

# **The Operative Management of Liver Trauma**

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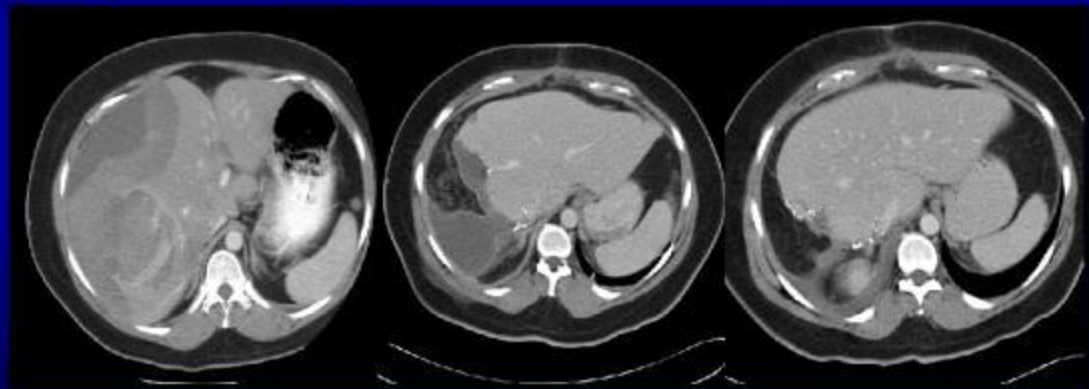


# Hypertrophy

Admission

Day 5 Post Resection

Day 20 Post Resection

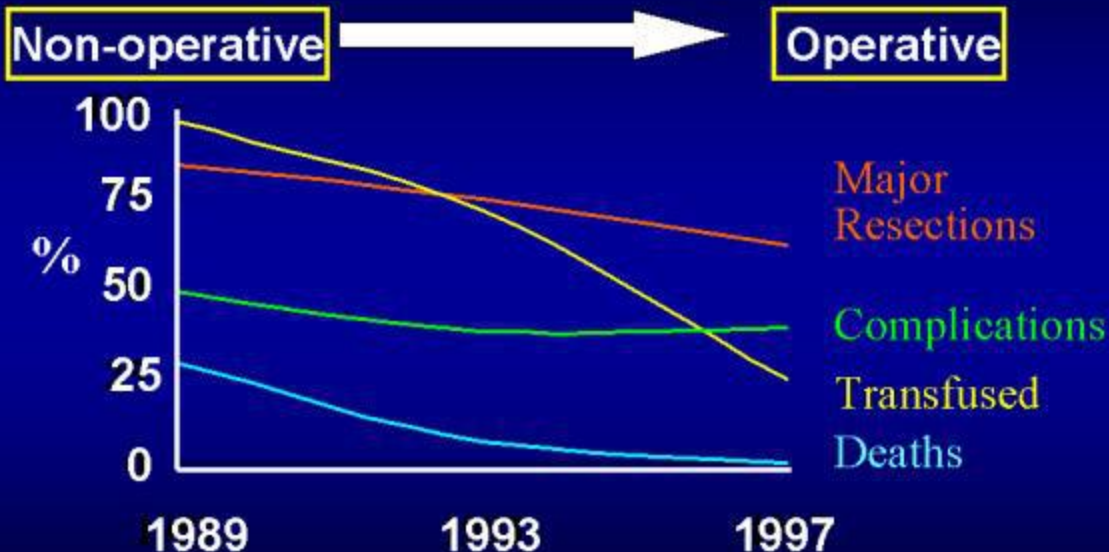


## **The Fear Factor**

- Training in hepatic surgery difficult to obtain
- Controlled, elective cases rare
- Appreciation of segmental anatomy recent

**“....the operative records described in brief and controlled terms what were apparently uneventful lobectomies for patients whose anaesthesia records, in contrast document transfusion of enormous quantities of blood- with several episodes of cardiac arrest and massive resuscitation efforts.”**

