Liver Abscess (1 of 11)

1. Patient presents with signs & symptoms suggestive of liver abscess ie fever, jaundice, right upper quadrant tenderness

2. DIAGNOSIS
   Do history, physical examination, & lab tests confirm liver abscess?

   Yes
   - **Non-pharmacological therapy**
     - Percutaneous needle aspiration
     - Percutaneous catheter drainage
     - Surgical drainage
   
   No
   - **ALTERNATIVE DIAGNOSIS**

3. EVALUATION
   Is patient responding adequately to treatment based on clinical findings & repeat imaging?

   Yes
   - **CONTINUE TREATMENT**
     - Revise antibiotics based on culture & sensitivity results
     - Shift to oral antibiotics once feasible
     - Treat underlying disorders

   No
   - **REASSESS PATIENT**
     - Change antibiotics as necessary
     - Assess need for other interventions ie surgical drainage

Not all products are available or approved for above use in all countries. Specific prescribing information may be found in the latest MIMS.
Liver Abscess (2 of 11)

1 CLINICAL PRESENTATION

- Liver abscess may result from peritonitis & bowel leakage via portal circulation, direct spread from biliary disease, or from hematogenous seeding

**Signs & Symptoms**
- Classical presentation: Fever, jaundice, right upper quadrant symptoms (pain, guarding, rocking & rebound tenderness)
  - Liver abscess diagnosis is not excluded w/ negative right upper quadrant findings
- Chills, malaise, fatigue, anorexia, weight loss, abdominal pain, vomiting
- Cough or hiccups from diaphragmatic irritation
- Pain referred to the right shoulder

**Other Clinical Presentations**
- Patients w/ liver abscess may occasionally be afebrile
- Elderly patients often present insidiously with low-grade fever, dull abdominal pain & other non-specific systemic symptoms
- Patients w/ multiple abscesses tend to present more acutely than those w/ a solitary abscess

**Risk Factors**
- Biliary tract disease is the most common cause of bacterial liver abscess
  - Suppurative cholangitis following biliary obstruction (eg from stones, malignancy, stricture, congenital conditions), recurrent pyogenic cholangitis
  - Post-op complication in patients who have undergone endoscopic sphincterotomy for bile duct stones or surgical biliary-intestinal anastomosis
- Cholecystitis, infections in organs in the portal bed
- Penetrating & blunt trauma to the liver
- Subphrenic or perinephric abscess may result in direct spread of infection from a contiguous focus
- Systemic bacteremia eg endocarditis, pyelonephritis that may result in spread of organisms to the liver through the hepatic artery
- Systemic illnesses including diabetes mellitus, malignancy, cirrhosis, cardiopulmonary disease, severe malnutrition, inflammatory disease
- Immune system deficiencies eg chronic granulomatous disease, hematologic malignancy, liver transplant
- Severe periodontal disease especially in alcoholics
- Amoebic liver abscess should be considered in patients from endemic areas or have traveled to an endemic area
  - 10 times more common in men as in women
  - Inmates of residential institutions, patients w/ underlying immunosuppression & men who have sex w/ men are at increased risk
- Other possible factors include pancreatoduodenectomy, chemoembolization or radiofrequency ablation in the presence of infected bile, necrosis of a primary tumor, or superinfection of metastases

**Causative Organisms**
- Most pyogenic liver abscesses are polymicrobial (eg enteric facultative & anaerobic species)
- Common etiologic agents of pyogenic liver abscess are *E coli, K pneumoniae, Proteus* sp & other Enterobacteriaceae, *Pseudomonas* sp, *Streptococcus* sp, *S aureus*, Enterococci, *B fragilis, F necrophorum*
  - Usual pathogens in patients w/ underlying biliary disease: Enterococci, enteric Gram-negative bacilli
  - Usual pathogens in patients w/ underlying colonic or biliary source of infection: Anaerobes, coliforms
  - *S aureus* may be isolated from patients w/ liver abscess resulting from hematogenous spread of microbes from a distant source
  - *Entamoeba histolytica* if amoebiasis is a potential consideration

2 DIAGNOSIS

- Diagnosis of liver abscess is made by history, physical examination, imaging, & culture of abscess material

**History**
- Inquire about patient’s medical history, recent procedures, place of residence, history of travel

**Physical Examination**
- Fever, jaundice
- Tender, enlarged liver w/ or w/o a palpable mass
- Epigastric tenderness may be found in patients w/ left hepatic lobe abscess
- Decreased breath sounds on the base of the right lung w/ signs of atelectasis & pleural effusion
- Pleural or hepatic friction rub
- Rare: Ascites, splenomegaly
## 2 DIAGNOSIS (CONT’D)

