



Crumlin | Temple Street | Tallaght | Connolly

## Liver Biopsy Guideline

<b>Area of use:</b>	All of organisation <input type="checkbox"/>	CHI at Connolly <input type="checkbox"/>	CHI at Crumlin <input checked="" type="checkbox"/>
	CHI at Herberton <input type="checkbox"/>	CHI at Tallaght <input type="checkbox"/>	CHI at Temple Street <input type="checkbox"/>
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## 1.0 Policy statement

The liver is the largest gland in the body, weighing between 1-2 kg (in adults). At birth, the liver constitutes 4-5% of the baby's body weight and grows along with the baby. The liver is situated in the right upper quadrant of the abdomen, under the diaphragm, just below the lower aspect of the ribs. The liver is wedge-shaped and has four lobes, the largest of which are the right and left lobes. The other two lobes include the caudate lobe and quadrate lobe. It consists of many lobules, which connect with ducts to form the common hepatic duct. This is responsible for transporting bile produced in the liver to the gallbladder and duodenum via the common bile duct. The liver's blood supply is mainly provided by the hepatic artery and hepatic portal vein.

### The liver has many complex functions:

- Production of bile- aids with intestinal absorption of fats and fat soluble vitamins A, D,E and K.
- Storage - the liver converts glucose to glycogen and stores for later use. It is also responsible for storing iron and copper.
- Detoxification- drugs, alcohol and other environmental toxins.
- Metabolism- involved in breaking down nutrients into less harmful forms for use by the body.
- Regulation of hormones, insulin, glucagon, cortisol, aldosterone, sex hormones.
- Synthesis of plasma proteins, albumin and clotting factors which are essential in the body.
- Regular of blood levels of amino acids, which form the building blocks of protein.
- Phagocytosis to help remove potentially infectious particles.

## 2.0 Definition of Guidelines

Liver biopsy is a procedure that removes a small piece of tissue from the liver, using a needle which is inserted through the skin via a small incision into the liver. The liver tissue is then sent to the lab for chemical testing and microscopic examination. It can be performed in a native or transplanted liver.

### Indications

- Confirm diagnosis
- Disease staging
- To assist in making therapeutic management decisions
- Help predict a prognosis in a person with a known diagnosis
- Monitor disease progression or response to treatment
- Obtain liver tissue for non-histological assessment
- Support research

## 3.0 Complications associated with liver biopsy

Generally, a liver biopsy is a safe procedure but there are risks associated. Complications are increased in the presence of infection or hepatic obstruction, ascites or pregnancy. It has been detailed that 60% of complications occur within 2 hours after liver biopsy and 96% within the first 24 hours.

### Complications include:

- Pain in 30%; usually mild and located in the region of the biopsy or right shoulder (referred pain).
- Hypotension from vaso-vagal episodes in 3%
- Haemorrhage: risk is increased with coagulopathy, cirrhosis, subcapsular biopsy and increased number of passes.
  - Haematoma in 6-23%
  - Haemobilia (bleeding into the biliary tract) 0.05%
  - Intraoperative/ Intrahepatic/ subcapsular haemorrhage
- Bacteraemia, sepsis and abscess formation
  - Those with any risk of covert biliary sepsis require preparation including IV antibiotics with cover for pseudomonas.
  - Post-transplant patients should have prophylactic antibiotics (usually Tazocin) IV pre-procedure and then 2 further doses. Can be substituted with oral ciprofloxacin post biopsy.
- Bile peritonitis
- Pneumothorax
- Haemothorax
- Trauma to nearby organs, including organ perforation.
  - For example- gallbladder, colon, kidneys, lungs
- Needle breakage
- Reaction to general anaesthetic agents
- Mortality is between 1 in 1000 and 1 in 10,000.

## 4.0 Types of Liver Biopsy

### Percutaneous

This type of biopsy is simple, reliable and minimally invasive. It is performed using palpation/ percussion to locate the liver. Suction, cutting or spring loaded needles are used to obtain a sample of liver tissue, usually from the right lobe. Ultrasound guidance is used in all children who have undergone liver transplant as the position of the new liver may be altered and this is the safest approach in preventing accidental puncturing of surrounding organs. (Bander and Mitchel 2007). Ultrasonographic guidance has been demonstrated to be associated with decreased rates of hospitalisation among adult patients. Contraindications to PC liver biopsy include ascites, coagulopathy and certain medical issues such as biliary dilatation or haemangioma.

