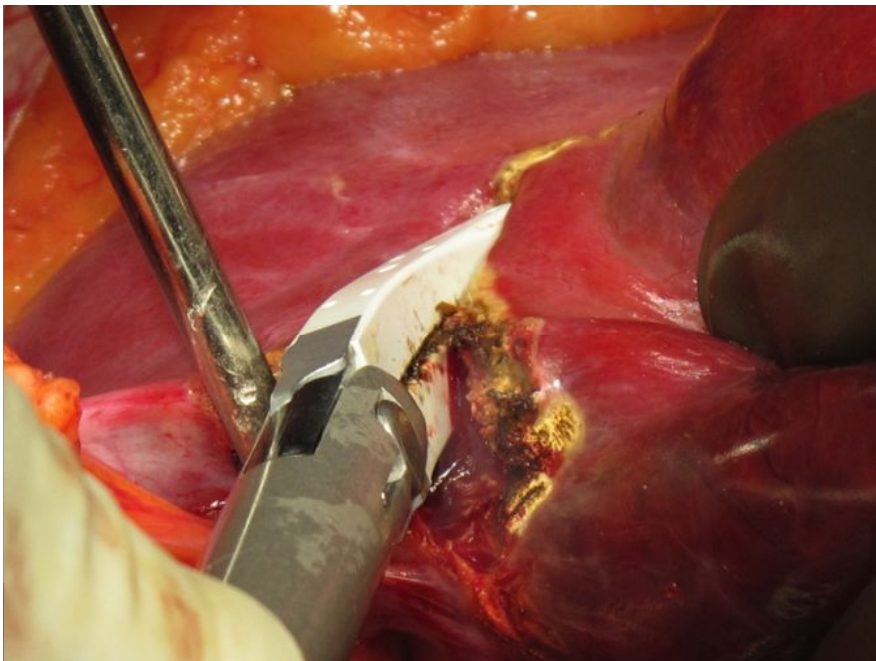
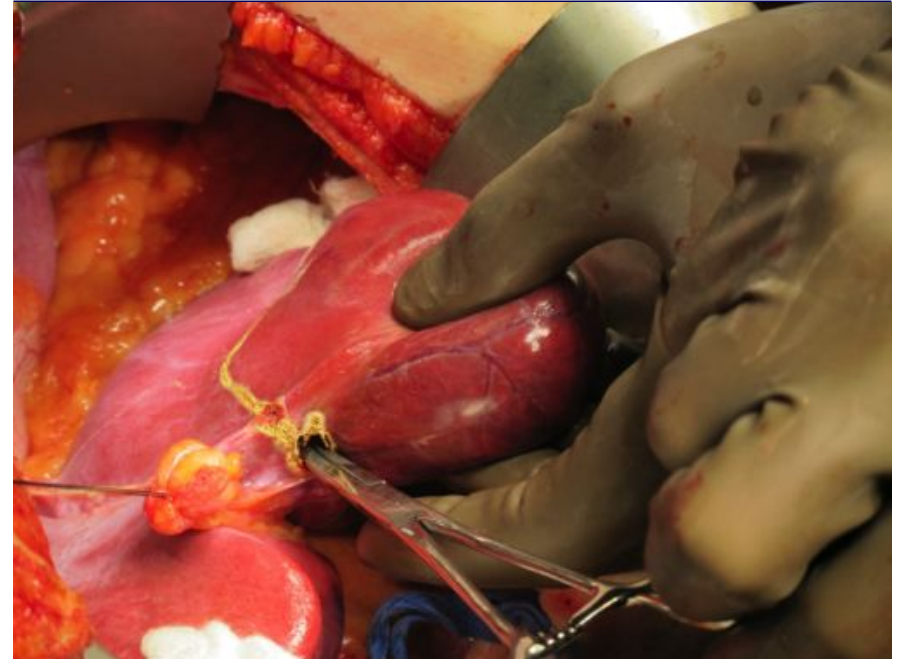
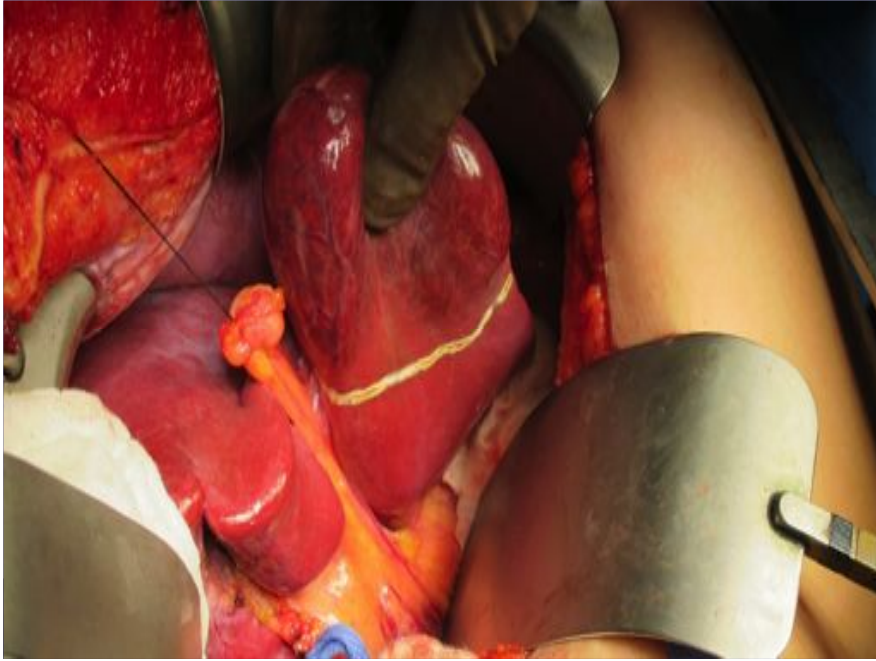