### Imaging
- Imaging of the liver is essential in making the diagnosis of liver abscess
- Ultrasound and computed tomography (CT) scan are the initial imaging procedures of choice
- Cannot distinguish pyogenic liver abscess from amoebic abscess

#### Ultrasound
- Inexpensive & accurate
- Recommended for patients w/ suspected biliary disorders & those who cannot be exposed to radiation or receive contrast dyes
- Useful for guiding needle aspiration of abscess
- Abscesses are seen as hypoechoic masses w/ irregularly shaped borders, w/ or w/o internal septations

#### CT Scan
- More sensitive than ultrasound
  - Can detect abscesses smaller than 1 cm better than ultrasound
- Superior to ultrasound for guiding complex drainage procedures
- Can be used to assess the relationship of an abscess to adjacent structures, to evaluate for a concurrent disorder in the abdomen & pelvis & to detect gas in the abscess
- Abscesses are seen as hypodense structures w/ or w/o a rim of contrast enhancement

#### Chest X-ray
- About half of patients will have basilar atelectasis, elevation of the right hemidiaphragm, & right pleural effusion
- May initially lead to a wrong diagnosis of pneumonia or pleural disease

### Cultures

#### Culture of Abscess Fluid
- Aspirated abscess fluid should be Gram stained & cultured to establish the microbiologic diagnosis
  - Other causes of liver abscess are amoeba & fungi, most commonly *Candida* species
- Culture from drains is not recommended due to contamination w/ skin flora

### Blood Culture
- Positive in about half of patients w/ liver abscess
- Samples should be taken for both aerobic & anaerobic cultures
- Results of blood & abscess fluid cultures are not always concordant

### Other Laboratory Examinations

#### Tests to Detect Amoebic Infection
- Enzyme-linked immunosorbent assay (ELISA) should be done to detect *E histolytica* in patients who are from endemic areas or have traveled to endemic areas
- Indirect hemagglutination may also be used in serologic diagnosis, but is less sensitive than ELISA
- Other serologic tests include indirect immunofluorescence & Latex agglutination technique
- Fecal exam to detect *E histolytica* trophozoites & cysts

#### Liver Function Tests
- Alkaline phosphatase elevation is seen in two-thirds of patients & tends to deviate from the normal range more than the other liver function tests
- Hypoalbuminemia is also common
- Abnormalities in ALT, AST & bilirubin levels are variable

#### Complete Blood Count
- Leukocytosis w/ neutrophil predominance
- May reveal anemia of chronic disease

### Alternative Diagnosis
- Cholecystitis
- Biliary disorders
- Hepatocellular carcinoma, inflammatory pseudotumor of the liver
  - Acute gastritis
  - Pleuropulmonary empyema

## 3 EVALUATION

- Monitor patient’s clinical response & follow-up imaging studies to decide duration of antibiotic therapy & need for other interventions
  - May follow temperature, white blood cell count, & serum C-reactive protein
  - Resolution of abnormalities on imaging lag behind clinical or lab marker improvement
- Surgical drainage may be needed in a patient w/ failed percutaneous drainage, persistent jaundice, renal impairment, multiloculated abscess
A  NON-PHARMACOLOGICAL TREATMENT

Indications for Drainage
- Most pyogenic abscesses require drainage
  - If multiple abscesses are present, only the largest abscess may require aspiration
  - Dispensing w/ a drainage procedure (ie giving antibiotics alone) should be considered only in patients w/ small abscesses not amenable to drainage or in those for whom drainage is too risky
- Patients w/ amoebic abscesses require drainage only for very large lesions & for those in whom rupture is imminent

Percutaneous Needle Aspiration
- Done under CT scan or ultrasound guidance; often the initial diagnostic procedure performed for a single abscess ≤5 cm
- Requires only local anesthesia & minimal sedation
- Allows sampling of small &/or multiple lesions for culture; may do away w/ the need for catheter placement

Percutaneous Catheter Drainage
- Standard of care for most liver abscesses
- Entails placement of a catheter under ultrasound or CT guidance followed by daily flushing
- Should be the initial intervention for small abscesses <5 cm & for single abscess >5 cm
- May be used for draining multiple abscesses
- Advantages: Does not require general anesthesia, allows gradual drainage, faster recovery rate
- Contraindications: Complicated thick-walled abscess w/ viscous pus, peritonitis, complicated access

