

Management of Pyogenic Liver Abscess

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HPI

- xx yo male inpatient in the Psychiatric ward complaining of fever, right sided abdominal pain and discharge from his umbilicus
- Denied any N/V/D or chills
- NKDA
- PMHx: schizophrenia, DM, obesity
- PSxHx: denies
- SocHx: negative

Physical Exam

- General: NAD, lying in bed
- CVS: tachycardic
- Chest: bibasilar decreased breath sounds
- Abd: obese, soft, mildly distended, RUQ tenderness on palpation, +voluntary guarding, no rebound, +purulent discharge from umbilicus
- Ext: +pedal edema

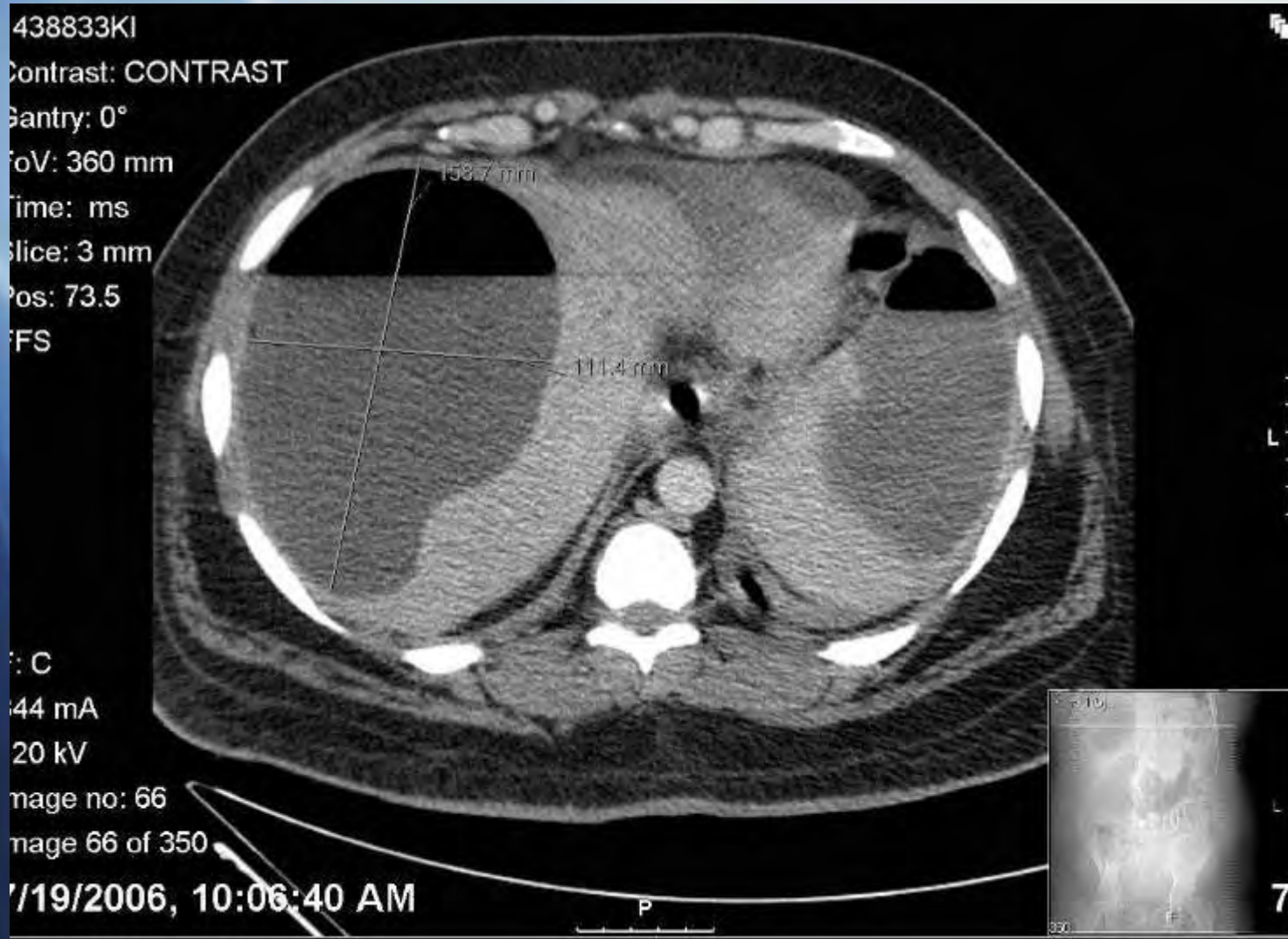
Vitals and Laboratory Values

- Tm: 101.4
- BP: 154/87
- HR: 105
- WBC: 13.7; PMN: 48%
- H/H: 11.4/36.4
- Lactate: 1.4
- AlkPhos: 192
- AST/ALT: 57/70
- Tbili: 0.5
- PT/PTT/INR: 15.5/23.3/1.6

Hospital Course

- Patient emergently transferred to the SICU
- CT Abd/Pelvis performed
 - Multiple intraabdominal abscesses and significant amount of free air
- Resuscitated and emergently taken to OR

