

American College of Radiology
ACR Appropriateness Criteria®

Imaging After Liver Transplant

Variant 1: Adult. Liver transplant. Immediate postoperative imaging. Initial imaging.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
CT abdomen with IV contrast multiphase	Usually appropriate	Limited	☢☢☢☢ 10-30 mSv		8	8	0	0	1	0	1	1	0	7	5
		References		Study Quality											
		8 (30577254)		2											
		7 (27616153)		3											
US duplex Doppler abdomen	Usually appropriate	Strong	0 0 mSv	0 0 mSv [ped]	8	8	0	0	1	0	0	0	2	6	6
		References		Study Quality											
		22 (21906897)		3											
		21 (21257940)		4											
		17 (8058930)		4											
		18 (26534929)		4											
		19 (32709390)		4											
		20 (17515341)		3											
		7 (27616153)		3											
		16 (28545872)		4											
		13 (21343534)		4											
		8 (30577254)		2											
		12 (33043396)		4											
		11 (33249391)		3											

		14 (16304013)		4											
		15 (17646460)		4											
		6 (31797026)		4											
CT abdomen with IV contrast	Usually appropriate	Limited	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	7	7	0	0	1	1	3	1	8	1	0
		References		Study Quality											
		7 (27616153)		3											
		8 (30577254)		2											
CT abdomen without and with IV contrast	May be appropriate	Limited	☼☼☼☼ 10-30 mSv	☼☼☼☼☼ 10-30 mSv [ped]	6	6	0	0	1	1	5	3	3	2	0
		References		Study Quality											
		8 (30577254)		2											
		7 (27616153)		3											
MRI abdomen without and with IV contrast with MRCP	May be appropriate (Disagreement)	Expert Opinion	○ ○ mSv	○ ○ mSv [ped]	5	5	2	1	4	1	3	3	0	0	0
US abdomen	May be appropriate	Limited	○ ○ mSv	○ ○ mSv [ped]	5	5	0	1	3	3	4	3	0	0	0
		References		Study Quality											
		7 (27616153)		3											
		10 (27235874)		4											
CT abdomen without IV contrast	Usually not appropriate	Limited	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	3	3	1	2	6	2	3	1	0	0	0
		References		Study Quality											
		9 (29267144)		3											
CTA abdomen with IV contrast	Usually not appropriate	Expert Opinion	☼☼☼ 1-10 mSv		3	3	3	1	8	1	0	1	0	0	0
MRI abdomen without IV contrast	Usually not appropriate	Expert Consensus	○ ○ mSv	○ ○ mSv [ped]	3	3	4	2	3	1	4	1	0	0	0

MRI abdomen without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	3	3	2	1	9	1	1	0	0	0	0
MRI abdomen without IV contrast with MRCP	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	3	3	3	2	4	1	3	1	1	0	0
Radiography abdomen	Usually not appropriate	Expert Consensus	☢☢ 0.1-1mSv	☢☢ 0.03-0.3 mSv [ped]	2	2	5	3	3	2	0	1	1	0	0

Variant 2: Adult. Liver transplant. Postoperative complications, suspected vascular etiology. Initial imaging.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
CT abdomen with IV contrast multiphase	Usually appropriate	Limited	☢☢☢☢ 10-30 mSv		8	8	0	0	0	0	1	0	1	7	6

References	Study Quality
19 (32709390)	4
16 (28545872)	4
7 (27616153)	3
8 (30577254)	2

US duplex Doppler abdomen	Usually appropriate	Strong	O 0 mSv	O 0 mSv [ped]	8	8	0	0	0	0	1	0	2	5	7
---------------------------	---------------------	--------	---------	---------------	---	---	---	---	---	---	---	---	---	---	---

References	Study Quality
22 (21906897)	3
21 (21257940)	4
17 (8058930)	4
18 (26534929)	4
19 (32709390)	4
20 (17515341)	3
7 (27616153)	3
16 (28545872)	4
13 (21343534)	4

