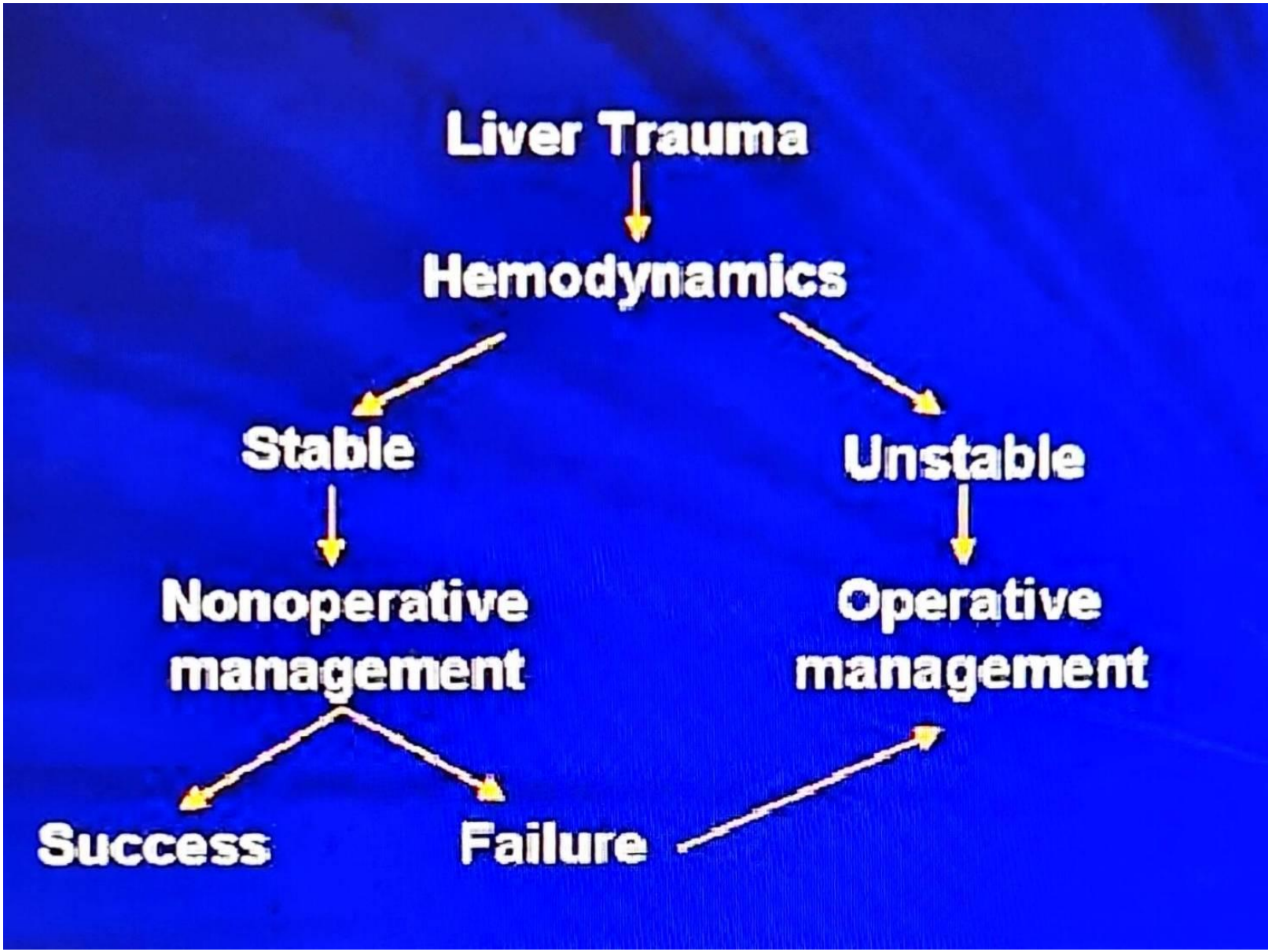
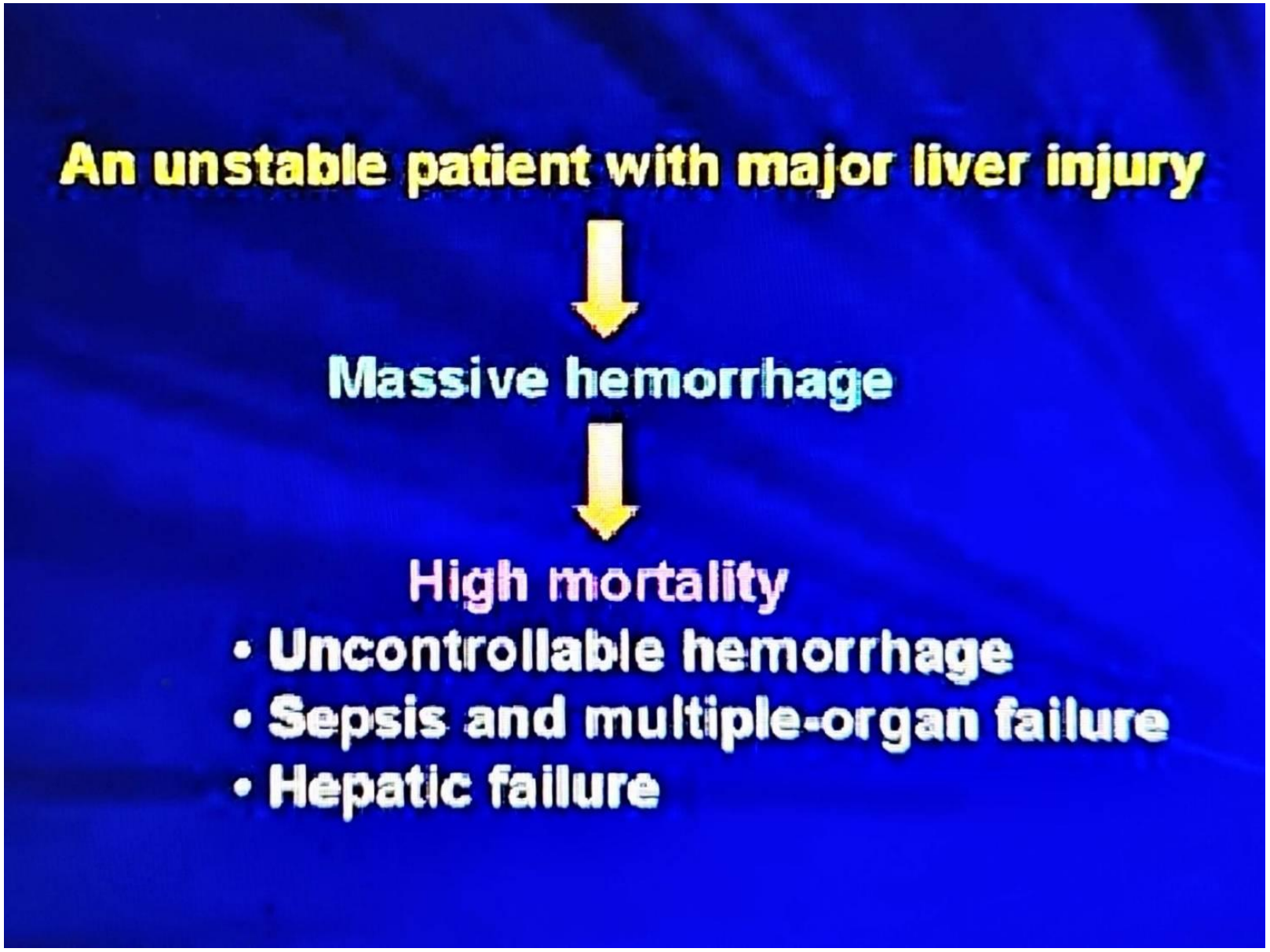

