HEPATOLITHIASIS

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Surgical Management of HEPATOLITHIASIS

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Overview

• HEPATOLITHIASIS:
  – Historical Perspectives
  – Definition
  – Epidemiology & Natural History
  – Etiology of Biliary Stones
  – Classification Systems
  – Symptoms
  – Diagnosis
  – Treatment Regiments
  – Conclusion
Historical Perspectives

- **Vachell & Stevens (1906)**
  - First published report of Intrahepatic Calculi

- **By 1930, multiple descriptions**
  - Recurrent Pyogenic Cholangitis
  - Hong Kong Disease
  - Biliary Obstruction Syndrome of the Chinese
  - Oriental Cholangitis
  - Oriental Infestational Cholangitis
  - Intrahepatic Lithiasis

Definition

• Calculi or concretions
  – located proximal to the confluence of the right and left hepatic ducts

• Stones are present in Right and/or Left hepatic ducts and/or their tributaries irrespective of the coexistence of choledocholithiasis or cholecystolithiasis

Nakayama F. Intrahepatic Stones; Blumgart’s Surgery of the Liver & Biliary Tract. 765-774. 1994
Epidemiology

- Occurs mainly in Southeast Asia:
  - China, Korea, Japan, Taiwan, Philippines, Vietnam, Thailand, Malaysia, Brazil, Indonesia and India
  - Incidence reported to be 20-30% of all patients undergoing surgery for gallstone disease.
  - Low incidence in Europe and North America
  - With increased immigration more cases are being reported in the North American institutions however there is little experience in treating the condition

Nakayama F. Intrahepatic Stones; Blumgart’s Surgery of the Liver & Biliary Tract. 765-774. 1994
Epidemiology

• **Statistics**

<table>
<thead>
<tr>
<th>Location</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taiwan</td>
<td>53.5</td>
</tr>
<tr>
<td>Shenyang</td>
<td>21.1</td>
</tr>
<tr>
<td>Beijing</td>
<td>9.2</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>3.1</td>
</tr>
<tr>
<td>Singapore</td>
<td>1.7</td>
</tr>
<tr>
<td>Fukuoka</td>
<td>4.6</td>
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</tbody>
</table>

Nakayama F. Intrahepatic Stones; Blumgart’s Surgery of the Liver & Biliary Tract. 765-774. 1994
Epidemiology

• **Incidence**
  – Equal gender distribution
  – Affects patients in 3rd to 7th decades on life
  – More common in rural areas of Southeast Asia among the lower socio-economic class
  – Overall incidence in East Asia is declining
    • China & Taiwan: 20%
    • Japan: 2.2%

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Epidemiology

• **Incidence in Europe & North America**
  - Very low prevalence <1%
  - **Swedish Experience:**
    - Lindstrom reported 5 cases of intrahepatic calculi in 763 cases of cholelithiasis (0.6%).
  - **Johns Hopkins Experience:**
    - Pitt & Cameron treated 54 cases between 1976-1993
  - **San Francisco General Hospital Experience:**
    - Harris et al treated 14 cases between 1984-1995


Classification

• **Most recent system: Nakayama in 1982**
  
  • Presence of stones in the intra-hepatic bile ducts: I
  
  • Presence of stones in the intra & extra-hepatic bile ducts: IE
  
  • Right & Left hepatic ducts distal to the confluence
  
  • Segmental ducts are divided into central & peripheral
    
    – Central: Ducts of first and second branches

Classification

Fig 1. Location of stones in intra- and extrahepatic bile ducts and right and left intrahepatic bile ducts. I, present in intrahepatic bile duct only; IE, present in both intra- and extrahepatic bile ducts; L, left lobe only; LR, present in both lobes; R, right lobe only.

