**Initiate Rifampicin 150 mg/day**
- Start ATT: Counsel about symptoms of ATT Hepatitis
- If ATT hepatitis severe (liver failure, coagulopathy or altered sensorium): Pyrazinamide reintroduction may be needed.
- Another approach could be low dose of one drug followed by full dose after three days.
- Duration of ATT: count only when full ATT is started

**PATIENT TO BE STARTED ON ATT**

**Risk factors for ATT Hepatitis**
- History of underlying liver disease (jaundice, ascites, GI bleeding)
- Physical findings suggestive of liver disease (Splenomegaly, ascites, icterus, edema)
- Alcoholism
- Hypoalbuminemia and Malnutrition
- Elevated aminotransferases at baseline
- HIV
- IV drug abuse
- Elderly age
- Chronic Liver disease +
- Intensive education & counselling
- Modified ATT may be needed based on Child Pugh Status
- LFT monitoring

**Evaluate for underlying liver disease**
- HBsAg, Anti-HCV, Ultrasound
- AST/ALT increased to 5 times of baseline/ULN

**Cirrhosis**
- Grade 3
  - No CCL or Cirrhosis
  - Start ATT
  - Counsel about symptoms of ATT Hepatitis

**No CCL or Cirrhosis**
- No

**ATT SELECTION FOR UNDERLYING LIVER DISEASE**

**CHILD PUGH (CTP) SCORE**

<table>
<thead>
<tr>
<th>Score 1</th>
<th>Score 2</th>
<th>Score 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bilirubin</td>
<td>&lt; 2 mg/dl</td>
<td>2-3 mg/dl</td>
</tr>
<tr>
<td>Albumin</td>
<td>&gt;3.5 g/dl</td>
<td>2.8-3.5 g/dl</td>
</tr>
<tr>
<td>INR</td>
<td>&lt;1.7</td>
<td>1.7-2.2</td>
</tr>
<tr>
<td>Ascites</td>
<td>Absent</td>
<td>Slight</td>
</tr>
<tr>
<td>Encephalopathy</td>
<td>Absent</td>
<td>Grade 1-2</td>
</tr>
</tbody>
</table>

**HEPATIC ENCEPHALOPATHY GRADE**
- Grade 0: normal consciousness, personality & psychological examination
- Grade 1: restless, disturbances in sleep, irritability or agitation, tremors, handwriting affected
- Grade 2: lethargy, disorientation to time, asterixis, ataxia
- Grade 3: somnolent & stuporous, disoriented to place, hyperactive reflexes, rigidity
- Grade 4: Unrousable coma, decerebrate

**ATT FOR UNDERLYING LIVER DISEASE**

**Child A Cirrhosis**
- (Score 1-6)
- Stable Liver disease
- Child B Cirrhosis
- (Score 7-10)
- Advanced Liver Disease
- Child C Cirrhosis
- (Score 11-15)
- Very advanced liver disease

**In Acute hepatitis**
- Avoid hepatotoxic drugs
- ATT with non-hepatotoxic drugs if urgent ATT required
- Wait till improvement in liver function if no urgent need of ATT

**REINTRODUCTION OF ATT HEPATOXIC DRUGS**
- If ATT hepatitis severe (liver failure, coagulopathy or altered sensorium): Pyrazinamide reintroduction may be needed.
- Another approach could be low dose of one drug followed by full dose after three days.
- Duration of ATT: count only when full ATT is started

**REINTRODUCTION OF ATT: IF AST AND ALT < 2 ULN**

**SEQUENTIAL**
- Initiate one at a time Rifampicin 10 mg/kg
- 1 week: repeat LFT
- Initiate Isoniazid 5 mg/kg
- 1 week: repeat LFT
- Initiate Pyrazinamide 25 mg/kg

**INCREMENTAL**
- Initiate Rifampicin 150 mg/day
  - Gradually increase dose by day 4
- Initiate Isoniazid 100 mg/day at day 8
  - Gradually increase dose by day 11
- Initiate Pyrazinamide 500 mg/day at day 15
  - Gradually increase dose by day 18

**ATT FOR UNDERLYING LIVER DISEASE**

**Child Status**
- Child A Cirrhosis (Score 1-6)
- Stable Liver disease
- Child B Cirrhosis (Score 7-10)
- Advanced Liver Disease
- Child C Cirrhosis (Score 11-15)
- Very advanced liver disease

**Suggested ATT**
- 9 months of therapy with HRE OR 2 months of therapy with HRE followed by 7 months of RIF
- One hepatotoxic drug regimen can be used: Two months of therapy with INH (or) RIF with ETH & aminoglycoside, followed by 10 months of therapy with NR/RIF & ETH
- No hepatotoxic drug
  - 18 to 24 months treatment using a combination of ETH, FQL, cycloserine & aminoglycoside / capreomycin
- Avoid hepatotoxic drugs
  - ATT with non-hepatotoxic drugs if urgent ATT required
  - Wait till improvement in liver function if no urgent need of ATT

**REFERENCES**

1. National TB Elimination Programme, Central TB Division, Ministry of Health and Family Welfare, GOI

**ABBREVIATIONS**

- ALT: Alanine transaminase
- AST: Aspartate transaminase
- ATT: Anti-tubercular treatment
- ASW: Aspergillus transmucosum
- GI: Gastro-intestinal
- HAV: Hepatitis A virus
- HBCAg: Hepatitis B surface Antigen
- ETH: Ethambutol
- FQL: Fluoroquinolone
- HBsAg: Hepatitis B virus
- HCV: Hepatitis C virus
- HVL: Hepatitis E virus
- INH: Isoniazid
- IQR: International normalized ratio
- IV: Intravenous
- LFT: Liver function tests
- MAP: Mycobacterium avium complex
- MS: Meningocephalitis
- NR: Non-rifampicin
- NR/RIF: Non-rifampicin/ RIF
- PT: Prothrombin time
- RIF: Rifampicin
- TB: Tuberculosis
- UNL: Upper limit of normal
- ULN: Upper limit of normal