American College of Radiology
ACR Appropriateness Criteria®

Clinically Suspected Vascular Malformation of the Extremities

Variant 1: Upper or lower extremity. Suspected vascular malformation presenting with pain or findings of physical deformity including soft-tissue mass, diffuse or focal enlargement, discoloration, or ulceration. Initial imaging.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
MRA extremity area of interest without and with IV contrast	Usually appropriate	Strong	O 0 mSv	O 0 mSv [ped]	9	9	0	0	0	0	0	0	0	3	9

References	Study Quality
6 (25525685)	4
7 (22890795)	4
9 (22674646)	3
2 (21343517)	1
25 (20182842)	4
24 (11959728)	1

MRI extremity area of interest without and with IV contrast	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	8	8	0	0	0	0	0	2	1	7	2

References	Study Quality
21 (24955647)	4
1 (26598124)	4
3 (25895482)	4
6 (25525685)	4
19 (25367671)	4
4 (24860131)	4
7 (22890795)	4
9 (22674646)	3

		20 (22024295)	4													
		2 (21343517)	1													
		5 (20888510)	4													
		22 (19931109)	4													
		8 (19020874)	4													
		23 (17533093)	4													
CTA extremity area of interest with IV contrast	Usually appropriate	Limited	Varies	Varies	7	7	0	0	0	0	1	0	9	2	0
		References	Study Quality													
		18 (26654395)	4													
		10 (26654394)	4													
		2 (21343517)	1													
US duplex Doppler extremity area of interest	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	7	7	0	0	0	0	2	1	4	5	0
		References	Study Quality													
		13 (24848826)	4													
		1 (26598124)	4													
		3 (25895482)	4													
		15 (21795487)	4													
		2 (21343517)	1													
		5 (20888510)	4													
		8 (19020874)	4													
		14 (10715041)	4													
MRA extremity area of interest without IV contrast	May be appropriate	Strong	O 0 mSv	O 0 mSv [ped]	6	6	0	1	0	1	3	4	3	0	0
		References	Study Quality													
		6 (25525685)	4													
		7 (22890795)	4													
		9 (22674646)	3													
		2 (21343517)	1													
		25 (20182842)	4													

		24 (11959728)		1												
CT extremity area of interest with IV contrast	May be appropriate	Limited	Varies	Varies	5	5	0	0	0	1	8	3	0	0	0
		References		Study Quality												
		10 (26654394)		4												
		3 (25895482)		4												
		6 (25525685)		4												
		12 (22024296)		4												
MRI extremity area of interest without IV contrast	May be appropriate	Limited	O 0 mSv	O 0 mSv [ped]	5	5	0	0	0	1	6	5	0	0	0
		References		Study Quality												
		21 (24955647)		4												
		1 (26598124)		4												
		3 (25895482)		4												
		6 (25525685)		4												
		19 (25367671)		4												
		4 (24860131)		4												
		7 (22890795)		4												
		9 (22674646)		3												
		20 (22024295)		4												
		2 (21343517)		1												
		5 (20888510)		4												
		22 (19931109)		4												
		8 (19020874)		4												
		23 (17533093)		4												
US extremity area of interest with IV contrast	May be appropriate	Limited	O 0 mSv	O 0 mSv [ped]	5	5	0	0	0	5	5	2	0	0	0
		References		Study Quality												
		16 (21092206)		4												
		17 (29630543)		3												

CT extremity area of interest without IV contrast	May be appropriate	Limited	Varies	Varies	4	4	1	0	3	5	2	0	1	0	0

References	Study Quality
10 (26654394)	4
3 (25895482)	4
6 (25525685)	4
12 (22024296)	4

CT extremity area of interest without and with IV contrast	Usually not appropriate	Limited	Varies	Varies	3	3	0	3	4	1	4	0	0	0	0

References	Study Quality
10 (26654394)	4
3 (25895482)	4
6 (25525685)	4
12 (22024296)	4

Radiography extremity area of interest	Usually not appropriate	Limited	Varies	Varies	3	3	2	4	4	1	1	0	0	0	0