		8 (30577254)			2											
MRI abdomen without and with IV contrast	May be appropriate	Limited	O 0 mSv	O 0 mSv [ped]	4	4	0	2	5	1	4	2	0	0	0	
		References			Study Quality											
		6 (31797026)			4											
		19 (32709390)			4											
		24 (12876028)			3											
MRI abdomen without and with IV contrast with MRCP	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	3	3	1	3	7	2	1	0	0	0	0	
US abdomen	Usually not appropriate	Limited	O 0 mSv	O 0 mSv [ped]	3	3	4	1	9	0	0	0	0	0	0	
		References			Study Quality											
		7 (27616153)			3											
CT abdomen without IV contrast	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	2	2	5	4	6	0	0	0	0	0	0	
MRI abdomen without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	4	4	5	1	1	0	0	0	0	
MRI abdomen without IV contrast with MRCP	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	3	5	4	1	1	0	0	1	0	
Radiography abdomen	Usually not appropriate	Expert Consensus	☼☼ 0.1-1mSv	☼☼☼ 0.03-0.3 mSv [ped]	1	1	11	3	1	0	0	0	0	0	0	

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
MRI abdomen without and with IV contrast with MRCP	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	8	8	0	0	0	0	0	1	2	6	6
		References		Study Quality											

		31 (21039885)	4													
		30 (28118992)	3													
		25 (25590390)	4													
		29 (30150050)	4													
		26 (34243928)	4													
MRI abdomen without IV contrast with MRCP	Usually appropriate	Limited	0 0 mSv	0 0 mSv [ped]	7	7	0	0	0	1	2	3	7	1	1	
		References		Study Quality												
		25 (25590390)		4												
		29 (30150050)		4												
US abdomen	Usually appropriate	Limited	0 0 mSv	0 0 mSv [ped]	7	7	0	0	0	2	2	1	3	4	3	
		References		Study Quality												
		25 (25590390)		4												
		12 (33043396)		4												
		6 (31797026)		4												
		11 (33249391)		3												
MRI abdomen without and with hepatobiliary contrast	Usually appropriate	Limited	0 0 mSv	0 0 mSv [ped]	7	7	0	0	0	0	1	2	5	6	1	
		References		Study Quality												
		28 (28181823)		2												
		27 (24012454)		4												
		25 (25590390)		4												
		26 (34243928)		4												
US duplex Doppler abdomen	Usually appropriate	Limited	0 0 mSv	0 0 mSv [ped]	7	7	0	0	0	0	1	0	10	3	0	
		References		Study Quality												
		10 (27235874)		4												
		12 (33043396)		4												
MRI abdomen without and with IV contrast	May be appropriate	Limited	0 0 mSv	0 0 mSv [ped]	6	6	0	0	1	0	4	7	2	0	0	

		References		Study Quality											
		25 (25590390)		4											
		29 (30150050)		4											
CT abdomen with IV contrast	May be appropriate	Limited	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	5	5	0	0	1	1	11	1	0	0	0
		References		Study Quality											
		16 (28545872)		4											
CT abdomen with IV contrast multiphase	May be appropriate (Disagreement)	Expert Opinion	☼☼☼☼ 10-30 mSv		5	5	0	0	2	1	6	4	1	0	0
		References		Study Quality											
		16 (28545872)		4											
CT abdomen without IV contrast	Usually not appropriate	Limited	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	3	3	4	2	5	2	1	1	0	0	0
		References		Study Quality											
		16 (28545872)		4											
CT abdomen without and with IV contrast	Usually not appropriate	Limited	☼☼☼☼ 10-30 mSv	☼☼☼☼☼ 10-30 mSv [ped]	3	3	3	0	10	1	0	0	0	0	0
		References		Study Quality											
		16 (28545872)		4											
MRI abdomen without IV contrast	Usually not appropriate	Expert Consensus	○ ○ mSv	○ ○ mSv [ped]	3	3	3	1	6	2	2	1	0	0	0
Radiography abdomen	Usually not appropriate	Expert Consensus	☼☼ 0.1-1mSv	☼☼☼ 0.03-0.3 mSv [ped]	1	1	11	3	1	0	0	0	0	0	0