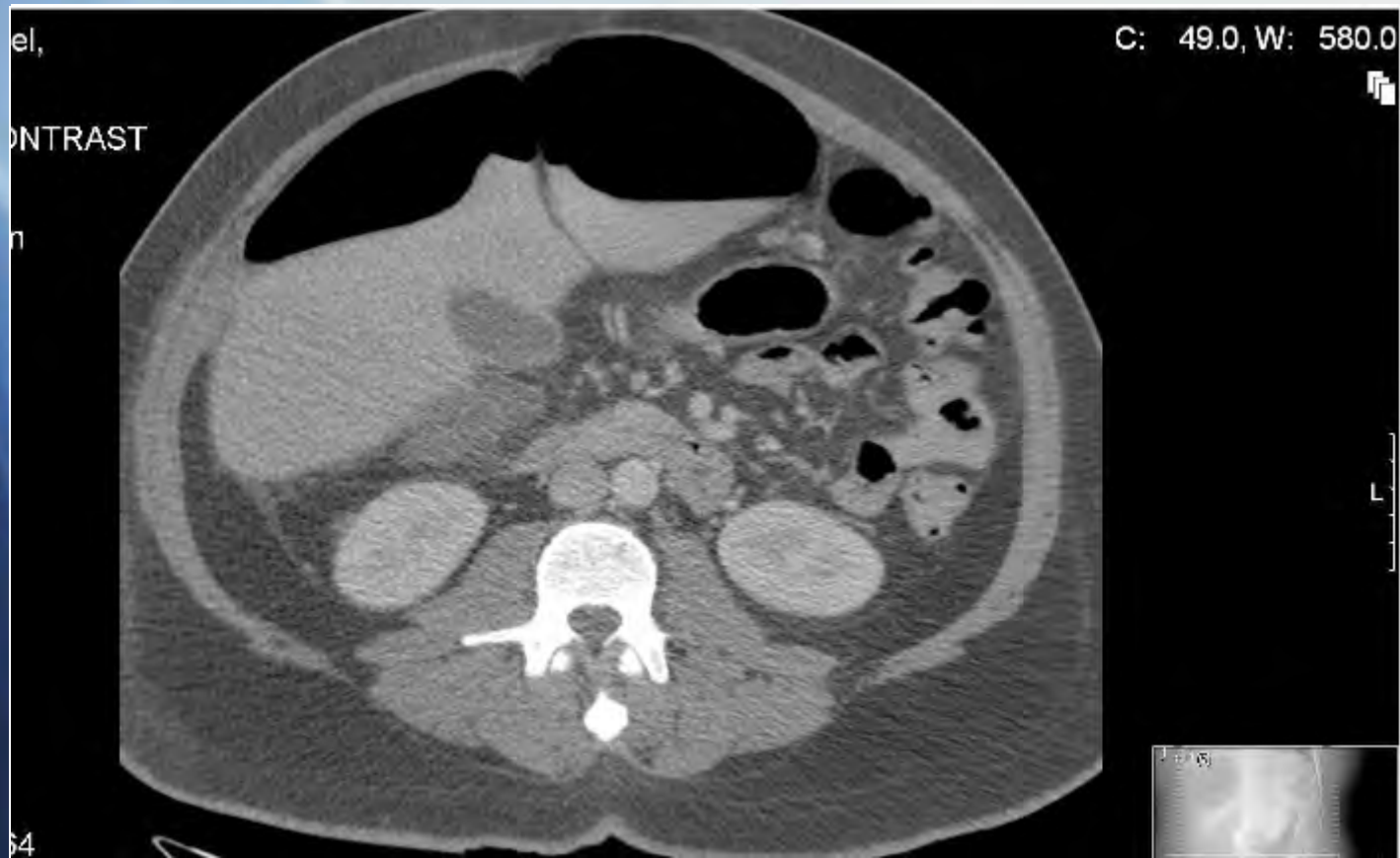
Imaging Studies



Imaging Studies



Imaging Studies



OR Course

- Significant intraabdominal pus
- Dense adhesions
- Sealed off perforation at appendix tip
- Large friable abscess on superior right liver lobe
- Abscess deroofed with drainage of >1liter of pus
- Abdomen irrigated
- 2 sump drains and a JP left in place

Management of Pyogenic Liver Abscess

Historical Perspective

- First comprehensive study was done by Ochsner and DeBakey in 1938
- Historically liver abscesses developed in young, healthy patients with an intraabdominal infection, most likely secondary to acute appendicitis
- Demographics have changed significantly over past four decades with the improvement in operative techniques and advent of antibiotics

Epidemiology

- Overall incidence increased from 13/100,000 to 20/100,000 hospital admissions over twenty year period

Table 1. PATIENT POPULATION

	1952-1972	1973-1993
No. of patients	80	153
Incidence, age, gender		
Incidence/10 ⁵ admissions	13	20*
Mean age (yr)	60.0	55.5