References	Study Quality
3 (25895482)	4
6 (25525685)	4
12 (22024296)	4
5 (20888510)	4

Arteriography extremity area of interest	Usually not appropriate	Limited	Varies	Varies	2	2	4	4	1	0	2	0	1	0	0

References	Study Quality
6 (25525685)	4
7 (22890795)	4
9 (22674646)	3
5 (20888510)	4
8 (19020874)	4

Variant 2: Upper or lower extremity. Vascular murmur (bruit or thrill). Initial imaging.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
MRA extremity area of interest without and with IV contrast	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	9	9	0	1	0	0	0	0	1	1	9

References	Study Quality
6 (25525685)	4
7 (22890795)	4
9 (22674646)	3
24 (11959728)	1

MRI extremity area of interest without and with IV contrast	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	8	8	0	1	0	0	0	2	3	5	1

References	Study Quality
3 (25895482)	4
6 (25525685)	4
19 (25367671)	4
20 (22024295)	4
2 (21343517)	1
5 (20888510)	4
23 (17533093)	4

US duplex Doppler extremity area of interest	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	8	8	0	0	0	0	0	1	4	7	0

References	Study Quality
13 (24848826)	4
6 (25525685)	4
7 (22890795)	4
9 (22674646)	3
15 (21795487)	4

		2 (21343517)	1													
		5 (20888510)	4													
		8 (19020874)	4													
		14 (10715041)	4													
CTA extremity area of interest with IV contrast	Usually appropriate	Limited	Varies	Varies	7	7	0	0	0	0	2	1	7	2	0
		References	Study Quality													
		18 (26654395)	4													
		10 (26654394)	4													
MRI extremity area of interest without IV contrast	May be appropriate	Limited	O 0 mSv	O 0 mSv [ped]	6	6	0	0	2	1	3	6	0	0	0
		References	Study Quality													
		3 (25895482)	4													
		6 (25525685)	4													
		19 (25367671)	4													
		20 (22024295)	4													
		2 (21343517)	1													
		5 (20888510)	4													
		23 (17533093)	4													
CT extremity area of interest with IV contrast	May be appropriate	Limited	Varies	Varies	5	5	0	0	2	0	7	3	0	0	0
		References	Study Quality													
		3 (25895482)	4													
		6 (25525685)	4													
		12 (22024296)	4													
CT extremity area of interest without and with IV contrast	May be appropriate (Disagreement)	Expert Opinion	Varies	Varies	5	5	0	4	4	0	2	2	0	0	0
		References	Study Quality													
		3 (25895482)	4													
		6 (25525685)	4													

		12 (22024296)		4											
MRA extremity area of interest without IV contrast	May be appropriate (Disagreement)	Expert Opinion	O 0 mSv	O 0 mSv [ped]	5	5	0	0	2	0	4	3	3	0	0
		References		Study Quality											
		6 (25525685)		4											
		7 (22890795)		4											
		9 (22674646)		3											
		24 (11959728)		1											
US extremity area of interest with IV contrast	May be appropriate	Limited	O 0 mSv	O 0 mSv [ped]	5	5	0	0	1	4	7	0	0	0	0
		References		Study Quality											
		16 (21092206)		4											
		17 (29630543)		3											
Arteriography extremity area of interest	May be appropriate	Limited	Varies	Varies	4	4	0	0	3	5	4	0	0	0	0
		References		Study Quality											
		6 (25525685)		4											
		7 (22890795)		4											
		9 (22674646)		3											
		5 (20888510)		4											
CT extremity area of interest without IV contrast	Usually not appropriate	Limited	Varies	Varies	3	3	1	1	5	3	0	2	0	0	0
		References		Study Quality											
		3 (25895482)		4											
		6 (25525685)		4											
		12 (22024296)		4											
Radiography extremity area of interest	Usually not appropriate	Limited	Varies	Varies	2	2	3	4	5	0	0	0	0	0	0
		References		Study Quality											
		3 (25895482)		4											

6 (25525685)	4
12 (22024296)	4
5 (20888510)	4

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.**