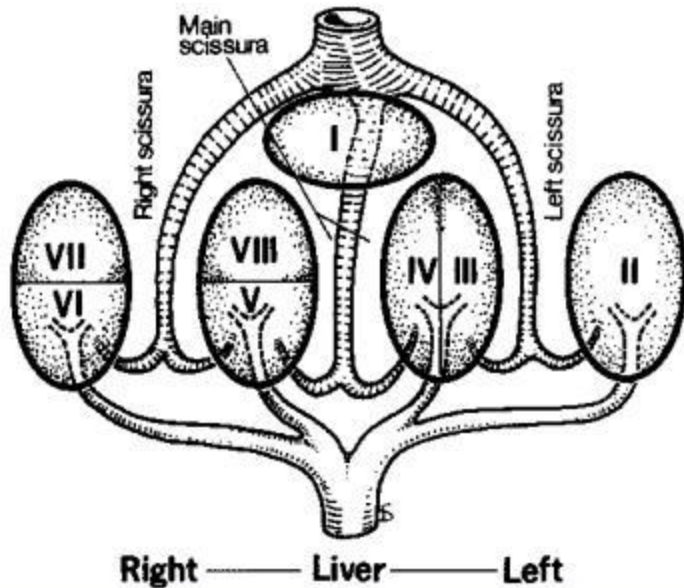
**Foster & Berman 1977.**



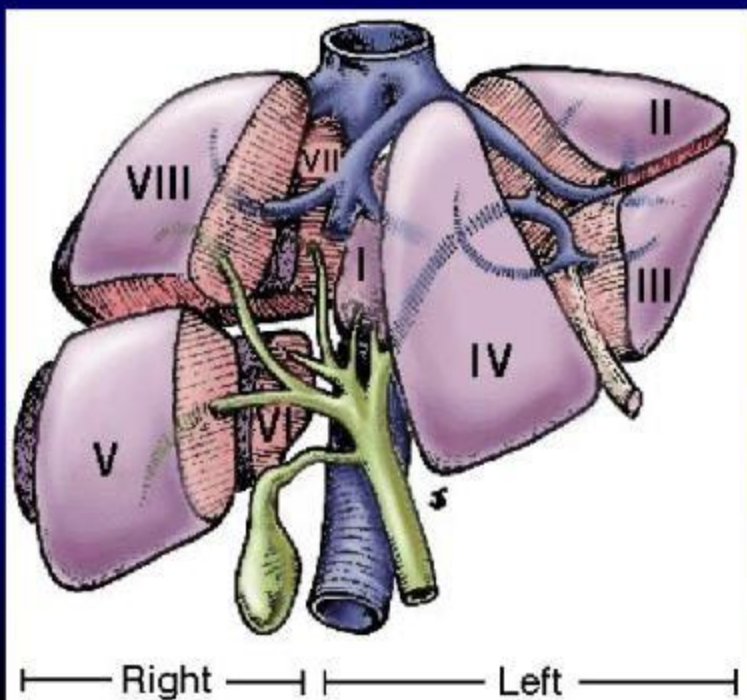
**330 consecutive hepatic resections**

**Ann Surg 1999;229:322**

## Segmental Anatomy

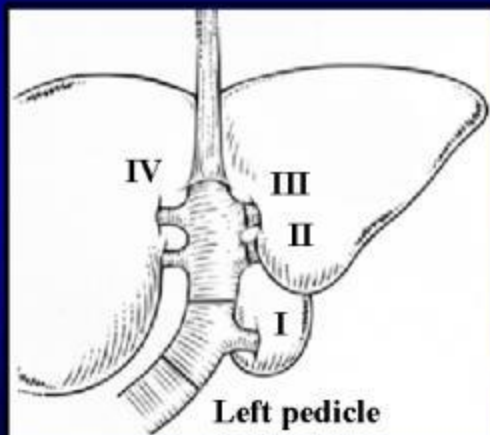
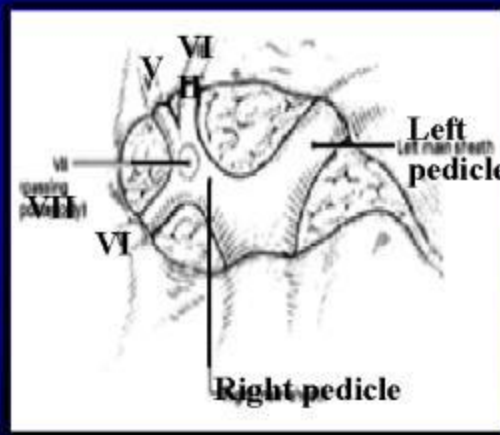


*Liver Trauma*



# Hepatic Resection & In Flow Control.

## General Principles





## **Mechanism of Hepatic Injury**

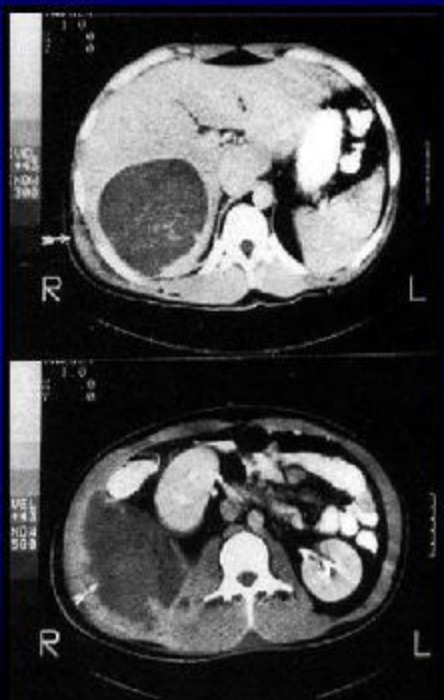
- **Blunt: Rapid deceleration**
  - » falls, RTC
  - » Rupture of Glissons capsule
  - » Parenchymal fractures
  - » Venous and/or arterial bleeding, bile duct disruption, devitalised liver.
- **Penetrating: Direct trauma**
  - » Gunshot, stab or impalement injuries.
  - » Minimal parenchymal disruption, venous and/or arterial bleeding, bile duct division. Devitalised liver rare.