### Transvenous

Such as transjugular or transfemoral. This involves percutaneous puncturing of the right internal jugular vein and the introduction, with use of fluoroscopy, of a catheter into the right hepatic vein and into the liver to obtain tissue samples. This method is considered the safest alternative in patients where there is: significant ascites (to prevent risk of peritonitis), a small hard cirrhotic liver (to prevent needle breakage), coagulopathy (biopsy is performed from within the vascular system which minimises the risk of bleeding) and obesity (difficult access) (Arturo 2001). Advances in biopsy needle designs have further enhanced and optimised the diagnostic yield of this test.

### Laparoscopic

Small incisions within the abdomen facilitate introduction of instruments to obtain biopsy specimens. Benefits of this method include larger specimen sample size, control of haemorrhage and the ability to assess the liver during the procedure. Contra-indications include severe cardiopulmonary failure, intestinal obstruction and bacterial peritonitis.

## Open Surgical

A deep abdominal incision is made and a small wedge of liver tissue is excised via a needle or knife.

Liver biopsies in Children’s Health Ireland are usually performed using ultrasound guidance by an interventional radiologist. Paediatric liver biopsies are performed under general anaesthetic as the maintenance of a safe position and control of breathing is essential in minimising potential risks of needle laceration and bleeding.

## 5.0 Management of a child pre & post liver biopsy

ACTION	RATIONALE & REFERENCE
<p><b>Pre-Operative Care</b></p> <p>Explain procedure to child/parents/carer.</p> <p>Ensure informed consent is obtained.</p> <p>Mark biopsy site with delible marker in theatre.</p> <p>Involve Play Therapist if required in pre procedural preparation.</p> <p><b>Pre-Procedural Laboratory Investigations</b></p> <p>The below investigations <b>MUST</b> be performed prior to this procedure.</p> <ul style="list-style-type: none"> <li>• Pre procedural bloods performed within 24-48hours.</li> <li>• <b>Full Blood count ( platelet &gt;80)</b> Discuss with GI consultant if plt &lt;80.</li> <li>• <b>Coagulation</b></li> <li>• <b>INR</b>, Prothrombin time and Activated Partial Thromboplastin Time. If INR &gt; 1.4 or PT prolonged &gt;2 seconds (&gt;16), FFP (10-20ml/kg) should be given pre-procedure. Discuss with GI Consultant.</li> <li>• <b>Group &amp; Hold</b></li> </ul>	<p>Prepared children report less pain and show less distress.</p> <p>Consent must include risk of bleeding, pneumothorax, intestinal injury, bile leak and infection. There is a very small but not negligible mortality risk.</p> <p>To ensure patient safety (OLCHC SOP 2010)</p> <p>Proper preparation may reduce child’s anxiety and encourage cooperation. (Ball &amp; Binder 2008). Children who receive therapeutic play preparation report lower anxiety levels and fewer negative emotions (Li 2007)</p> <p>Liver biopsy does not pose excessive risk if adequate homeostasis can be achieved prior to biopsy (Theodore 2004). Prompt detection and treatment of any abnormalities will assist with this.</p> <p>Pre procedural investigations ensure the child is safely prepared and any abnormalities / coagulopathies can be detected and addressed by the medical team in a timely manner prior to biopsy.</p> <p>The liver is a highly vascular organ (holds 13% of the total blood supply at any given moment) making bleeding a significant risk factor. People with liver disease often have clotting problems and are therefore at greater risk of bleeding. Specific bloods are ordered to determine clotting ability as specific blood products must be available in the event of bleeding.</p>

Please check with GI Team if additional bloods are required. If the child is unstable, bloods are performed on the day of the procedure. In some cases, bloods may be accepted if performed within 48 hours of biopsy – according to consultant decision.

### Fasting

Ensure the child fasts as per hospital guidelines

**NOTE:** Children with suspected metabolic liver disease need an individualised fluid and fasting plan agreed with family, nursing and medical staff before admission.

### Medications

Ensure the child's medications are reviewed by the medical team. Certain medications may need to be restricted e.g. Non-Steroidal Anti Inflammatory Drugs and Blood Thinning agents (Aspirin, Warfarin). In certain cases, one may need to cover with subcutaneous heparin- which should subsequently be discontinued 24 hours prior to biopsy.

**Aspirin:** should be discontinued at least 5 days pre-liver biopsy, **Warfarin:** discontinued at least 3 days pre biopsy.

Medications that **should not be held** include anti-rejection medications, anti-convulsant treatment, insulin.

Post-transplant patients/patients at higher risk of biliary sepsis may require prophylactic IV antibiotic cover pre and post procedure.

### Post-Operative Care:

#### Monitoring vital signs

Close observation of the child's vital signs including: Temperature, Pulse, Respiration, Oxygen Saturation, Blood Pressure measurements.

