Operative Management of Liver Trauma
The liver is the most commonly injured abdominal organ after penetrating and blunt trauma\(^1\).

- Blunt abdominal trauma—most common cause of injuries, 95% secondary to vehicle accident
- Overall mortality from liver trauma\(\rightarrow\) 10–15%.
- Complex injuries who are actively bleeding have > 50% mortality (formidable challenge)

Mechanism of Injury

- **Blunt**: Rapid deceleration
  - Rupture of Glissons capsule
  - Parenchymal fractures
  - Venous and/or arterial bleeding, bile duct disruption, devitalized liver

- **Penetrating**: Direct trauma
  - Minimal parenchymal disruption, venous and/or arterial bleeding, bile duct division
  - Devitalized liver rare
Liver Injury Grading system (AAST)

- American Association for the Surgery of trauma organ injury scale

<table>
<thead>
<tr>
<th>Grade</th>
<th>Laceration</th>
<th>Hematoma</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>$\leq 1$ cm deep</td>
<td>$&lt; 10$ cm surface</td>
</tr>
<tr>
<td>II</td>
<td>1-3 cm deep</td>
<td>10-50% surface</td>
</tr>
<tr>
<td></td>
<td>10cm length</td>
<td>IP $&lt; 10$ cm</td>
</tr>
<tr>
<td>III</td>
<td>$&gt; 3$ cm deep</td>
<td>$&gt; 50$% surface</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IP $&gt; 10$ cm</td>
</tr>
<tr>
<td>IV</td>
<td>25-75% lobe</td>
<td>Rupture, active bleeding</td>
</tr>
<tr>
<td></td>
<td>3 segments</td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>Venous</td>
<td></td>
</tr>
</tbody>
</table>
Assessing Need for Surgery

Criteria for non-operative management

- Hemodynamically stable
- Simple hepatic parenchymal laceration of intrahepatic hematoma
- Absence of active hemorrhage
- Hemoperitoneum of less than 500ml
- Limited need for liver related blood transfusions (<6 U PRBCs/24hr)
- Absence of peritoneal signs
- Absence of other peritoneal injuries that would otherwise require an operation.

Operative Management

Goals

1. CONTROL BLEEDING AND STABILIZE PATIENT.

2. Removal of devitalized tissue

3. Ligate or repair damaged blood vessels and bile ducts
Operative Management (low grade injuries)

- Grade-I&II: Simple injuries can be managed by any one of variety of methods (simple suture, electrocautery or Topical Hemostatic Agents

- Does not require drainage.
Operative Options (High grade Injuries)

- Perihepatic packing
- Omental Packing
- Extensive hepatorrhaphy
- Hepatotomy with selective vascular ligation
- Selective Hepatic Artery Ligation
- Lobar Resection
Operative management

- Initial control of bleeding portal triad occlusion (Pringle maneuver), or bimanual compression of the liver or even manual compression abdominal aorta above celiac trunk.

- If hemorrhage is unaffected by portal triad occlusion major vena cava injury or atypical vascular anatomy should be expected.


Pringle Manoeuvre
Operative Management: Perihepatic Packing

Indication:
- Coagulopathy
- Irreversible shock from blood loss (10u)
- hypothermia(32C),
- acidosis(PH7.2),
- bilobar injury, large nonexpanding hematoma, capsular avulsion, vena cava or hepatic vein injuries


Pack removal

- return when physiologically stable
  - prefer before 72 hrs
  - remove packs
  - drain, drain, drain (closed)
  - enteral access
  - close abdomen
Other options:

- Omental packing
- Intrahepatic tamponade with penrose drains
- Fibrin glue
- Retrohepatic venous injuries
  -- venovenous bypass
  -- Atriocaval shunting
Operative Management (contd..)

- Hepatorraphy

- Hepatotomy with direct suture ligation
  --using the finger fracture technique, electrocautery or an ultrasonic dissector to expose damaged vessels and hepatic duct which ligated or clipped
  --low incidence of rebleeding, necrosis and sepsis
Figure 30–4.
Nonviable portions of the liver are debrided. Debridement ceases only when bleeding viable hepatic parenchyma is encountered.
Operative Management

- Mesh wrapping
  --new technique for grade III, IV laceration, tamponading large intrahepatic hematomas
  --not indicated where juxtacaval or hepatic vein injury is suspected
Conclusion

- Major liver injury is still associated with a significant mortality rate.
- Associated organ injuries and severity of the liver injury seem to be responsible for the majority of deaths in patients with major liver injuries.
Conclusion

- Main points in the management of severe liver injuries should include the rapid control of bleeding from the liver together with aggressive resuscitation, definitive surgical procedures, dealing with associated organ injuries and supportive post operative care.