Classification

• Nakayama: 1982
  – Strictures (S): decrease in the diameter of bile ducts relative to adjacent parts.
    • S0: Absence of stricture
    • S1: Slight stricture (Diameter > 2mm)
    • S2: Marked stricture (Diameter < 2 mm)

Classification

• Nakayama: 1982
  – Dilatation (D): increase in diameter of bile duct beyond physiological range
    – D0: Absence of dilatation
    – D1: Slight dilatation
    – D2: Marked dilatation
    – Extrahepatic Bile Ducts:
      » 20 mm divides D1 and D2
    – Intrahepatic Bile Ducts:
      » 10 mm divides D1 and D2

Classification

• **Additional Criteria**
  - Gallbladder (G)
    - Cholesterol stones: “Gc”
    - Calcium Bilirubinate: “Gb”
    - Uncertain type of stone: “Gx”
  - Extrahepatic Bile Ducts (B)
  - Intrahepatic Bile Ducts (H)

Classification

### Table 54.2 Classification of hepatolithiasis

<table>
<thead>
<tr>
<th>Type</th>
<th>Lobe</th>
<th>Stenosis of bile duct</th>
<th>Site&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Dilatation of bile duct</th>
<th>Site&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intrahepatic — I</td>
<td>Left — L</td>
<td>No stenosis — S₀</td>
<td>Peripheral: Sa-p&lt;sup&gt;c&lt;/sup&gt;, Sp-p, Sl-p, Sm-p</td>
<td>No dilatation — D₀</td>
<td>Peripheral: Da-p, Dp-p, D1-p, Dm-p</td>
</tr>
<tr>
<td>Intra- and extrahepatic — IE</td>
<td>Right — R</td>
<td>Slight stenosis — S₁</td>
<td>Central: Sa-c, Sp-c, Sl-c, Sm-c</td>
<td>Slight dilatation — D₁</td>
<td>Central: Da-c, Dp-c, D1-c, Dm-c&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>IE</td>
<td>Left and right — LR</td>
<td>High-grade stenosis — S₂</td>
<td>Hepatic duct — Sh or Shh</td>
<td>High-grade dilatation — D₂</td>
<td>Hepatic duct — Dh or Dh or Dsh</td>
</tr>
<tr>
<td>IE</td>
<td>LR, LR</td>
<td>Common hepatic duct — Sch</td>
<td></td>
<td>Common hepatic duct — Dch</td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup> Predominant location is underlined.

<sup>b</sup> p, peripheral; c, central; l, lateral segmental duct; m, medical segmental duct; a, anterior segmental duct; p, posterior segmental duct; rh, right hepatic duct; lh, left hepatic duct; ch, common hepatic duct; cb, common bile duct.

<sup>c</sup> Stenosis of peripheral portion of anterior segmental duct.

<sup>d</sup> Dilatation of central portion of medial segmental duct.

**Example.** Gastroenterology, 1982. Bb-Hb-[IE • LR • S₁ • D₁, cb-], Sp, two cdegs. No stone was present in gallbladder. Calcium bilirubinate stones were present in extrahepatic and intrahepatic bile ducts. Intra- and extrahepatic ducts involved, the latter predominating. Left and right lobes involved. No stricture present. Slight dilatation of whole bile duct. Stenosis of duodenal papilla present. One previous operation, i.e. cholecystectomy. Present operation: choledochotomy, choledochostomy and sphincteroplasty. See text for symbols not explained in table. (From Nakayama 1982.)

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Etiology

• **Intrahepatic Lithiasis**
  – **East vs. West**
    – In the west is generally thought to be secondary to stones originating in the gall bladder or primarily resulting from benign strictures, sclerosing cholangitis, choledochal cysts or malignant biliary tumors.

    – In the East it is regarded as a separate entity altogether. The majority of cases are associated with recurrent pyogenic cholangitis in regions with parasitic infestations

Etiology

• Ethnic vs. Environmental factors
  • Survey by Nakayama looked at the proportion of HL in different provinces of China as compared to that of HL in Japan:
    – Taiwan 53.1%
    – Hong Kong 3.1%
    – Singapore 1.7%
    – Japan 4.1%
  • In spite of a similar ethnic background (Chinese descent) the relative proportion of HL is marked different in Taiwan, Hong Kong & Singapore