Surgical Management
of Hepatic Injuries

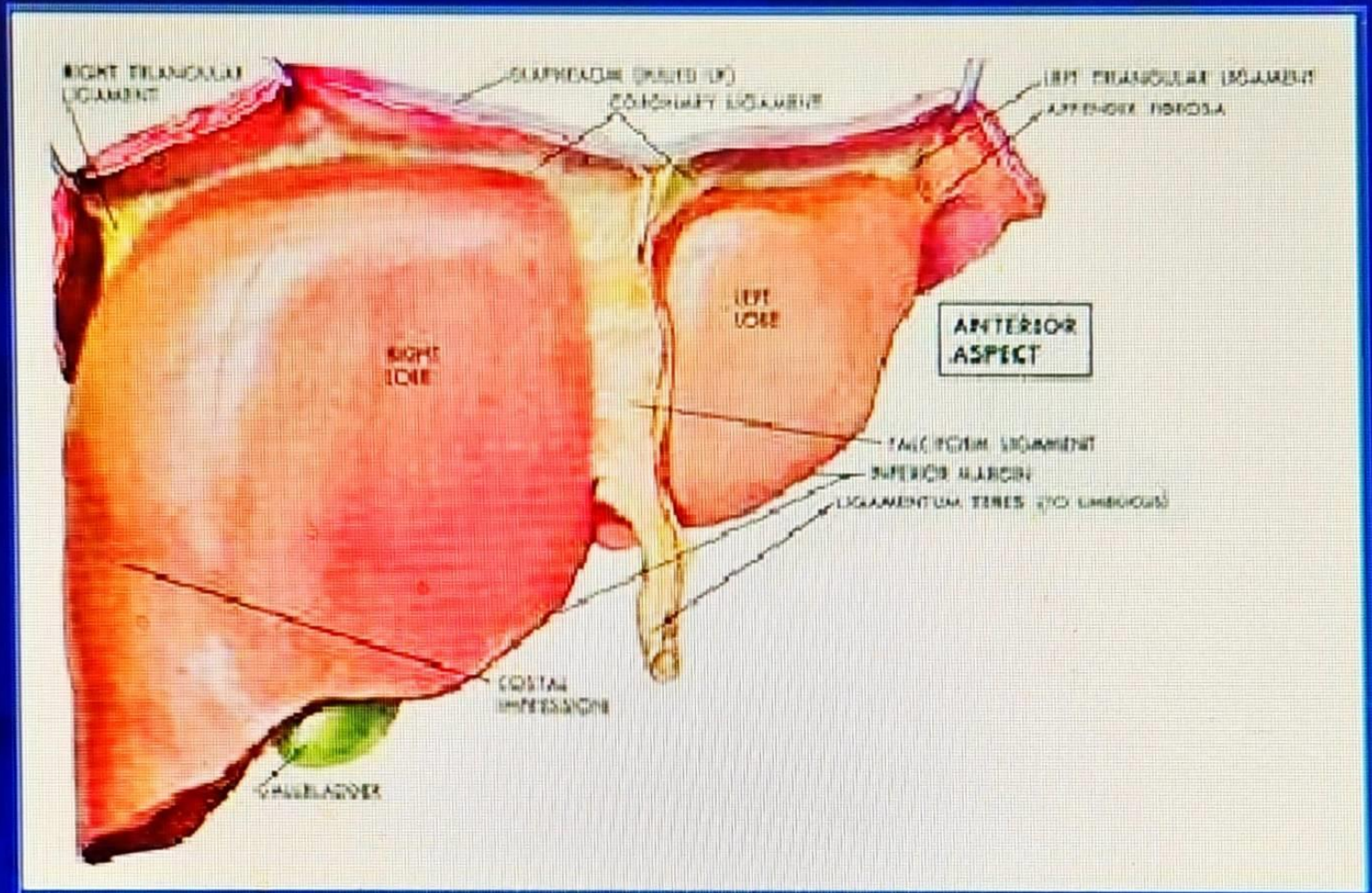

Liver Trauma
Hemodynamics
Stable
Unstable
Nonoperative management
Operative management
Success
Failure


An unstable patient with major liver injury
Massive hemorrhage
High mortality
• Uncontrollable hemorrhage
• Sepsis and multiple-organ failure
• Hepatic failure

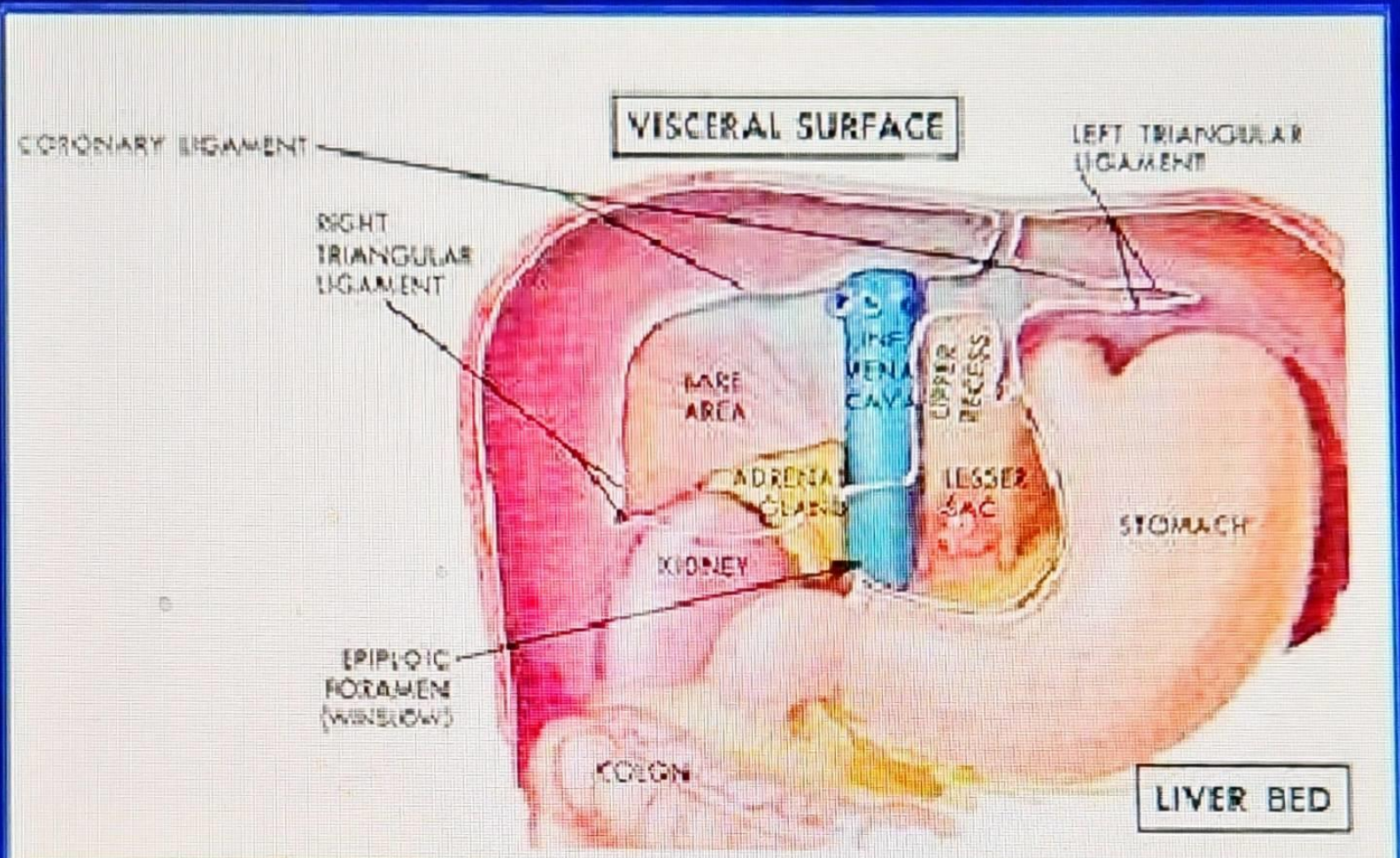
Principles of surgical treatment

- Early control of hemorrhage
- Definitive control of hemorrhage
- Removal of devitalized liver tissue
- Preservation of normal liver parenchyma