## LIVER INJURY SCALE

Grade	Injury description
I. Hematoma	Subcapsular, non-expanding, <10% surface area
Laceration	Capsular tear, non-bleeding, <1cm parenchymal depth
II. Hematoma	Subcapsular, non-expanding, 10-50% surface area
Laceration	Capsular tear, active bleeding; 1-3cm parenchymal depth, <10cm in length
III. Hematoma	Subcapsular, >50% surface area or expanding; ruptured subcapsular hematoma with active bleeding; intraparenchymal hematoma >2cm or expanding
Laceration	>3cm parenchymal depth
IV. Hematoma	Ruptured intraparenchymal haematoma with active bleeding
Laceration	Parenchymal disruption involving 25-50% of hepatic lobe
V. Laceration	Parenchymal disruption involving >50% of hepatic lobe
Vascular	Juxtahepatic venous injuries; i.e retrohepatic vena cava/major hepatic veins
VI. Vascular	Hepatic avulsion

## Investigations

- Primary/Secondary survey
- FBC, U&E, LFTs, Coags, amylase
- X match blood, possible products.
- Trauma films
- CT Scan

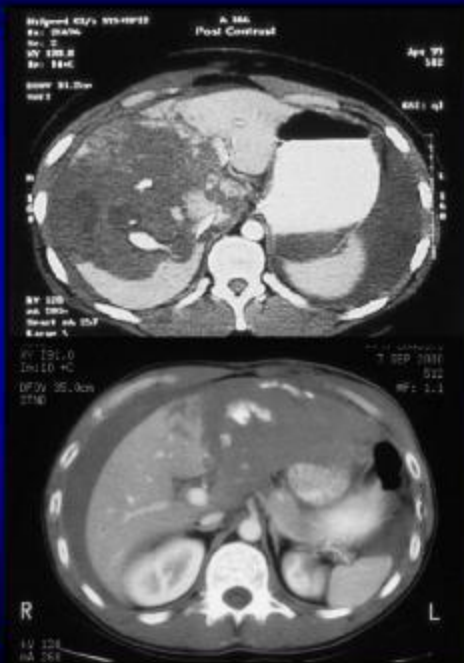


## **Indications for Operation**

- |  |   |
|--|---|
| <ul style="list-style-type: none"><li>• <b><u>Blunt</u></b></li><li>• Hemodynamic instability</li><li>• Transfusion &gt; 1 blood volume</li><li>• Devitalised parenchyma</li><li>• Sepsis / biloma</li></ul> | <ul style="list-style-type: none"><li>• <b><u>Penetrating</u></b></li><li>• Penetration beneath peritoneum</li><li>• Selective exploration<ul style="list-style-type: none"><li>– Instability</li><li>– Guarding</li><li>– Evisceration</li></ul></li></ul> |
|--|---|

## Auckland Operation vs Conservative

- 1998 -2002 8 operative cases versus 37 conservatively.
- Indications for operation:  
  
Instability (n=3)  
  
Parenchyma (n=4)  
  
Hepatic ischemia (n=1)



## **Raised Intrahepatic Pressure.**



## **Operative Management**

- **Summon help?**
- **Set up**
- **Incision**
- **Hepatic mobilisation and exposure**
- **In flow  $\pm$  outflow control**
- **Specific problems**
  - **Parenchymal tears and devascularization**
  - **Retrohepatic venous injury**
  - **Hilar injury and disruption**