Etiology

• Environmental factors
  – Parasitic Infestations
    • Clonorchis Sinensis & Ascaris Lumbricoides
      – Despite of epidemiologic association, evidence supporting the role of these infections in pathogenesis is inconclusive.
      – Infestations can only be demonstrated in 30% of patients with HL.
      – HL is common in some Asian countries in which Parasites are not endemic
        » Certain areas of Malaysia, China & Taiwan with high prevalence of HL are virtually free of Clonorchis

Etiology

• Parasites

  • Theory:

    – Analysis of stones have shown debris & ova which may have served as a nidus for stone formation

    – This is probably incidental rather than causative and may merely be an association with stones in endemic areas of infestation

Etiology

- **Environmental factors**
  - **Bacterial Infections**
    - Human bile is sterile under normal circumstances
    - Incidence of Bacteria in bile of patients with HL is almost 100% in most series
    - Bacteria commonly found:
      - Klebsiella sp
      - E. Coli
      - Pseudomonas sp
      - Enterococcus sp
      - Bacteroides sp
    - Entry route: access biliary tree by injury from a parasitic infection

Sheen-Chen SM et al. Bacteriology & Antimicrobial choices in Hepatolithiasis. AJIC 2000;28:298-301
Etiology

- Bacterial Infection
  - Polymicrobial infection usually prevails
  - Most bacterial species present show B-glucuronidase activity

<table>
<thead>
<tr>
<th>Bacterial species</th>
<th>β-Glucuronidase activity</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Escherichia coli</em></td>
<td>+</td>
</tr>
<tr>
<td><em>Klebsiella</em> spp.</td>
<td>+</td>
</tr>
<tr>
<td><em>Pseudomonas</em> spp.</td>
<td>−</td>
</tr>
<tr>
<td><em>Streptococcus</em> group D</td>
<td>+</td>
</tr>
<tr>
<td><em>Morganella</em> spp.</td>
<td>−</td>
</tr>
<tr>
<td><em>Enterobacter</em> spp.</td>
<td>−</td>
</tr>
<tr>
<td><em>Aeromonas</em> spp.</td>
<td>−</td>
</tr>
<tr>
<td><em>Citrobacter</em> spp.</td>
<td>−</td>
</tr>
<tr>
<td><em>Bacteroides</em> fragilis</td>
<td>−</td>
</tr>
<tr>
<td><em>Clostridium</em> <em>perfringens</em></td>
<td>+</td>
</tr>
</tbody>
</table>

Nakayama F. Intrahepatic Stones; Blumgart’s Surgery of the Liver & Biliary Tract. 765-774. 1994
Etiology

• Bacterial infection

  • B-Glucuronidase is responsible for catalyzing the hydrolysis of direct bilirubin to the indirect unconjugated form

  • Unconjugated bilirubin is water-insoluble & combines with calcium bilirubinate to form Calcium Bilirubinate (PIGMENT) stones which comprise the majority of the cases of Hepatolithiasis (80%)

  • Cholesterol & mixed stones are increasing (10%) as the western diet invades Asia

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Etiology

Fig. 54.3 Composition of intrahepatic stones. Calcium bilirubinate stones or brown pigment stones Cholesterol stones. The composition is calculated using an assumption that stones are composed entirely of cholesterol, bilirubin and fatty acid.

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Etiology

• Bile Stasis

• Main cause of Intrahepatic Stones in the West

• Stenosis & Strictures
  – Benign strictures
    » Postoperative: Most Common Etiology
  – Sclerosing Cholangitis
  – Choledochal cysts
  – Malignant biliary tumors

Etiology

• **Other factors**
  
  – **Diet**
    
    • **Asian diet:**
      – high in carbohydrates and low in fat & protein.
    