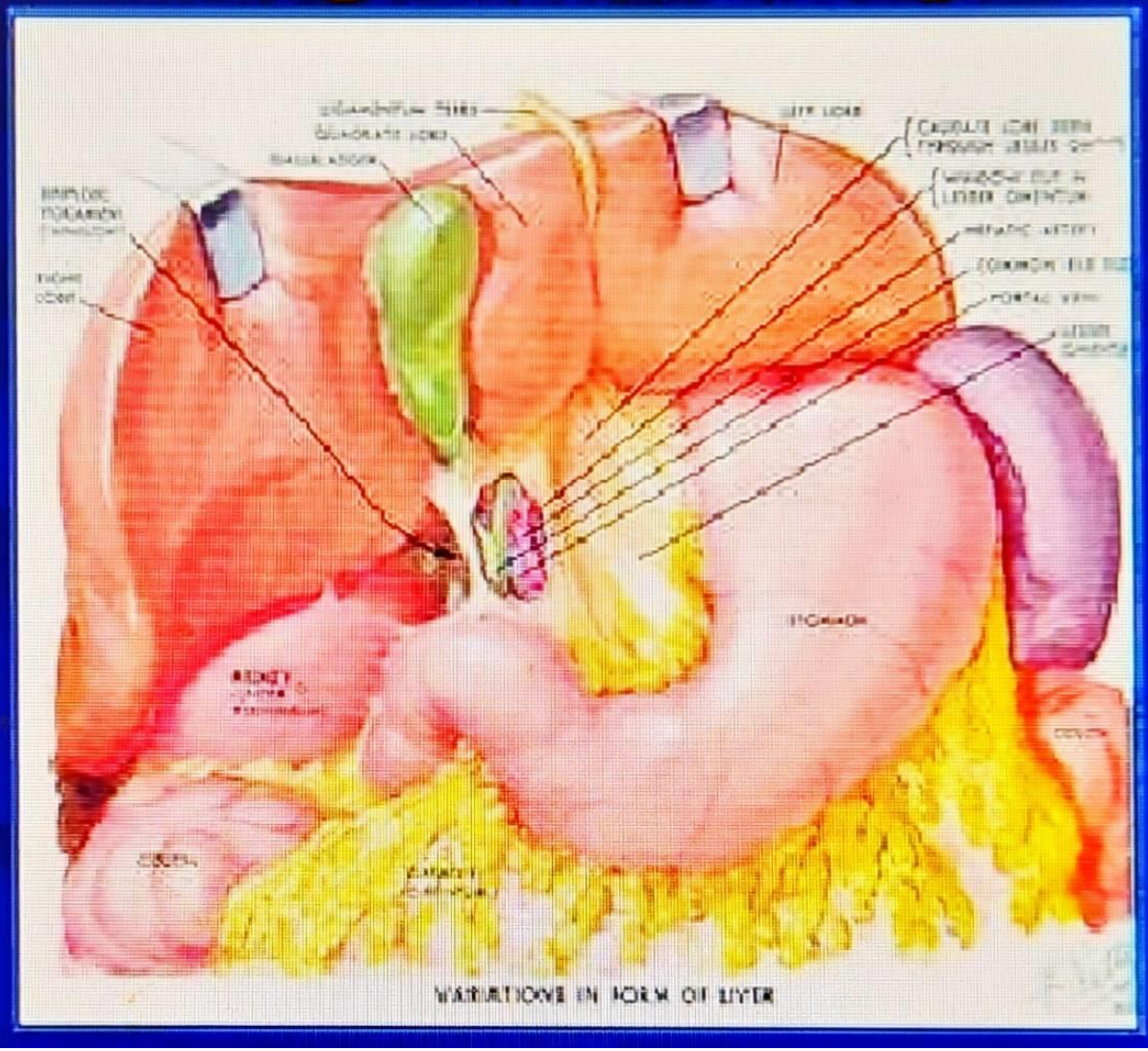
Surgical Anatomy



Surgical Anatomy



Surgical Anatomy



Operation

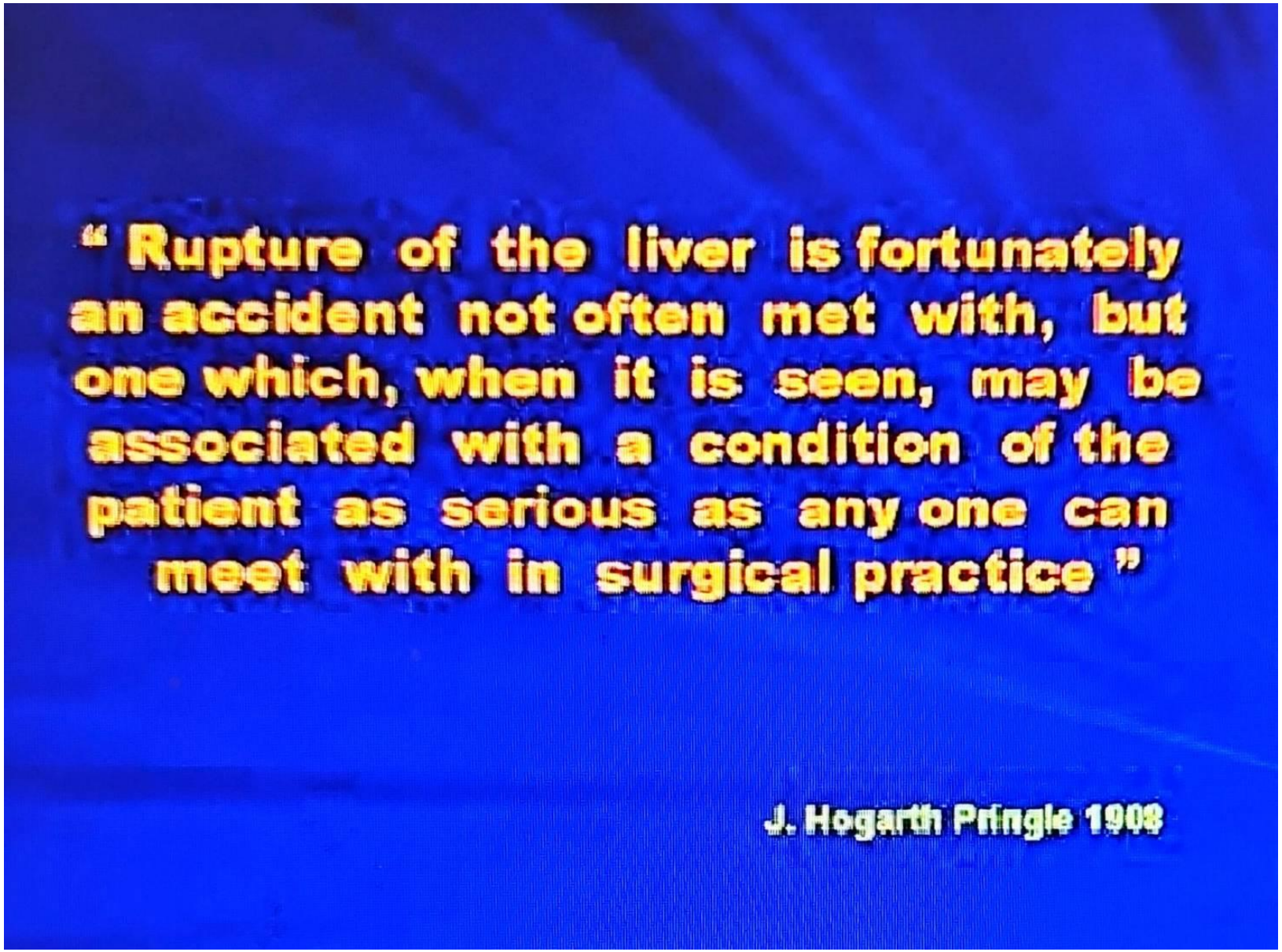
- Preparation from chest to thigh
- Upper midline incision extension to below umbilicus
- Rapid removal of intraabdominal blood and clots
- Packing liver wounds
- Resuscitation : adequate volume replacement and prevention of hypothermia
- Appropriate liver mobilization
- Searching for associated intraabdominal injuries

