Compression of hepatoduodenal ligament by sponges during perihepatic packing for liver trauma leading to difficult maneuvering of angiography catheter through common hepatic artery: 'Mishra Phenomenon'

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Hepatic Trauma

- JPN Apex Trauma Center, New Delhi.
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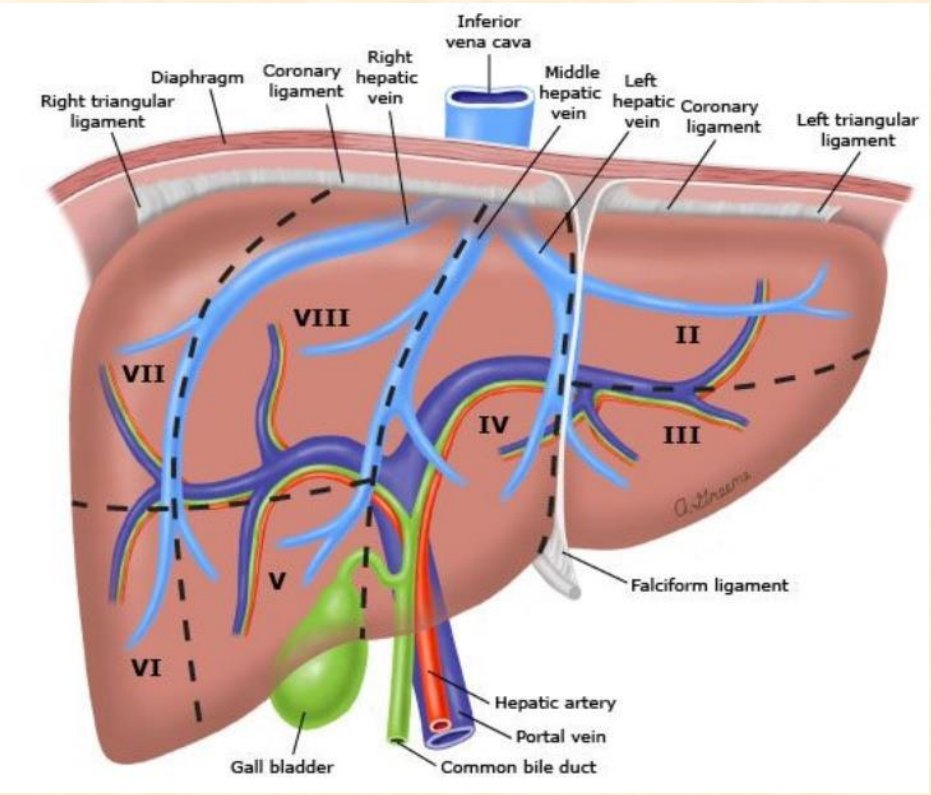
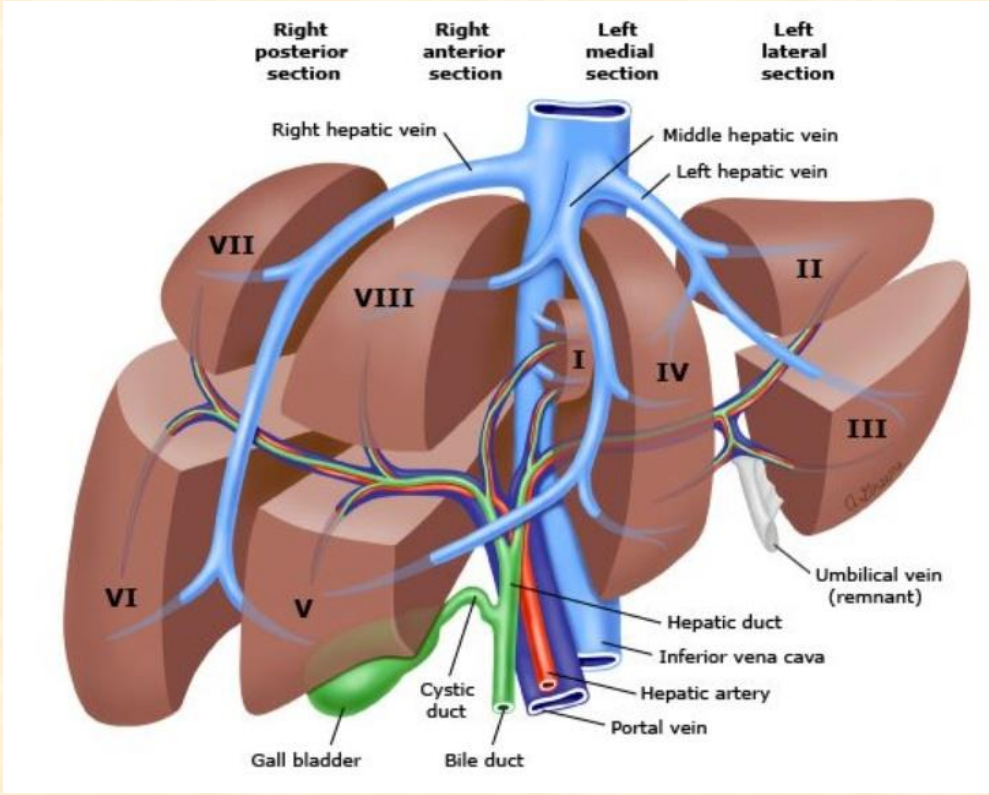
- Workload (annually)
  ED footfall - >55000, Red area – 5%
  Sx admissions (N) - >1600
  - RTI – 60%
  - Torso trauma – 50%
  - Liver trauma (n) - >115 (7%), grade IV +V – 40 (33% of n)
  - Hepatic angioembolization – 29 (25% of n)
  - OM – 23 (20% of n)
  - Mortality – 9 (8% of n)

Hepatic Trauma

- Most frequently injured abdominal organ
- Mx : NOM, OM, AE
- OM : surgical challenge : anatomical position, size, vascularity & difficult access to venous drainage
- Goal of OM : control bleeding from liver (simple to complicated techniques)
- Damage control principles in unstable patients.