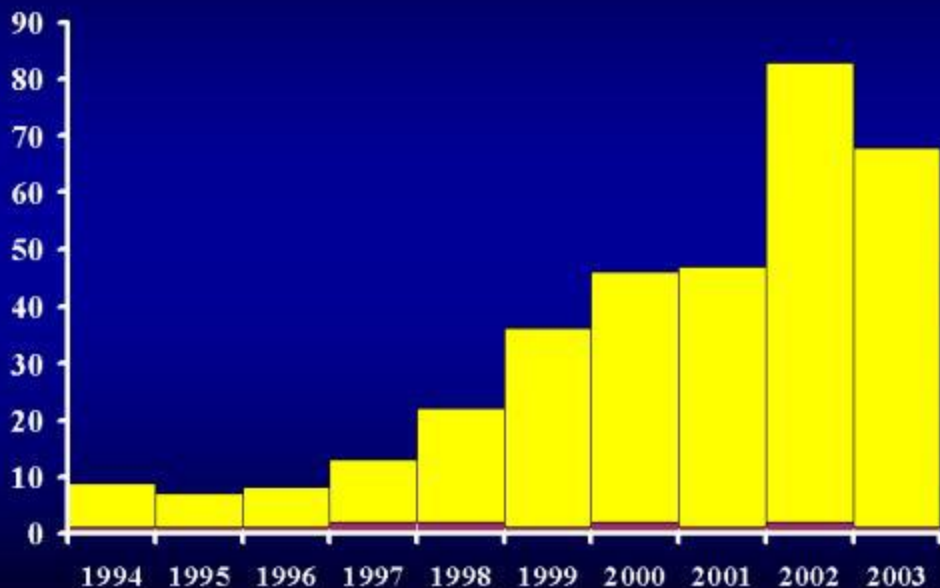


## *Liver Trauma*





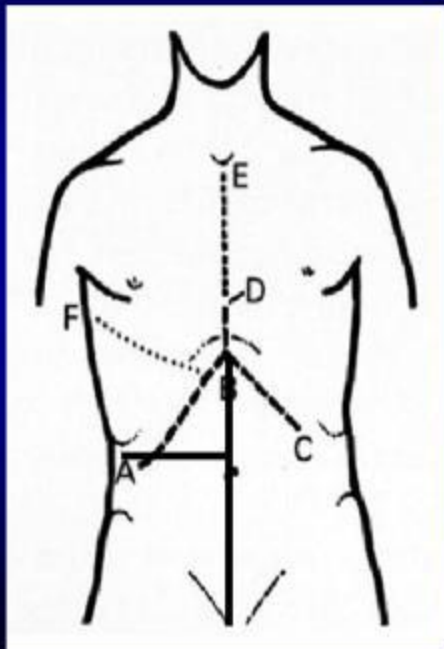
## Liver Resections by Year



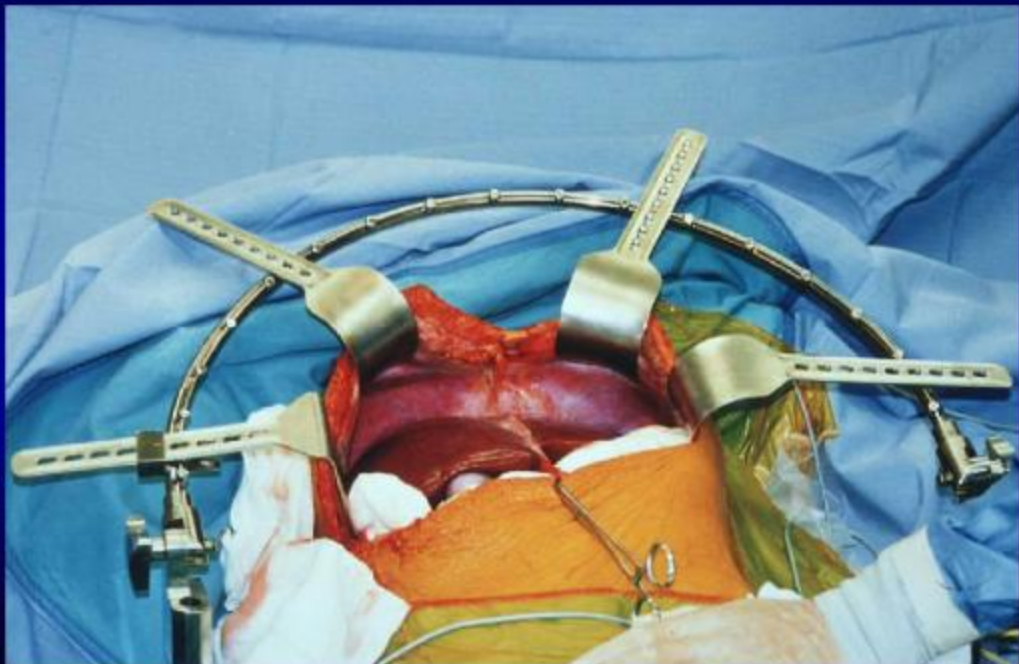
## *Liver Trauma*



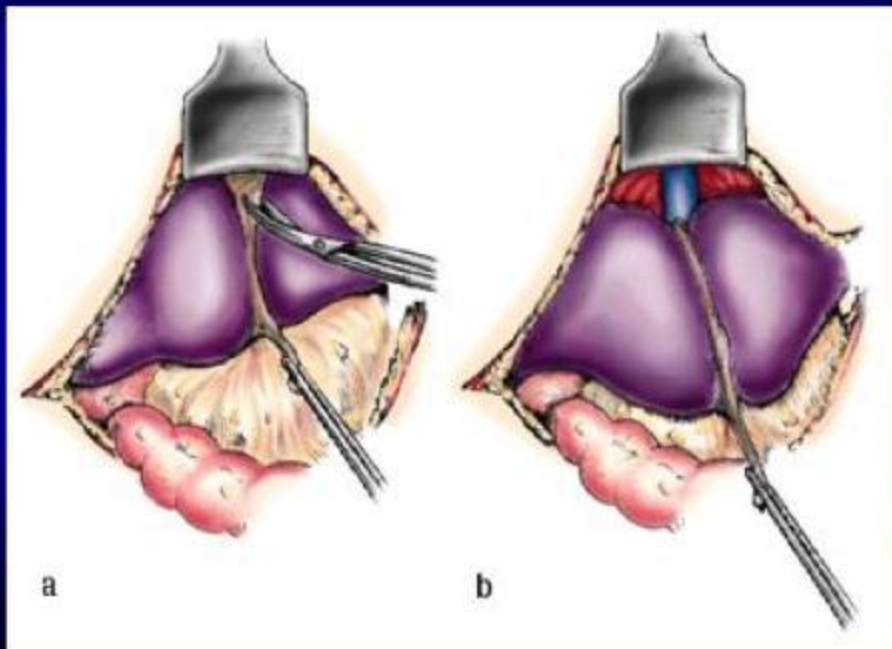
# Incisions



# Surgical Technique



# Hepatic Mobilisation



## **Right Lobar Mobilization**



# Hepatic Inflow

Celiac, common hepatic,  