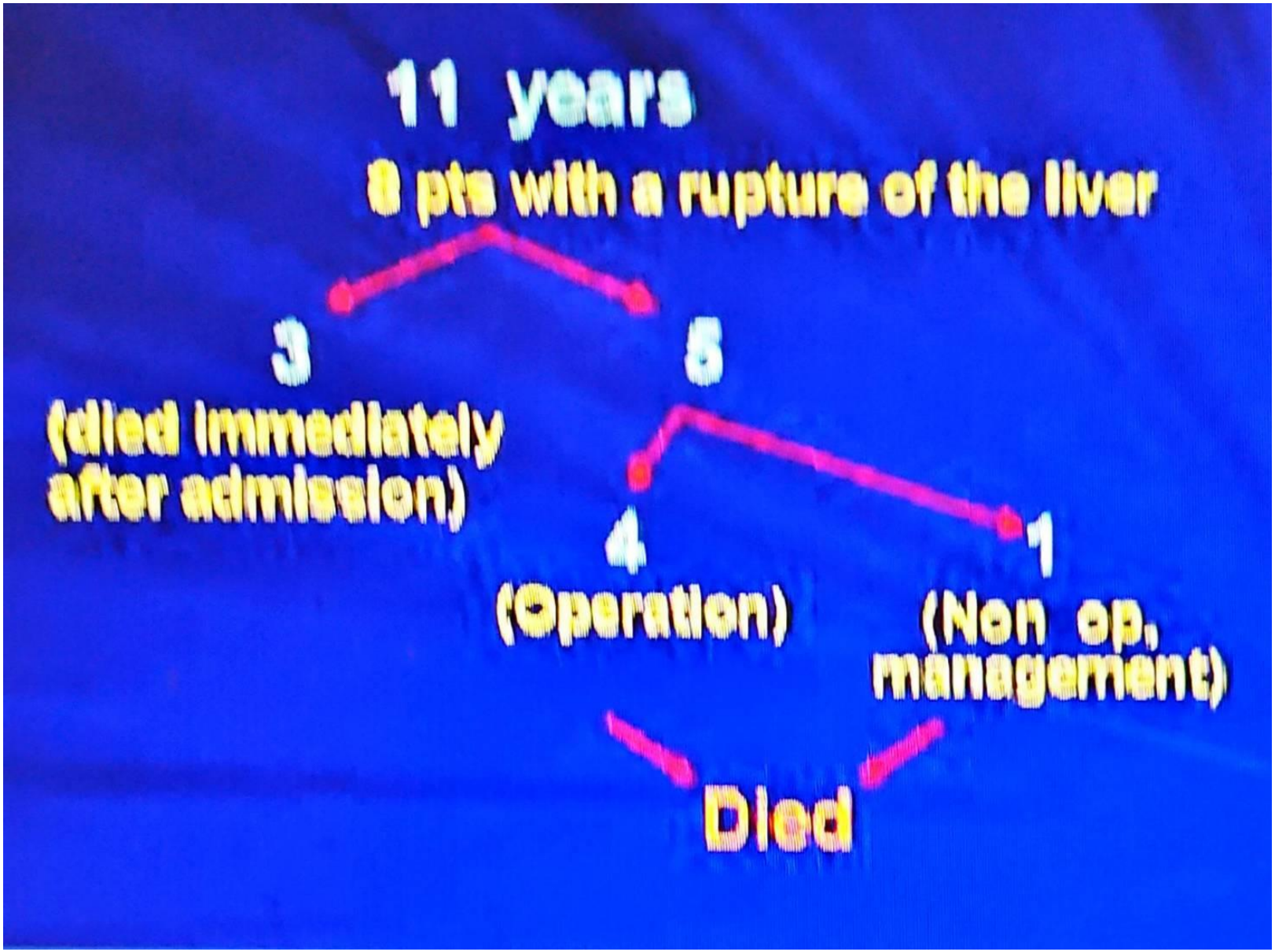
Pringle maneuver

- First described by J. Hogarth Pringle in 1908
- Clamping 20 min., reperfusion 5 min.
- Clamping 30 - 60 min.
- Clamping 75 min.

Notes on the arrest of hepatic hemorrhage due to trauma.

By J. Hogarth Pringle, F.R.C.S. of Glasgow
Ann Surg 1908; 48 : 541


" Rupture of the liver is fortunately an accident not often met with, but one which, when it is seen, may be associated with a condition of the patient as serious as any one can meet with in surgical practice "
J. Hogarth Pringle 1908

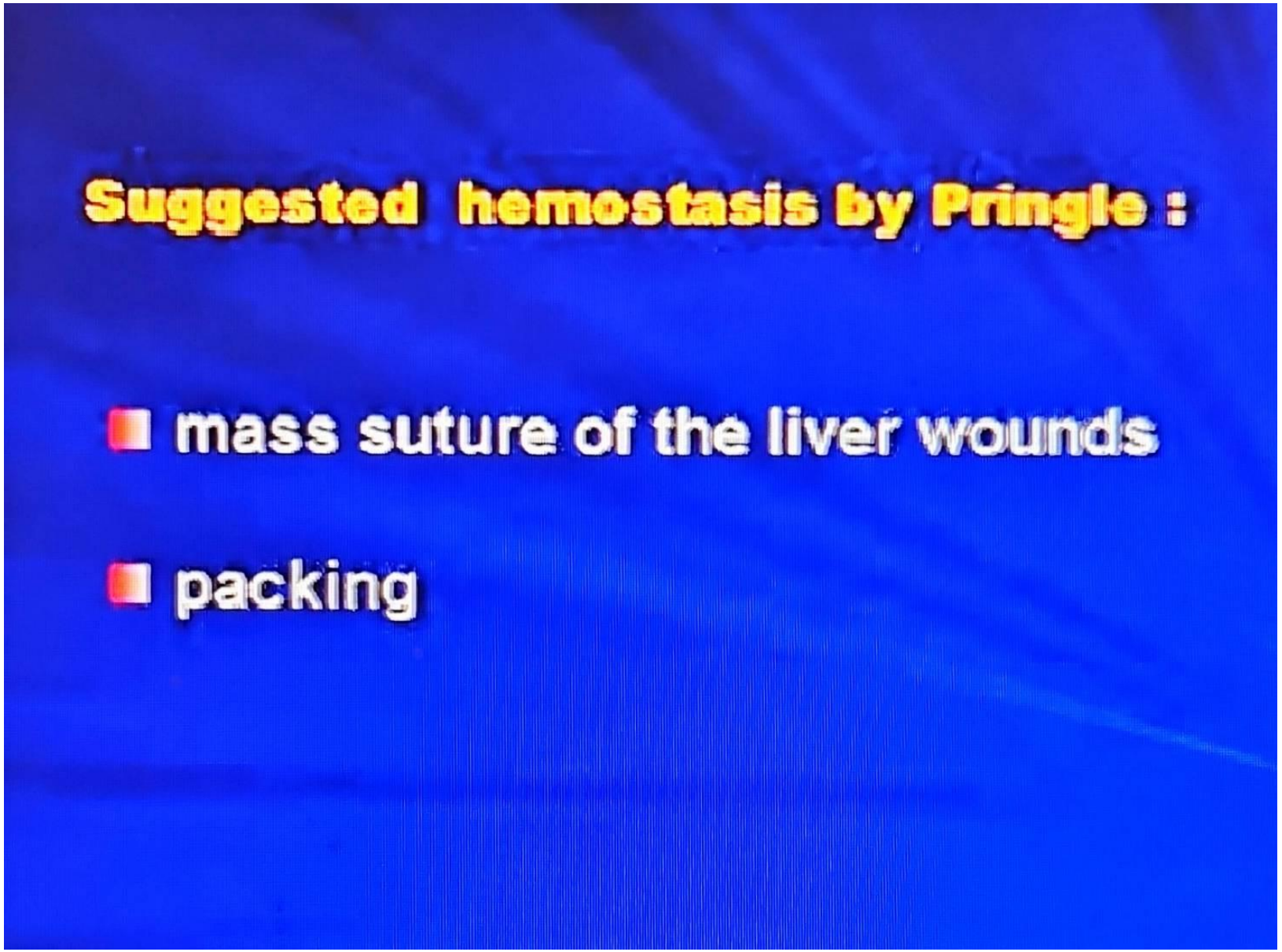

11 years
8 pts with a rupture of the liver
3
(died immediately after admission)
5
4
(Operation)
1
(Non op. management)
Died

1st case

"…. and before anything could be done to arrest it the patient had died, not from the blood lost prior to the operation but from the profuse and uncontrolled hemorrhage that took place from the torn surfaces of the liver"

2nd case

"…..and after opening the abdomen an assistant held the portal vein and the hepatic artery between a finger and thumb and completely arrested all bleeding,……"