If the pt needs a big operation, the decision **MUST** be made quickly



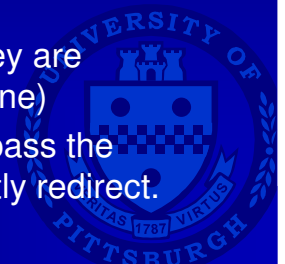
Staplers have revolutionized elective liver surgery: about time we caught up





Key principles with the staplers

- Once you start the resection with the stapler, it is difficult to stop because of oozing from the staple line
- Place the smaller blade of the stapler in the parenchyma
- The scrub nurse must be quick with the reloads
- The staplers do not know what they are stapling. (Remember Cantlie's Line)
- If you meet resistance when you pass the stapler into the parenchyma, gently redirect.



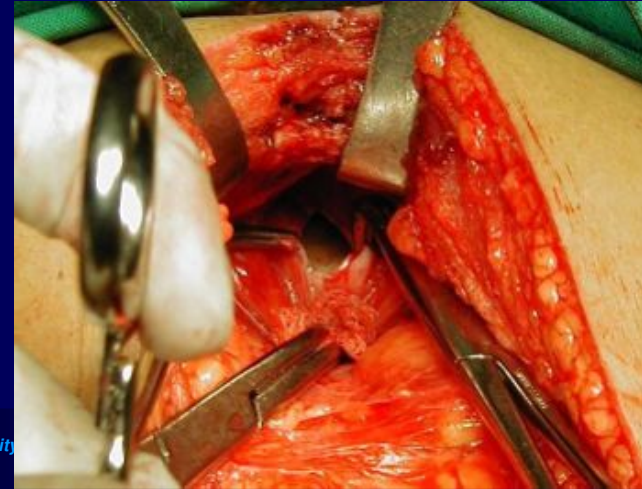
Two maneuvers to use when you are really in trouble

- Intrapericardial control of the IVC
- Rapid maneuver to encircle the suprahepatic IVC