Male (%)	50	57
Associated diseases		
HBP malignancy (%)	23	42*
Benign biliary (%)	28	18
Prior gastric surgery (%)	26	7*
Diabetes mellitus (%)	15	15
Cirrhosis (%)	13	5
Abscesses		
Solitary (%)	40	52
Multiple (%)	60	48
Location of abscesses		
Both (%)	49	22*
Right (%)	38	63*
Left (%)	14	14

HBP = hepatobiliary or pancreatic.
* p < 0.05 vs. 1952-1972.

Huang et al., Pyogenic Hepatic Abscess: Changing Trends Over 42 Years, *Annals of Surgery*, 1996; 5:600-609

Pathogenesis of the disease

- Liver regularly exposed to bacteria via portal circulation
 - Routine clearance occurs without incidence
- Abscess occurs when the inoculum of bacteria exceeds the liver's ability to clear the bacteria



Pathogenesis of the disease

- Routes of Infection
 - Via biliary tree
 - Via portal vein
 - Via hepatic artery
 - Direct extension from a nearby focus of infection
 - Blunt or penetrating trauma
 - Obscure origin

602 Huang and Others

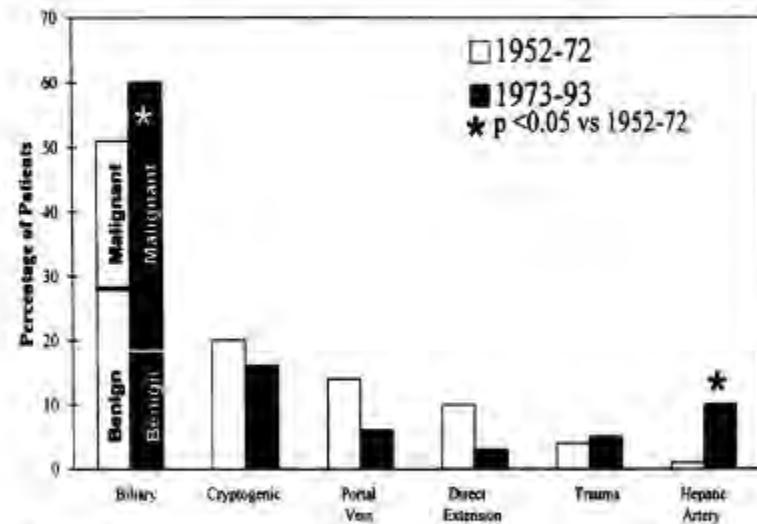


Figure 1. Etiology of pyogenic hepatic abscesses from 1952 to 1993 period.

