Laparoscopic Choledocotomy

R. K. Mishra
Biliary Anatomy

1. Gallbladder
2. Cystic duct
3. Common bile duct
4. Proper hepatic artery
5. Cystic artery
6. Gastroduodenal artery
7. Portal vein
8. Abdominal aorta
Transcystic vs Transcholedocal approach

<table>
<thead>
<tr>
<th></th>
<th>TA</th>
<th>Ch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter of the cystic duct</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 3 mm</td>
<td>NR</td>
<td>Yes</td>
</tr>
<tr>
<td>≥ 3 mm</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Cystic valves</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NR</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Entrance of cystic duct into CBD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lateral (right margin of CBD)</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Medial or posterior</td>
<td>NR</td>
<td>Yes</td>
</tr>
<tr>
<td>Stone impacted in ampulla</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Severe inflammation in CBD</td>
<td>Yes</td>
<td>NR</td>
</tr>
<tr>
<td>Laparoscopic suturing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor</td>
<td>Yes</td>
<td>NR</td>
</tr>
<tr>
<td>Good</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>CBD diameter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 7 mm</td>
<td>Yes</td>
<td>NR</td>
</tr>
<tr>
<td>≥ 7 mm</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Large stones</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NR</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Number of stones</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 4 mm</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>≥ 4 mm</td>
<td>NR</td>
<td>Yes</td>
</tr>
<tr>
<td>Stone location in CBD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proximal *</td>
<td>NR</td>
<td>Yes</td>
</tr>
<tr>
<td>Distal *</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

TA = Transcystic Approach  
Ch = Choledochotomy  
* to insertion of cystic duct  
NR = Not Recommended
Operating room set-up

Reverse Trendelenberg
Operating room set-up

1. Radiological equipment (portable X-ray unit or portable C-arm fluoroscope, laparoscopic ultrasound)
2. Laparoscopic unit
3. Anesthetic unit
4. Laparoscopic unit for choledochoscopy
5. Instrument table
6. Electrocautery
7. Operating table
Port Position
The choledochoscope used in the choledochotomy approach has a small outer caliber ($\leq 3.2$ mm). The dimensions of the operating channel must be $\geq 1.1$ mm (in order to be able to introduce a Dormia basket while maintaining the irrigation flow). The choledochoscope should have a maneuverable tip, but with a certain degree of rigidity.
Laparoscopic Ultrasound

Ultrasound has been used successfully in open surgery for many years. Since the introduction of laparoscopic ultrasound probes, this technology has also been used for evaluation of abdominal pathology during minimally invasive procedures. With the loss of touch and stereoscopic vision during laparoscopy, such technologies become an important source of additional information. Ultrasound can be used for evaluation of the biliary anatomy and to evaluate the presence of stones. Several probes with or without flexible tips and with different degrees of motion are available on the market.
Dormia Basket

- Dormia Basket is used to extract Stone
- It should be of less than 1 mm diameter in thickness
Dilators

Balloon dilatation catheter
Fogarty catheter

Semi-rigid dilators are used:
- bougies or flexible atraumatic dilators;
- sequential bougie catheters;
- balloon dilatation catheters – these can also be used to extract stones.
Exposure

The liver is lifted by suspension of the ligamentum teres with the aid of a transcutaneous suture.
Dissection of Callots Triangle
Clipping of Cystic Duct
Secure Cystic artery
The operating table is placed into a flat position (i.e. taken out of reverse Trendelenburg and left tilt) with a slight right tilt to displace the CBD anteriorly.
Intraoperative Cholangiogram
Choledocoscopy
Opening of Anterior Peritoneum of CBD

After opening the anterior peritoneal layer along the free edge of the lesser omentum, hemostasis is achieved and the anterior surface of the CBD is exposed over a length of 10 to 20 mm.
Choledocotomy

The choledochotomy is made vertically in the supra-duodenal portion of the CBD with a retractable blade or scissors. It can be enlarged if necessary. It should be equivalent in length to the size of the largest stone. It can be used for any CBD measuring over 7 mm in diameter.
Extraction of stone

Commonly, stones clear spontaneously when the CBD is opened. Residual stones are extracted using various techniques.
Extraction of stone by suction

A high-pressure suction-irrigation device makes it possible to flush out a large number of stones via opening of the CBD when the choledochoscope is removed.
Extraction of stone by milking

Stones that are easily accessible or visible through choledochotomy are extracted with atraumatic graspers. Stones can also be pushed out by exerting pressure with the graspers on the surrounding CBD wall.
Extraction of stone by catheter

The catheter is passed into the CBD and beyond the stone. It is then inflated to occlude the lumen and gently withdrawn bringing any stone up into the choledochotomy. It can be useful to dislodge impacted stones.
Choledocolithotomy
Confirmation of stone clearance
Extraction of stone by Dormia

The basket is introduced into the choledochotomy. It is then opened and the basket is moved around slowly until the stone can be felt and pushed into the basket prior to closure and extraction.
Insertion of T tube
Fixation of T tube
After finishing Choledocotomy a retrograde Cholecystectomy is performed
Thank You

Prof. Sir Alfred Cuschieri Giving Lecture to Dr. R. K. Mishra at Ninewells Hospital U.K.