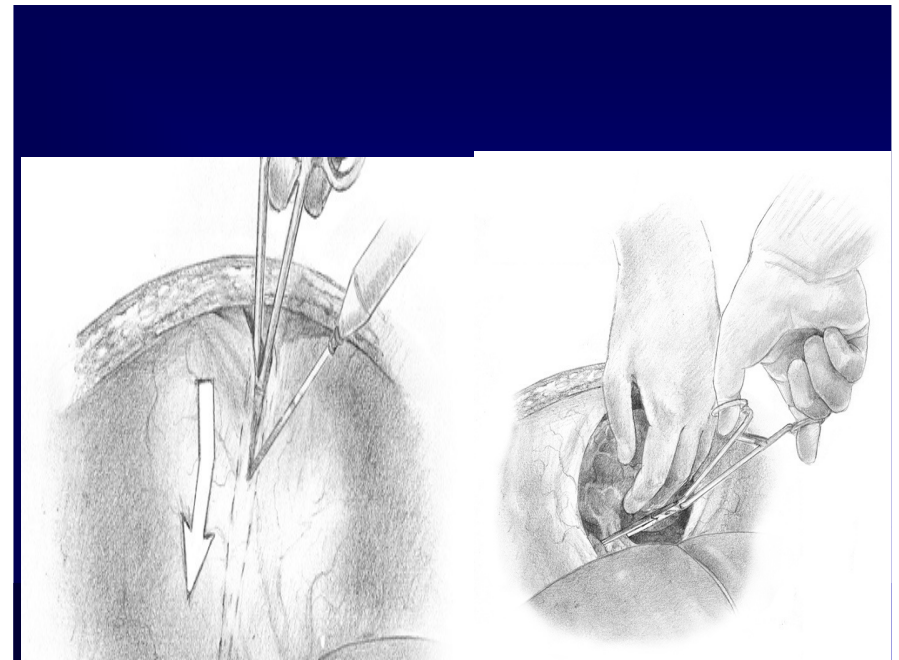
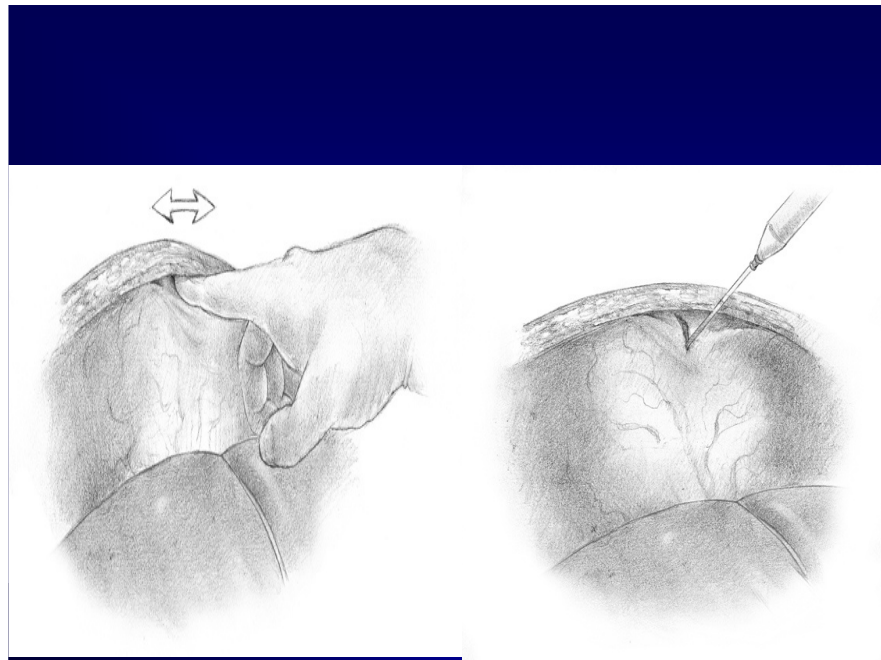