Huang et al., *Pyogenic Hepatic Abscess: Changing Trends Over 42 Years*, *Annals of Surgery*, 1996; 5:600-609

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Underlying Etiology

- Biliary pathology 27.1%
- Hepatic cirrhosis 3.7%
- Hepatocellular carcinoma 2.8%
- Ruptured appendicitis 0.9%
- Colon diverticulitis 0.9%
- Ampullary carcinoma 0.9%
- Metastatic liver tumors 0.9%

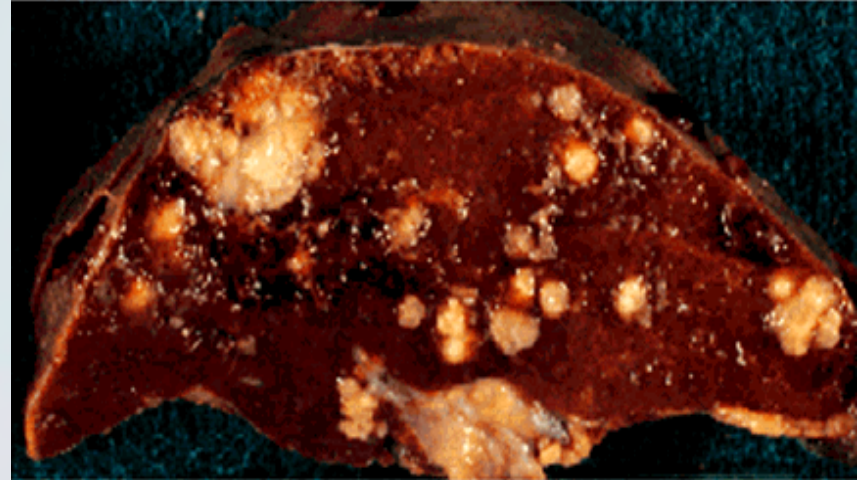
Chan et al., Pyogenic Liver Abscess: A Retrospective Analysis of 107 Patients During a 3-Year Period, Japanese Journal of Infectious Disease, 2005; 58: 366-368

Characteristics of Infection

- Right lobe involvement 75%
- Left lobe involvement 20%
- Caudate lobe involvement 5%
- Bilobar involvement uncommon
- Solitary abscess 50%
- Size of abscess varies from <1mm to several cm
- May be loculated or occur as a single cavity

Characteristics of Infection

- Gross appearance:
 - Tan, fluctuant structure
 - May cause local adhesion secondary to inflammation



Microbiology

- Microbiology of abscess reflects source
- Abscesses due to pyelophlebitis or cholangitis tend to be polymicrobial
 - 40% are polymicrobial
 - Majority are solitary
 - Isolated organisms include: Enterococci and streptococci
- Abscesses due to systemic infection tend to be monomicrobial
 - Most commonly staphylococcal species
 -

Microbiology of Infection

- Most common organisms cultured are:
 - Klebsiella pneumonia and E. coli
- Other organisms include:
 - Staphylococcus aureus, enterococcus, streptococcus viridans and bacteroides species
- Uncommon organisms encountered:
 - pseudomonas, proteus, enterobacter, citrobacter, serratia, β -hemolytic strep, microaerophilic strep, fusobacterium, clostridium and other rare anaerobes
- Fungal and mycobacterial hepatic abscesses are rare and are associated with immunosuppression

Lee et al., Pyogenic Liver Abscess: An Audit of 10 Years' Experience And Analysis of Risk Factors, Digestive Surgery, 2001; 18:459-466

