

PAEDIATRIC LIVER TRANSPLANT DOPPLER ULTRASOUND

Paediatric Liver Transplant Doppler Ultrasound on a 'cut-down' liver

Objective To ensure that all staff follow correct procedure of evaluation for Doppler Ultrasound, in the assessment of the paediatric patient with Liver Transplant.

Responsibility All sonographers, trainee sonographers, registrars and sonologists performing liver transplant ultrasound examinations.

Frequency For all paediatric liver transplant Doppler ultrasound examinations.

Procedure The table below describes the process to follow.

Step	Action
1	Procedure Code: Post transplant – UDLPOTX Pre transplant - UDLPRTX
2	Transducer frequency: C 9-4, C5-1, C5-2 or X6-1 may also be used as complimentary.
3	Technical: <ul style="list-style-type: none"> • Select Abdominal or Transplant preset • Minimum power output consistent with adequate tissue penetration • Minimum depth of field and maximum magnification to optimally demonstrate anatomy • TGC and overall gain settings to optimise tissue characteristics
4	The patient is required to be nil per mouth for 2-4 hours prior to examination to minimise overlying bowel gas.
5	The appropriate worksheet should be taken into the room when performing the examination so that protocol is followed.

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Pre-operative Transplant Evaluation	
1	Procedure and image recording as for upper abdominal ultrasound with the additional evaluation and imaging as follows:
2	B-mode and spectral Doppler should be performed and imaged to demonstrate the patency, direction and waveform of blood flow in the portal vein (PV), hepatic veins (HV), IVC and hepatic artery (HA) (peak systolic velocity (PSV) of HA recorded). Measure diameter of main portal vein (MPV) and CHA at the porta hepatis.
3	Assess liver parenchyma looking for sonographic signs of cirrhosis, portal hypertension (varices), portal vein thrombosis, cavernous transformation, hepatopetal flow in PV, ascites or splenomegaly.
4	Identification of intra or extra-hepatic malignancy. Note should be made of the number and size of any lesions, segmental distribution of lesion/s, vascular invasion, regional lymphadenopathy and ascites.
5	Linear array views of the liver documenting the liver edge.

Post-operative Transplant Evaluation	
1	Sonographers should be familiar with the document prepared by Dr Andrew Holden titled "Ultrasonography in Orthotopic Liver Transplantation" February 1998.
2	Day 1 post-operative ultrasound in PICU A review of the surgeon's "operation note" in patient's charts is essential prior to scanning to gain an appreciation of surgical anatomy as there can be many variations from normal.
3	Follow procedure as for upper abdomen ultrasound with the addition of the following:
4	Images recorded in L/S and T/S to document any intra or extra-hepatic haematomas or collections, or any intra-peritoneal free fluid or collections.
5	Doppler Assessment includes assessment of the Hepatic Artery, Hepatic Vein(s), Portal Vein and IVC. Special attention must be given to vessel anastomoses.

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6	Intrahepatic portal vein is to be evaluated with CD/PD and spectral waveform with a minimum of two traces within the liver parenchyma.
7	The true HA in its proximal, middle and distal areas, as well as the intrahepatic component of the artery are to be evaluated with CD/PD and spectral waveform for quantitative assessment (Acceleration time and resistive index (RI), end diastolic velocity (EDV) and PSV).
8	If a stenosis is suspected, this should be carefully evaluated with recording of maximum PSV.
9	B-Mode and Doppler images taken to document the patency and Doppler values in hepatic/portal vessels and IVC. If hepatic artery stenosis is suspected, intrahepatic waveforms must be evaluated for "Tardus-Parvus" changes.
10	Check for intrahepatic biliary dilatation and document if appropriate.
11	Scans performed subsequent to the Day 1 scan generally require imaging of only the liver, biliary tree and vascular components. Limited views of the kidneys and spleen should also be taken. A general scout of whole abdomen including pelvis however must be done to document any free fluid or collection.
12	<p>Frequency of Sonographic Assessment:</p> <ul style="list-style-type: none"> • Routine post-transplant sonograms are performed: • Days 1, 2, 3, 4, 5, 6, 7 and yearly there after. • Also as clinically indicated.
13	<p>The sonographer should also be familiar with criteria from this document for diagnosing a stenosis.</p> <p>When completing the ultrasound if pathology is suspected the sonographer should inform the clinician requesting the ultrasound and the relevant radiologist (if scan performed on call, the on call interventional radiologist should become involved if the sonographer requires such).</p>
14	<p>After Hours Requests:</p> <p>Liver Transplant Doppler Ultrasound examinations requested outside of normal working hours will be performed by the liver transplant on call transplant sonographer, contactable through the hospital Contact Centre.</p>

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15	A completed vascular worksheet with any significant B-mode finding must be scanned in to IMPAX as per protocol.
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Note:

1	When the examination is performed outside of normal hours, MRT call-back, coded 'CALL' must be entered in the product code on QDoc. MOBUS code must also be entered to reflect an ultrasound done outside of the radiology department.
2	For a full paediatric liver transplant use the liver transplant Doppler protocol that is used for adults.