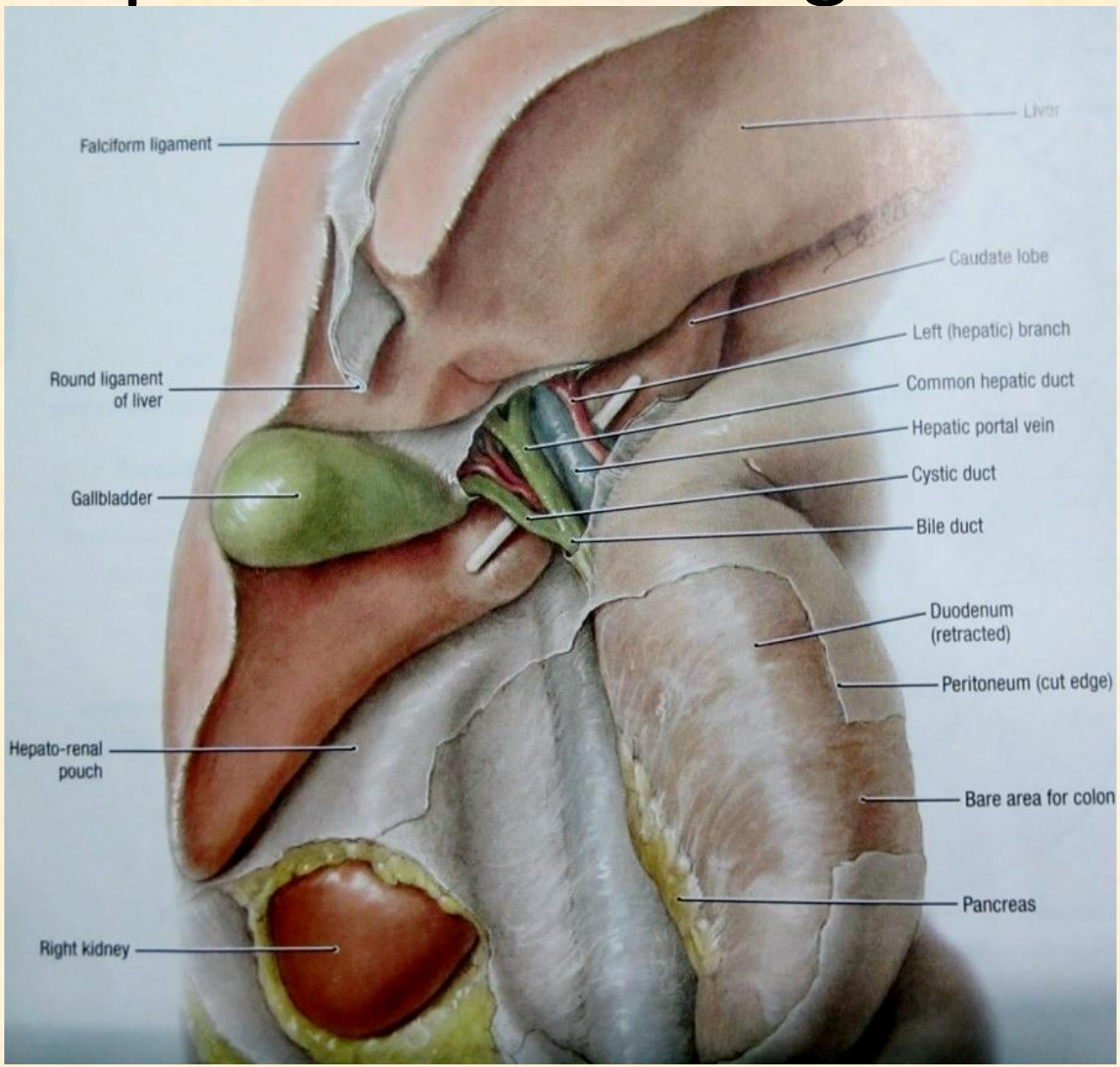
Anatomy of liver





Photos courtesy : UpToDate/David G Jacobs

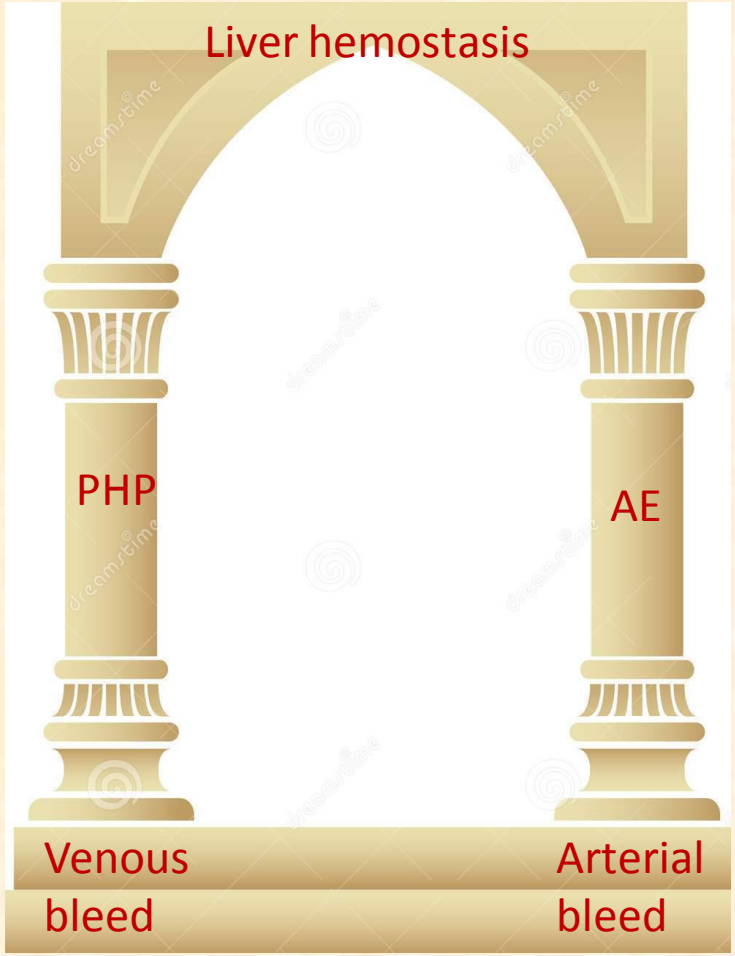
Hepato-duodenal ligament



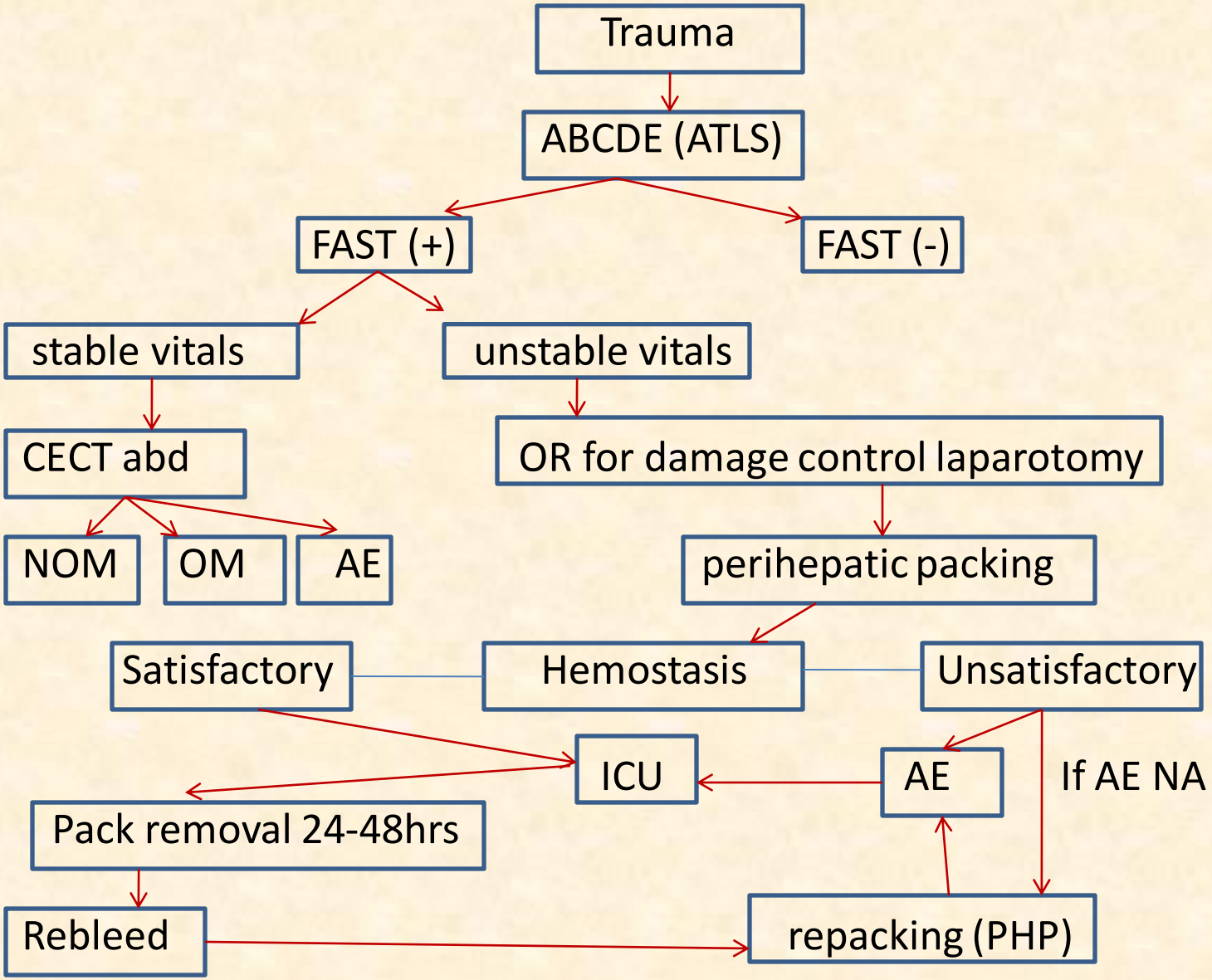
Photos courtesy : Grant's atlas of anatomy

Perihepatic packing (PHP) & selective hepatic artery angioembolization (AE)

