ESPR survey on peri-operative imaging in children with liver transplantation

Intro

Dear colleagues from the Paediatric Radiology ESPR (Member) Work Group in collaboration with the Paediatric Transplantation Working Group of the ESPGHAN, we are conducting a survey aimed at current peri-operative imaging practices in paediatric liver transplantation. This collaboration intends to identify a group of top sites in transnational and trans-disciplinary peri-operative imaging practices that could be used in prospective multi-centre studies.

The survey

This survey focuses on the current status regarding imaging procedures including sonography in paediatric liver transplantation. For each site, a person responsible for the imaging procedures should fill in the survey questionnaire. Please limit to one per site. A representative of that centre, its name of the questions and the specific physician responsible for the imaging procedures in that centre.

In this online survey you can use the hyperlinks and forwards items to warm-between each section. The Word version (attached) remembered you can go back and forth between sections. Please, fill in the Word version first and then copy the answers into the online version. The PDF version can be used in preparation and equally handed round your colleagues. Please, complete the survey within two weeks (around 30 minutes) for which you can return to centre edition.

All information provided by you will be treated confidential. In case of a publication, approval will be obtained for all participating sites and co-authorship will be offered.

Please, complete the survey between the two parties signatories.

Kind regards,

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Key Institution

Please fill in your name and full contact details.

Name
Full name
Full last name

Medical specialty:

- Paediatric transplantation surgery
- Paediatric gastroenterology
- Paediatric intensive care
- Paediatric radiology/sonology

Name of your institution

Name Answer

Email

Name Answer

Phone number

Name Answer

Which setting best describes your workplace?

- University - Academic hospital setting
- Specialist children's hospital setting
- Community - District hospital setting
- Sonologist

Please fill in the responsible persons for each subspecialty of your site (name and email address)

Paediatric transplantation surgery
Name and email address of the responsible person(s)

Name Answer

Paediatric gastroenterology
Name and email address of the responsible person(s)

Name Answer

Paediatric intensive care
Name and email address of the responsible person(s)

Name Answer

Paediatric radiology/sonology
Name and email address of the responsible person(s)

Name Answer

Demographics

1. How many children < 36 years of age were liver transplanted on average per annum in the last three years (2016-2020)?
Please give a number

Name Answer

2. How many children < 3 years of age were liver transplanted on average per annum in the last three years (2016-2020)?
Please give a number

Name Answer

3. How many children < 3 years of age were liver transplanted on average per annum in the last three years (2016-2020)?
Please give a number

Name Answer

4. What proportion of children < 36 years of age were liver transplanted for hepatoblastoma and hepatocellular carcinoma on average per annum in the last three years (2016-2020)?
Transplanted for neoplastic disease in %

Name Answer

5. What rate the proportion of children < 3 years were with other liver transplantation on average per annum in the last three years (2016-2020)?
Rest non-transplanted in %

Name Answer

6. What rate the proportion of children < 3 years of age with living related liver transplantation on average in the last three years (2016-2020)?
Living related transplanted in %

Name Answer

7. What rate the proportion of children < 3 years with secondary abdominal closure by PATCH interposition on average in the last three years (2016-2020)?
Patch interposition in %

Name Answer

Pre-transplant imaging

8. Do you do a preoperative US (non contrast upper GI tract) prior ultrasound to the proximal imaging modality for definition of anatomy and to plan liver transport surgery in children?

- No
- Yes

9. Do you perform abdominal CT imaging in children in preparation of liver transplantation?

- No
- Yes, in all patients
- Yes, in selected patients - please specify below

- In children < 1 year
- In children < 3 years
- In children not requiring sedation
- In children with prior abdominal surgery (e.g. Kasai)
- In children with abnormalities on US
- Sonologist

If you answered "yes" to the previous question please continue with question #10. If you answered "no" please jump to question #13.

10. Please check your main indications for CT in pre-transplant evaluation

- Vascular anatomy
- Vascular patency
- Organ volume
- Tumor and tumor characterization
- Sonologist

11. Please specify the usual CT scan area

- Upper abdomen (liver)
- Complete abdomen

12. Please **rank all** the CT phases you perform

- Native (no contrast)
- Arterial phase
- Parenchymal phase
- Late phase

13. Do you perform abdominal MRI imaging in children in preparation of liver transplantation?

- No
- Yes, in all patients
- Yes, in selected patients - please specify below

- In children < 1 year
- In children < 3 years
- In children not requiring sedation
- In children with prior abdominal surgery (e.g. Kasai)
- In children with abnormalities on US
- Sonologist

If you answered "yes" to the previous question please continue with question #14. If you answered "no" please jump to question #15 on the next page.