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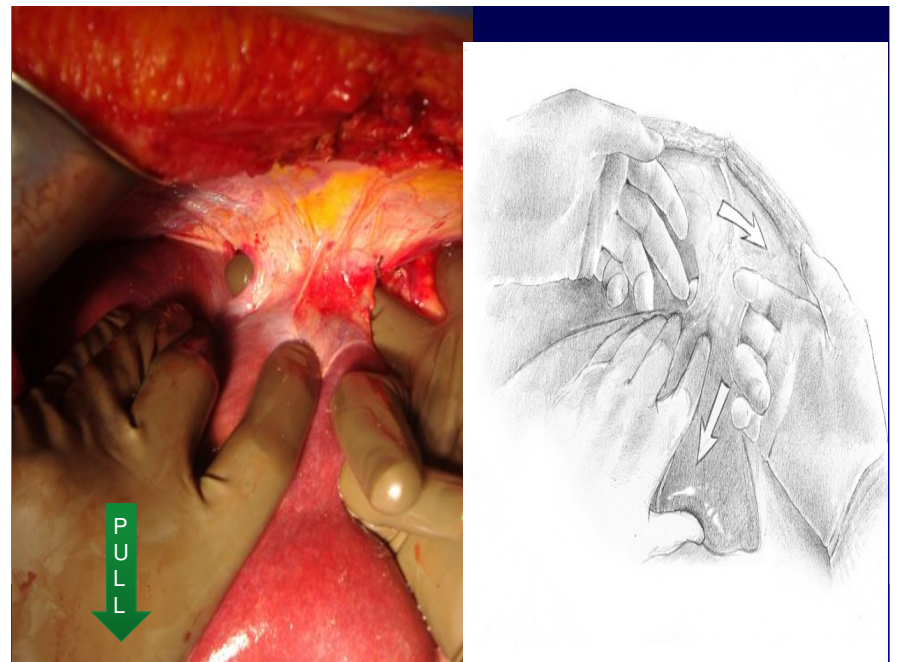
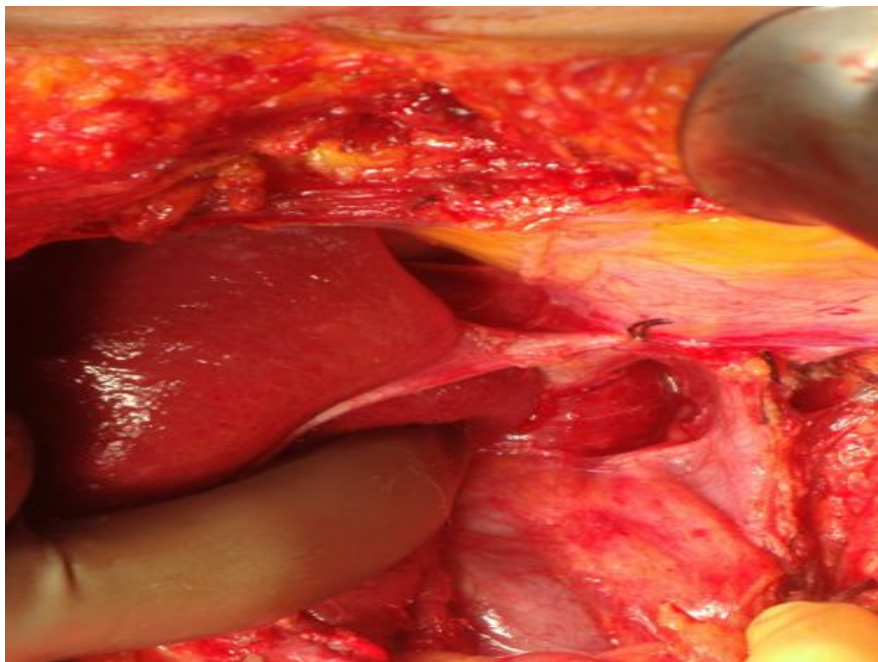
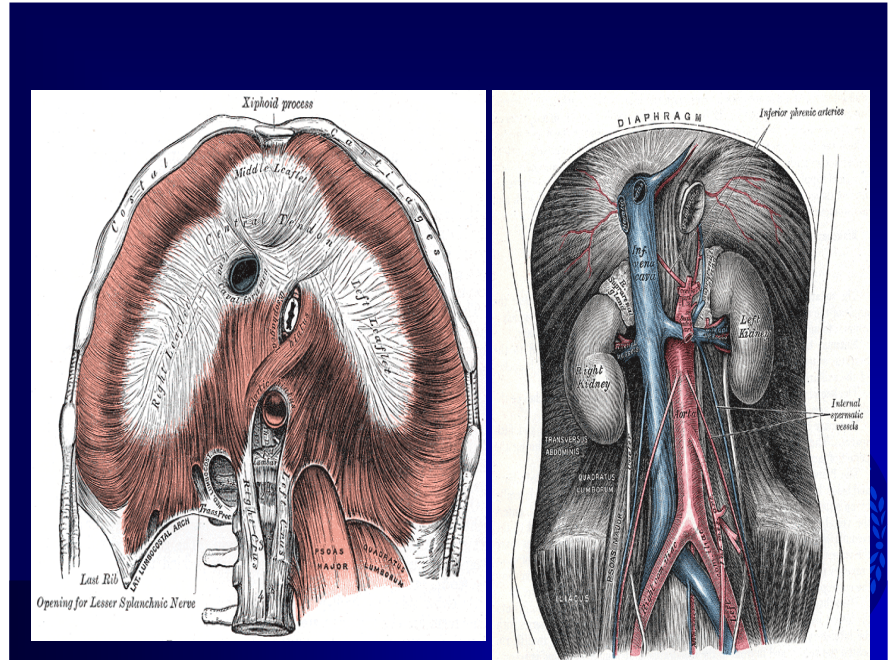
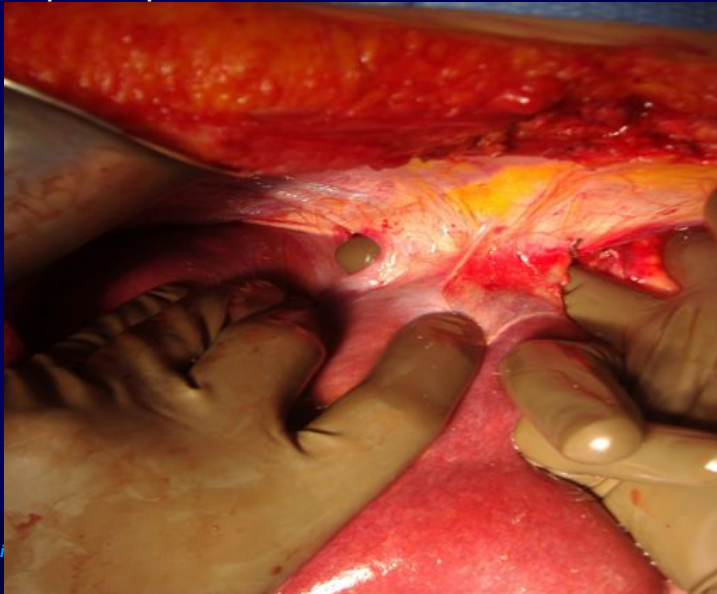
Open the central pericardium; clamp the IVC in the pericardium with curved Potts clamp