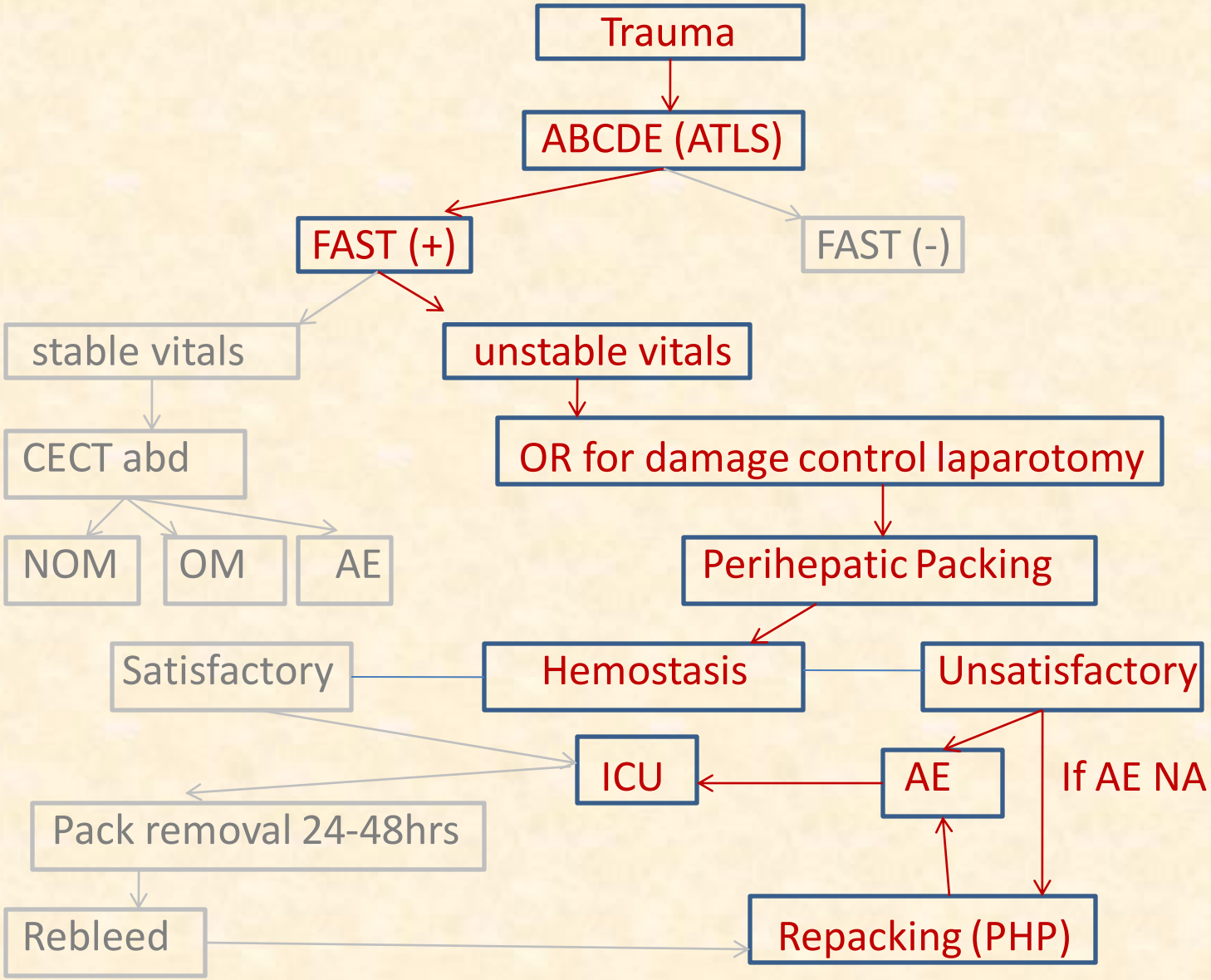
Two important hemostatic maneuvers, established as very effective measures in controlling bleeding from liver trauma.



Management of liver trauma



Management of liver trauma

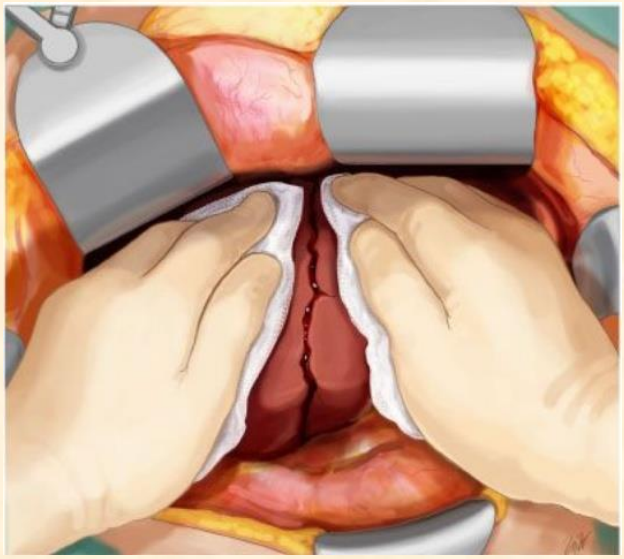


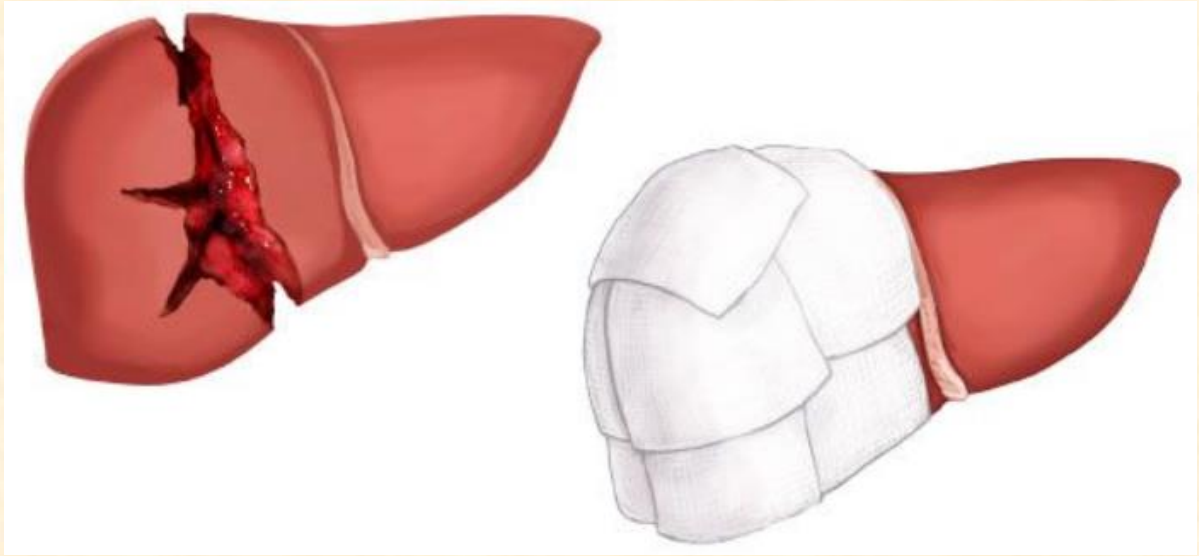
Perihepatic packing (PHP)

- Technique : Manual compression

  Pringle maneuver

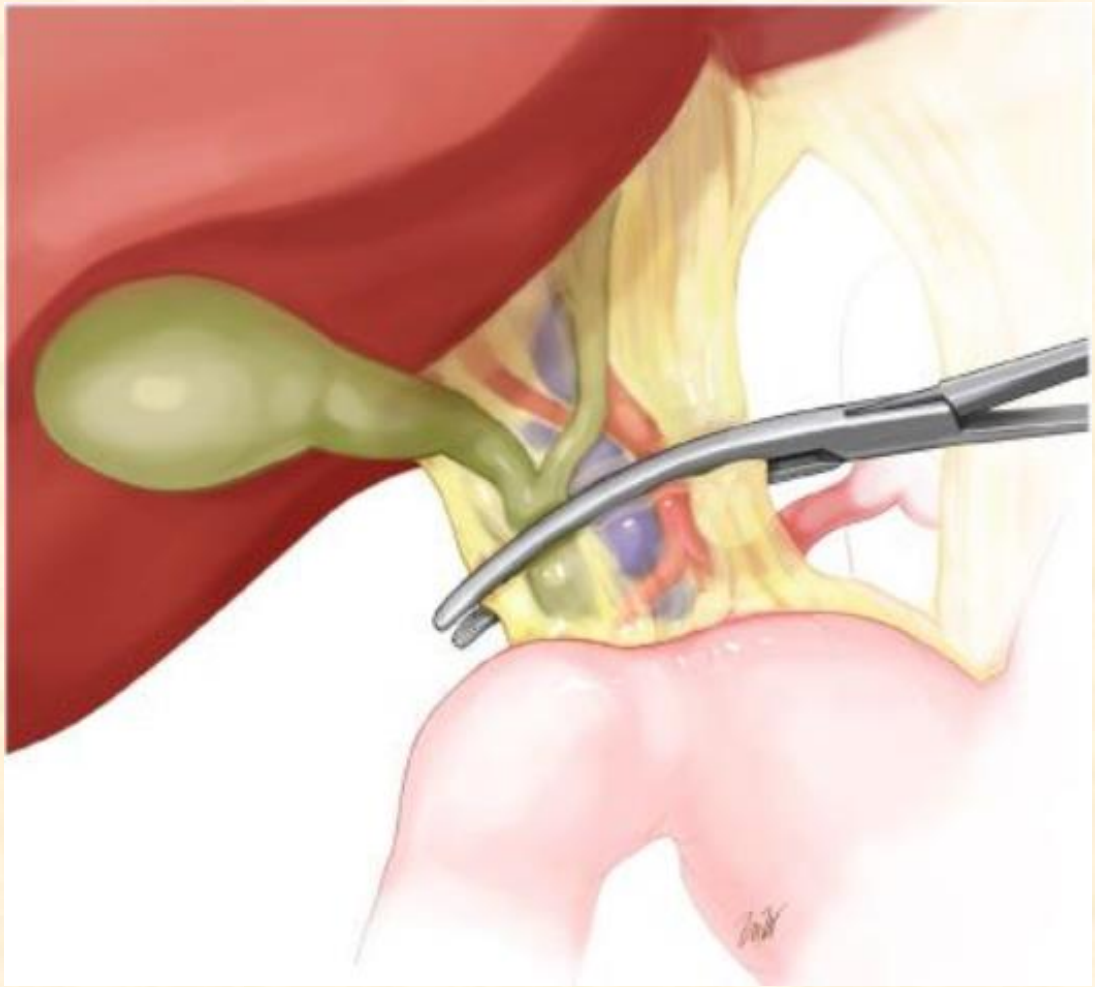
  Surgical sponge packing





Courtesy: Uptodate

Pringle maneuver



Clamping the hepatoduodenal ligament / Porta

Photo coutesy: Uptodate

Perihepatic packing (PHP)

- Effective especially for venous bleed (80%).
- Give time to manage arterial bleed also.
- Relatively simple with respect to other complicated hemostatic techniques.
- Reduces rate of rebleeding and mortality.