Observation frequency as below:

- 5 mins x 1 hour

Liaise with the GI team in relation to abnormal results to determine if it is necessary to administer clotting factors in order for to proceed with biopsy safely.

The GI team will individually assess each child to determine this.

To ensure patient safety (OLCHC 2010). An empty stomach may reduce the risk of aspiration caused by potential nausea and vomiting (Muslim 2009).

Post-prandial hyperemia may increase portal flow and could increase risk of bleeding (Rockey et al 2009)

To ensure individualised care and correct treatment is delivered. Management of specific drugs should be handled on an individual basis and the need to hold medications in the pre procedural period must be weighed against risk.

Anti-coagulants may be discontinued pre biopsy to reduce the risk of bleeding, ensuring effective and safe care.

To detect any abnormalities and ensure prompt treatment. Intra-peritoneal haemorrhage is the most serious bleeding complication associated with percutaneous liver biopsy and can be the result of accidental penetration of the hepatic artery or portal vein (Rockey 2009). Severe bleeding is most likely to occur within 2-4 hours post procedure but late haemorrhage can occur up to **several days** later (Arturo et al 2001).

<ul style="list-style-type: none"><li>• <b>15 mins x next 2 hours</b></li><li>• <b>30 mins x next 4 hours</b></li><li>• <b>1 hourly x 2 hours</b></li><li>• <b>4 hourly thereafter for 16 hours or until discharge</b></li></ul> <p>Document vital signs in PEWS chart, report and escalate as per recommendations on PEWS chart.</p> <p><b>IV access</b> Ensure the IV cannula remains insitu until discharge, check patency regularly.</p> <p><b>Pain</b> Assess the child's level of pain using appropriate assessment tools.  Ongoing pain, change in vital signs or any nursing concerns indicate the need for medical review.</p> <p><b>Positioning</b> Encourage child to rest, preferably lying on right side.  If this position is not tolerated the supine position is acceptable  Encourage bed rest for at least 2-3 hours post procedure.  Children can mobilise to toilet under supervision 3-4 hours after returning to ward or can be offered bedpan.</p> <p><b>Wound Site</b> A pressure dressing is applied in theatre and this should be left in situ for 24 hours.</p>	<p>Delayed bleeding can be caused by premature clot dissolution due to liver disease hyper fibrinolysis</p> <p>Tachycardia and hypotension are suggestive of bleeding and the child will require prompt medical evaluation.</p> <p>Deterioration in respiratory status may be indicative of Pneumothorax or Haemothorax caused by accidental penetration of the lungs or introduction of air into the chest cavity during procedure.</p> <p>All invasive procedures carry a risk of opportunistic infection. In children with biliary tract anomalies and Roux en Y anastomosis where there is close proximity to the bowel there is a further predisposition to infection.</p> <p>Treatment of bleeding may require urgent fluid; blood or platelet infusion so immediate IV access is necessary. Specific patients may need IV antibiotic cover.</p> <p>As per local guidelines (CHI 2021). Mild pain often occurs in right upper quadrant or shoulder for a short duration and can be managed by analgesics that do not interfere with clotting (Soykan 2002). Severe persistent pain particularly in right hypochondrium may indicate subcapsular haematoma or pneumothorax. Sudden onset of severe pain may suggest biliary peritonitis and the child will require review by the medical team.</p> <p>This position allows liver to rest against the lateral abdominal wall and reduce risk of bleeding and bile leakage (Hyun 2004)</p> <p>A dressing is used to apply pressure and help prevent bleeding.</p> <p>To detect any bleeding or infection</p>
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<p>Observe the wound site when monitoring vital signs. Monitor wound site for bleeding, redness, tenderness or discharge.</p> <p>Report any concerns to the GI team immediately</p> <p><b>Diet</b> Observe for any nausea/vomiting</p> <p>Diet as per consultant instructions on green endoscopy procedure sheet. Children can drink 1-2 hours after the procedure, a light diet after 4 hours and then regular diet after 6 hours post procedure.</p> <p><b>Prior to discharge</b> Ensure the child’s medications are reviewed as certain medications may be recommenced.</p> <p>Ensure child/parent are prepared adequately for discharge.</p> <p>Ensure that appropriate discharge advice is given including Liver Biopsy Leaflet. Allow time for questions.</p>	<p>Any hematemesis should be reported to the medical team</p> <p>Prolonged withholding of medication may be harmful to the child</p> <p>Patient and parents will be informed of biopsy results once made available.</p> <p>Parent Information leaflet will give written reinforcement of signs to observe at home that are suggestive of complications.</p>
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