    • **Saturated fats causes CCK release & relaxation of the sphincter of Oddi**
      – Low fat diet leads to biliary stasis
    
    • **Low protein diet**
      – Low level of Glucaro-1,4-lactone which is an inhibitor of B-Glucuronidase, potentiating the deconjugation reaction

Etiology

• Rare causes:
  – Iatrogenic Factors
Location

• Left duct involvement > Right ducts
  – Reason for preponderance is unknown
  – Left duct courses horizontally in relation to the CHD as compared to the right duct forming an acute angle
  – Unusual branching of the right segmental ducts draining into the left hepatic duct
  – No statistically proven difference on necropsy studies
Pathophysiology

- **Recurrent Pyogenic Cholangitis**
  - Recurrent bouts of cholangitis
  - Inflammatory changes in the bile ducts leading to further stricture formation and causing bile stasis
  - Walls of the ducts are thickened and fibrosed
  - Hepatic parenchyma associated with stones within the intrahepatic ducts show mild to severe atrophy and fibrosis leading to cirrhosis
Natural History

- If left untreated Hepatolithiasis leads to
  - Recurrent pyogenic cholangitis
  - Progressive biliary strictures
  - Formation of liver abscesses
  - Atrophy of the affected liver
  - Secondary biliary cirrhosis
  - Portal Hypertension
  - Cholangiocarcinoma

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Natural History

• 122 patients with CT & CT-Cholangiography findings of Hepatolithiasis
  – 14/122 became symptomatic at mean 3.4 yrs
  – Symptoms:
    • Recurrent abdominal pain, hepatic abscesses, lobar atrophy, cholangitis & cholangiocarcinoma
    • Lobar Atrophy: Major role in development symptoms
      – 13/14 (93%) of symptomatic group
      – 14/108 (13%) of asymptomatic group

Natural History

• 122 patients with CT & CT-Cholangiography findings of Hepatolithiasis

  – Summary:

  • Recurrence of HL in the atrophic liver causes persistent chronic inflammation which leads to formation of strictures and more HL and possibly cholangiocarcinoma.

  • Lobar Atrophy is a risk factor for cholangiocarcinoma & hepatectomy is indicated

Natural History

• **Cholangiocarcinoma & Hepatolithiasis**
  – Incidence: 2.36% - 10%
  – Proposed mechanisms
    • Prolonged irritation of biliary epithelium by calculi
    • Long term exposure to bile & its products
    • Repeated infections
    • Metabolic byproducts of bacteria in the biliary tree
    • Dynamic irritation by unstable bile flow
      – Bile Stasis, reflux & turbulence


Cholangiocarcinoma & Hepatolithiasis

- China

  - Sixteen of 20 (80%) of patients with peripheral intrahepatic cholangiocarcinoma had associated intrahepatic stones.

Chen MF, Jan YY et al. Clinical experience in 20 hepatic resections for peripheral cholangiocarcinoma. Cancer 1989;64:2226-2232
Cholangiocarcinoma & Hepatolithiasis

• Taiwan
  – Five cases of Cholangiocarcinoma in 101 patients (5%) with Hepatolithiasis
  

• Japan
  – Eight cases of Cholangiocarcinoma developing in 109 patient (7.3%) with intrahepatic stones
  
  Chijiiwa K et al. Late development of cholangiocarcinoma after the treatment of Hepatolithiasis. Surg Gynecol Obstet 1993;177:279-282.
Cholangiocarcinoma & Hepatolithiasis

• Hong Kong
  – Ten of 103 (10%) patients of undergoing hepatectomy for Hepatolithiasis had cholangiocarcinoma
  – In addition 3 patients developed cholangiocarcinoma at interval of 7 – 36 months after the first operation for Hepatolithiasis

Cholangiocarcinoma & Hepatolithiasis

- Hong Kong:
  - Follow up of 91 patients.
  - 5 yr survival
    - Group I: 9%
    - Group II: 93%

**Conclusion:**
Cholangiocarcinoma is an independent prognostic factor of the survival of patients with Hepatolithiasis who underwent hepatectomy.

