

American College of Radiology
ACR Appropriateness Criteria®

Acute Onset Flank Pain-Suspicion of Stone Disease (Urolithiasis)

Variant 1: Acute onset flank pain. Suspicion of stone disease. No history or remote history of stone disease. 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 and pelvis without IV contrast	Usually appropriate	Strong	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	9	9	0	0	0	0	0	0	1	2	14
		References		Study Quality											
		24 (16600742)		4											
		23 (19890646)		4											
		22 (19457812)		2											
		21 (19230922)		3											
		20 (27533351)		3											
		19 (23374764)		3											
		18 (19251939)		3											
		17 (29625137)		2											
		16 (11110945)		1											
		15 (8571915)		2											
		3 (11756098)		3											
US kidneys and bladder retroperitoneal	May be appropriate (Disagreement)	Expert Opinion	○ ○ mSv	○ ○ mSv [ped]	5	5	0	2	1	0	0	12	1	1	0
		References		Study Quality											
		40 (28611874)		1											
		39 (27154825)		3											
		38 (11461855)		4											

37 (12819916)	2
35 (27289025)	3
36 (27459091)	3
34 (17373690)	2
33 (11756713)	3
30 (28341578)	2
16 (11110945)	1
11 (28845492)	3
42 (27063853)	3
41 (26797359)	2

US color Doppler kidneys and bladder retroperitoneal	May be appropriate (Disagreement)	Expert Opinion	O 0 mSv	O 0 mSv [ped]	5	5	5	3	3	1	0	4	1	0	0
Radiography abdomen and pelvis	May be appropriate		☹☹☹ 1-10 mSv	☹☹☹ 0.3-3 mSv [ped]	4	n/a	0	0	0	0	0	0	0	0	0
Radiography intravenous urography	Usually not appropriate	Strong	☹☹☹ 1-10 mSv	☹☹☹ 0.3-3 mSv [ped]	3	3	5	3	4	3	1	1	0	0	0

References	Study Quality
31 (12898174)	1
32 (9836541)	1

MRI abdomen and pelvis without IV contrast	Usually not appropriate	Limited	O 0 mSv	O 0 mSv [ped]	3	3	3	2	7	4	0	1	0	0	0
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References	Study Quality
25 (15900055)	3
26 (8911161)	2

MRI abdomen and pelvis without and with IV contrast	Usually not appropriate	Limited	O 0 mSv	O 0 mSv [ped]	3	3	4	3	5	5	0	0	0	0	0
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References	Study Quality
25 (15900055)	3
26 (8911161)	2

MRU without IV contrast	Usually not appropriate	Limited	O 0 mSv	O 0 mSv [ped]	3	3	4	0	5	3	3	2	0	0	0
		References		Study Quality											
		26 (8911161)		2											
		28 (23532422)		3											
MRU without and with IV contrast	Usually not appropriate	Limited	O 0 mSv	O 0 mSv [ped]	3	3	5	1	3	2	4	2	0	0	0
		References		Study Quality											
		27 (11133546)		2											
		28 (23532422)		3											
CT abdomen and pelvis with IV contrast	Usually not appropriate	Limited	⊗⊗⊗ 1-10 mSv	⊗⊗⊗⊗ 3-10 mSv [ped]	2	2	4	5	6	1	1	0	0	0	0
		References		Study Quality											
		14 (27611106)		3											
		13 (30225609)		3											
		12 (24504541)		3											
CT abdomen and pelvis without and with IV contrast	Usually not appropriate	Expert Consensus	⊗⊗⊗⊗ 10-30 mSv	⊗⊗⊗⊗⊗ 10-30 mSv [ped]	2	2	4	6	7	0	0	0	0	0	0
CTU without and with IV contrast	Usually not appropriate	Expert Consensus	⊗⊗⊗⊗ 10-30 mSv	⊗⊗⊗⊗⊗ 10-30 mSv [ped]	2	2	3	7	7	0	0	0	0	0	0

Variant 2: Acute onset flank pain in patient with known current stone disease, diagnosed on recent imaging. Recurrent symptoms of stone disease. Follow-up imaging.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
CT abdomen and pelvis without IV contrast	Usually appropriate	Strong	⊗⊗⊗ 1-10 mSv	⊗⊗⊗⊗ 3-10 mSv [ped]	9	9	0	1	0	0	0	0	3	3	10