splenic, and left gastric nodes

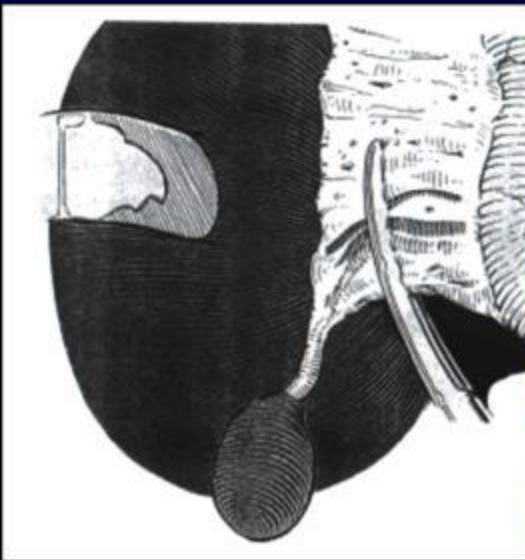
Divided left gastric  
artery

Divided right  
gastroepiploic artery





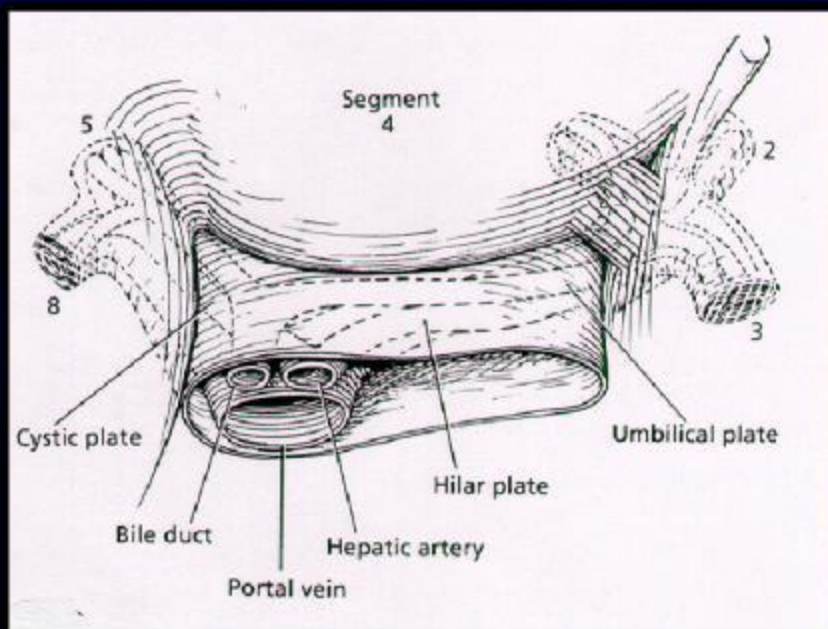
# Pringle Manoeuvre



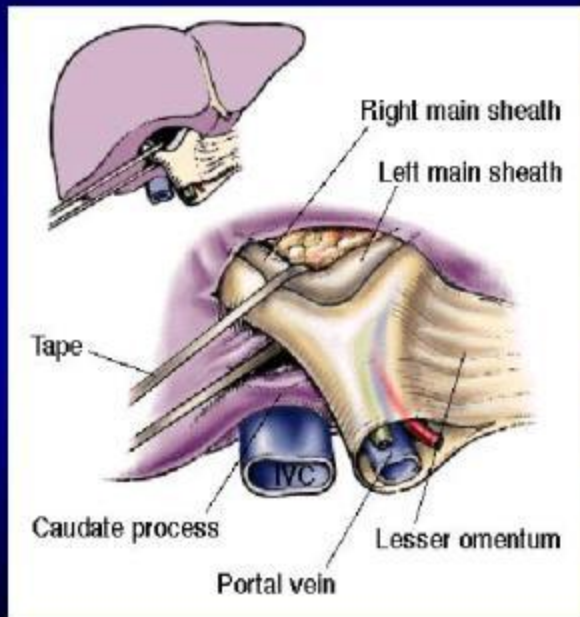
Ann Surg 1908;48:541-49



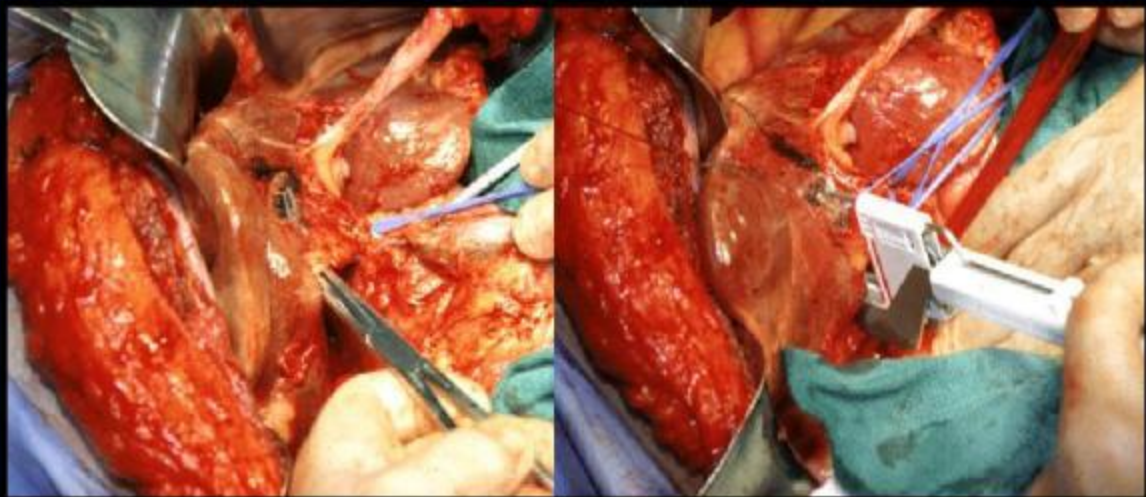
