

**American College of Radiology
ACR Appropriateness Criteria®**

Management of Vertebral Compression Fractures

Variant 1: New symptomatic vertebral compression fracture (VCF) identified on radiographs. No known malignancy. Next imaging study.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
MRI spine area of interest without IV contrast	Usually appropriate	Strong	0 0 mSv	0 0 mSv [ped]	9	9	0	0	0	0	0	0	1	9	10
		References		Study Quality											
		46 (23619191)		2											
		47 (18831901)		2											
		51 (16687528)		2											
		50 (25946722)		2											
		49 (21217433)		2											
		48 (21779855)		4											
		45 (19504131)		4											
		44 (21162942)		2											
		43 (19282740)		4											
CT spine area of interest without IV contrast	Usually appropriate	Strong	Varies	Varies	8	8	0	0	0	1	1	1	3	7	7
		References		Study Quality											
		42 (26928067)		2											
		41 (26537691)		2											
		40 (28065376)		2											
		39 (22091375)		4											
		12 (14519867)		4											

CT myelography spine area of interest	Usually not appropriate	Expert Consensus	Varies	Varies	2	2	8	3	3	4	2	0	0	0	0			

Variant 2: New symptomatic VCF identified on radiographs. History of malignancy. Next imaging study.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations											
							1	2	3	4	5	6	7	8	9			
MRI spine area of interest without and with IV contrast	Usually appropriate	Strong	0 0 mSv	0 0 mSv [ped]	9	9	0	0	0	0	0	0	2	8	10			

References	Study Quality
46 (23619191)	2
47 (18831901)	2
71 (21555353)	2
70 (21857034)	3
69 (21214309)	2
68 (2740506)	4
66 (28670417)	3
65 (29348133)	4

CT spine area of interest without IV contrast	Usually appropriate	Strong	Varies	Varies	7	7	0	0	0	0	0	1	13	6	1			
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References	Study Quality
67 (26376170)	4
66 (28670417)	3
42 (26928067)	2
41 (26537691)	2
40 (28065376)	2
39 (22091375)	4
12 (14519867)	4

MRI spine area of interest without IV contrast	Usually appropriate	Strong	0 0 mSv	0 0 mSv [ped]	7	7	1	0	0	0	3	3	5	5	3	
		References	Study Quality													
		46 (23619191)	2													
		47 (18831901)	2													
		71 (21555353)	2													
		70 (21857034)	3													
		69 (21214309)	2													
		68 (2740506)	4													
		66 (28670417)	3													
		65 (29348133)	4													
FDG-PET/CT skull base to mid-thigh	May be appropriate	Moderate	☼☼☼☼ 10-30 mSv	☼☼☼☼ 3-10 mSv [ped]	6	6	0	1	0	1	6	4	4	4	0	
		References	Study Quality													
		74 (27694173)	4													
		73 (32105873)	Good													
		64 (3277565)	4													
		61 (12195540)	4													
Bone scan whole body	May be appropriate	Strong	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	5	5	0	0	1	2	9	5	3	0	0	
		References	Study Quality													
		72 (22487972)	4													
		58 (24694774)	3													
		56 (21165311)	3													
		55 (26364958)	3													
		54 (18349795)	2													
		53 (20706042)	3													
		52 (22927151)	3													
MRI spine area of interest with IV contrast	May be appropriate (Disagreement)	Expert Opinion	0 0 mSv	0 0 mSv [ped]	5	5	6	0	7	0	1	7	0	0	0	

References	Study Quality
46 (23619191)	2
47 (18831901)	2
71 (21555353)	2
70 (21857034)	3
69 (21214309)	2
68 (2740506)	4
66 (28670417)	3
65 (29348133)	4

Image-guided biopsy spine area of interest	May be appropriate	Limited	Varies	Varies	5	5	0	0	0	1	10	9	1	0	0
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References	Study Quality
75 (19829253)	3

SPECT or SPECT/CT spine area of interest	May be appropriate	Limited	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	5	5	0	0	0	1	18	1	1	0	0
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References	Study Quality
59 (22208854)	2
57 (23559712)	4
58 (24694774)	3

CT myelography spine area of interest	May be appropriate	Expert Consensus	Varies	Varies	4	4	3	2	2	4	7	2	0	0	0
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CT spine area of interest without and with IV contrast	Usually not appropriate	Strong	Varies	Varies	3	3	9	0	5	1	6	0	0	0	0
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References	Study Quality
67 (26376170)	4
66 (28670417)	3
42 (26928067)	2
41 (26537691)	2
40 (28065376)	2
39 (22091375)	4

94 (26204297)	4
93 (19530588)	3
92 (-3194747)	4
91 (20580503)	3
90 (8059251)	4
89 (22194515)	2
88 (24484060)	2
70 (21857034)	3
67 (26376170)	4
66 (28670417)	3
16 (20809724)	4

