

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

Management of Vertebral Compression Fractures

Variant 1: New symptomatic compression fracture identified on radiographs or CT. No known malignancy.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Medical management	Usually appropriate	Strong	N/A	N/A	8	8	0	0	0	1	0	0	3	4	6
		References		Study Quality											
		19 (27544377)		1											
		62 (19478654)		1											
		63 (19657122)		1											
		64 (1836154)		4											
		65 (1627411)		4											
		61 (24077202)		3											
MRI spine area of interest without IV contrast	Usually appropriate	Strong	0 0 mSv	0 0 mSv [ped]	8	8	1	0	0	0	1	0	2	4	6
		References		Study Quality											
		43 (23619191)		2											
		44 (18831901)		2											
		42 (19504131)		4											
		40 (19282740)		4											
		45 (21779855)		4											
		46 (21217433)		2											
		41 (21162942)		2											
		47 (25946722)		2											

CT spine area of interest without IV contrast	Usually appropriate	48 (16687528)			2											
		Strong	Varies	Varies	7	7	0	0	0	1	5	0	3	3	2	

References	Study Quality
37 (28065376)	2
9 (14519867)	4
36 (22091375)	4
38 (26537691)	2
39 (26928067)	2

Percutaneous vertebral augmentation	May be appropriate	Strong	N/A	N/A	6	6	0	0	0	0	4	5	1	4	0
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References	Study Quality
82 (26630417)	1
76 (27400110)	2
19 (27544377)	1
74 (25787683)	2
78 (25404372)	2
77 (23391839)	3
30 (23021641)	1
20 (21375382)	1
84 (21076886)	3
80 (20625321)	2
83 (20372942)	3
85 (19829253)	3
31 (22116114)	2
33 (24325929)	4
69 (9403451)	4
62 (19478654)	1
72 (20190623)	1
67 (9536480)	4
63 (19657122)	1

66 (10529144)	2
73 (19246088)	1
71 (20701962)	1
70 (19657121)	1
81 (22194515)	2
75 (16429288)	4
79 (18989668)	2

Tc-99m bone scan whole body	May be appropriate	Strong	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	5	5	0	0	1	1	12	1	1	0	0
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References	Study Quality
50 (20706042)	3
51 (18349795)	2
53 (21165311)	3
49 (22927151)	3
52 (26364958)	3

Surgical consultation	May be appropriate	Expert Consensus	N/A	N/A	5	5	0	0	0	4	5	2	2	0	1
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Tc-99m SPECT/CT spine area of interest	May be appropriate	Limited	☼☼☼☼ 10-30 mSv		5	5	0	0	1	0	13	1	0	1	0
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References	Study Quality
56 (22208854)	2
54 (23559712)	4
55 (24694774)	3

FDG-PET/CT skull base to mid-thigh	Usually not appropriate	Limited	☼☼☼☼ 10-30 mSv	☼☼☼☼☼☼ 10-30 mSv [ped]	3	3	7	0	0	2	4	0	0	1	0
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References	Study Quality
57 (12195540)	4
59 (12811277)	1
58 (11914890)	4

MRI spine area of interest without IV contrast	Usually appropriate	Strong	0 0 mSv	0 0 mSv [ped]	8	8	1	0	0	0	1	0	2	4	6
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References	Study Quality
43 (23619191)	2
44 (18831901)	2
42 (19504131)	4
40 (19282740)	4
45 (21779855)	4
46 (21217433)	2
41 (21162942)	2
47 (25946722)	2
48 (16687528)	2

CT spine area of interest without IV contrast	Usually appropriate	Strong	Varies	Varies	7	7	0	0	0	1	5	0	3	3	2
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References	Study Quality
37 (28065376)	2
9 (14519867)	4
36 (22091375)	4
38 (26537691)	2
39 (26928067)	2

Percutaneous vertebral augmentation	May be appropriate	Strong	N/A	N/A	6	6	0	0	0	0	4	5	1	4	0
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References	Study Quality
82 (26630417)	1
76 (27400110)	2
19 (27544377)	1
74 (25787683)	2
78 (25404372)	2
77 (23391839)	3
30 (23021641)	1
20 (21375382)	1