# Cut-Away View Hilar Plate



## *Liver Trauma*



## **Mass Ligation of In Flow Pedicle**

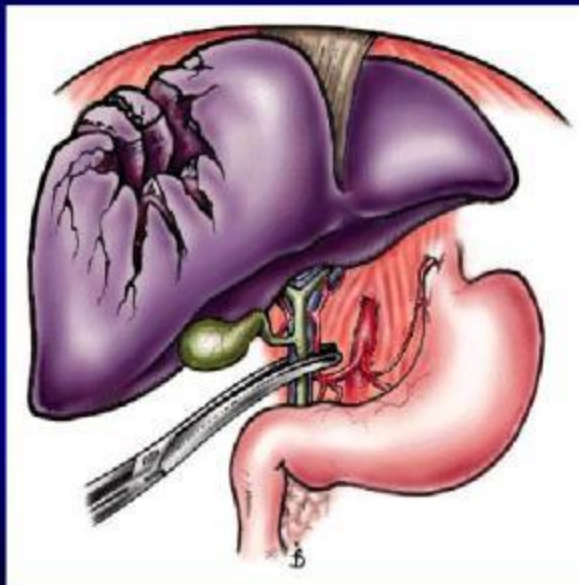


## Outflow Control

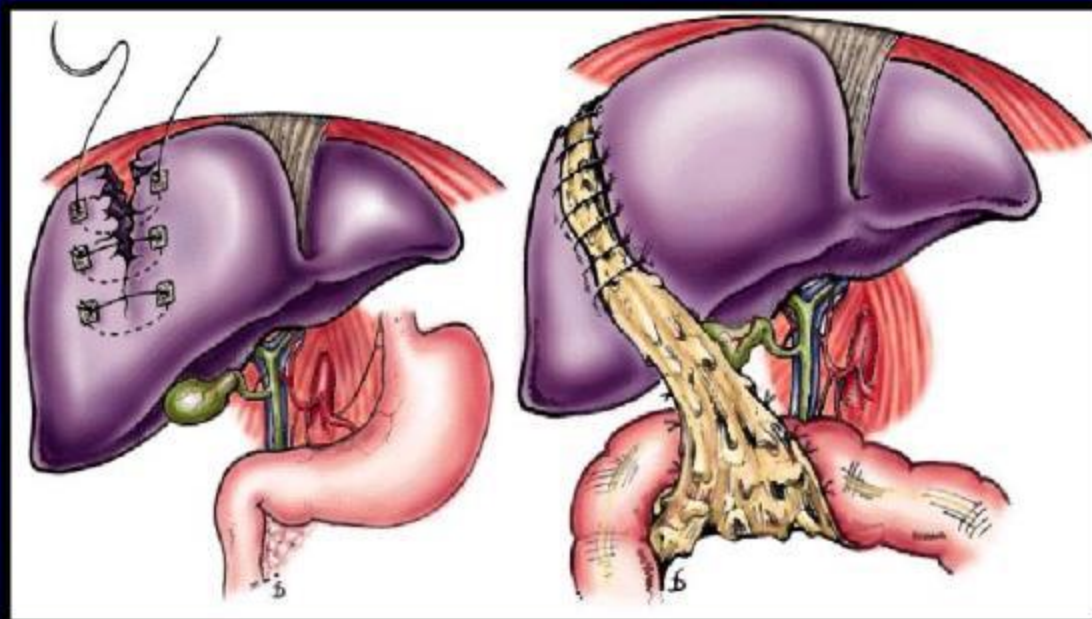


## Parenchymal Tears

- Mobilise the liver
- Direct compression
- Inflow Control
- Explore fracture
- Suture bleeding sites
- Mattress sutures
- Packing