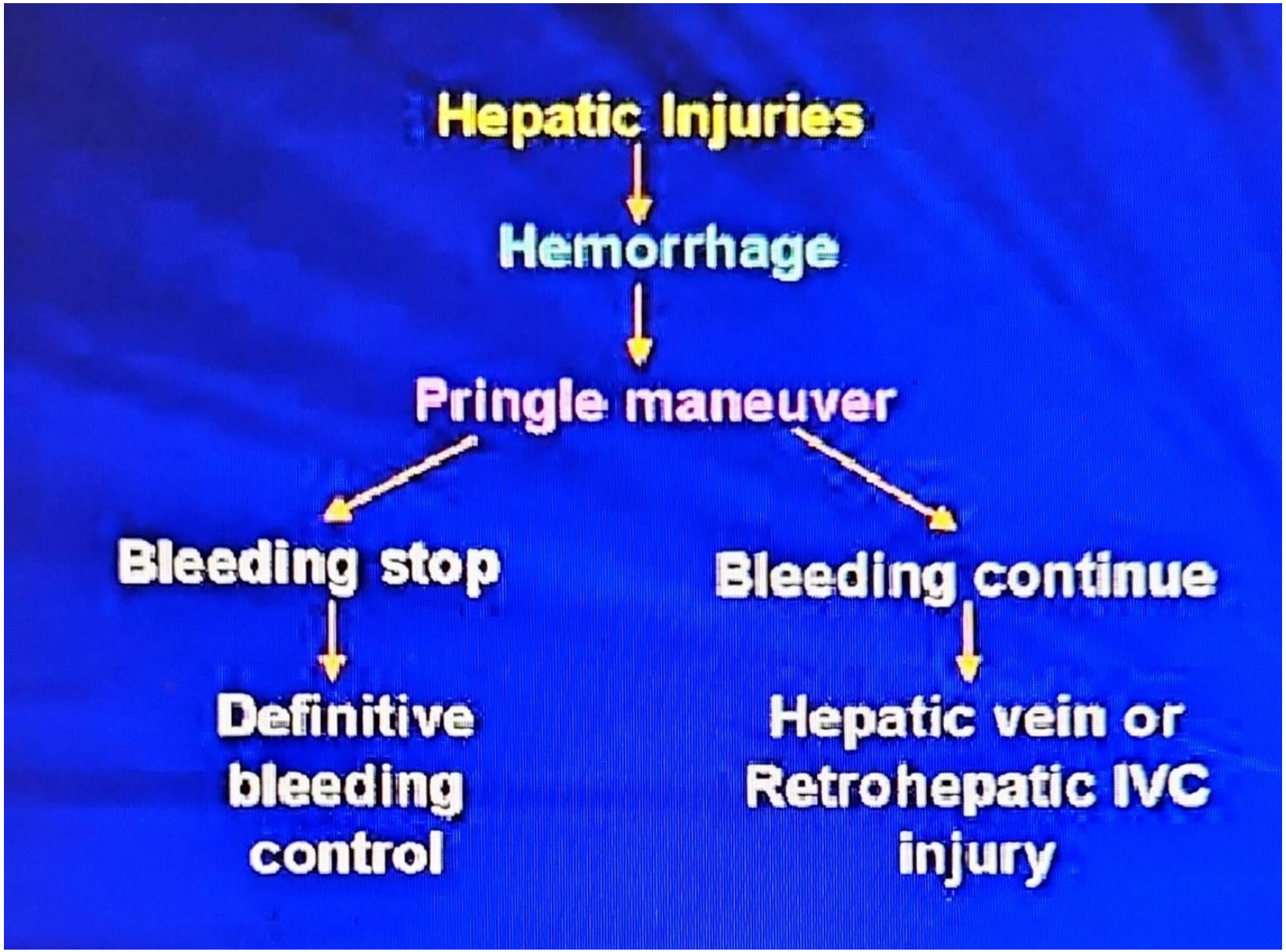

Suggested hemostasis by Pringle :
mass suture of the liver wounds
packing

Suggested exposure for a wound situated far back of the large right lobe of the liver :

- by dividing the coronary and right lateral ligaments.....
- by freeing a portion of the lower thoracic wall by dividing the ribs and holding up this flap of ribs and diaphragm.

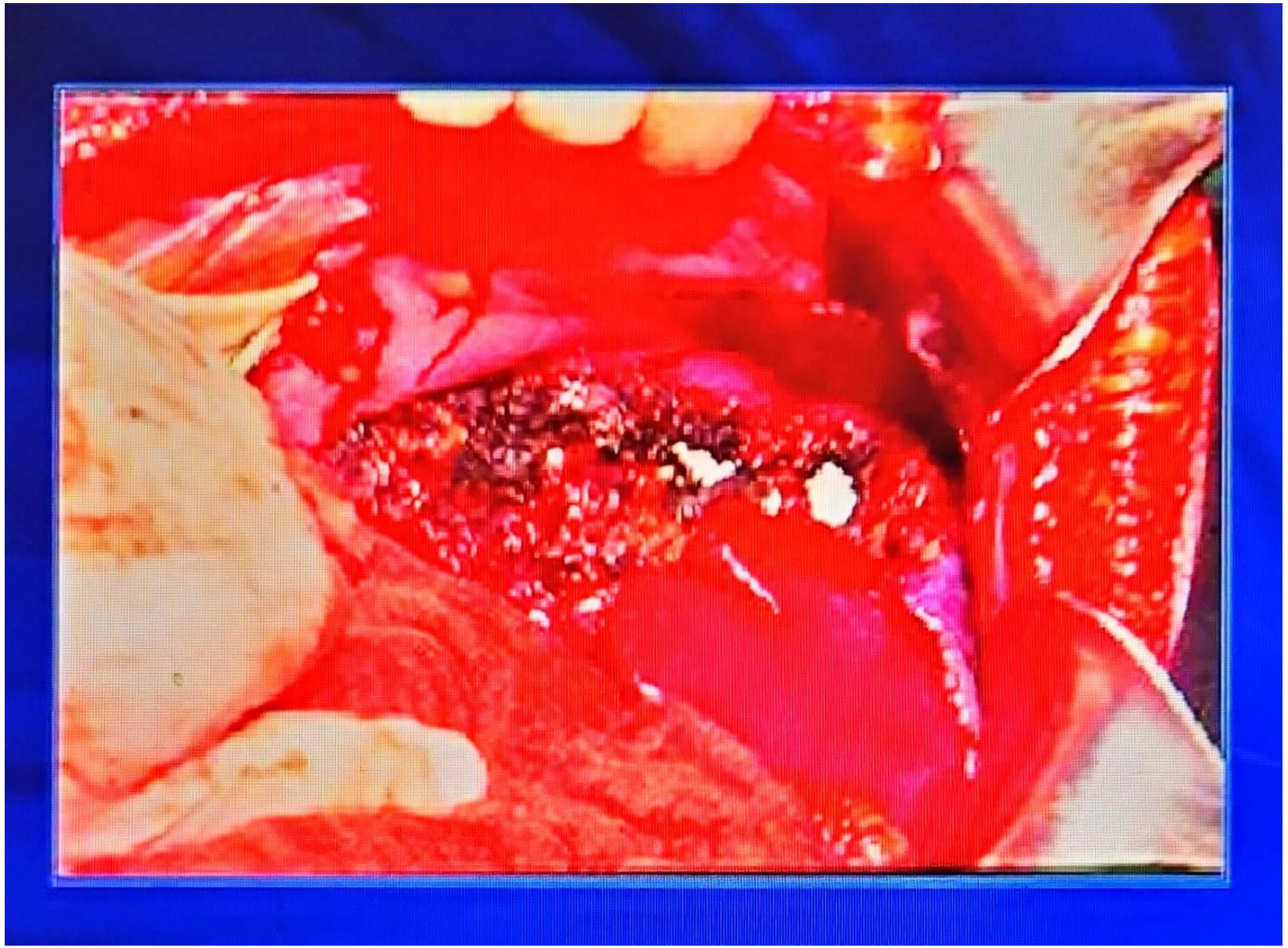
4th case

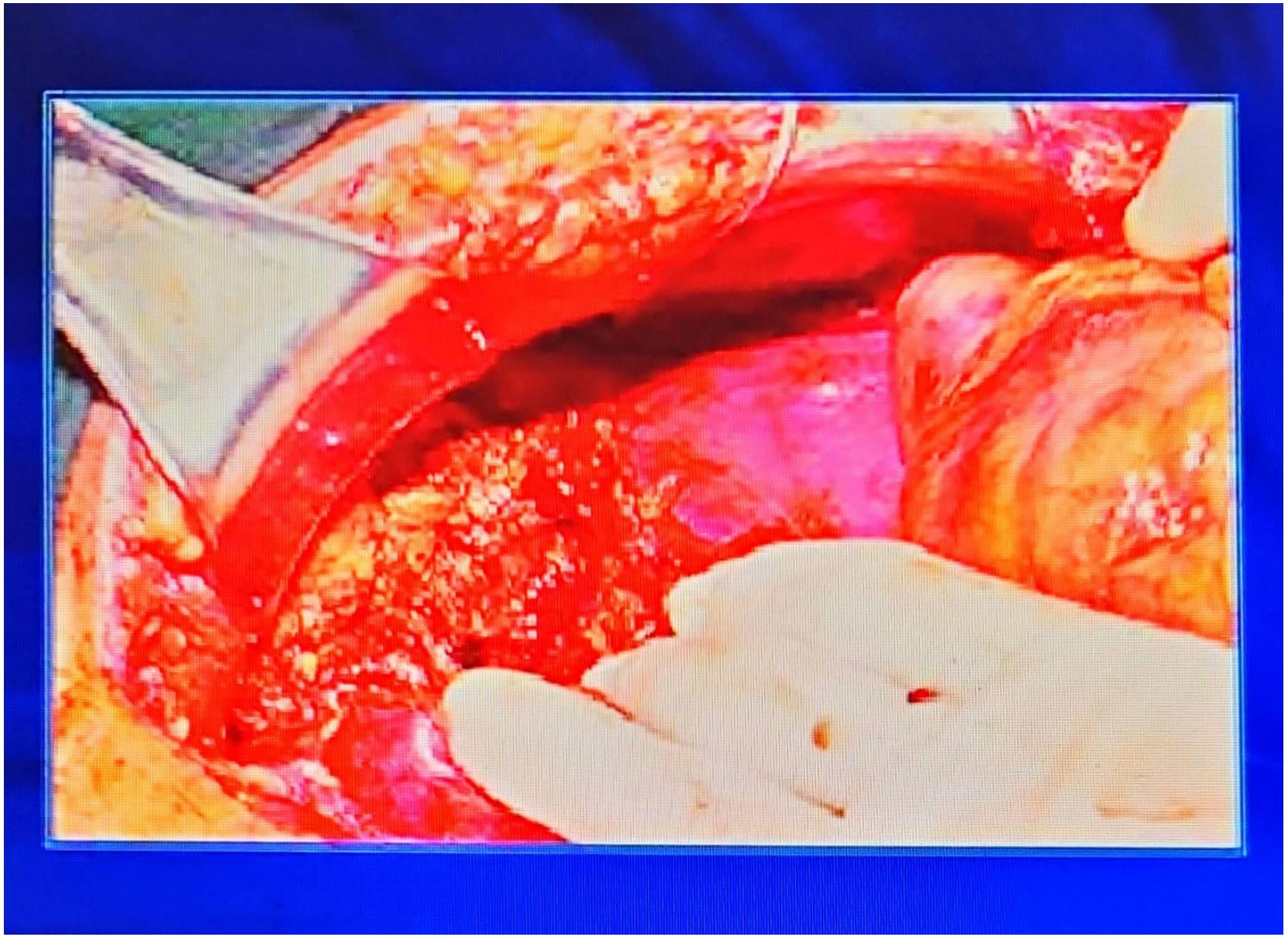
"…. The convexity of the upper surface of the liver itself appeared to the chief obstacle to getting at the coronary ligament but having got the lateral ligament divided it was found possible, by traction and pressure, etc., to tear the upper layer of the coronary ligament, although this succeeded to some extent it quickly become apparent that the rupture in the liver tissue was being considerably enlarged by the maneuver and it become necessary in consequence of this to desist from further attempts in this direction"