Surgical Drainage
- Indications for surgical drainage: Treatment of underlying intra-abdominal disorders including peritonitis, failure of previous percutaneous catheter drainage, multiple & loculated abscesses, ruptured abscess, viscous abscess obstructing the drain, large abscesses >5 cm
- Open drainage may be through the transperitoneal or transpleural approach
- Laparoscopic drainage enables exploration of entire abdomen w/ significantly reduced patient morbidity
- Possible complications of drainage include recurrent pyogenic hepatic abscess, intra-abdominal abscess, kidney or liver failure, surgical wound infection

Endoscopic Retrograde Cholangiopancreatography (ERCP)
- May be used in patients w/ prior biliary procedures & whose infection is connected w/ the biliary tree

B  PHARMACOLOGICAL THERAPY

Principles of Empiric Antibiotic Therapy
- Antibiotics should be started as soon as pyogenic liver abscess is considered
- Antibiotic therapy alone w/o drainage should be considered only in patients w/ small abscesses (<3-5 cm) that are not amenable to drainage & in those in whom drainage will pose an unreasonable risk
- Initial antibiotics should be broad spectrum to cover common causative pathogens of pyogenic liver abscess
- Metronidazole should be part of the initial therapy to provide empiric treatment for both anaerobes & *E histolytica*
- Antibiotics should be based on local antimicrobial resistance patterns & modified based on culture & sensitivity testing results

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Specific prescribing information may be found in the latest MIMS.
**Antibiotic Options**

- **Ampicillin + Aminoglycoside**
  - Should be part of antibiotic regimen when a biliary source is suspected
- **Cephalosporins**
  - 2nd or 3rd generation cephalosporins are recommended when a colonic source is considered
  - Provide excellent coverage for enteric bacilli
  - Some cephalosporins have coverage against anaerobes
- **Metronidazole or Clindamycin**
  - Should be included in antibiotic regimen to cover for anaerobes if other antibiotics being used do not have anaerobic coverage
  - If amoebiasis is suspected, Metronidazole should be started
- **Other antibiotics/antibiotic combinations that may be used for pyogenic liver abscesses include:**
  - Antipseudomonal penicillins w/ or w/o beta-lactamase inhibitor
  - Carbapenems
  - Recommended for patients w/ diabetes mellitus due to risk of ESBL infection
  - Fluoroquinolone + Metronidazole +/- aminoglycoside
  - Vancomycin + Metronidazole +/- aminoglycoside

**Drugs for Amoebic Liver Abscess**

- **Chloroquine**
  - May be used as an adjunct w/ Metronidazole in patients w/ large & multiple abscesses
  - Active against *E histolytica* trophozoites, achieves high concentrations in hepatic tissue
- **Metronidazole**
  - Highly lethal to *E histolytica* trophozoites
  - Absorbed quickly through the gut w/ excellent bioavailability
- **Secnidazole, Tinidazole**
  - May be substituted for Metronidazole in uncomplicated cases of invasive amoebiasis
- **Luminal amoebicides eg Diloxanide furoate, Etofamide, Iodoquinol, Nitazoxanide & Paromomycin are active against *E histolytica* cysts & trophozoites in the intestine**

**Duration of Antibiotic Therapy**

**Pyogenic Liver Abscess**

- Duration of therapy should be based on severity of infection & patient’s response
- IV antibiotics should be continued for at least 2 wk; therapy may be continued through the oral route afterwards for up to 6 wk
- Multiple abscesses may need up to 12 wk of antibiotic treatment

**Ameobic Abscess**

- IV Metronidazole should be given for 5-10 days
- Following a course of Metronidazole, an oral luminal amoebicide should be given for 7 days to eradicate residual amoeba in the intestines