84 (21076886)	3
80 (20625321)	2
83 (20372942)	3
85 (19829253)	3
31 (22116114)	2
33 (24325929)	4
69 (9403451)	4
62 (19478654)	1
72 (20190623)	1
67 (9536480)	4
63 (19657122)	1
66 (10529144)	2
73 (19246088)	1
71 (20701962)	1
70 (19657121)	1
81 (22194515)	2
75 (16429288)	4
79 (18989668)	2

Tc-99m bone scan whole body	May be appropriate	Strong	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	5	5	0	0	1	1	12	1	1	0	0
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References	Study Quality
50 (20706042)	3
51 (18349795)	2
53 (21165311)	3
49 (22927151)	3
52 (26364958)	3

Surgical consultation	May be appropriate	Expert Consensus	N/A	N/A	5	5	0	0	0	4	5	2	2	0	1
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Tc-99m SPECT/CT spine area of interest	May be appropriate	Limited	☼☼☼☼ 10-30 mSv		5	5	0	0	1	0	13	1	0	1	0
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References	Study Quality
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56 (22208854)	2
54 (23559712)	4
55 (24694774)	3

FDG-PET/CT skull base to mid-thigh	Usually not appropriate	Limited	☼☼☼☼ 10-30 mSv	☼☼☼☼☼ 10-30 mSv [ped]	3	3	7	0	0	2	4	0	0	1	0
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References	Study Quality
57 (12195540)	4
59 (12811277)	1
58 (11914890)	4
60 (3277565)	4

MRI spine area of interest without and with IV contrast	Usually not appropriate	Strong	○ 0 mSv	○ 0 mSv [ped]	2	2	6	2	4	0	1	0	0	0	1
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References	Study Quality
43 (23619191)	2
44 (18831901)	2
42 (19504131)	4
40 (19282740)	4
45 (21779855)	4
46 (21217433)	2
41 (21162942)	2
47 (25946722)	2
48 (16687528)	2

MRI spine area of interest with IV contrast	Usually not appropriate	Strong	○ 0 mSv	○ 0 mSv [ped]	2	2	7	2	3	0	1	0	1	0	0
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References	Study Quality
43 (23619191)	2
44 (18831901)	2
42 (19504131)	4
40 (19282740)	4
45 (21779855)	4

		46 (21217433)			2													
		41 (21162942)			2													
		47 (25946722)			2													
		48 (16687528)			2													
CT spine area of interest without and with IV contrast	Usually not appropriate	Strong	Varies	Varies	1	1	8	3	2	0	1	0	0	0	0	0	0	
		References			Study Quality													
		37 (28065376)			2													
		9 (14519867)			4													
		36 (22091375)			4													
		38 (26537691)			2													
		39 (26928067)			2													
CT spine area of interest with IV contrast	Usually not appropriate	Strong	Varies	Varies	1	1	8	2	3	0	1	0	0	0	0	0	0	
		References			Study Quality													
		37 (28065376)			2													
		9 (14519867)			4													
		36 (22091375)			4													
		38 (26537691)			2													
		39 (26928067)			2													
Percutaneous thermal ablation	Usually not appropriate	Limited	N/A	N/A	1	1	12	0	2	0	0	0	0	0	0	0	0	
		References			Study Quality													
		86 (18566009)			4													
Radiation oncology consultation	Usually not appropriate	Expert Consensus	N/A	N/A	1	1	10	1	1	1	1	0	0	0	0	0	0	