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Suprahepatic control of IVC in the abdomen



Find the bile duct leaks in the OR



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Major hepatic injury

- Do not be in the OR unless necessary
- Once in the OR, be a minimalist if you can
- If simple moves fail, quickly change toward debridement, oversew or rarely resection.
- Do no more than necessary operatively. Difficult problems can be made impossible.

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EJ

- 25 yo F unrestrained driver versus pole
- Airbag deployed
- Self extricated, complaining of hip and foot pain
- Visibly intoxicated
- HR 73, BP 110/76



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EJ

- Boarded, collared
- Taken to level 1 Trauma Center, but not as a Trauma activation
- CT scans ordered
- Trauma Consulted after scans



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Contained Rupture of the Suprahepatic Vena Cava



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Contained Rupture of the Suprahepatic Vena Cava

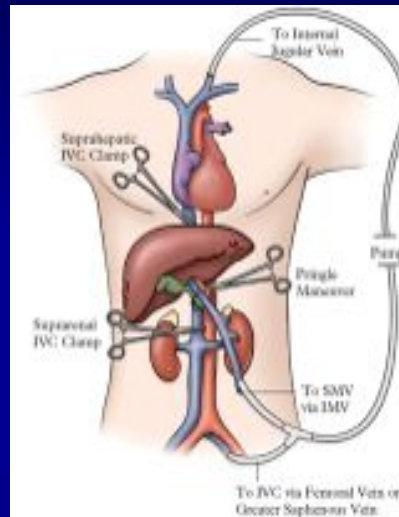


What is your plan???

