American College of Radiology ACR Appropriateness Criteria®

Imaging After Liver Transplant

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

P 1	Appropriateness	GOF.	4 1 1/ DDI	D I DDY	D 41	37.11]	Final	Tabu	latio	ns		
Procedure	Category	SOE	Adults RRL	Peds RRL	Rating	Median	1	2	3	4	5	6	7	8	9
CT abdomen with IV contrast multiphase	Usually appropriate	Limited	≎≎≎≎ 10-3 mSv	0	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	O 0 mSv	O 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	9	7	7	0	0	1	1	3	1	8	1	0
		References		Stud	y Quality										
		7 (27616153)			3										
		8 (30577254)			2										
CT abdomen without and with IV contrast	May be appropriate	Limited	���� 10-3 mSv	30	6	6	0	0	1	1	5	3	3	2	0
		References		Stud	y Quality										
		8 (30577254)			2										
		7 (27616153)			3										
MRI abdomen without and with IV contrast with MRCP	May be appropriate (Disagreement)	Expert Opinion	O 0 mSv	O 0 mSv [ped]	5	5	2	1	4	1	3	3	0	0	0
US abdomen	May be appropriate	Limited	O 0 mSv	O 0 mSv [ped]	5	5	0	1	3	3	4	3	0	0	0
		References		Stud	y Quality										
		7 (27616153)			3										
		10 (27235874)			4										
CT abdomen without IV contrast	Usually not appropriate	Limited	��� 1-10 mSv	99993- 10 mSv [ped]	3	3	1	2	6	2	3	1	0	0	0
		References		Stud	y 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	O 0 mSv	O 0 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.

D 1	Appropriateness	COF	A L L DDI	D I DDI	D (1	3.7.11			F	inal	Tabu	latio	ıs		
Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	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										
		12 (33043396)			4										
		11 (33249391)			3										
		14 (16304013)			4										
		15 (17646460)			4										
		5 (30569729)		(Good										
		6 (31797026)			4										
CT abdomen with IV contrast	Usually appropriate	Limited	��� 1-10 mSv	���� 3- 10 mSv [ped]	7	7	0	0	1	0	2	2	9	0	0
		References		Stud	y Quality										
		19 (32709390)			4										
		18 (26534929)			4										
		7 (27616153)			3										
		16 (28545872)			4										
		8 (30577254)			2										
		6 (31797026)			4										
CTA abdomen with IV contrast	Usually appropriate	Limited	��� 1-10 mSv		7	7	0	0	0	1	0	0	11	2	0
		References		Stud	y Quality										
		23 (25498085)			4										
		19 (32709390)			4										
		7 (27616153)			3										
		16 (28545872)			4										
		8 (30577254)			2										
CT abdomen without and with IV contrast	May be appropriate	Limited	���� 10-30 mSv	⊕⊕⊕⊕⊕ 10-30 mSv [ped]	6	6	1	0	0	2	3	2	6	1	0
		References		Stud	y Quality										_
		19 (32709390)			4										
		16 (28545872)			4										
		7 (27616153)			3										

		8 (30577254)			2										
MRI abdomen without and with IV contrast	May approp	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			1	1						
MRI abdomen without and with IV contrast with MRCP	Usuall approp	Expert Consensus	O 0 mSv	O 0 mSv [ped]	3	3	1	3	7	2	1	0	0	0	0
US abdomen	Usuall approp	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	Usuall approp	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	Usuall approp	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	Usuall approp	Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	3	5	4	1	1	0	0	1	0
Radiography abdomen	Usuall approp	Expert Consensus	�� 0.1-1mSv	�� 0.03- 0.3 mSv [ped]	1	1	11	3	1	0	0	0	0	0	0

Variant 3: Adult. Liver transplant. Postoperative complications, suspected biliary etiology. Initial imaging.

ъ .	Appropriateness	COF	A L L DDI	D I DDI	D 41	3.7.11			F	inal '	Гаbu	latio	ns		
Procedure	Category	SOE	Adults RRL	Peds RRL	Rating	Median	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						1				
MRI abdomen without IV contrast with MRCP	Usually appropriate	Limited	O 0 mSv	O 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	O 0 mSv	O 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	O 0 mSv	O 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	O 0 mSv	O 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	O 0 mSv	O 0 mSv [ped]	6	6	0	0	1	0	4	7	2	0	0

	ı																
			References			Study	y Quality										
			25 (25590390)				4										
			29 (30150050)				4										
CT abdomen with IV contrast	May approp		Limited	��� 1-10 mSv	0	���� 3- 10 mSv [ped]	5	5	0	0	1	1	11	1	0	0	0
			References			Study	y Quality										
			16 (28545872)				4										
CT abdomen with IV contrast multiphase	May approp (Disagree	riate	Expert Opinion	���� 10-3 mSv	30		5	5	0	0	2	1	6	4	1	0	0
			References			Study	y Quality										
			16 (28545872)				4										
CT abdomen without IV contrast	Usually approp		Limited	��� 1-10 mSv	0	���� 3- 10 mSv [ped]	3	3	4	2	5	2	1	1	0	0	0
			References		•	Study	y Quality										
			16 (28545872)			_	4										
CT abdomen without and with IV contrast	Usually approp		Limited	���� 10-3 mSv	30	≎≎≎≎≎ 10-30 mSv [ped]	3	3	3	0	10	1	0	0	0	0	0
			References			Study	y Quality										
			16 (28545872)				4										
MRI abdomen without IV contrast	Usually approp		Expert Consensus	O 0 mSv	,	O 0 mSv [ped]	3	3	3	1	6	2	2	1	0	0	0
Radiography abdomen	Usually approp	y not riate	Expert Consensus	�� 0.1-1m	ıSv	�� 0.03- 0.3 mSv [ped]	1	1	11	3	1	0	0	0	0	0	0

Variant 4: Adult. Post liver transplant. Surveillance.

	Appropriateness	COE	A L L DDI	n i nni	·	3.5.31]	inal	Tabı	ılatio	ns		
Procedure	Category	SOE	Adults RRL	Peds RRL	Rating	Median	1	2	3	4	5	6	7	8	9

December	Appropriateness	SOE	A 3114 DDI	D. J. DDI	D-45	М. З			F	inal	Tabu	latio	ıs		
Procedure	Category	SUE	Adults RRL	Peds RRL	Rating	Median	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	O 0 mSv	O 0 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	O 0 mSv	O 0 mSv [ped]	7	7	0	0	0	0	0	1	9	4	0
MRI abdomen without and with hepatobiliary contrast	Usually appropriate	Limited	O 0 mSv	O 0 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	O 0 mSv	O 0 mSv [ped]	5	5	1	0	1	2	8	2	0	0	0

US abdomen	May approp (Disagree	riate	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 approp (Disagree	riate	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 approp		Expert Consensus	≎≎≎≎ 10- mSv	-30	����� 10-30 mSv [ped]	4	4	0	1	3	6	2	2	0	0	0
MRI abdomen without IV contrast	May approp		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 approp		Expert Consensus	��� 1-10 mSv	0	���� 3- 10 mSv [ped]	2	2	4	4	6	0	0	0	0	0	0
FDG-PET/CT skull base to mid-thigh	Usually approp		Limited	≎≎≎≎ 10- mSv	-30	���� 3- 10 mSv [ped]	2	2	4	8	1	0	1	0	0	0	0
			References			Study	Quality										
			35 (31306801)				4										
Radiography abdomen	Usually approp		Expert Consensus	�� 0.1-1m	nSv	�� 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.