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# Dosage Guidelines

## Aminoglycosides

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dosage</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amikacin</td>
<td>15 mg/kg/day IM/IV divided 8 hrly, 12 hrly or 24 hrly</td>
<td><strong>Adverse Reactions</strong>&lt;br&gt;• Ototoxic effects (can cause irreversible ototoxicity resulting in hearing loss, dizziness, vertigo); Renal effects (reversible nephrotoxicity; acute renal failure has been reported usually when other nephrotoxic drugs have also been administered); Neuromuscular effects (neuromuscular blockade resulting in respiratory depression &amp; muscular paralysis); Hypersensitivity reactions&lt;br&gt;<strong>Special Instructions</strong>&lt;br&gt;• Ototoxicity &amp; nephrotoxicity are most likely in dehydrated patients, those w/ renal impairment, in patients who are receiving high doses or for long periods or who are also receiving or have received other ototoxic/nephrotoxic drugs&lt;br&gt;- Consider monitoring of serum concentrations &amp;/or peak serum concentrations/MIC ratio in these patients&lt;br&gt;• Use w/ caution in patients w/ conditions associated w/ muscle weakness (eg myasthenia gravis), patients w/ pre-existing renal dysfunction, vestibular or cochlear impairment.</td>
</tr>
<tr>
<td>Dibekacin</td>
<td>1-3 mg/kg/day IM/IV divided 12 hrly</td>
<td></td>
</tr>
<tr>
<td>Gentamicin</td>
<td>3-5 mg/kg/day IM/IV divided 8 hrly&lt;br&gt;5 mg/kg IV 24 hrly</td>
<td></td>
</tr>
<tr>
<td>Isepamicin</td>
<td>15 mg/kg/day IM/IV divided 12-24 hrly&lt;br&gt;<strong>Max dose:</strong> 1.5 g/day</td>
<td></td>
</tr>
<tr>
<td>Netilmicin</td>
<td>4-6 mg/kg/day IV divided 8-12 hrly</td>
<td></td>
</tr>
<tr>
<td>Sisomicin</td>
<td>3 mg/kg/day IM/IV divided 8 hrly</td>
<td></td>
</tr>
</tbody>
</table>

*All dosage recommendations are for non-pregnant & non-breastfeeding women, & non-elderly adults w/ normal renal & hepatic function unless otherwise stated. Not all products are available or approved for above use in all countries. Products listed above may not be mentioned in the disease management chart but have been placed here based on indications listed in regional manufacturers’ product information. Specific prescribing information may be found in the latest MIMS.*
### Dosage Guidelines

#### CEPHALOSPORINS

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dosage</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cephalosporin (1st Generation)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cefazolin</td>
<td>1-4 g/day IM/IV divided 8-12 hrly</td>
<td></td>
</tr>
<tr>
<td><strong>Cephalosporins (2nd Generation)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cefotiam</td>
<td>0.5-2 g/day IM/IV divided 6-12 hrly</td>
<td>200-400 mg PO 8 hrly</td>
</tr>
<tr>
<td>Cefoxitin</td>
<td>1-2 g IM/IV 8 hrly</td>
<td></td>
</tr>
<tr>
<td><strong>Cephalosporins (3rd Generation)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cefmenoxime</td>
<td>1-2 g IV/day divided 6-12 hrly</td>
<td></td>
</tr>
<tr>
<td>Cefoperazone</td>
<td>1-2 g IV 12 hrly Max dose: 12 g/day</td>
<td></td>
</tr>
<tr>
<td>Cefoperazone-sulbactam</td>
<td>2-4 g/day IV divided 12 hrly Max dose: 8 g/day (4 g of Cefoperazone)</td>
<td></td>
</tr>
<tr>
<td>Cefotaxime</td>
<td>1-2 g IM/IV 8 hrly Max dose: 12 g/day Infant &amp; childn: 50-100 mg/kg/day IM/IV divided 6-12 hrly</td>
<td></td>
</tr>
<tr>
<td>Ceftazidime</td>
<td>1-6 g IM/IV divided 8-12 hrly Max dose: 9 g/day</td>
<td></td>
</tr>
<tr>
<td>Ceftizoxime</td>
<td>1-2 g IM/IV 8-12 hrly</td>
<td></td>
</tr>
<tr>
<td>Ceftriazone</td>
<td>1-4 g/day IV 24hrly</td>
<td></td>
</tr>
<tr>
<td><strong>Cephalosporin (4th Generation)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cefepime</td>
<td>2 g IV 12 hrly</td>
<td></td>
</tr>
</tbody>
</table>

#### Adverse Reactions

- Hypersensitivity reaction (urticaria, pruritus, severe reactions eg anaphylaxis can occur); GI effects (diarrhea, N/V, rarely antibiotic-associated diarrhea/colitis); Other effects (Candidal infections, inj site inflammation)
- High doses may be associated w/ CNS effects (encephalopathy, convulsions); Rarely hematologic, hepatic & renal effects have occurred
- Prolonged prothrombin time (P:T), prolonged activated partial thromboplastin time (APTT), &/or hypoprothrombinemia (w/ or w/o bleeding time) have been reported & occurs most frequently w/ N-methylthiotetrazole (NMTT) side chain-containing cephalosporins