Variant 4: Adult. Post liver transplant. Surveillance.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
CT abdomen with IV contrast multiphase	Usually appropriate	Limited	⊕⊕⊕⊕ 10-30 mSv		8	8	0	0	0	0	0	0	3	10	1
		References		Study Quality											
		37 (-3198352)		4											
		36 (28009758)		4											
		35 (31306801)		4											
		32 (37199193)		4											
MRI abdomen without and with IV contrast	Usually appropriate	Limited	○ ○ mSv	○ ○ mSv [ped]	7	7	0	0	0	0	0	0	10	2	2
		References		Study Quality											
		37 (-3198352)		4											
		36 (28009758)		4											
		35 (31306801)		4											
		32 (37199193)		4											
MRI abdomen without and with IV contrast with MRCP	Usually appropriate	Expert Consensus	○ ○ mSv	○ ○ mSv [ped]	7	7	0	0	0	0	0	1	9	4	0
MRI abdomen without and with hepatobiliary contrast	Usually appropriate	Limited	○ ○ mSv	○ ○ mSv [ped]	7	7	0	0	0	0	3	2	4	5	0
		References		Study Quality											
		37 (-3198352)		4											
		36 (28009758)		4											
		35 (31306801)		4											
		32 (37199193)		4											
CT abdomen with IV contrast	May be appropriate	Expert Consensus	⊕⊕⊕ 1-10 mSv	⊕⊕⊕⊕ 3-10 mSv [ped]	5	5	0	0	1	1	6	5	1	0	0
MRI abdomen without IV contrast with MRCP	May be appropriate	Expert Consensus	○ ○ mSv	○ ○ mSv [ped]	5	5	1	0	1	2	8	2	0	0	0

US abdomen	May be appropriate (Disagreement)	Expert Opinion	O 0 mSv	O 0 mSv [ped]	5	5	2	1	2	0	1	7	1	0	0
US duplex Doppler abdomen	May be appropriate (Disagreement)	Expert Opinion	O 0 mSv	O 0 mSv [ped]	5	5	1	0	2	0	2	6	2	0	1
CT abdomen without and with IV contrast	May be appropriate	Expert Consensus	☢☢☢☢ 10-30 mSv	☢☢☢☢☢ 10-30 mSv [ped]	4	4	0	1	3	6	2	2	0	0	0
MRI abdomen without IV contrast	May be appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	4	4	1	0	3	4	5	1	0	0	0
CT abdomen without IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢☢ 3-10 mSv [ped]	2	2	4	4	6	0	0	0	0	0	0
FDG-PET/CT skull base to mid-thigh	Usually not appropriate	Limited	☢☢☢☢☢ 10-30 mSv	☢☢☢☢☢ 3-10 mSv [ped]	2	2	4	8	1	0	1	0	0	0	0
		References	Study Quality												
		35 (31306801)	4												
Radiography abdomen	Usually not appropriate	Expert Consensus	☢☢ 0.1-1mSv	☢☢ 0.03-0.3 mSv [ped]	1	1	11	2	1	0	0	0	0	0	0

Appendix Key

A more complete discussion of the items presented below can be found by accessing the supporting documents at the designated hyperlinks.

Appropriateness Category: The panel's recommendation for a procedure based on the assessment of the risks and benefits of performing the procedure for the specified clinical scenario.

SOE: Strength of Evidence. The assessment of the amount and quality of evidence found in the peer reviewed medical literature for an appropriateness recommendation.

- **References:** The citation number and PMID for the reference(s) associated with the recommendation.
- **Study Quality:** The assessment of the quality of an individual reference based on the number of study quality elements described in the reference.

RRL: Relative Radiation Level. A population based assessment of the amount of radiation a typical patient may be exposed to during the specified procedure.

Rating: The final rating (1-9 scale) for the procedure as determined by the panel during rating rounds.

Median: The median rating (1-9 scale) for the procedure as determined by the panel during rating rounds.

Final tabulations: A histogram showing the number of panel members who rated the procedure as noted in the column heading (ie, 1, 2, 3, etc.).

Additional supporting documents about the AC methodology and processes can be found at www.acr.org/ac.