Symptoms

• No pathognomonic symptoms
  • RUQ Pain
  • Fever
  • Bouts of Cholangitis
  • Less frequently jaundice
  • Abnormal LFTs with elevation of Alk Phos
  • In study of 54 patients at Johns Hopkins
    – 1. Cholangitis 67%
    – 2. Abdominal Pain 63%
    – 3. Jaundice 39%

Diagnostics

• RUQ Ultrasonography
  – Ductal dilation & calculi seen in 85-90%

• CT Scan
  – Hepatic Architecture & atrophy

• Mapping of the biliary tree
  – MRCP
  – ERCP - therapeutic
  – PTC - therapeutic
Treatment

- **Aims of treatment**
  - Prevention of liver damage by early clearance of stones and elimination of bile stasis
    - Removal of stones
    - Removal of strictured bile ducts
    - Providing good drainage of bile
      - Minimizing bacterial infection
    - Resection of source of recurrent infection & biliary stasis
    - Removal of cholangiocarcinoma
    - Removal of atrophic liver
    - Removal of hepatic abscess
  - Residual stones should be able to spontaneously enter the GI tract

Treatment

• Team Approach to treatment
  – Combined Interventional Radiological, Gastroenterological & Surgical Regimen using the Transhepatic approach
    • Percutaneous Placement of transhepatic access catheters
    • Surgery for underlying biliary disease & stone removal
    • Postoperative percutaneous choledochoscopy & residual or recurrent stone removal through transhepatic stents

Treatment

• **Percutaneous Options**
  – In the Jaundice Patient
  – PTC with PT Biliary Drainage (PTBD):
    • Sinus tract dilated to 18 Fr to ease introduction of
      – Choldechoscope
      – Basket/Balloon catheters/Stents
      – Microwave, Electrohydraulic lithotripsy and Laser
        probes for stone fragmentation & piecemeal removal

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Treatment

- Percutaneous Transhepatic Choledoscopic removal of intrahepatic stones
  - Retrospective study of 79 patients with early diagnosed intrahepatic stones over 8 years
    - Success rate of 76.8 %
    - Removal of right sided stones was difficult
    - Cholangitis recurred in 1/3 of patients within 3-5 years
    - Intrahepatic strictures was the major determinant for recurrence of stones and symptoms.

Treatment

• Percutaneous Transhepatic Placement of Metallic Stents in the Treatment of Complicated Intrahepatic Biliary Stricture With Hepatolithiasis
  – No recurrent strictures or formed calculi were found in the six patients during follow-up periods of up to 64 months.
  – Metallic stents are a well-tolerated and promising alternative in the management of refractory intrahepatic long-segment biliary strictures with Hepatolithiasis.

Treatment

• **Endoscopic Retrograde Approach**
  – Absence of Jaundice
  – Removal of both Intra & Extrahepatic biliary stones
    • Introduction of basket/balloon catheters
    • Avoids injury to the hepatic parenchyma
    • Difficult technique with high failure rates

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Treatment

- **Extracorporeal Shock Wave Lithotripsy**
  - Limited success if there is no predetermined evacuation route for the stone fragments
  - Frequent presence of bile duct strictures makes removal difficult in spite of successful fragmentation
  - Stone clearance rate of up to 95% reported
    - When combined with ERCP and Electrohydraulic lithotripsy.

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Treatment

• **Choledochostomy Approach**
  – Previous CBD exploration with T-tube placement with tract maturation
  – Insertion of balloon/basket catheters
  – Choledochofibrescopy
  – Limited to the Left hepatic ducts
  – Difficult to reach the Right biliary tree
    • Unfavorable angle

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Treatment

• Postoperative Choledoscopic Removal of Intrahepatic Stones via a T-tube tract
  – Retrospective study of 44 patients in Hong Kong
    • Successful procedure in 22/44 patients
    • Presence of Stricture associated with higher failure rates (P=0.002)
    • Invaluable access route but a limited procedure when strictures present

Treatment

• Surgical Options
  – Based on presence of I or IE Hepatolithiasis
    • Choledochotomy with CBD Exploration
    • Choledochostomy with drainage
    • Hepatico/Cholangioenterostomy
    • Placement of Access Loops
    • Hepatic Resection
      – Lobectomy (L>R)
      – Segmental Resection
    • Hepatic Transplantation

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Treatment

- **Access Loop Procedures**
  - Provide continuous postoperative access to the biliary tree for residual/recurrent stone retraction
  - **Percutaneous/Cutaneous**
    - Permanent cutaneous access
      - Hepaticocutaneous jejunostomy
        » Side effects: bile leakage, cutaneous excoriation, electrolyte imbalances
    - Percutaneous access
      - Subparietal hepaticojejunal access