CT spine area of interest without IV contrast	Usually appropriate	Strong	Varies	Varies	8	8	0	0	1	1	1	3	4	7	3
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References	Study Quality
66 (28670417)	3
42 (26928067)	2
41 (26537691)	2
40 (28065376)	2
39 (22091375)	4
12 (14519867)	4

MRI spine area of interest without IV contrast	Usually appropriate	Strong	0 0 mSv	0 0 mSv [ped]	7	7	1	0	0	0	3	1	7	8	0
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References	Study Quality
96 (23960179)	4
95 (27441748)	4
94 (26204297)	4
93 (19530588)	3
92 (-3194747)	4
91 (20580503)	3
90 (8059251)	4
89 (22194515)	2

88 (24484060)	2
70 (21857034)	3
67 (26376170)	4
66 (28670417)	3
16 (20809724)	4

Bone scan whole body	May be appropriate	Limited	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	5	5	1	0	0	3	10	3	2	0	1
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References	Study Quality
98 (12369658)	2
97 (11110531)	4

FDG-PET/CT skull base to mid-thigh	May be appropriate	Strong	☼☼☼☼ 10-30 mSv	☼☼☼☼ 3-10 mSv [ped]	5	5	0	0	1	0	17	2	1	0	0
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References	Study Quality
73 (32105873)	Good
101 (23251117)	4
74 (27694173)	4
63 (12811277)	1
62 (11914890)	4
61 (12195540)	4

Image-guided biopsy spine area of interest	May be appropriate	Limited	Varies	Varies	5	5	0	0	0	2	15	3	1	0	0
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References	Study Quality
102 (30767427)	2

SPECT or SPECT/CT spine area of interest	May be appropriate	Limited	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	5	5	0	0	0	4	16	0	1	0	0
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References	Study Quality
57 (23559712)	4
99 (8254410)	3
100 (18993040)	3

CT spine area of interest without and with IV contrast	Usually not appropriate	Strong	Varies	Varies	3	3	8	1	10	2	0	0	0	0	0
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References	Study Quality
66 (28670417)	3
42 (26928067)	2
41 (26537691)	2
40 (28065376)	2
39 (22091375)	4
12 (14519867)	4

CT spine area of interest with IV contrast	Usually not appropriate	Strong	Varies	Varies	3	3	9	1	10	1	0	0	0	0	0
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References	Study Quality
66 (28670417)	3
42 (26928067)	2
41 (26537691)	2
40 (28065376)	2
39 (22091375)	4
12 (14519867)	4

MRI spine area of interest with IV contrast	Usually not appropriate	Strong	0 0 mSv	0 0 mSv [ped]	3	3	8	0	5	0	7	1	0	0	0
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References	Study Quality
96 (23960179)	4
95 (27441748)	4
94 (26204297)	4
93 (19530588)	3
92 (-3194747)	4
91 (20580503)	3
90 (8059251)	4
89 (22194515)	2
88 (24484060)	2
70 (21857034)	3

67 (26376170)	4
66 (28670417)	3
16 (20809724)	4

CT myelography spine area of interest	Usually not appropriate	Expert Consensus	Varies	Varies	3	3	6	2	4	3	4	1	0	0	0
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Variant 5: Asymptomatic, osteoporotic VCF. Initial treatment.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Medical management only	Usually appropriate	Strong	N/A	N/A	9	9	0	0	0	0	0	0	1	4	15

References	Study Quality
36 (24325929)	4
111 (12052450)	1
110 (12879220)	2
109 (28739478)	4
108 (19478654)	1
107 (24077202)	3
104 (1627411)	4
103 (1836154)	4

Percutaneous vertebral augmentation	Usually not appropriate	Expert Consensus	N/A	N/A	3	3	7	3	11	0	0	0	0	0	0
Surgical consultation	Usually not appropriate	Expert Consensus	N/A	N/A	3	3	7	2	4	4	2	0	1	0	0
Percutaneous ablation spine	Usually not appropriate	Limited	N/A	N/A	1	1	14	2	4	0	0	0	0	0	0

References	Study Quality
112 (18566009)	4

Radiation oncology consultation	Usually not appropriate	Expert Consensus	N/A	N/A	1	1	14	2	4	0	0	0	0	0	0
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Variant 6: Symptomatic osteoporotic VCF with bone marrow edema or intravertebral cleft. Initial treatment.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Medical management only	Usually appropriate	Strong	N/A	N/A	8	8	0	0	1	0	2	0	4	7	6

References	Study Quality
113 (19657122)	1
108 (19478654)	1
107 (24077202)	3
104 (1627411)	4
103 (1836154)	4
101 (23251117)	4

Percutaneous vertebral augmentation	Usually appropriate	Strong	N/A	N/A	8	8	0	0	0	0	1	1	7	7	4
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References	Study Quality
125 (26630417)	1
120 (27400110)	2
22 (27544377)	1
122 (25404372)	2
21 (24315046)	1
33 (23021641)	1
23 (21375382)	1
34 (22116114)	2
36 (24325929)	4
89 (22194515)	2
108 (19478654)	1