Perihepatic packing - disadvantages

- Fails to control arterial / major venous bleed
- Excessive pressure → hepatic necrosis, abd compart.
- Re-bleed after pack removal.
- Sepsis / infective complications.
- False assurance of hemostasis.
- Only a temporary measure.
- ‘May not be that simple!’

Angioembolization (AE)

- Relatively recent advancement (Interventional Radio).

- Technique : Angiography suite →

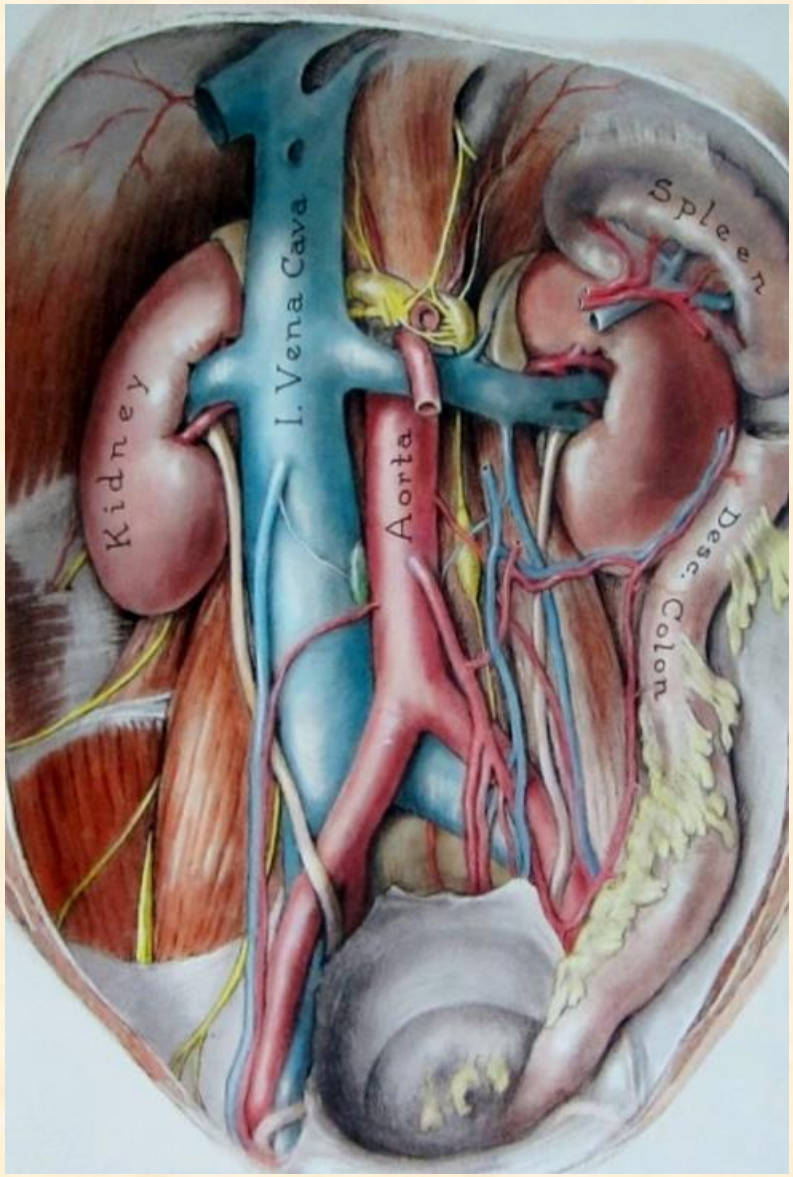
  Catheterization:Femoral A → External Iliac A→

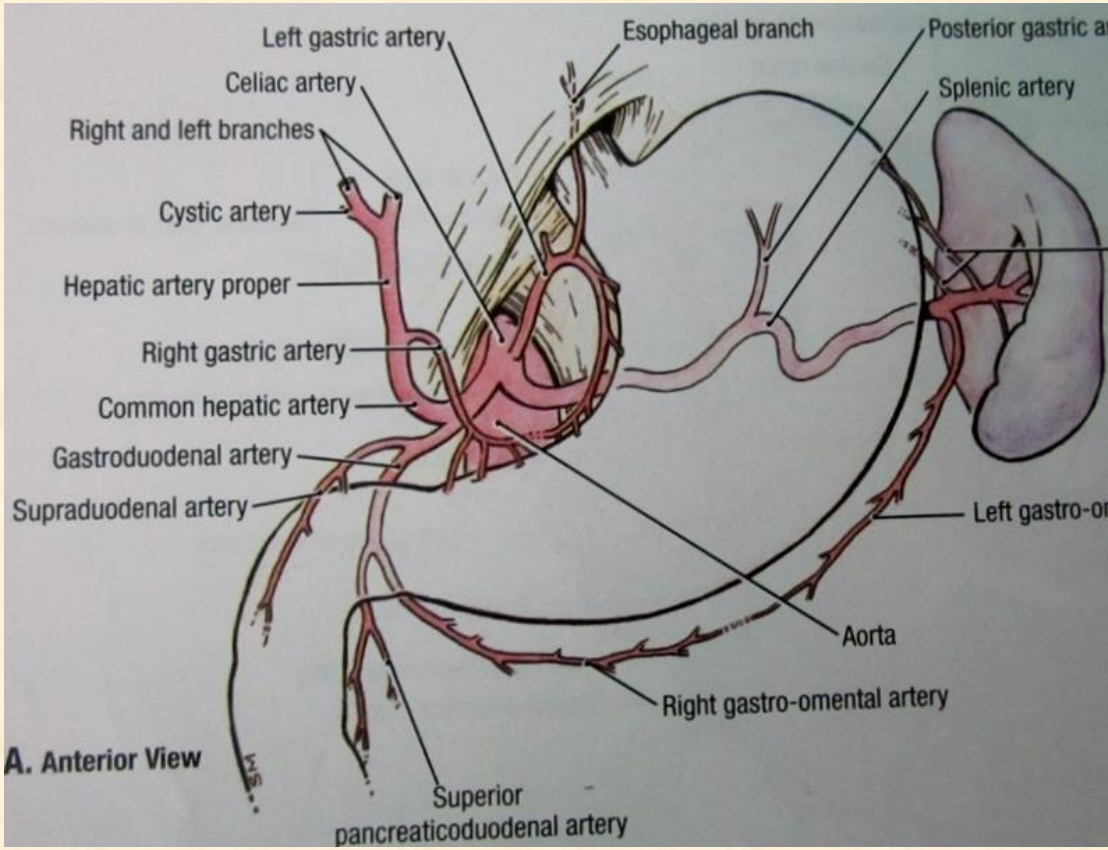
  Common Iliac A→ Aorta→ Celiac Axis→ Common

  Hepatic A →Hepatic A → Selective branch

- Indications :
  - post PHP bleed (arterial)
  - CT showing vascular blush/Pseudoaneurysm
  - ‘Failed’ NOM