Variant 3: Osteoporotic compression fracture, with or without edema on MRI and no “red flags”. With or without spinal deformity, worsening symptoms, or pulmonary dysfunction.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Medical management	Usually appropriate	Limited	N/A	N/A	8	8	1	0	0	0	2	0	2	3	6
		References	Study Quality												
		69 (9403451)	4												
		67 (9536480)	4												
		64 (1836154)	4												
		65 (1627411)	4												
		66 (10529144)	2												
		68 (13677812)	4												
Percutaneous vertebral augmentation	Usually appropriate	Strong	N/A	N/A	7	7	0	1	0	0	4	2	3	3	1
		References	Study Quality												
		91 (24744201)	3												
		18 (24315046)	1												
		14 (24253785)	1												
		92 (24077200)	2												
		29 (22628598)	3												
		20 (21375382)	1												
		80 (20625321)	2												
		31 (22116114)	2												
		33 (24325929)	4												
		81 (22194515)	2												
		1 (8324412)	4												
		61 (24077202)	3												
		79 (18989668)	2												
		89 (10892628)	4												
		90 (8324411)	4												
Surgical consultation	Usually not appropriate	Expert Consensus	N/A	N/A	3	3	3	2	3	2	2	1	0	1	0

80 (20625321)	2
31 (22116114)	2
33 (24325929)	4
81 (22194515)	2
1 (8324412)	4
61 (24077202)	3
79 (18989668)	2
89 (10892628)	4
90 (8324411)	4

Surgical consultation	Usually not appropriate	Expert Consensus	N/A	N/A	3	3	3	2	3	2	2	1	0	1	0
Percutaneous thermal ablation	Usually not appropriate	Limited	N/A	N/A	1	1	12	1	0	0	1	0	0	0	0
		References			Study Quality										
		86 (18566009)			4										
Radiation oncology consultation	Usually not appropriate	Expert Consensus	N/A	N/A	1	1	9	2	2	0	1	0	0	0	0

Variant 5: Painful osteoporotic compression fracture with edema on MRI. Contraindication to vertebral augmentation or surgery (eg, fitness, pregnancy, infection, coagulation disorder, etc.).

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Medical management	Usually appropriate	Expert Consensus	N/A	N/A	9	9	0	0	0	0	0	0	1	2	11
Surgical consultation	May be appropriate	Expert Consensus	N/A	N/A	5	5	0	0	0	2	7	2	2	0	1
Radiation oncology consultation	Usually not appropriate	Expert Consensus	N/A	N/A	1	1	11	1	2	0	0	0	0	0	0

Variant 6: Painful osteoporotic compression fracture with edema on MRI. Contraindication to vertebral augmentation or surgery (eg, fitness, pregnancy, infection, coagulation disorder, etc.).

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Medical management	Usually appropriate	Expert Consensus	N/A	N/A	9	9	0	0	0	0	0	0	1	2	11
Surgical consultation	May be appropriate	Expert Consensus	N/A	N/A	5	5	0	0	0	2	7	2	2	0	1
Radiation oncology consultation	Usually not appropriate	Expert Consensus	N/A	N/A	1	1	11	1	2	0	0	0	0	0	0

Variant 7: Known malignancy and new back pain. Compression fracture identified on radiographs or CT.

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	4	8

References	Study Quality
110 (23960179)	4
81 (22194515)	2
102 (24484060)	2
103 (28670417)	3
104 (26376170)	4
106 (20580503)	3
107 (19530588)	3
108 (26204297)	4
101 (21857034)	3
109 (27441748)	4

		13 (20809724)			4												
Image-guided biopsy spine area of interest	Usually appropriate	Expert Consensus	Varies	Varies	7	7	0	0	0	1	5	1	2	4	1		
FDG-PET/CT skull base to mid-thigh	May be appropriate	Limited	⊗⊗⊗⊗ 10-30 mSv	⊗⊗⊗⊗⊗ 10-30 mSv [ped]	6	6	0	0	0	0	6	4	2	1	1		
		References		Study Quality													
		113 (23251117)		4													
		57 (12195540)		4													
		59 (12811277)		1													
		58 (11914890)		4													
		114 (27694173)		4													
Tc-99m bone scan whole body	May be appropriate	Expert Consensus	⊗⊗⊗ 1-10 mSv	⊗⊗⊗⊗⊗ 3-10 mSv [ped]	5	5	0	1	0	1	8	3	0	2	0		
MRI spine area of interest without IV contrast	May be appropriate (Disagreement)	Expert Opinion	○ 0 mSv	○ 0 mSv [ped]	5	6	0	0	2	1	4	2	4	1	1		
		References		Study Quality													
		110 (23960179)		4													
		81 (22194515)		2													
		102 (24484060)		2													
		103 (28670417)		3													
		104 (26376170)		4													
		106 (20580503)		3													
		107 (19530588)		3													
		108 (26204297)		4													
		101 (21857034)		3													
		109 (27441748)		4													
		13 (20809724)		4													
Tc-99m SPECT/CT spine area of interest	May be appropriate	Limited	⊗⊗⊗⊗ 10-30 mSv		5	5	1	0	0	3	8	2	0	1	0		