Hepatic Injuries
Hemorrhage
Pringle maneuver
Bleeding stop
Bleeding continue
Definitive bleeding control
Hepatic vein or Retrohepatic IVC injury

Hemostasis of the injured liver

- Direct suture ligation
- Resectional debridement
- Omental packing






ร.พ.จุฬาลงกรณ์

Hepatic artery ligation

- May be safely performed if the portal vein is normal.
- May have some risk of liver failure in shocked and traumatized liver.

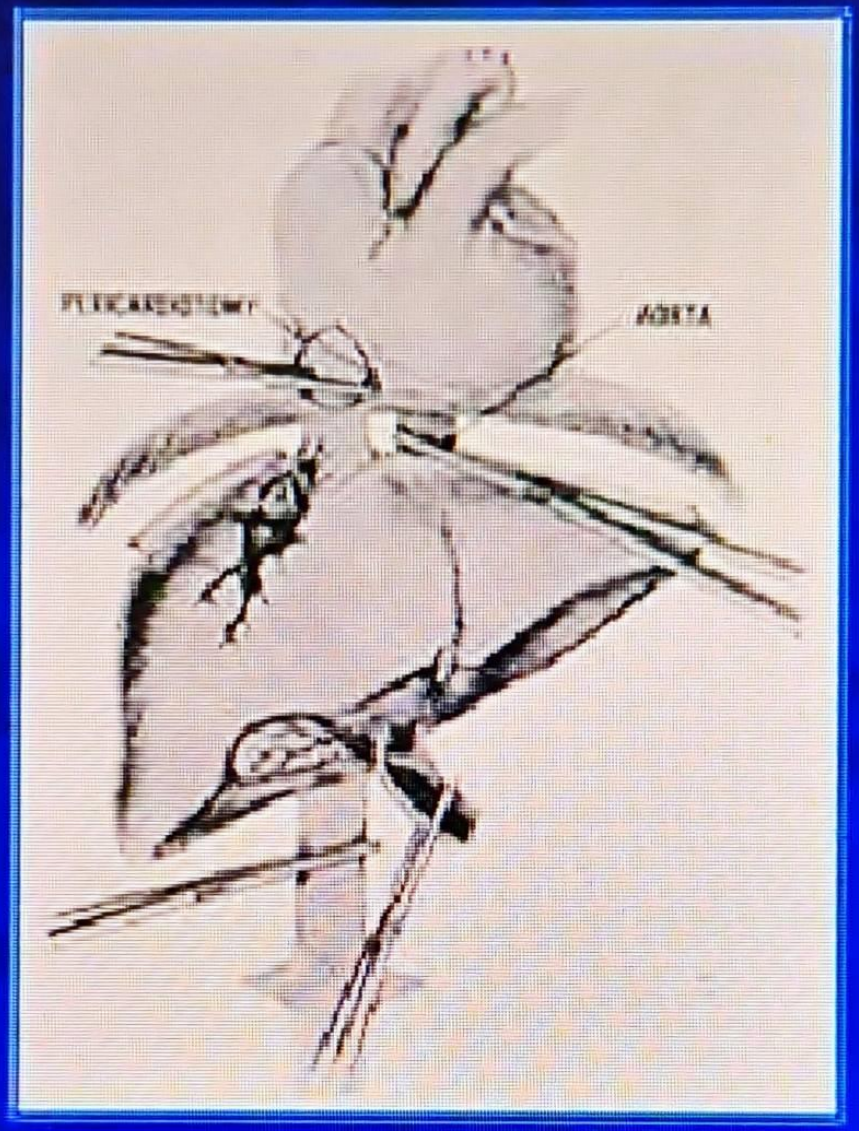
Anatomic hepatic resection

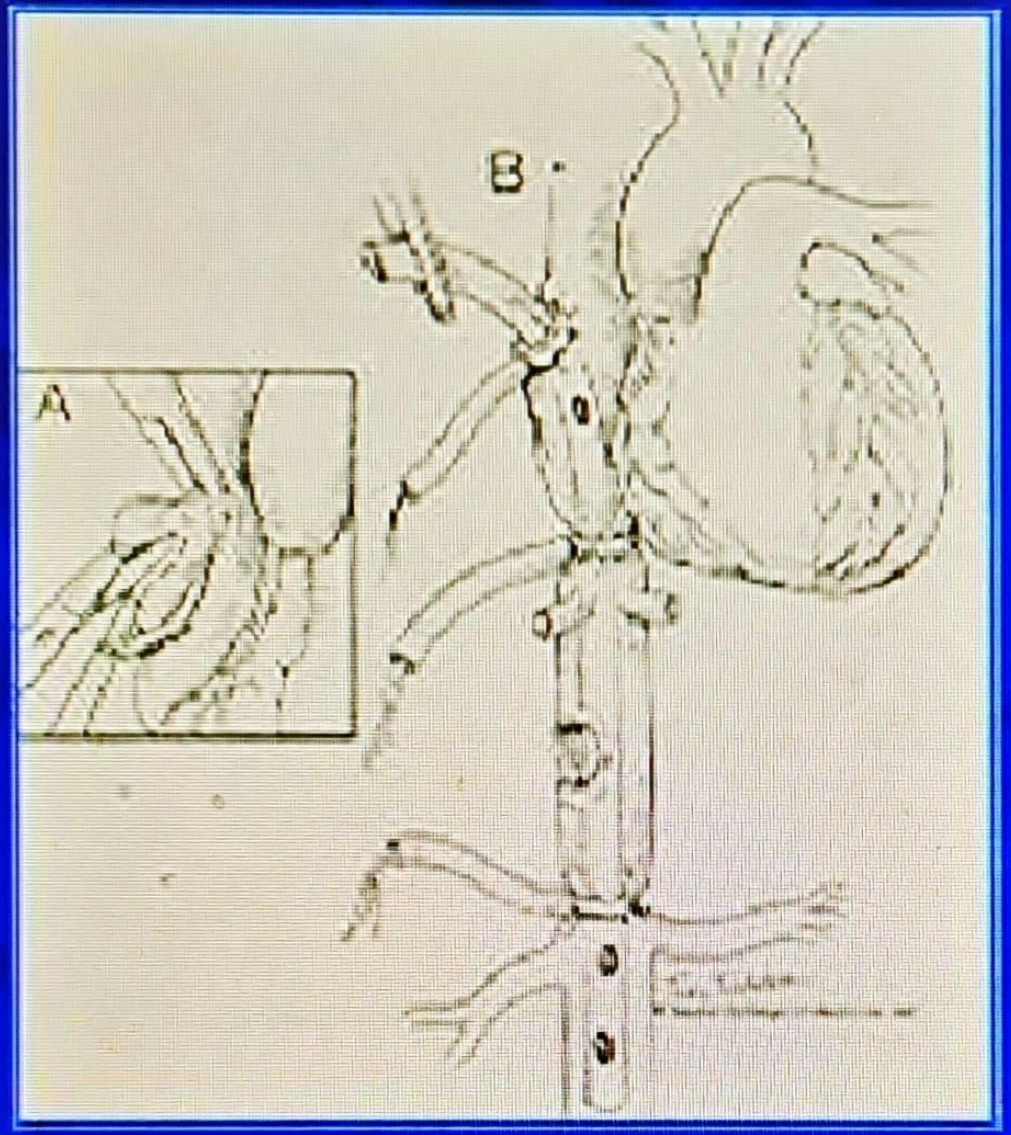
- No longer recommended
- Currently perform when the liver has already been transected by the injuries.
- May be beneficial in hepatic vein or retrohepatic IVC injury.