Vascular anatomy



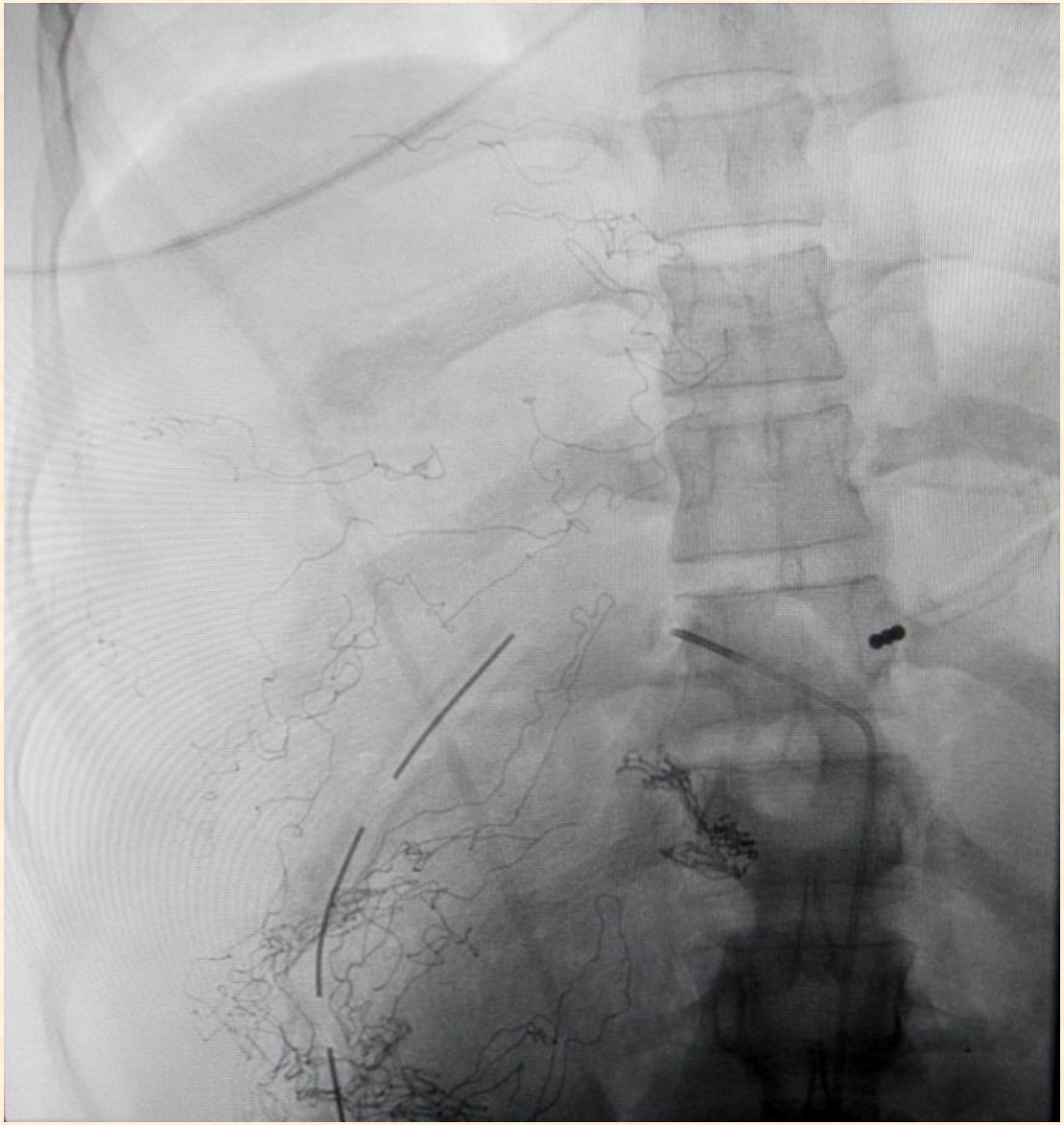


Photos courtesy : Grant's atlas of anatomy

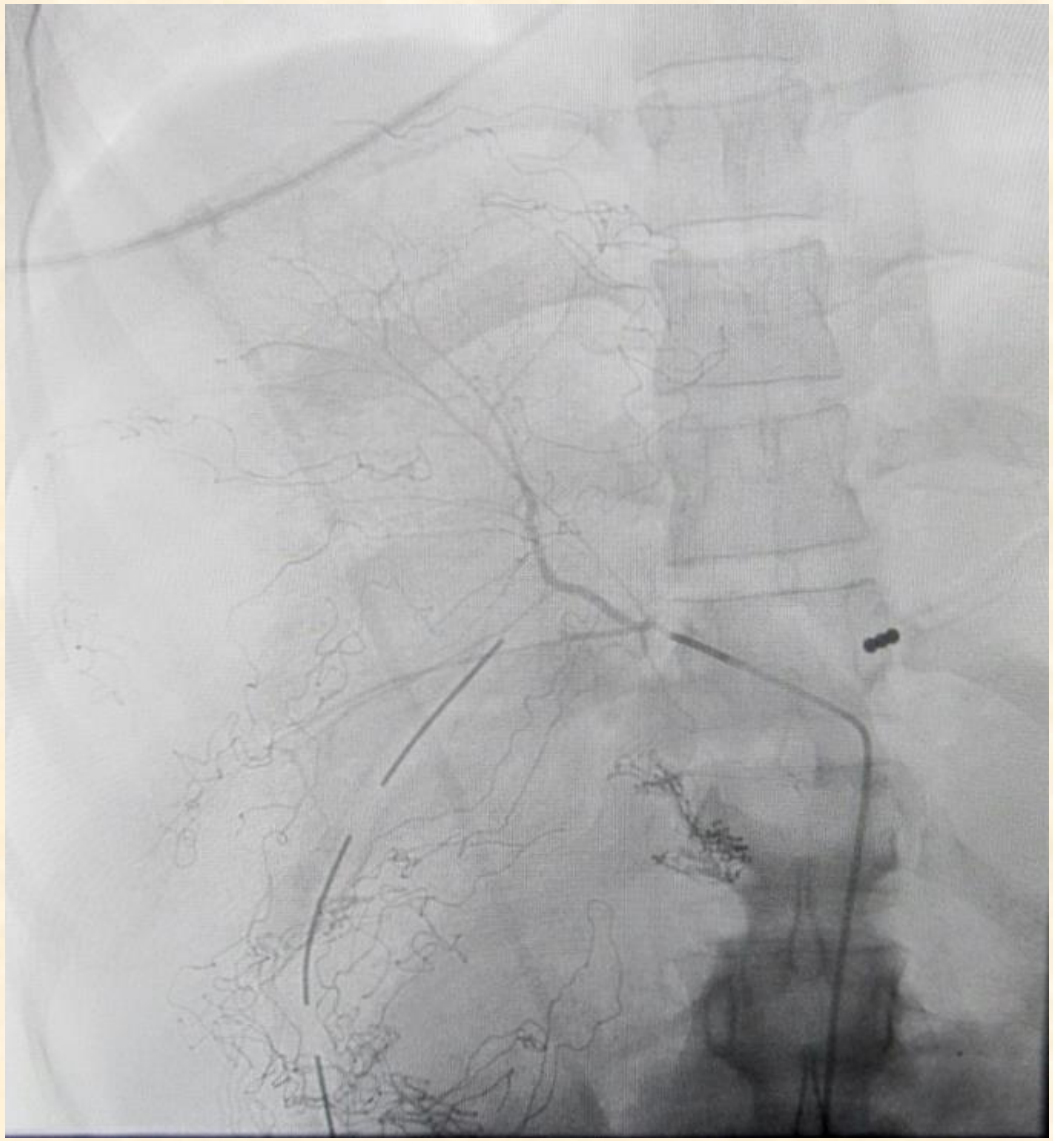
Disadvantages

- Hepatic necrosis (?)
- Need expertise and facility.
- Need contrast injection (nephrotoxicity).
- Cannot treat large vein / retro hepatic vein injuries.
- Patient needs transport to angiography suite.