Microbiology of Infection

Aerobes	n	%	Anaerobes	n	%
<i>Klebsiella pneumoniae</i>	68	66	<i>Bacteroides fragilis</i>	10	9
<i>Escherichia coli</i>	11	10.7	<i>Clostridium perfringens</i>	1	0.9
<i>Pseudomonas</i>	6	5.8			
<i>Enterobacter</i>	3	2.9			
<i>Aeromonas</i>	1	0.9			
<i>Acinetobacter</i>	1	0.9			
<i>Viridans streptococcus</i>	1	0.9			
<i>Salmonella</i>	1	0.9			

¹ The positive rate of bacterial culture is 84.4%.

Lee et al., Pyogenic Liver Abscess: An Audit of 10 Years' Experience And Analysis of Risk Factors, *Digestive Surgery*, 2001; 18:459-466

Clinical Presentation

- Classic presentation of fever, jaundice, RUQ pain and tenderness occurs in only 10% of the cases
- Most common presenting symptoms include
 - fever, chills, abdominal pain
- Other common findings:
 - Anorexia, weight loss, hepatomegaly
- Rupture presents with peritonitis

Sign/Symptom	No.	%
Initial complaint		
Fever/chills	31	38
Abdominal pain	29	16
Anorexia/malaise	9	12
Symptoms		
Fever/chills	55	75
Anorexia/malaise	42	58
Abdominal pain	40	55
Nausea/vomiting	20	27
Weight loss	21	29
Night sweats	7	10
Diarrhea	6	8
Signs		
Fever (T > 38)	45	61
Hepatomegaly	28	38
RUQ tenderness	26	36
Weight loss	23	31
Right basilar rales	18	25
Jaundice	17	23
Diffuse abdominal tenderness	11	15
Ascites	3	4

Branum et al., Hepatic Abscess: Changes in Etiology, Diagnosis, and Management, Annals of Surgery; 1989, 212: 655-662