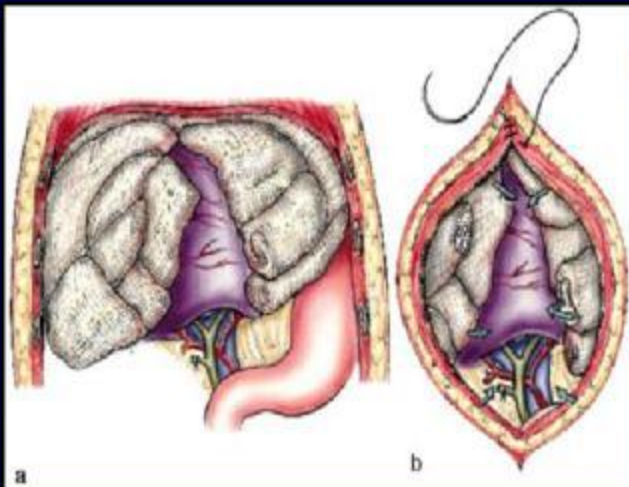


## **Mattress & Buttress**

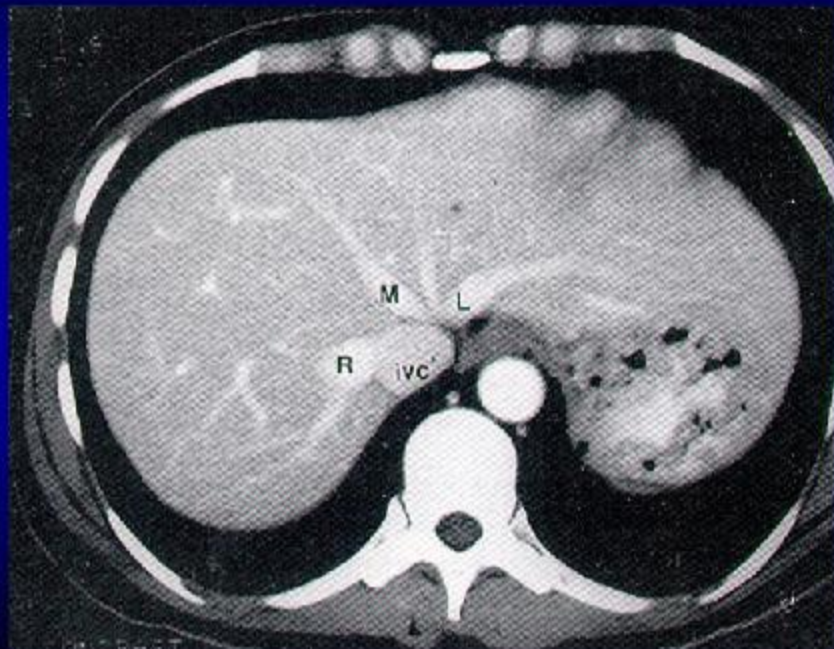




# Hepatic Packing

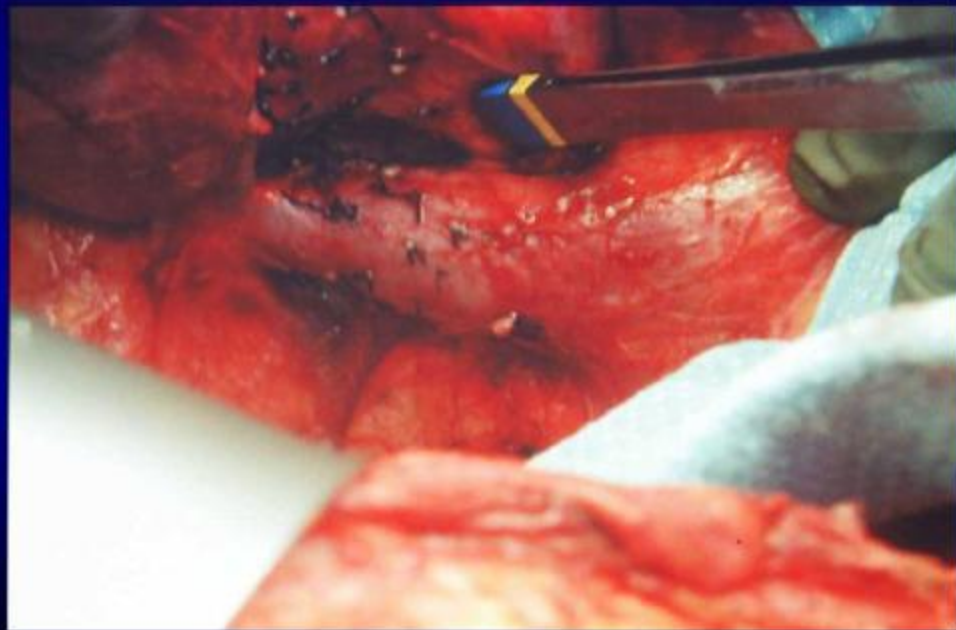


## **Venous and Caval Injuries**

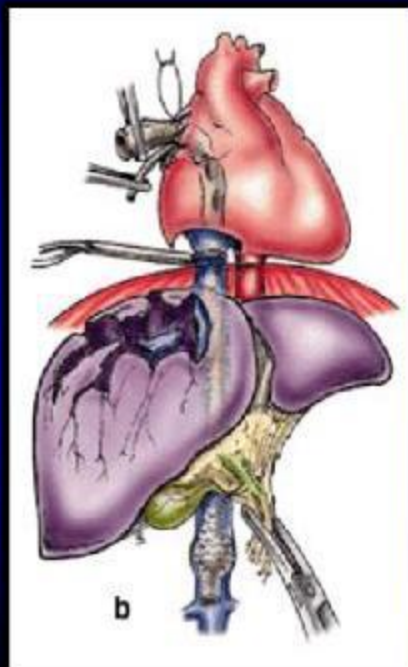
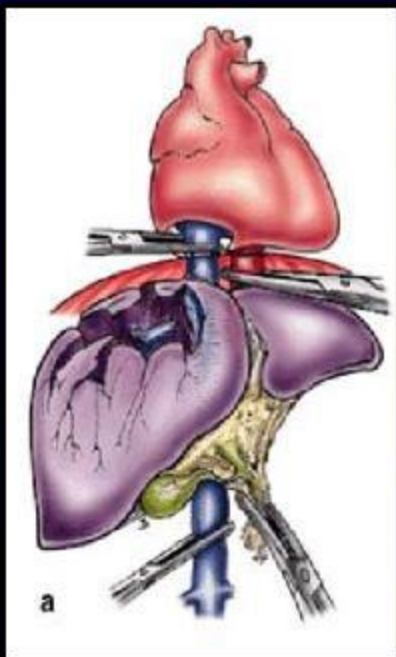