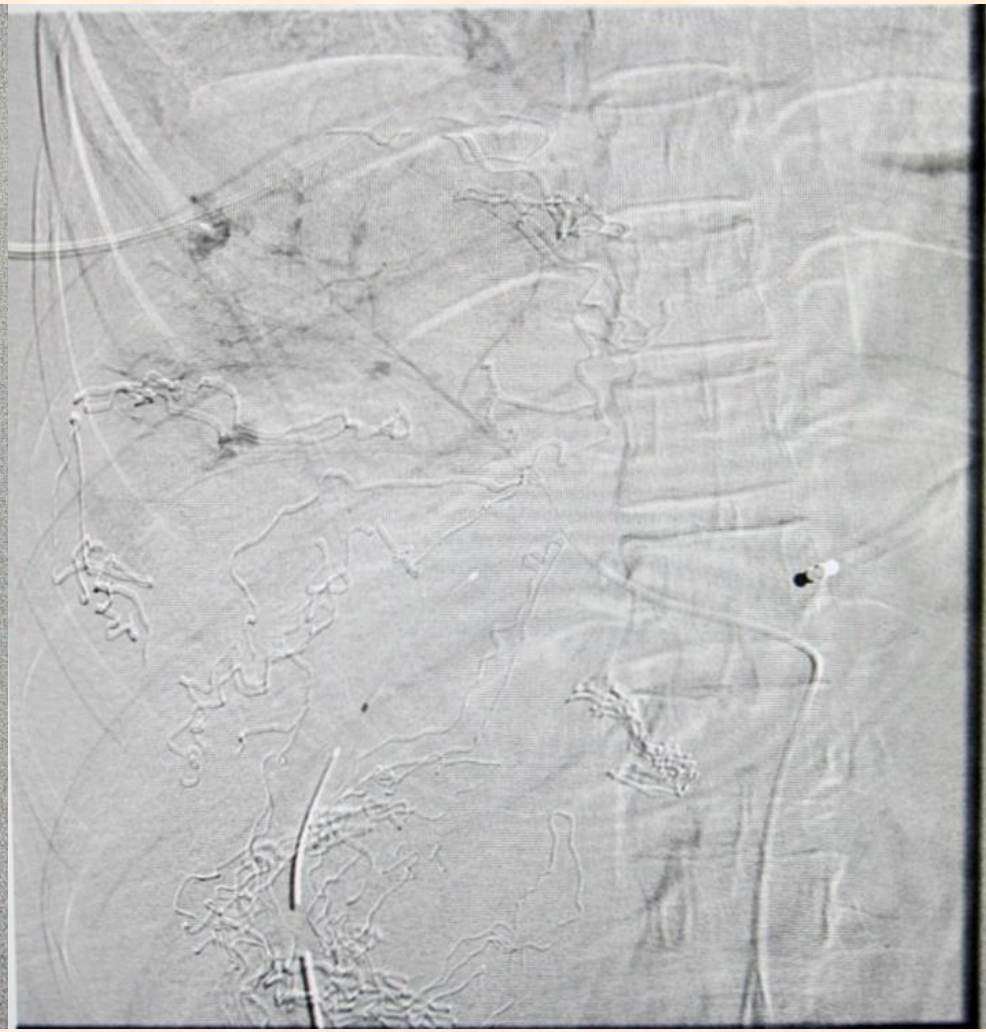
Catheterization of the hepatic artery



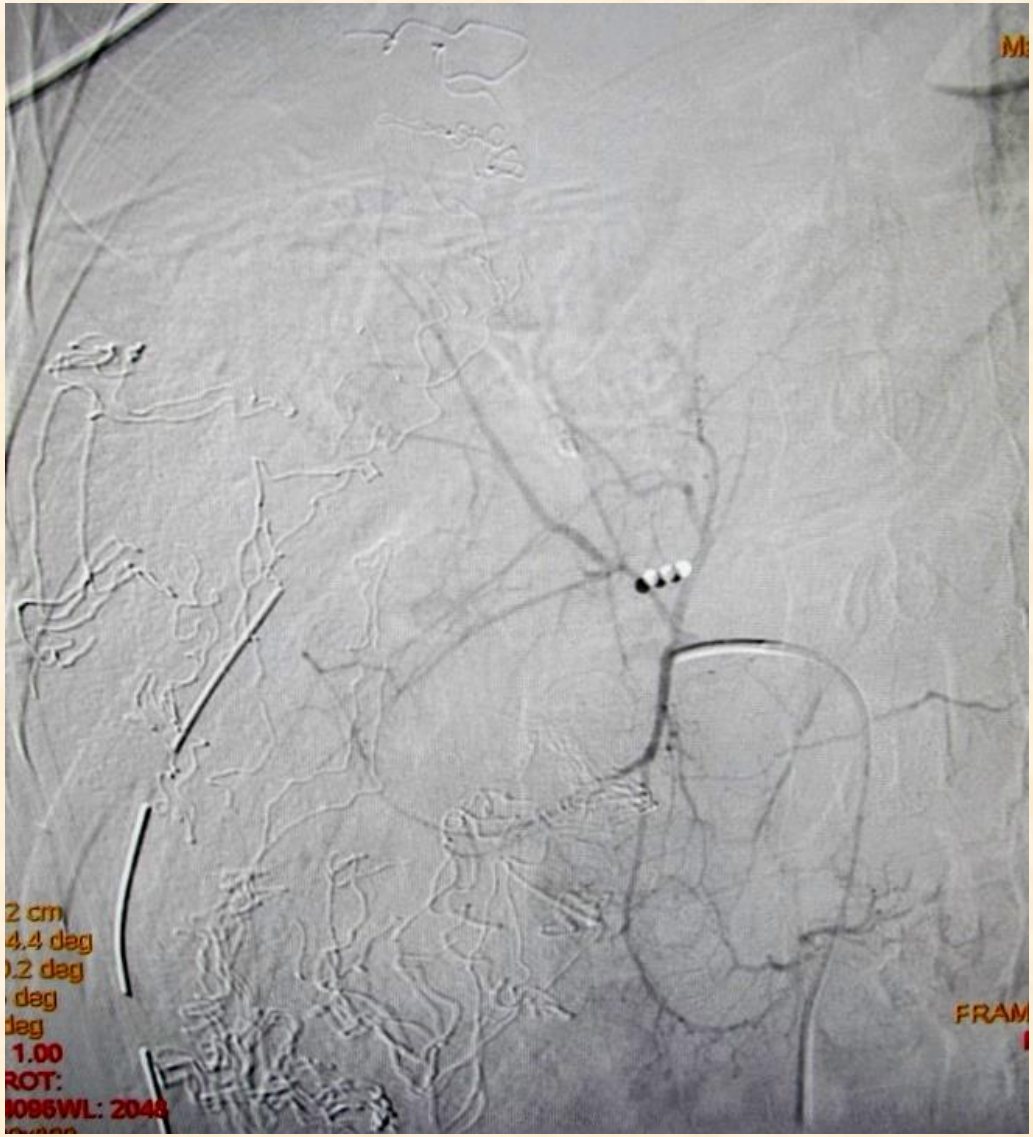
Angiography of the hepatic artery



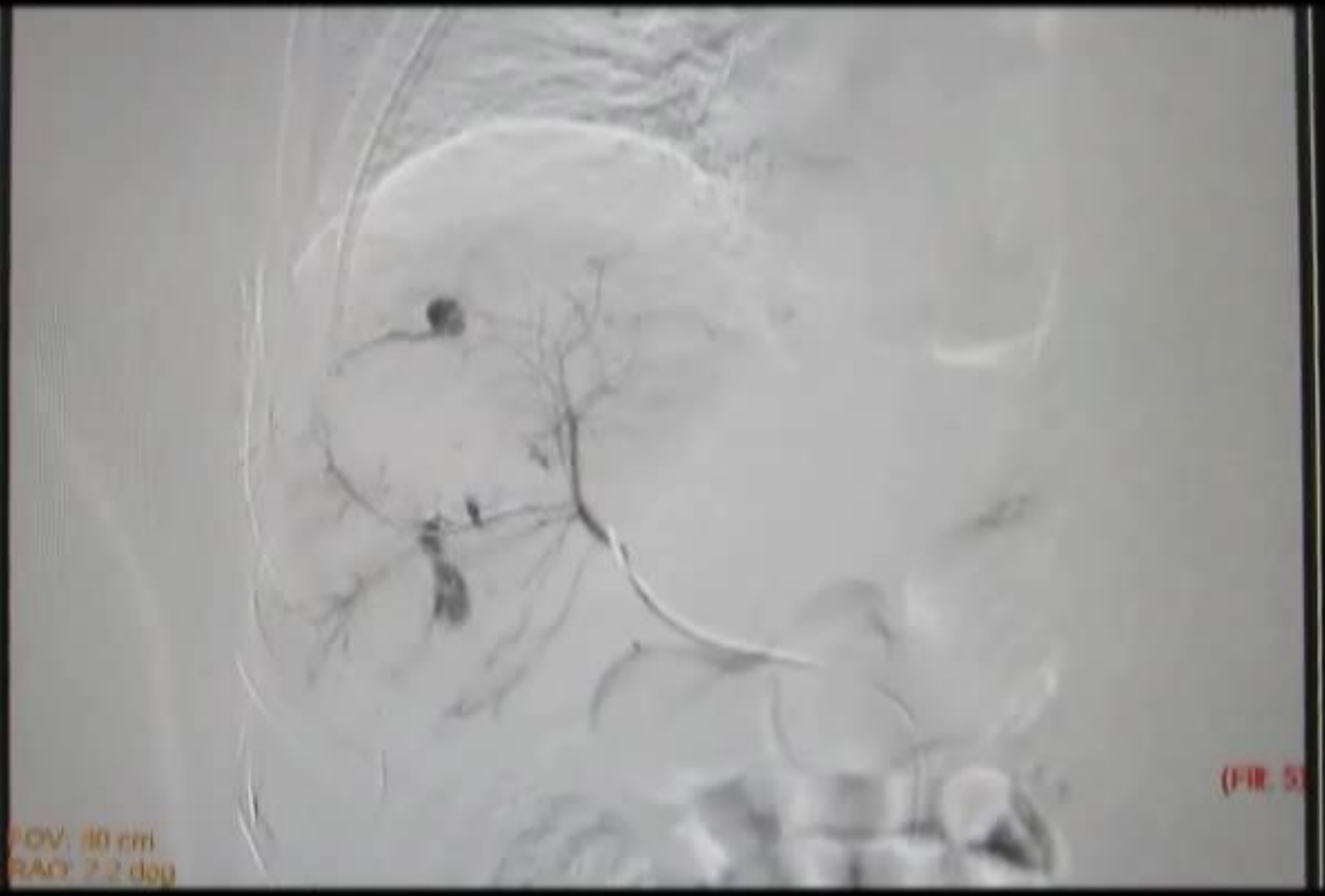
Hepatic angiography showing vascular blush