#### Special Instructions

- May be taken w/ food to decrease gastric distress
- Ceftriazone is contraindicated in hyperbilirubinemic neonates
- Avoid simultaneous administration of Ceftriazone w/ IV Ca-containing soln
- Use suspension containing sodium benzoate w/ caution in neonates as this has been associated w/ gasping syndrome
- Use w/ caution in patients allergic to Penicillin, there may be 10% chance of cross sensitivity; & patients w/ renal impairment & GI disease esp w/ history of colitis

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### Dosage Guidelines

#### PENICILLINS

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dosage</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aminopenicillins w/ or w/o Beta-lactamase Inhibitors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amoxicillin</td>
<td>0.25-1 g PO 8 hrly 0.25-0.5 g IM/IV 6-8 hrly</td>
<td>Adverse Reactions  • Hypersensitivity reactions (rash, urticaria, pruritus, severe reactions eg anaphylaxis can occur); GI effects (diarrhea, N/V, rarely antibiotic-associated diarrhea/colitis); Other effect (Candidal infections)  • Rarely hematologic effects; Renal &amp; hepatic effects have occurred; High doses may be associated w/ CNS effects (encephalopathy, convulsions)  Special Instructions  • Avoid in patients w/ Penicillin allergy  • Use w/ caution in patients w/ renal impairment</td>
</tr>
<tr>
<td>Amoxicillin/ clavulanic acid (Amoxicillin/ clavulanate, Co-amoxiclav)</td>
<td>375- 625 mg PO 8 hrly 1.2 g IV 6-8 hrly</td>
<td></td>
</tr>
<tr>
<td>Ampicillin</td>
<td>250- 500 mg IM/IV 6 hrly</td>
<td></td>
</tr>
<tr>
<td>Ampicillin/ sulbactam (Sultamicillin: Pro-drug of Ampicillin/ sulbactam)</td>
<td>375- 750 mg PO 12 hrly 1.5-12 g/day IV divided 8-12 hrly Max dose: 4 g Sulbactam</td>
<td></td>
</tr>
<tr>
<td>Antipseudomonal Penicillins w/ or w/o Beta-lactamase Inhibitors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Piperacillin</td>
<td>2-4 g IM/IV 4-6 hrly</td>
<td></td>
</tr>
<tr>
<td>Piperacillin/ tazobactam</td>
<td>2.25-4.5 g IM/IV 6-8 hrly</td>
<td></td>
</tr>
<tr>
<td>Ticarcillin/ clavulanic acid (Ticarcillin/ clavulanate)</td>
<td>3.2 g IV 4-6 hrly</td>
<td></td>
</tr>
</tbody>
</table>

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## Other Beta-Lactams

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dosage</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Carbapenems</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Doripenem</td>
<td>500 mg IV 8 hrly</td>
<td></td>
</tr>
<tr>
<td>Ertapenem</td>
<td>1 g IM/IV 24 hrly</td>
<td></td>
</tr>
<tr>
<td>Imipenem/cilastatin</td>
<td>1-2 g/day divided 6-8 hrly</td>
<td>Max dose: 4 g/day</td>
</tr>
<tr>
<td>Meropenem</td>
<td>0.5-1 g IV 8 hrly</td>
<td></td>
</tr>
</tbody>
</table>

### Adverse Reactions
- GI effects (diarrhea, N/V, antibiotic-associated diarrhea/colitis, tongue/tooth discoloration, altered taste);
- Hypersensitivity reactions ranging from mild (eg rash) to severe (eg anaphylaxis) can occur; Other effect (Candidal infections)
- CNS effects (mental disturbances, confusion);
- Rare dermatologic reactions (exfoliative dermatitis, Stevens-Johnson syndrome etc);
- Rare hepatic effects

### Special Instructions
- Use w/ caution in patients allergic to penicillins, cephalosporins or other beta-lactams, patients w/ renal impairment
- Use w/ caution in patients w/ CNS disorders (eg epilepsy)

## Quinolones

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dosage</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ciprofloxacin</td>
<td>500 mg PO 12 hrly; 200 mg IV 12 hrly</td>
<td></td>
</tr>
<tr>
<td>Levoflaxacin</td>
<td>500-750 mg IV 24 hrly</td>
<td></td>
</tr>
<tr>
<td>Moxifloxacin</td>
<td>400 mg PO 24 hrly; 400 mg IV 24 hrly</td>
<td></td>
</tr>
</tbody>
</table>