106 (20580503)	3
107 (19530588)	3
108 (26204297)	4
101 (21857034)	3
109 (27441748)	4
13 (20809724)	4

Image-guided biopsy spine area of interest	Usually appropriate	Expert Consensus	Varies	Varies	7	7	0	0	0	1	5	1	2	4	1
FDG-PET/CT skull base to mid-thigh	May be appropriate	Limited	☼☼☼☼ 10-30 mSv	☼☼☼☼☼ 10-30 mSv [ped]	6	6	0	0	0	0	6	4	2	1	1

References	Study Quality
113 (23251117)	4
57 (12195540)	4
59 (12811277)	1
58 (11914890)	4
114 (27694173)	4

Tc-99m bone scan whole body	May be appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼☼ 3-10 mSv [ped]	5	5	0	1	0	1	8	3	0	2	0
MRI spine area of interest without IV contrast	May be appropriate (Disagreement)	Expert Opinion	0 0 mSv	0 0 mSv [ped]	5	6	0	0	2	1	4	2	4	1	1

References	Study Quality
110 (23960179)	4
81 (22194515)	2
102 (24484060)	2
103 (28670417)	3
104 (26376170)	4
106 (20580503)	3
107 (19530588)	3
108 (26204297)	4

93 (21629164)	4
135 (17224814)	2
133 (17688054)	2
134 (25032525)	4
131 (21277118)	4
132 (28507888)	Inadequate

Medical management	Usually appropriate	Expert Consensus	N/A	N/A	8	8	1	0	0	1	1	1	2	4	4
Percutaneous vertebral augmentation	May be appropriate	Strong	N/A	N/A	6	6	0	0	0	1	4	9	0	0	0

References	Study Quality
116 (21333599)	1
117 (8685351)	2
118 (22130630)	M
119 (23816297)	4
120 (24905395)	4

Percutaneous thermal ablation	May be appropriate	Strong	N/A	N/A	5	5	0	1	0	0	8	5	0	0	0
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References	Study Quality
121 (25054391)	3
122 (26427837)	2
130 (26022981)	2
127 (20041484)	2
128 (14722039)	2
129 (24927327)	3
123 (23065947)	2
124 (24238380)	4
125 (23265724)	2
126 (26635286)	2

Surgical consultation	May be appropriate (Disagreement)	Expert Opinion	N/A	N/A	5	5	0	0	2	1	5	4	2	0	0
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Variant 10: Asymptomatic pathologic spinal fracture with or without edema on MRI.

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

References	Study Quality
93 (21629164)	4
135 (17224814)	2
133 (17688054)	2
134 (25032525)	4
131 (21277118)	4
132 (28507888)	Inadequate

Medical management	Usually appropriate	Expert Consensus	N/A	N/A	8	8	1	0	0	1	1	1	2	4	4
Percutaneous vertebral augmentation	May be appropriate	Strong	N/A	N/A	6	6	0	0	0	1	4	9	0	0	0

References	Study Quality
116 (21333599)	1
117 (8685351)	2
118 (22130630)	M
119 (23816297)	4
120 (24905395)	4

Percutaneous thermal ablation	May be appropriate	Strong	N/A	N/A	5	5	0	1	0	0	8	5	0	0	0
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References	Study Quality
121 (25054391)	3

122 (26427837)	2
130 (26022981)	2
127 (20041484)	2
128 (14722039)	2
129 (24927327)	3
123 (23065947)	2
124 (24238380)	4
125 (23265724)	2
126 (26635286)	2

Surgical consultation	May be appropriate (Disagreement)	Expert Opinion	N/A	N/A	5	5	0	0	2	1	5	4	2	0	0
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Variant 11: Pathologic spinal fracture with severe and worsening pain.