		References	Study Quality													
		15 (8571915)	2													
		16 (11110945)	1													
US kidneys and bladder retroperitoneal	May be appropriate	Limited	O 0 mSv	O 0 mSv [ped]	6	6	0	0	0	2	4	10	1	0	0	
		References	Study Quality													
		36 (27459091)	3													
US color Doppler kidneys and bladder retroperitoneal	May be appropriate (Disagreement)	Expert Opinion	O 0 mSv	O 0 mSv [ped]	5	5	5	3	2	2	1	3	1	0	0	
CT abdomen and pelvis with IV contrast	May be appropriate	Limited	⊗⊗⊗ 1-10 mSv	⊗⊗⊗⊗ 3-10 mSv [ped]	4	4	0	2	0	7	6	1	1	0	0	
		References	Study Quality													
		45 (31300208)	3													
		44 (25082439)	3													
		43 (29675722)	3													
Radiography abdomen and pelvis	May be appropriate		⊗⊗⊗ 1-10 mSv	⊗⊗⊗ 0.3-3 mSv [ped]	4	n/a	0	0	0	0	0	0	0	0	0	
CT abdomen and pelvis without and with IV contrast	Usually not appropriate	Expert Consensus	⊗⊗⊗⊗ 10-30 mSv	⊗⊗⊗⊗⊗ 10-30 mSv [ped]	3	3	4	3	9	0	1	0	0	0	0	
CTU without and with IV contrast	Usually not appropriate	Expert Consensus	⊗⊗⊗⊗ 10-30 mSv	⊗⊗⊗⊗⊗ 10-30 mSv [ped]	3	3	1	1	7	5	2	0	1	0	0	
MRI abdomen and pelvis without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	3	3	5	1	6	4	0	1	0	0	0	
MRI abdomen and pelvis without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	3	3	5	2	7	2	1	0	0	0	0	
MRU without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	3	3	4	1	4	5	2	1	0	0	0	

MRU without and with IV contrast	Usually not appropriate	Limited	0 0 mSv	0 0 mSv [ped]	3	3	5	0	5	4	1	2	0	0	0
		References		Study Quality											
		28 (23532422)		3											
Radiography intravenous urography	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼ 0.3-3 mSv [ped]	2	2	5	5	3	3	0	1	0	0	0

Variant 3: Pregnant patient. Acute onset flank pain. Suspicion of stone disease. Initial or follow-up imaging.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
US kidneys and bladder retroperitoneal	Usually appropriate	Limited	0 0 mSv	0 0 mSv [ped]	7	7	0	0	0	0	0	3	7	3	4
		References		Study Quality											
		54 (23771120)		4											
		53 (20833847)		4											
		52 (15075842)		4											
CT abdomen and pelvis without IV contrast	May be appropriate	Limited	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	6	6	0	0	1	3	2	8	3	0	0
		References		Study Quality											
		47 (18042011)		4											
MRU without IV contrast	May be appropriate	Limited	0 0 mSv	0 0 mSv [ped]	5	5	1	1	1	0	9	4	0	1	0
		References		Study Quality											
		50 (17954650)		4											
		49 (15126809)		3											
		48 (8544647)		2											
US color Doppler kidneys and bladder retroperitoneal	May be appropriate (Disagreement)	Expert Opinion	0 0 mSv	0 0 mSv [ped]	5	5	4	2	2	0	1	1	3	4	0

MRI abdomen and pelvis without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	2	2	5	6	3	0	1	1	1	0	0
Radiography abdomen and pelvis	Usually not appropriate		⊗⊗⊗ 1-10 mSv	⊗⊗⊗ 0.3-3 mSv [ped]	2	n/a	0	0	0	0	0	0	0	0	0
CT abdomen and pelvis with IV contrast	Usually not appropriate	Expert Consensus	⊗⊗⊗ 1-10 mSv	⊗⊗⊗⊗ 3-10 mSv [ped]	1	1	11	1	2	0	1	2	0	0	0
CT abdomen and pelvis without and with IV contrast	Usually not appropriate	Expert Consensus	⊗⊗⊗⊗ 10-30 mSv	⊗⊗⊗⊗⊗ 10-30 mSv [ped]	1	1	10	4	2	0	0	1	0	0	0
CTU without and with IV contrast	Usually not appropriate	Expert Consensus	⊗⊗⊗⊗ 10-30 mSv	⊗⊗⊗⊗⊗ 10-30 mSv [ped]	1	1	11	1	3	0	1	1	0	0	0
Radiography intravenous urography	Usually not appropriate	Limited	⊗⊗⊗ 1-10 mSv	⊗⊗⊗ 0.3-3 mSv [ped]	1	1	11	0	4	1	1	0	0	0	0

		References		Study Quality											
		51 (1433534)		4											
MRI abdomen and pelvis without and with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	13	0	4	0	0	0	0	0	0
MRU without and with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	12	1	3	0	0	1	0	0	0

Variant 4: Acute onset flank pain. Suspicion of stone disease. CT without contrast is inconclusive for the presence of stones. Next imaging study.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
CTU without and with IV contrast	May be appropriate	Expert Consensus	⊗⊗⊗⊗ 10-30 mSv	⊗⊗⊗⊗⊗ 10-30 mSv [ped]	6	6	0	0	0	1	5	9	2	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.