### Adverse Reactions
- GI effects (N/V, diarrhea, abdominal pain, dyspepsia, diarrhea, rarely antibiotic-associated diarrhea/colitis);
- CNS effects (headache, dizziness, sleep disorders, restlessness, drowsiness);
- Dermatologic effects (rash, pruritus, photosensitivity);
- Hypersensitivity reactions can range from mild (eg rash) to severe/life-threatening (eg Stevens-Johnson syndrome)
- Rarely hematologic effects; hepatic & renal effects
- Some quinolones have the potential to prolong the QT

### Special Instructions
- Administer at least 2 hr before or 3 hr after Al- or Mg-containing antacids, dietary supplements containing Zn or Fe or buffered ddl preparations
- Avoid exposure to strong sunlight or tanning beds
- Use w/ caution in patients w/ epilepsy or history of CNS disorders, in patients w/ impaired renal or hepatic function & in those w/ G6PD deficiency

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## Glycopeptide

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dosage</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vancomycin</td>
<td>500 mg IV 6 hrly</td>
<td><strong>Adverse Reactions</strong></td>
</tr>
<tr>
<td></td>
<td>1 g IV 12 hrly</td>
<td>• “Red neck syndrome” related to too rapid infusion: Flushing, erythema, rash over face &amp; upper torso, hypotension &amp; shock-like symptoms may occur</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Hypersensitivity reactions (anaphylactoid reactions, Stevens-Johnson syndrome); Hematologic effects have occurred; Renal effect (nephrotoxicity may occur esp at high doses in patients w/ predisposing factors); Ototoxic effects (ototoxicity, which is more likely w/ high plasma concentrations or in renal impairment, may be irreversible; tinnitus may precede hearing loss &amp; can be used as a sign to discontinue treatment)</td>
</tr>
</tbody>
</table>

## Imidazoles

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dosage</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metronidazole</td>
<td>500 mg IV 8 hrly</td>
<td><strong>Adverse Reactions</strong></td>
</tr>
<tr>
<td></td>
<td>500 mg PO 8 hrly</td>
<td>• GI effects (N/V, metallic taste, diarrhea, constipation); CNS effects (weakness, dizziness, headache, mood changes); Other effects (Candidal infection, darkening of urine)</td>
</tr>
<tr>
<td></td>
<td><strong>Amoebic liver abscess:</strong> 500-750 mg PO 8 hrly</td>
<td>• Hematologic &amp; hepatic effects have occurred; Rarely hypersensitivity reactions</td>
</tr>
<tr>
<td>Secnidazole</td>
<td>1.5 g PO 24 hrly</td>
<td>• High dose or prolonged use has caused peripheral neuropathy &amp; epileptiform seizures</td>
</tr>
<tr>
<td>Tinidazole</td>
<td>2 g PO 24 hrly</td>
<td><strong>Special Instructions</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Use w/ caution in patients w/ hepatic impairment, CNS disease, blood dyscrasias</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• If given &gt;10 days, recommend monitoring CBC &amp; clinical monitoring for CNS effects</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Tinidazole: Use w/ caution in patients &lt;3 yr of age since safety &amp; efficacy have not been established</td>
</tr>
</tbody>
</table>
# Dosage Guidelines

## OTHER ANTIBIOTICS (CONT’D)

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dosage</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lincomycin</td>
<td>150-450 mg PO 6 hrly 1.2-2.7 g/day IM/IV divided 6-8 hrly</td>
<td>Adverse Reactions:&lt;br&gt;- GI effects (diarrhea, severe antibiotic-related pseudomembranous colitis, N/V, abdominal pain, metallic taste); Hypersensitivity reactions (rash, urticaria, rarely anaphylaxis)&lt;br&gt;- Severe dermatologic effects have occurred (erythema multiforme, exfoliative &amp; vesiculobullous dermatitis); Hematologic &amp; hepatic effects have occurred; Other effect (polyarthritis)&lt;br&gt;Special Instructions:&lt;br&gt;- Use with caution in patients with GI disease especially with history of colitis&lt;br&gt;- Use with caution in atopic patients &amp; in patients with renal or hepatic impairment&lt;br&gt;- Discontinue if diarrhea occurs</td>
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All dosage recommendations are for non-pregnant & non-breastfeeding women, & non-elderly adults with normal renal & hepatic function unless otherwise stated. Not all products are available or approved for above use in all countries. Products listed above may not be mentioned in the disease management chart but have been placed here based on indications listed in regional manufacturers' product information. Specific prescribing information may be found in the latest MIMS. Please see the end of this section for the reference list.