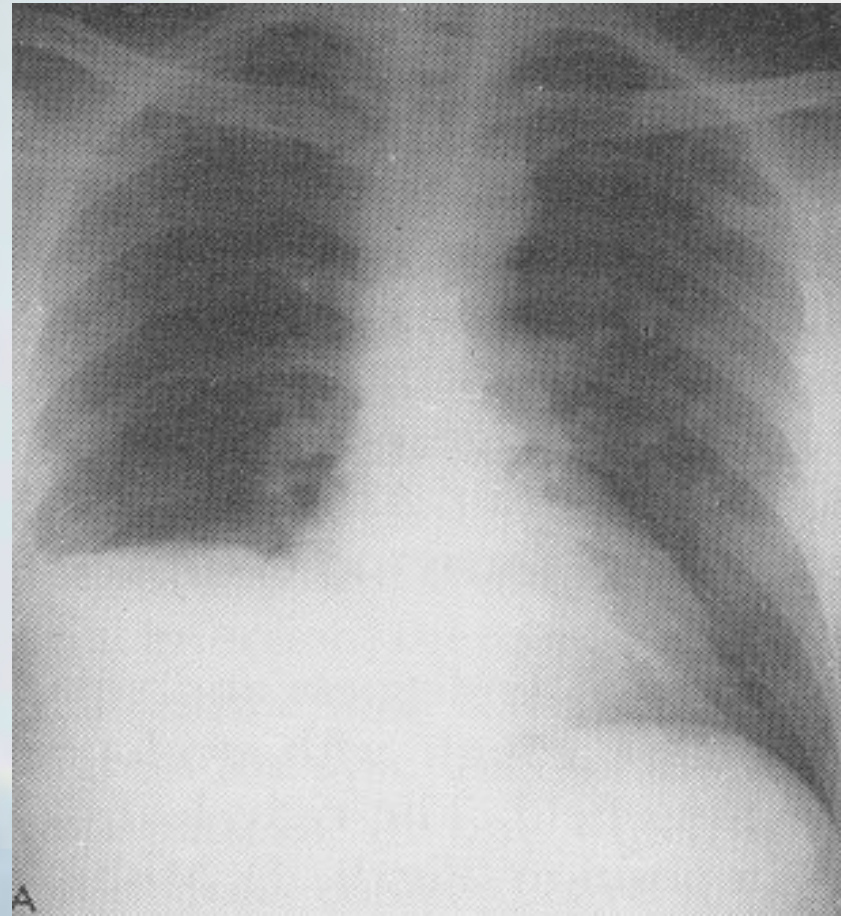
Laboratory Findings

- Typically nonspecific however, leukocytosis is present in up to 90% of the cases
- Abnormal LFTs are often present and usually reflect underlying biliary disease
 - AlkPhos levels are mildly elevated in 70-80% of the cases
 - Tbili is elevated in approximately 20% of the cases
 - Transaminases may also be mildly elevated
- None of these blood tests are diagnostic of hepatic abscesses but because they reflect a hepatic abnormality, imaging studies may be prompted

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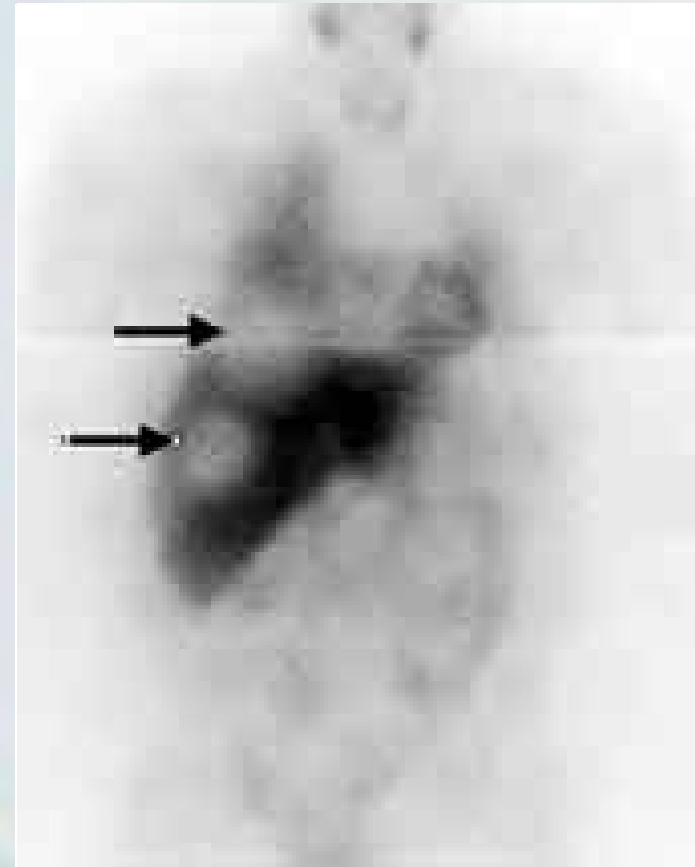
Imaging Studies

- CXR:
 - Abnormal approximately 50% of the time
 - Reflects subdiaphragmatic process
 - may present as an elevated right hemidiaphragm
 - right pleural effusion
 - atelectasis



Imaging Studies

- Radionuclide Scans:
 - Technetium-99m sulfur colloid scans used historically
 - Identifies an abscess based on differential activity of the cells within the abscess and the surrounding cells
 - Limited by its inability to detect lesions $< 2\text{cm}$



Imaging Studies

- Ultrasound:
 - 80-95% sensitive
 - Demonstrates round/oval hypogenic area
 - Better visualization of biliary tree
 - Distinguishes solid from cystic lesions
 - Limitations:
 - poor visualization liver dome
 - user-dependent
 - inadequate for obese habitus



Imaging Studies

- CT scan:
 - 95-100% sensitive
 - Gold standard
 - Hypoattenuated lesions in comparison to the liver parenchyma
 - Able to visualize microabscesses