14. Please check your main indications for MRI in pre-transplant evaluation

- Anatomy
- Vascular patency and flow
- Organ volume
- Tissue characterization (e.g. iron overload, fat quantification)
- Lesion characterization
- Sonologist

15. Which MRI vascular imaging technic do you use

	2D	3D	Time-resolved - 3D (Contrast enhanced, Volume Examination)
Contrast enhanced MR Angiography (CE-MRA)			

	TSE	SSFPT	HSL	PCA	4D Flow	Other
Non-contrast MR angiography (non-MRA)						

TSE - Turbo Spin Echo; SSFPT - Steady-state free precession (True FISP, Trueno, CFI, Trueno); HSL - Venous self-blacking; PCA - phase contrast angiography

Intra-operative imaging

16. Do you use intra-operative ultrasound to control your vascular anastomoses?

- No
- Yes, in a select patient
- Yes, in some patients - please specify below

Name Answer

If you answered "yes" to the previous question please continue with question #17. If you answered "no" please jump to question #20 on the next page.

17. Who performs the intra-operative ultrasound?

- Transplant surgeon alone
- With gastroenterologist
- With radiologist
- With anesthesiologist

18. Do you with and more intraoperative ultrasound images to document the results?

- No
- Yes, in every patient
- Yes, when performed by radiologist
- Sonologist

19. Do you with and store cine images (DICOM volumes) to document the intra-operative results?

- No
- Yes, in every patient
- Yes, when performed by radiologist
- Sonologist

20. Do you perform intra-operative US at defined time points during the operation?

- No
- Yes, after hepatic artery anastomosis
- Yes, after biliary anastomosis
- Yes, before and after abdominal closure
- Sonologist

21. Which US based vascular imaging technique do you use intra-operatively?

- Color Doppler
- Power angio mode
- B-Flow
- Microvascular flow
- Sonologist

22. Do you additionally use US contrast intra-operatively?

- No
- Yes, in every patient
- Only in case of unclear situations

23. Do you use other modalities or devices to monitor your vascular anastomoses?

- No
- Yes
- Sonologist

Post-transplant imaging

24. Do you perform post-operative ultrasound monitoring on the ICU within the first 7 days?

- No
- Yes, in every patient
- Yes, in some patients - please specify below

Name Answer

25. Is the intra-operative information about the liver transplantation (graft type, vascular anastomoses, biliary anastomoses) intra-operative problems provided to you before the US examination?

- No
- Yes, in front of the surgeon report
- Yes, as a surgical drawing on paper
- Yes, by direct image of the intra-operative US examination
- Sonologist

26. When is the 1st post-operative ultrasound on the ICU scheduled?

- Shot arrival at ICU
- Within 6-12 hours
- Within 24 hours
- Next morning day time, 12 hours
- In case of intercepted in clinical abnormalities
- No general rule

27. Is there a defined frequency for ultrasound monitoring in the early post-operative phase (within the first 7 post-operative days)?

- Twice daily (approx. every 12 hours)
- Once daily (every 24 hours)
- Every 48-72 hours
- Sonologist

28. Do you regularly perform ultrasound follow-up examinations after the acute post-operative phase (within the first 1 year after the transplantation)?

- No, only in case of abnormalities
- Yes, on a daily basis until discharge
- 2-3 times a week
- Twice a week
- Sonologist

29. Who mainly performs the post-operative ultrasound monitoring?

- Transplant surgeon
- Gastroenterologist
- Intensive care doctors
- Radiologist
- Sonographer
- Interdisciplinary team

Please specify in case more than one answer or interdisciplinary teams are involved

Name Answer

30. Indicate the level of experience of the person primarily performing the post-operative ultrasound monitoring

- 1st - 2nd year resident
- 3rd - 4th year resident
- Fellow
- Senior/Staff

31. Does your center use a standardized abdominal protocol for post-transplant ultrasound?

- No
- Yes

If you answered "yes" to the previous question please continue with question #32. If you answered "no" please jump to question #34.