GradeV hepatic injuries
(Hepatic vein or retrohepatic IVC injuries)

- Direct suture repair
- Anatomic hepatic resection
- Omental or perihepatic packing

Buckman RF Jr, et al. J Trauma 2000; 48:978-84.

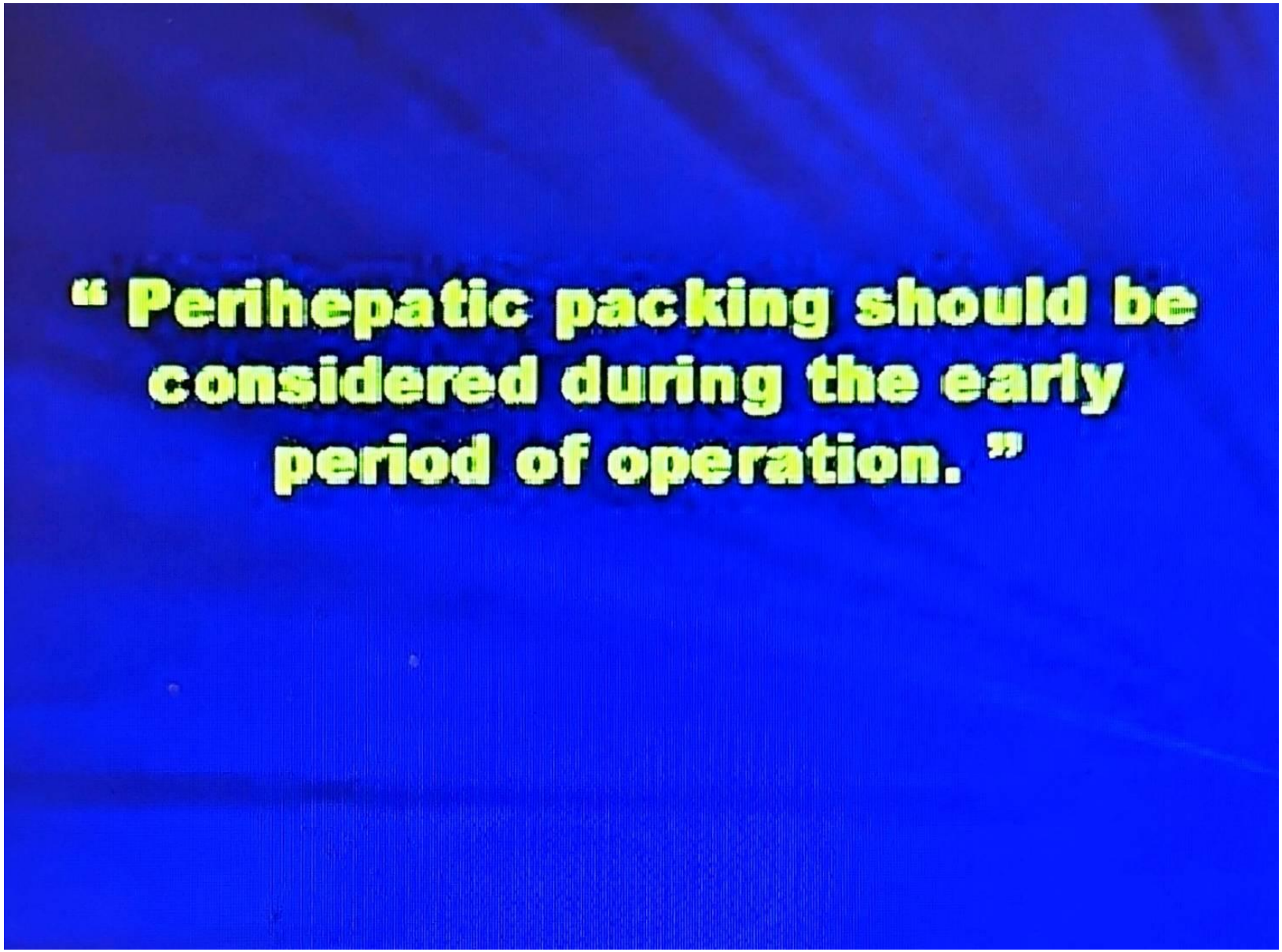

AORTA


A
B

Perihepatic packing

Indications

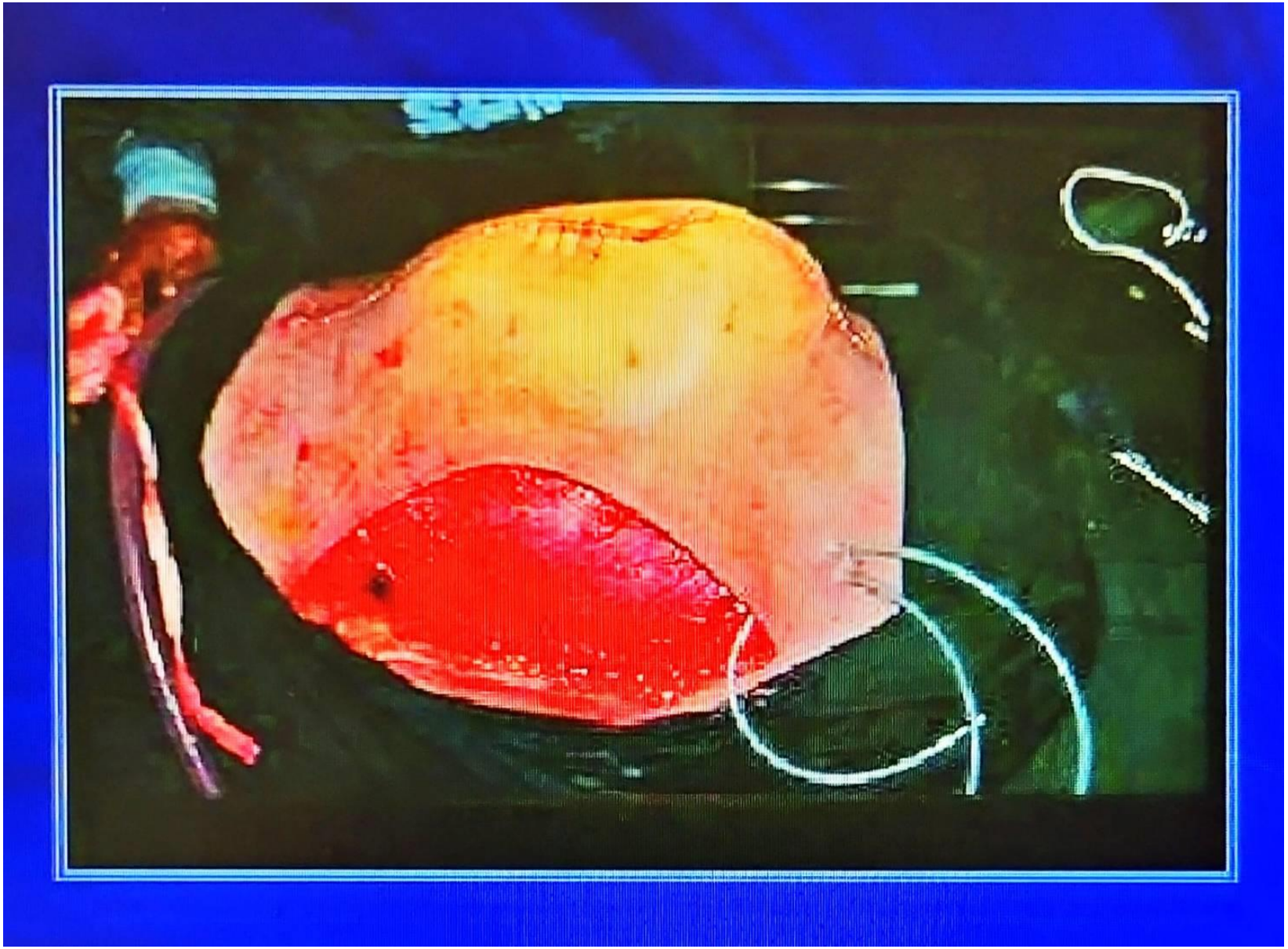
- Ongoing hemorrhage
- Physiologic exhaustion of hypothermia, acidosis, and coagulopathy
- Segment VI, VII injuries
- Grade V hepatic injuries
- Inadequate resources


" Perihepatic packing should be considered during the early period of operation. "