Differential Diagnosis

- amebic abscesses
- echinococcal cysts
- Echinococcal cysts distinguished by:
 - history
 - characteristic radiological findings
- However, presentation of amebic and pyogenic abscesses are nearly identical

Amebic vs. Pyogenic Liver Abscess

Clinical Features	Amebic Abscess	Pyogenic Abscess
Age	20-40	>50
Male:Female ratio	>10:1	1.5:1
Solitary vs. multiple	Solitary >80%	Solitary 50%
Location	Usually right liver	Usually right liver
Travel in endemic area	Yes	No
Diabetes	Uncommon	More common
Alcohol use	Yes	Yes
Jaundice	Rare	Common
Elevated bilirubin	Uncommon	Common
Elevated AlkPhos	Common	Common
Positive Blood culture	No	Common
Positive amebic serology	Yes	No

Treatment

- Untreated pyogenic abscesses are uniformly fatal
- Survival rate has improved from 20% in 1938 to approximately 80% presently
- Primary goal in treatment:
 - eliminate both the abscess and the underlying source
 - typically accomplished by a combination of IV antibiotics and abscess drainage

Treatment

- Initial treatment with empiric antibiotics
- Broad spectrum antibiotics with metronidazole until pyogenic abscess is confirmed
- Antibiotic therapy adjusted to isolated organisms
- Duration of antibiotic therapy not well-defined
 - 6 weeks of parenteral therapy is commonly advocated

Percutaneous Drainage

- First description of percutaneous drainage of pyogenic liver abscess by McFadzean et al. in 1953
- Efficacy and safety of percutaneous drainage established by mid-1980s
- Percutaneous drainage is now the primary modality for drainage of pyogenic liver abscess

Percutaneous Drainage: Advantages and Disadvantages

- Advantages:
 - Avoids general anesthesia
 - Shorter hospitalization
 - Well tolerated
- Disadvantages:
 - High failure rate (30%)
 - Failures secondary to:
 - thick-walled abscess
 - viscid pus
 - presence of loculations
 - Not indicated in the presence of ascites or abscess in close proximity to pleura

Surgical Drainage

- Presently reserved for:
 - Failed percutaneous drainage
 - Patients who have a contraindication to percutaneous drainage
 - Patients who require surgical management of an underlying problem
 - Multiple or loculated abscesses

Surgical Drainage

- Historical route of extraperitoneal drainage dictated by the position of the abscess
 - Anterior abscesses approached through a subcostal incision
 - Posterior abscesses approached using a posterior retroperitoneal incision through the bed of the twelfth rib
 - A transpleural approach for “high-lying” lesions has been described

Transperitoneal Drainage

- Advantages include:
 - Ability to explore the entire abdominal cavity and locate the primary source of infection
 - Full exposure of the liver
 - Determination best drainage site
 - Ability to locate multiple abscesses
 - Intraoperative ultrasound allows:
 - localization of the abscess
 - guidance for adequate and precise drainage
 - avoids damage to the liver parenchyma

Catheter Drainage vs. Needle Aspiration

- Continuous catheter drainage
 - widely accepted mode of IR drainage
- Yu et al (2004) conducted a 5-year prospective randomized comparison of the two modalities

Catheter Drainage vs. Needle Aspiration

- Needle aspiration:
 - Treatment success rate 97%
 - Low mortality (3%)
 - Decreased length of hospitalization
 - Disadvantage: multiple aspirations required

Yu et al, Treatment of Pyogenic Liver Abscess: Prospective Randomized Comparison of Catheter Drainage and Needle Aspiration, Hepatology, 2004; 39(4): 932 - 938

Summary

- Most frequently occurs in 5th decade
- Most common underlying etiology
 - Biliary pathology
- Most commonly isolated organism
 - Klebsiella and E. coli
- Antibiotics and percutaneous drainage are the mainstay of treatment
 - Needle aspiration and continuous catheter drainage are safe and effective

Summary

- Surgical drainage reserved for:
 - Failed percutaneous drainage
 - Contraindication to percutaneous drainage
 - Surgical management of an underlying problem
 - Multiple or loculated abscesses