113 (19657122)	1
114 (19657121)	1
115 (20701962)	1
116 (20190623)	1
117 (19246088)	1
118 (25787683)	2
119 (16429288)	4
121 (23391839)	3
123 (18989668)	2
124 (20625321)	2
20 (25822543)	1
126 (31325625)	1
127 (30552168)	4
129 (21076886)	3
128 (20372942)	3

Surgical consultation	May be appropriate	Limited	N/A	N/A	5	5	0	0	0	1	17	1	1	1	0
		References		Study Quality											
		130 (25808687)		4											
Percutaneous ablation spine	Usually not appropriate	Limited	N/A	N/A	1	1	14	2	3	0	1	0	0	0	0
		References		Study Quality											
		112 (18566009)		4											
Radiation oncology consultation	Usually not appropriate	Expert Consensus	N/A	N/A	1	1	15	2	3	0	0	0	0	0	
Systemic radionuclide therapy	Usually not appropriate	Expert Consensus	N/A	N/A	1	1	17	1	2	0	0	0	0	0	

Variant 7: New symptomatic VCF. History of prior vertebroplasty or surgery. Initial treatment.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations									
							1	2	3	4	5	6	7	8	9	
Percutaneous vertebral augmentation	Usually appropriate	Strong	N/A	N/A	8	8	0	0	0	0	3	0	7	8	2	
		References	Study Quality													
		136 (19581311)	2													
		135 (20672965)	2													
		134 (28072794)	Good													
		133 (29743284)	2													
Medical management only	Usually appropriate	Limited	N/A	N/A	7	7	0	0	2	0	3	1	5	6	3	
		References	Study Quality													
		36 (24325929)	4													
		107 (24077202)	3													
		108 (19478654)	1													
Surgical consultation	May be appropriate	Limited	N/A	N/A	5	5	0	0	0	1	12	7	1	0	0	
		References	Study Quality													
		137 (21629164)	4													
Percutaneous ablation spine	Usually not appropriate	Limited	N/A	N/A	1	1	11	3	4	0	2	0	0	0	0	
		References	Study Quality													
		112 (18566009)	4													
Radiation oncology consultation	Usually not appropriate	Expert Consensus	N/A	N/A	1	1	12	3	2	2	1	0	0	0	0	
Systemic radionuclide therapy	Usually not appropriate	Expert Consensus	N/A	N/A	1	1	15	1	3	1	0	0	0	0	0	

Variant 8: Benign VCF with worsening pain, deformity, or pulmonary dysfunction. Initial treatment.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Percutaneous vertebral augmentation	Usually appropriate	Strong	N/A	N/A	8	8	0	0	0	0	0	1	6	8	5
		References		Study Quality											
		27 (26109687)		2											
		22 (27544377)		1											
		21 (24315046)		1											
		17 (24253785)		1											
		32 (22628598)		3											
		124 (20625321)		2											
		34 (22116114)		2											
		1 (8324412)		4											
		23 (21375382)		1											
		31 (14736654)		2											
		33 (23021641)		1											
		36 (24325929)		4											
		89 (22194515)		2											
		107 (24077202)		3											
		123 (18989668)		2											
		138 (10892628)		4											
		139 (8324411)		4											
		141 (24077200)		2											
		30 (25844701)		Good											
		29 (26071690)		1											
		28 (25884343)		2											
		26 (26280719)		2											
		25 (25300981)		2											
		24 (24901876)		1											
Surgical consultation	Usually appropriate	Expert Consensus	N/A	N/A	7	7	0	0	1	0	1	2	9	6	2

			151 (-3121235)		4														
			150 (20562730)		4														
Radiation oncology consultation	Usually appropriate	Strong	N/A	N/A	8	8	0	0	0	0	3	0	6	8	3				
			References		Study Quality														
			165 (27479724)		4														
			163 (32540335)		2														
			161 (31119099)		4														
			159 (15450875)		4														
			158 (7607970)		2														
			157 (6178497)		1														
			156 (21277118)		4														
			96 (23960179)		4														
			95 (27441748)		4														
			15 (29048517)		Good														
Percutaneous vertebral augmentation	Usually appropriate	Strong	N/A	N/A	7	7	0	0	0	0	2	1	10	4	3				
			References		Study Quality														
			17 (24253785)		1														
			149 (8685351)		2														
			148 (21333599)		1														
Percutaneous ablation spine	Usually appropriate	Strong	N/A	N/A	7	7	0	0	1	1	4	2	9	2	1				
			References		Study Quality														
			147 (31677728)		4														
			146 (26635286)		2														
			145 (33308579)		4														
			144 (24927327)		3														
			143 (29794238)		2														
Medical management only	May be appropriate	Limited	N/A	N/A	5	5	0	1	0	1	16	2	0	1	0				

		References		Study Quality											
		142 (15047923)		4											
Systemic radionuclide therapy	May be appropriate	Limited	N/A	N/A	4	4	5	1	4	1	10	0	0	0	0
		References		Study Quality											
		167 (15925817)		4											
		166 (15653650)		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.