Pack removal

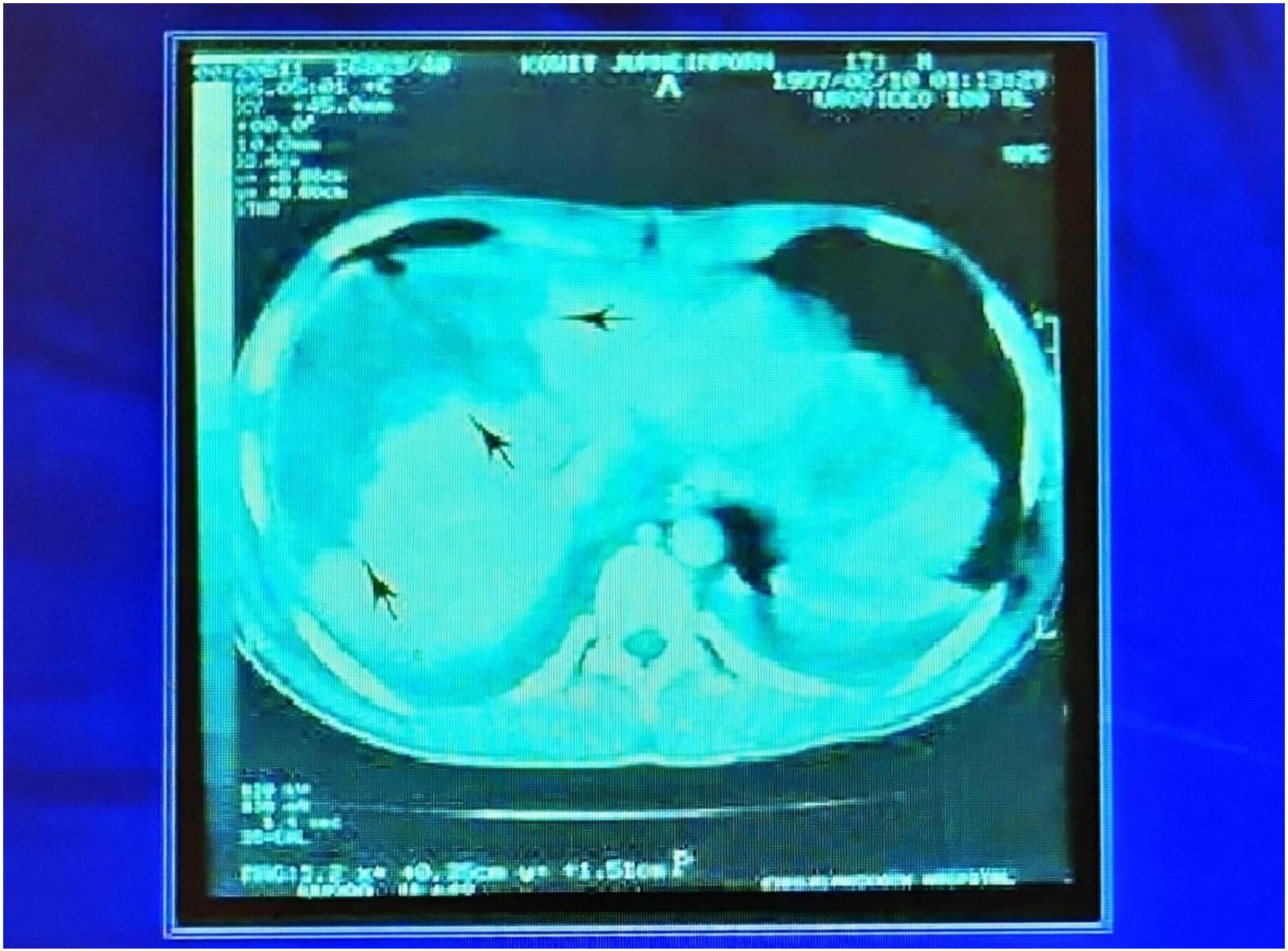
- Hypothermia, acidosis,and coagulopathy have been corrected.
- 48-72 hours post packing
- Use several litres of warm saline solution
- Beware of abdominal compartment syndrome

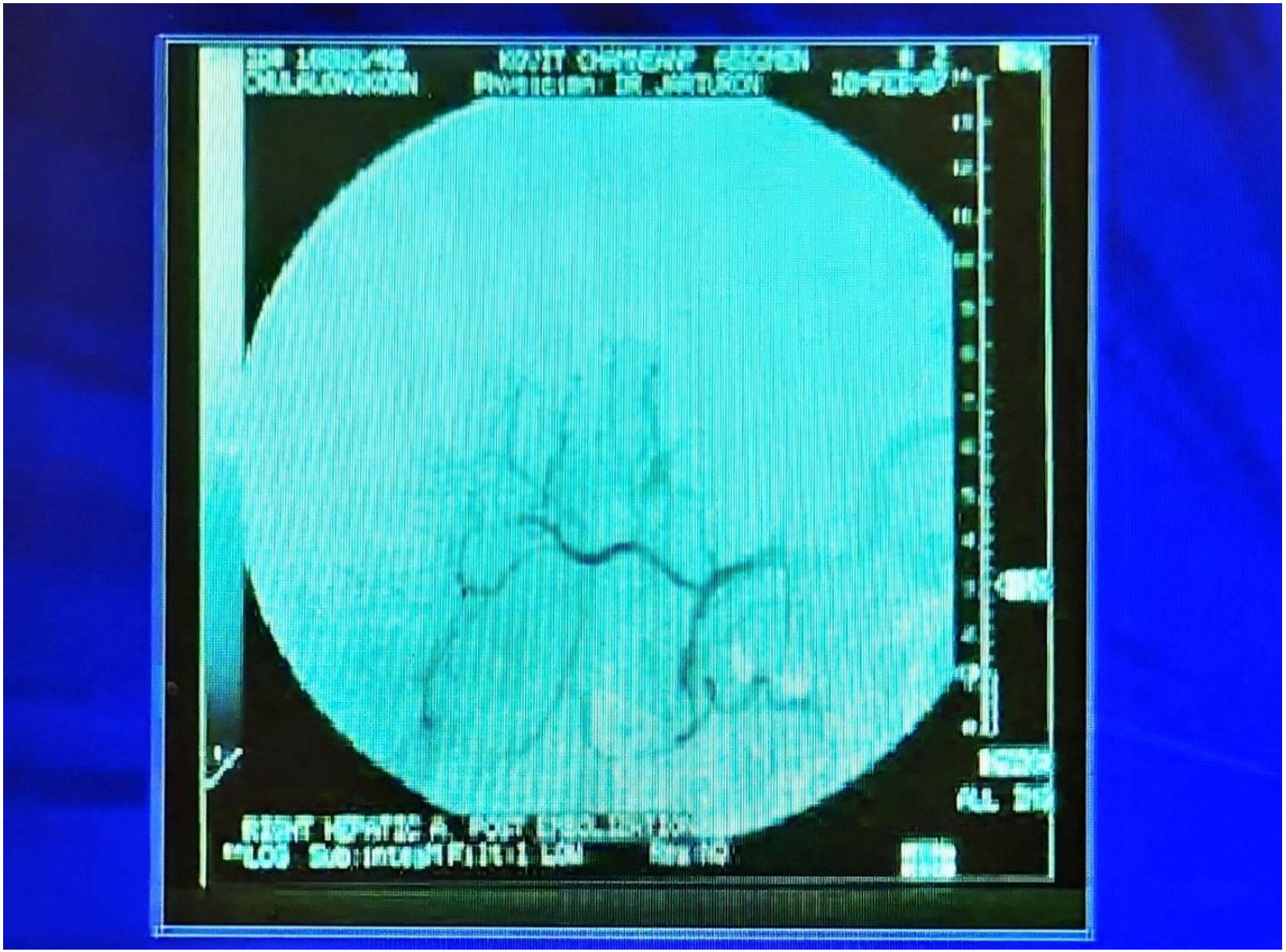

A
R



Post perihepatic packing angiography with embolization

- ↓ bleeding after perihepatic packing
- ↓ bleeding during pack removal
- Use in selected cases






CHULALONGKORN
Physician : DR.JARTURON
BRANCH OF RIGHT HEPATIC VEIN

Penetrating injury to the liver

- Hemostasis only the bleeding penetrating tract
- Shallow tract ⟶ unroof with suture ligation
- Deep or bilobar GSW ⟶ balloon tamponade
- Perihepatic packing
- Postoperative angiography with embolization

Drains

" High grade injury and wounds with obvious bile leakage should be routinely drain. "

"Closed – suction drains clearly has been proven to be superior over Penrose drain. "

Complications of operative management

- Bleeding 2 – 7 %
- Hemobilia 0.3 - 1.2 %
- Bilhemia (Biliovenous fistulas) < 1%
- Biliary fistulae 4 - 6 %

Conclusions

- Controlling hemorrhage is the first priority in operative management of hepatic injuries.
- Adeguate exposure reguires appropriate incision and hepatic mobilization.
- Direct suture ligation and resectional debridement are the most common procedures used.
- Perihepatic packing should be considered early when indicated.
- Angiography with embolization enhances outcome.