32. Please mark the key imaging elements which are documented in your standardized protocol

	LIVER PARENCHYMA (E.GRAIN, GRT)	
	Yes	No
Representative still images of section and outflow (curved probe)		
Cine sweeps covering entire liver (outflow to medium curved probe)		
Representative high resolution still images (linear probe)		
Cine sweeps high resolution (linear probe)		
Color Doppler measurement		
Line elastography		

	LIVER VASCULAR (FLOW IMAGES, E.G. DOPPLER SHIFTS)	
	Yes	No
Representative still images of section and outflow (curved probe)		
Cine sweeps covering entire liver (outflow to medium curved probe)		
Color velocities/values in portal hepatic and outflow (curved probe)		
Representative high resolution still images (linear probe)		
Cine sweeps high resolution (linear probe)		
Peak velocities/values at anastomosis level (linear probe)		

	EXTRAHEPATIC LOCATIONS	
	Yes	No
Spleen length measurement		
Spleen flow velocity/indices at Hilum		
Spleen elastography		
Pleural effusion		

Ascites ☐

OTHER ELEMENTS?
Please specify

Meine Antwort

33. Which ultrasound flow imaging technique do you use?

- ☐ Color Doppler
- ☐ Power Angio
- ☐ B-Flow
- ☐ Microvascular flow
- ☐ Sonstiges: _____

34. Do you routinely use US contrast examinations for post-transplant evaluation?

- ○ No
- ○ Yes - please tell us below for what indications

Meine Antwort

35. Do you use other non-imaging based devices to control vascular anastomoses and vascular patency?

- ○ No
- ○ Yes - please specify below

Meine Antwort

36. Do you perform abdominal CT postoperatively after LTX?

- ○ No
- ○ Yes - please mark below for which indications

- ☐ Hepatic artery thrombosis, suspected
- ☐ Hepatic artery stenosis, grading
- ☐ Portal vein thrombosis, suspected
- ☐ Portal vein stenosis, grading
- ☐ Hepatic outflow obstruction
- ☐ Unclear intraabdominal fluid collections (seroma, biloma, abscess), +/- in combination with CT guided drainage
- ☐ Sonstiges: _____

37. How often did you perform abdominal CT in children after liver transplantation in the last year?
Approximate number

Meine Antwort

38. Do you perform MRI after liver transplantation and before discharge from the hospital?

- ○ No
- ○ Yes - please mark below your indications

- ☐ Bile duct abnormalities on US
- ☐ Characterization of intra-abdominal fluid collections on US
- ☐ Suspected vascular problems on US
- ☐ Post-operative baseline examination before discharge in children not requiring sedation

Liver elastography

PLEASE FILL IN THIS SECTION ONLY IF YOUR CENTER PERFORMS IT.

39. Which ultrasound elastography technique do you use?

- ☐ Transient elastography
- ☐ Point shear wave elastography (pSWE)
- ☐ Two-dimensional shear wave elastography (2D-SWE)

40. When is the 1st post-operative ultrasound liver elastography scheduled?

- ○ No general rule
- ○ Within 24 hours
- ○ Next working day (max. 72 hours)
- ○ Within the first 7 days
- ○ Within the hospital stay/before discharge

41. Is there a defined frequency for ultrasound liver elastography in the early post-operative phase (within the first 7 post-operative days or until discharge from the ICU)?

- ○ No general rule
- ○ Twice daily (approx. every 12 hours)
- ○ Once daily (every 24 hours)
- ○ Every 48-72 hours
- ○ Sonstiges: _____

42. Do you require children to have fasted before the ultrasound examination?

- ○ No
- ○ Yes, all children minimum 2 hours
- ○ Yes, all children minimum 4 hours
- ○ Sonstiges: _____

43. Do you control the amount of transducer pressure applied in freehand SWE examinations with epigastric probe position (directly above the liver)?

- ○ No, probe pressure is not controlled
- ○ No, probe pressure is not controlled, but lowest possible transducer pressure must be used
- ○ Yes, semi quantitatively by measuring the degree of abdominal compression (Distance from skin to lower transplant border or spine)
- ○ Yes, by measuring compressive transducer force (technical device)

44. Do you perform MR Elastography in children after LTX?

- ○ No
- ○ Yes

Outlook

45. Would you be interested to standardize your peri-operative imaging approach together with other European centers?

- ○ No
- ○ Yes

46. Would you be willing to share your ultrasound protocols presently applied?

- ○ No
- ○ Yes

47. Would you be interested to work with us on a common standard how to perform peri-operative ultrasound in children with liver transplantation?

- ○ No
- ○ Yes

48. Would you be interested to collect standardized imaging data of liver transplanted children within a European network?

- ○ No
- ○ Yes

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