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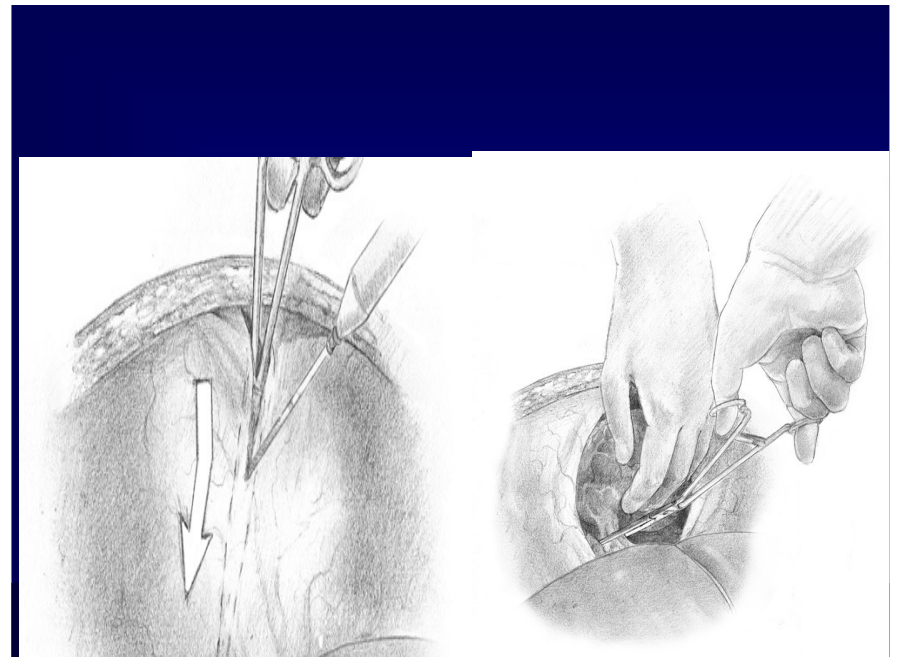
Stable patient...very difficult injury. What next?

- Assemble the right team
- Surgical team – liver expert
- Blood bank
- Liver transplant anesthesia
- Veno-venous bypass

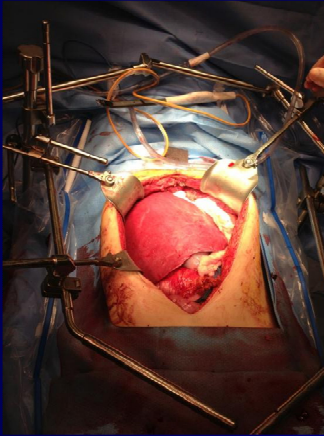


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How do we approach this injury?



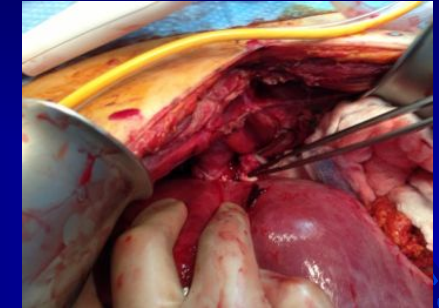
- May require a sternotomy to control the vena cava as it enters the heart
 - Most surgeons would do this
 - If she were unstable, we would have
- We were able to control this by opening the diaphragm and clamping the vena cava within the pericardium from below the diaphragm
- The vena cava was found to be completely transected between the liver and the heart

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Suprahepatic Vena Cava Transection

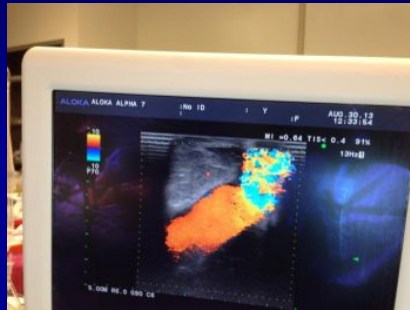
- Repaired with vascular sutures
- Repairing it required oversewing one of the three veins from the liver to the cava (Left Hepatic vein)
- A liver resection was performed



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Suprahepatic Vena Cava Transection

- Transfused 8 units of blood in the OR
- Packed with lap pads---- DAMAGE CONTROL
- Returned to OR in 24h. Abdomen closed
- Discharged well in 10 days



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Thank you