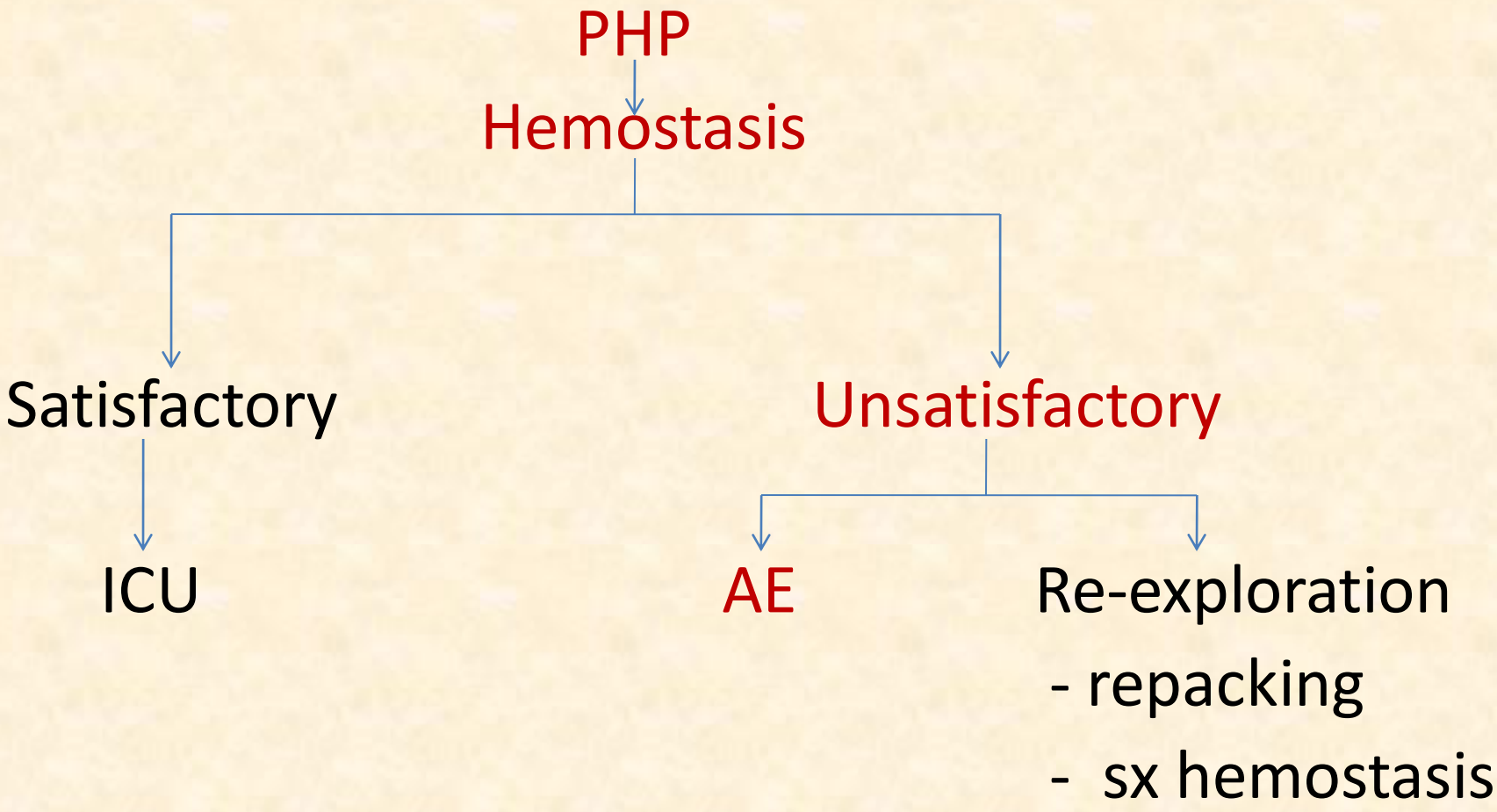
After angioembolization, vascular blush vanished




FOV: 40 cm



Peri-hepatic packing → Hepatic Angioembolization



Our observation 5 yrs back….

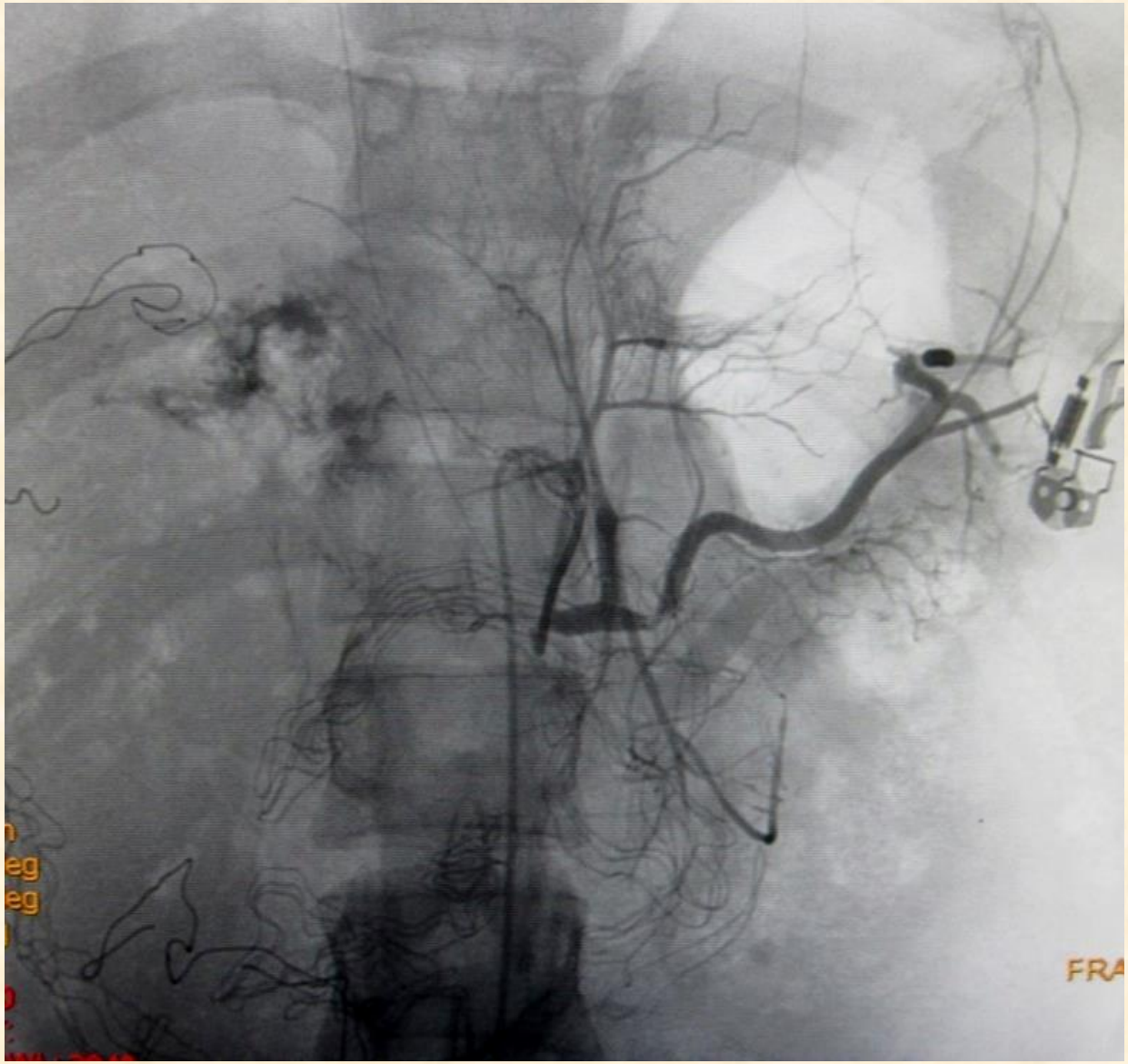
2 cases of hepatic trauma → PHP →

Bleeding continued with unstable vitals.

Hepatic AE tried, but catheter couldn't be negotiated through the hepatic artery though flow of blood through the same was demonstrated. Team was puzzled!