- **Endoscopic**
  - Interposition jejunal segment between hepatic hilum & duodenum
  - Side to side Roux-en-Y jejuno-duodenal access loop
  
  
Treatment

• Access Loops

Treatment

• **Current surgical approaches**
  – Treatment is fashioned on individual basis

  • Hepatic Resection
  • Exploration of CBD and intrahepatic ducts with biliary drainage or cholangioenterostomy
  • Percutaneous techniques

Treatment

• **Indications for Hepatic Resection**
  
  – **Advantage**
    
    • Removal of all stones along with pathologic bile ducts Including the carcinomatous bile ducts
  
  – **Atrophic & Fibrotic / Abscess of a liver segment or lobe**
    
    • Left > Right
  
  – **Possibility of concomitant cholangiocarcinoma**
  
  – **Localized intrahepatic calculi with irreversible biliary strictures**

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Hepatic Resection

• Immediate and long-term outcomes of hepatectomy for Hepatolithiasis
  – Retrospective study of 103 patients over 13 years in Hong Kong

<table>
<thead>
<tr>
<th>Table I. Preoperative clinical data</th>
<th>Number of patients</th>
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<tbody>
<tr>
<td>Gender</td>
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</tr>
<tr>
<td>Male</td>
<td>39 (38%)</td>
</tr>
<tr>
<td>Female</td>
<td>64 (62%)</td>
</tr>
<tr>
<td>Presentation</td>
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</tr>
<tr>
<td>Acute cholangitis</td>
<td>91 (88%)</td>
</tr>
<tr>
<td>Acute pancreatitis</td>
<td>5 (5%)</td>
</tr>
<tr>
<td>Liver abscess</td>
<td>3 (3%)</td>
</tr>
<tr>
<td>Cholangiocarcinoma</td>
<td>4 (4%)</td>
</tr>
<tr>
<td>Previous operation</td>
<td></td>
</tr>
<tr>
<td>Cholecystectomy</td>
<td>32 (31%)</td>
</tr>
<tr>
<td>Choledochojejunostomy</td>
<td>9 (9%)</td>
</tr>
<tr>
<td>Hepaticocutaneous jejunostomy</td>
<td>4 (4%)</td>
</tr>
<tr>
<td>Exploration of CBD</td>
<td>3 (3%)</td>
</tr>
<tr>
<td>Location of stone</td>
<td></td>
</tr>
<tr>
<td>Left lobe</td>
<td>79 (77%)</td>
</tr>
<tr>
<td>Right lobe</td>
<td>10 (10%)</td>
</tr>
<tr>
<td>Left and right lobes</td>
<td>14 (14%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table II. Operative procedures</th>
<th>Number of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left lateral sectorectomy</td>
<td>20 (19%)</td>
</tr>
<tr>
<td>Left lateral sectorectomy with</td>
<td></td>
</tr>
<tr>
<td>hepaticocutaneous jejunostomy</td>
<td>43 (42%)</td>
</tr>
<tr>
<td>Left hepatectomy</td>
<td>7 (7%)</td>
</tr>
<tr>
<td>Left hepatectomy with</td>
<td>10 (10%)</td>
</tr>
<tr>
<td>hepaticojejunostomy</td>
<td></td>
</tr>
<tr>
<td>Left hepatectomy with</td>
<td>9 (9%)</td>
</tr>
<tr>
<td>hepaticocutaneous jejunostomy</td>
<td></td>
</tr>
<tr>
<td>Right hepatectomy</td>
<td>5 (5%)</td>
</tr>
<tr>
<td>Right hepatectomy with</td>
<td>4 (4%)</td>
</tr>
<tr>
<td>hepaticojejunostomy</td>
<td></td>
</tr>
<tr>
<td>Right hepatectomy with</td>
<td>5 (5%)</td>
</tr>
<tr>
<td>hepaticocutaneous jejunostomy</td>
<td></td>
</tr>
</tbody>
</table>