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

References	Study Quality
143 (6178497)	1
135 (17224814)	2
131 (21277118)	4

Percutaneous vertebral augmentation	Usually appropriate	Strong	N/A	N/A	7	7	0	0	0	0	4	1	4	4	1
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References	Study Quality
14 (24253785)	1
110 (23960179)	4
116 (21333599)	1
137 (28041324)	2
117 (8685351)	2

142 (16112300)	1
148 (20562730)	4
93 (21629164)	4
11 (21709187)	3
141 (15450879)	4

Radiation oncology consultation	Usually appropriate	Strong	N/A	N/A	8	8	0	0	0	0	4	0	3	4	3
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References	Study Quality
110 (23960179)	4
93 (21629164)	4
143 (6178497)	1
140 (26606009)	2
150 (15450875)	4
119 (23816297)	4
149 (21533865)	2

Percutaneous vertebral augmentation	Usually appropriate	Strong	N/A	N/A	7	7	0	0	0	0	4	0	6	2	2
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References	Study Quality
24 (26109687)	2
146 (24935074)	4
91 (24744201)	3
14 (24253785)	1
110 (23960179)	4
80 (20625321)	2
81 (22194515)	2
116 (21333599)	1
137 (28041324)	2
79 (18989668)	2
117 (8685351)	2

Medical management	May be appropriate	Expert Consensus	N/A	N/A	5	5	0	1	0	0	7	4	0	2	0
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					150 (15450875)	4												
					119 (23816297)	4												
					149 (21533865)	2												
Percutaneous vertebral augmentation	Usually appropriate	Strong	N/A	N/A	7	7	0	0	0	0	4	0	6	2	2			
					References	Study Quality												
					24 (26109687)	2												
					146 (24935074)	4												
					91 (24744201)	3												
					14 (24253785)	1												
					110 (23960179)	4												
					80 (20625321)	2												
					81 (22194515)	2												
					116 (21333599)	1												
					137 (28041324)	2												
					79 (18989668)	2												
					117 (8685351)	2												
Medical management	May be appropriate	Expert Consensus	N/A	N/A	5	5	0	1	0	0	7	4	0	2	0			
Percutaneous thermal ablation	May be appropriate	Strong	N/A	N/A	5	5	0	0	0	1	7	6	0	0	0			
					References	Study Quality												
					147 (23412159)	2												
					86 (18566009)	4												
					140 (26606009)	2												
					130 (26022981)	2												
					108 (26204297)	4												
					126 (26635286)	2												
					120 (24905395)	4												

Variant 15: Pathologic spinal fracture with neurologic deficits.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Surgical consultation	Usually appropriate	Moderate	N/A	N/A	9	9	0	0	0	0	0	0	1	1	12
		References		Study Quality											
		148 (20562730)		4											
		93 (21629164)		4											
		11 (21709187)		3											
		141 (15450879)		4											
		152 (-3121235)		4											
		153 (26337716)		Good											
Radiation oncology consultation	Usually appropriate	Strong	N/A	N/A	8	8	0	0	0	0	3	3	0	2	6
		References		Study Quality											
		143 (6178497)		1											
		150 (15450875)		4											
		154 (7607970)		2											
		131 (21277118)		4											
		155 (27479724)		4											
Medical management	May be appropriate	Limited	N/A	N/A	5	5	0	0	0	1	8	1	1	1	2
		References		Study Quality											
		151 (15047923)		4											

Variant 16: Pathologic spinal fracture with neurologic deficits.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Surgical consultation	Usually	Moderate	N/A	N/A	9	9	0	0	0	0	0	0	1	1	12

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.