# Caval Exposure

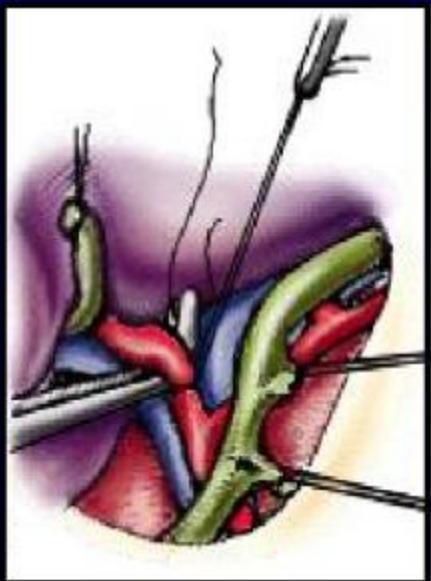


## **Retrohepatic Caval Injuries.**

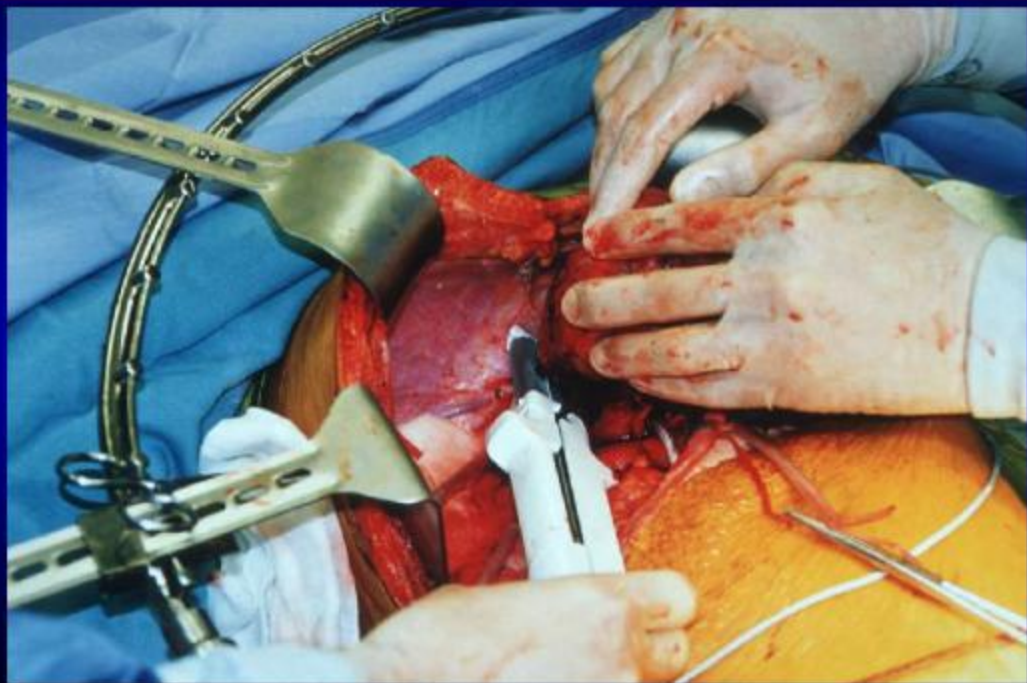


## **Hilar Injury and Disruption**

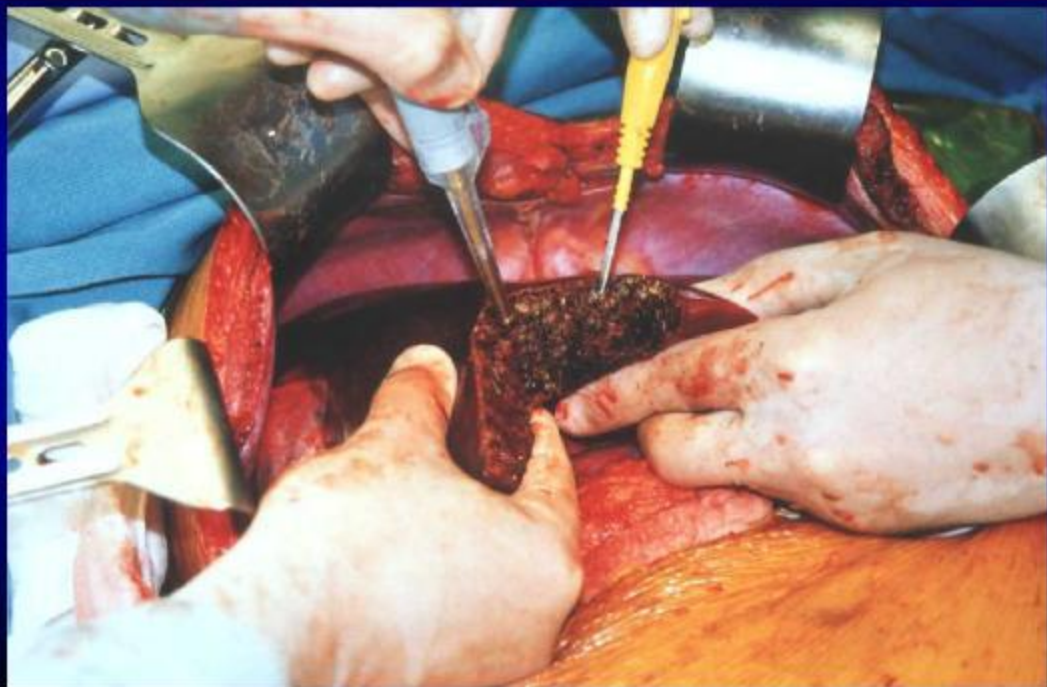
- |                         |                    |
|-------------------------|--------------------|
| • <u>Hepatic Artery</u> | Repair<br>Ligation |
| • <u>Portal vein</u>    | Repair<br>Ligation |
| • <u>Bile duct</u>      | Drainage<br>Repair |



## **Emergent Parenchymal Division**



# **Elective Parenchymal Division**



## **Prognosis**

- **Overall mortality 10% for operatively managed trauma**
  - » **Grade III/IV injury 10%**
  - » **Grade V/VI injury > 75%**

**Brit J Surg 1993;80:86-88**

- **Blunt trauma mortality 27%**
- **Penetrating trauma mortality 11%**

**Surgery 1997;35:10-15**