Fig 1. Algorithm of treatment for hepatolithiasis.
Hepatic Resection

• Immediate and long-term outcomes of hepatectomy for Hepatolithiasis
  • Immediate & Final clearance rate of 90 % & 98 %
  • Morbidity & 30 Day Mortality of 28 % & 2 %
  • R Hepatectomy & Preoperative Hyperbilirubinemia
    – Predictive of post operative complications
    – 10% cholangiocarcinoma
  • At 56 months recurrence in 8/103 patients

• Conclusion
  • Safe & effective method with high immediate stone clearance rate & low long term stone recurrence rate

Left Hepatic Resection

• The surgical treatment of isolated left-sided Hepatolithiasis
  • Retrospective analysis of 128 patients with HL isolated to the left hepatic ducts over 22 years in China
  • Concomitant strictures were present in 72% of patients

Left Hepatic Resection

Table VI. Operative procedures, residual stone, and the long-term results

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Patients (n)</th>
<th>Residual stones (%)</th>
<th>Outcome (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Good</td>
</tr>
<tr>
<td>Left lateral segmentectomy</td>
<td>68</td>
<td>22*</td>
<td>53†</td>
</tr>
<tr>
<td>Left hepatic lobectomy</td>
<td>27</td>
<td>4*‡</td>
<td>96*‡</td>
</tr>
<tr>
<td>Bile duct external drainage</td>
<td>18</td>
<td>56</td>
<td>6</td>
</tr>
<tr>
<td>Choledocho-hepatico-jejuno</td>
<td>15</td>
<td>47</td>
<td>47</td>
</tr>
<tr>
<td>TOTAL</td>
<td>128</td>
<td>26</td>
<td>54</td>
</tr>
</tbody>
</table>

- Left Hepatic lobectomy is the most effective treatment to remove all lesions, stones, strictures or potential cholangiocarcinoma

Hepatic Resection vs. PTCSL

- **Comparison of Treatments for Hepatolithiasis: Hepatic Resection Versus Cholangioscopic Lithotomy**
  - *Retrospective review of 54 patients over 16 years in Japan*
  - 26 patients underwent Hepatic Resection
    - Mainly Left sided stones
  - 28 patients underwent PTCSL
    - Mainly Right and some B/L stones
    - Average of 6 treatments per patient

Hepatic Resection vs. PTCSL

Hepatic Resection vs. PTCSL

• Rate of complete removal of intrahepatic stones was similarly high in the hepatic resection and the PTCSL groups
• Complication and 5-year survival rates were comparable
• Recurrence rate was significantly higher in the PTCSL group
• Conclusion:
  – Localized Hepatolithiasis with strictures is better managed by hepatic resection
  – Resection of the dominant segment followed by POCSL is also recommended for bilateral stones.

Johns Hopkins Experience

• **Intrahepatic Stones: Transhepatic Team Approach**
  – Retrospective study of 54 patients over 18 years
    • 2 hepatic resection in total due to earlier presentation
    • PTBD routinely done all pts & achieved complete removal in 14 patients
    • 40 pts underwent surgery for stone clearance & stricture treatment with bilioenteric anastomosis and access loops
    • Postoperative percutaneous procedures were required in 20/40 pts for residual stones & persistent intrahepatic stones.
  • MULTIDISCIPLINARY TEAM APPROACH
    – Recurrence of rate of 20%
    – Final Stone clearance rate of 94%

Hong Kong Experience

- Treatment of Hepatolithiasis: improvement of result by a systematic approach
  - Retrospective review of 127 patients over 6 years
    - Recurrence rate independent of biliary drainage
    - Stone recurrence of 15.8 % which is lowest ever reported
      » Highest reported rate 70%
    - Complete stone clearance rate of 89.9 %
    - Treatment of recurrence facilitated through permanent cutaneous access loops

Conclusion

• HL is complex disease which requires a transhepatic team approach individualized for each patient according to the site of involvement & presence of strictures.

• Multidisciplinary approach including surgical, endoscopic and interventional radiological techniques has the best outcome.