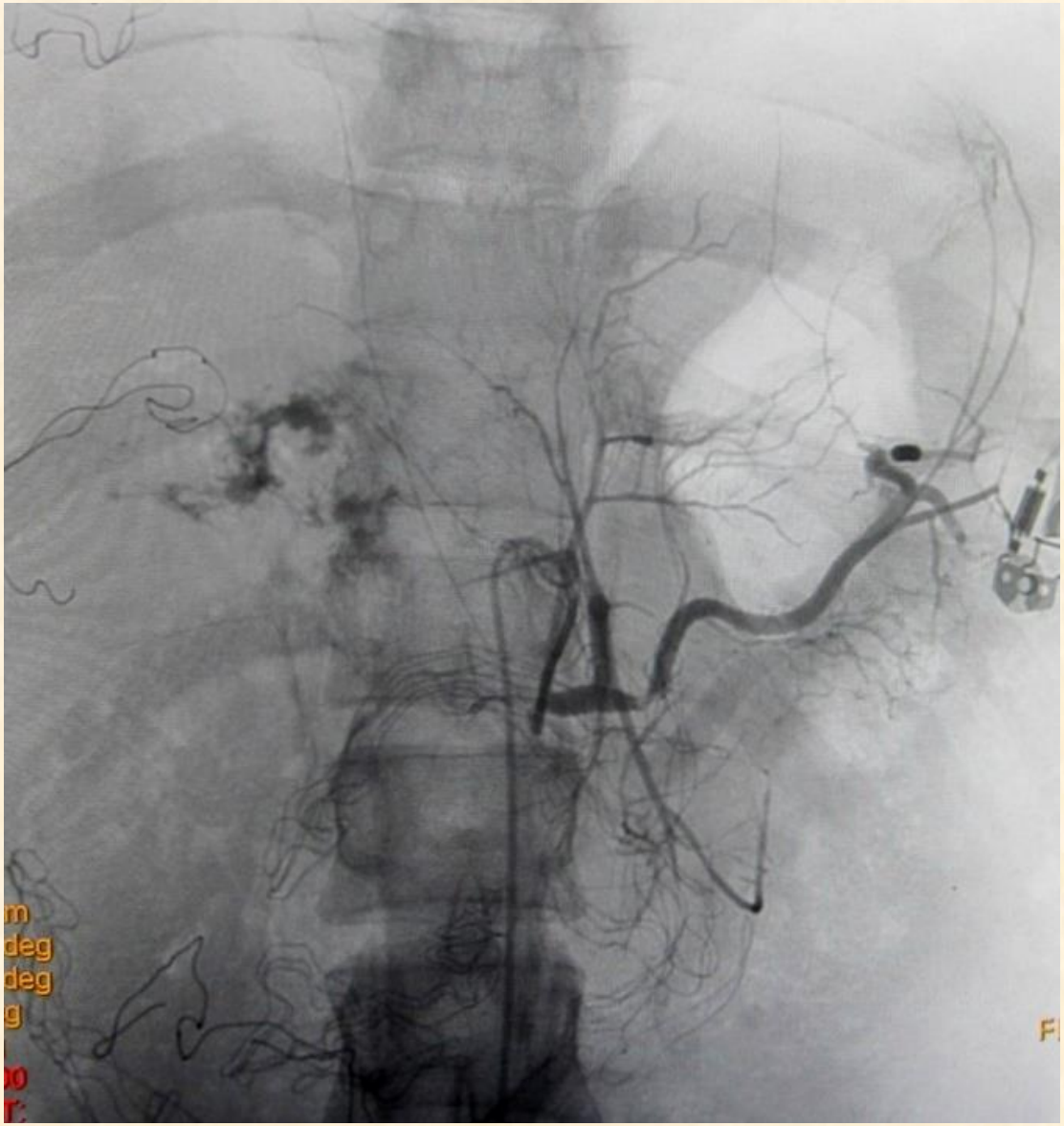
Catheterization of the celiac axis

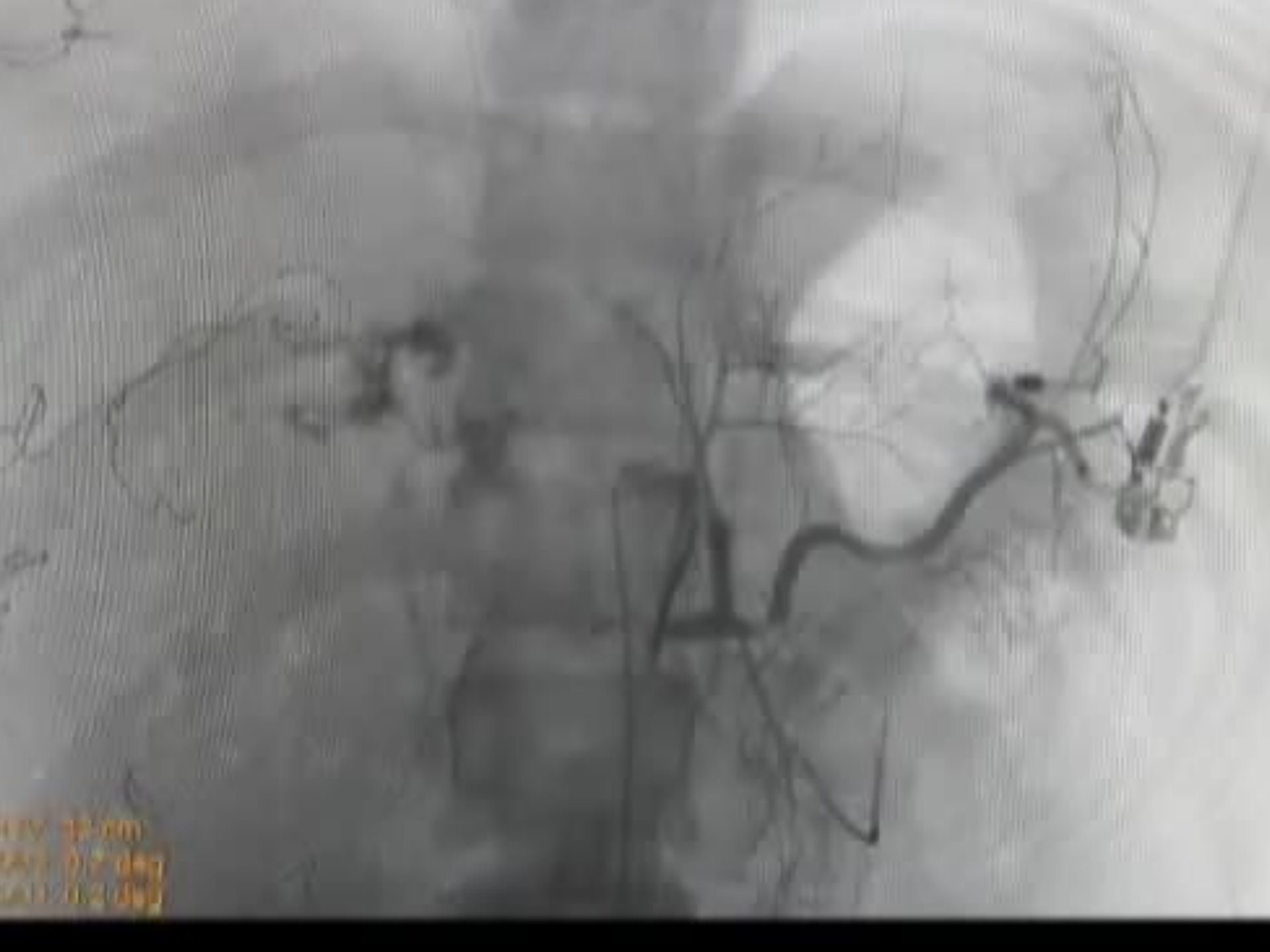
Angiography of the celiac axis



Angiography showing vascular blush

Angiography showing vascular blush






(Fig. 5)

- MOST PLAUSIBLE CAUSE: surgical sponges used for PHP compressing upon the hepatoduodenal ligament through which the hepatic artery was coursing.
- Management policy was established : not to pack around hepatoduodenal ligament / porta.
- No such failure observed after this in our Institution.
- Literature review did not reveal any such phenomenon /complications or failure of angiography catheter negotiation.

Last five years.....

- 82 cases of hepatic angioembolization
- 42 post PHP + 40 without PHP
- No failures were observed after the change of policy!!

'Mishra Phenomenon'
vs
'Sponge Pringle'

- Pringle- Complete obstruction to vascular inflow
- Mishra Phenomenon- Vascular inflow may not be compromised *but* catheter negotiation will be difficult/unsuccessful

Significance of *Mishra Phenomenon*

- Prevention of failure of hepatic AE.
- ? Prevention of hepatic necrosis by ensuring vascularity to the liver.
- ? Prevention of excessive bile leak from injured liver.

Summary

- Post PHP hepatic angiography / AE is one of the best strategy following failure of PHP.
- In coming years with increased availability of angiography and expertise, such practices are going to increase significantly.
- Awareness of *Mishra Phenomenon* will avoid failure of selective hepatic artery AE and other complications.

Thank You