# 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 | O 0 mSv | O 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 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bone scan whole body | May be appropriate | Strong | ☢☢☢ 1-10 mSv | ☢☢☢☢ 3-10 mSv [ped] | 5 | 5 | 1 | 0 | 2 | 6 | 8 | 3 | 0 | 0 | 0 |

| References | Study Quality |
|---|---|
| 56 (21165311) | 3 |
| 55 (26364958) | 3 |
| 54 (18349795) | 2 |
| 53 (20706042) | 3 |
| 52 (22927151) | 3 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SPECT or SPECT/CT spine area of interest | May be appropriate | Strong | ☢☢☢ 1-10 mSv | ☢☢☢☢ 3-10 mSv [ped] | 5 | 5 | 0 | 0 | 0 | 3 | 16 | 2 | 0 | 0 | 0 |

| References | Study Quality |
|---|---|
| 59 (22208854) | 2 |
| 60 (29893749) | 2 |
| 58 (24694774) | 3 |
| 57 (23559712) | 4 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CT spine area of interest without and with IV contrast | Usually not appropriate | Strong | Varies | Varies | 3 | 3 | 6 | 3 | 4 | 1 | 4 | 1 | 1 | 0 | 0 |

| References | Study Quality |
|---|---|
| 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 | 5 | 2 | 8 | 0 | 3 | 2 | 0 | 0 | 0 |

| References | Study Quality |
|---|---|
| 42 (26928067) | 2 |
| 41 (26537691) | 2 |
| 40 (28065376) | 2 |
| 39 (22091375) | 4 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 12 (14519867) | | 4 | | | | | | | | | | | | |
| MRI spine area of interest without and with IV contrast | Usually not appropriate | Strong | O 0 mSv | O 0 mSv [ped] | 3 | 3 | 5 | 1 | 5 | 6 | 4 | 0 | 0 | 0 | 0 |
| | | 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 | | | | | | | | | | | | |
| MRI spine area of interest with IV contrast | Usually not appropriate | Strong | O 0 mSv | O 0 mSv [ped] | 3 | 3 | 8 | 1 | 12 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 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 | | | | | | | | | | | | |
| FDG-PET/CT skull base to mid-thigh | Usually not appropriate | Limited | ☢☢☢☢ 10-30 mSv | ☢☢☢☢ 3-10 mSv [ped] | 2 | 2 | 6 | 5 | 3 | 3 | 3 | 0 | 0 | 0 | 0 |
| | | References | | Study Quality | | | | | | | | | | | | |
| | | 65 (29348133) | | 4 | | | | | | | | | | | | |
| | | 64 (3277565) | | 4 | | | | | | | | | | | | |
| | | 63 (12811277) | | 1 | | | | | | | | | | | | |

| | |
|---|---|
| 62 (11914890) | 4 |
| 61 (12195540) | 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 | O 0 mSv | O 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 |

| 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 | O 0 mSv | O 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 | O 0 mSv | O 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 |

| 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 |

| 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 |
| 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 |

| References | Study Quality |
|---|---|
| 67 (26376170) | 4 |
| 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 | 0 | 4 | 6 | 2 | 0 | 0 | 0 | 0 |
| | | References | | Study Quality | | | | | | | | | | | | |
| | | 67 (26376170) | | 4 | | | | | | | | | | | | |
| | | 66 (28670417) | | 3 | | | | | | | | | | | | |
| | | 42 (26928067) | | 2 | | | | | | | | | | | | |
| | | 41 (26537691) | | 2 | | | | | | | | | | | | |
| | | 40 (28065376) | | 2 | | | | | | | | | | | | |
| | | 39 (22091375) | | 4 | | | | | | | | | | | | |
| | | 12 (14519867) | | 4 | | | | | | | | | | | | |

**Variant 3: New back pain. Previously treated VCF or multiple VCFs. Initial Imaging.**

| Procedure | Appropriateness Category | SOE | Adults RRL | Peds RRL | Rating | Median | Final Tabulations | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| CT spine area of interest without IV contrast | Usually appropriate | Strong | Varies | Varies | 8 | 8 | 0 | 0 | 0 | 0 | 2 | 3 | 4 | 4 | 7 |
| | | References | | Study Quality | | | | | | | | | | | |
| | | 78 (20528649) | | 2 | | | | | | | | | | | |
| | | 77 (15690210) | | 4 | | | | | | | | | | | |
| | | 76 (22637642) | | 2 | | | | | | | | | | | |
| | | 39 (22091375) | | 4 | | | | | | | | | | | |
| | | 12 (14519867) | | 4 | | | | | | | | | | | |
| MRI spine area of interest without IV contrast | Usually appropriate | Limited | O 0 mSv | O 0 mSv [ped] | 8 | 8 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 7 | 9 |
| | | References | | Study Quality | | | | | | | | | | | |
| | | 80 (17361377) | | 2 | | | | | | | | | | | |
| | | 79 (24792612) | | 4 | | | | | | | | | | | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MRI spine area of interest without and with IV contrast | May be appropriate | Limited | O 0 mSv | O 0 mSv [ped] | 6 | 6 | 0 | 0 | 0 | 0 | 9 | 4 | 7 | 1 | 0 |

| References | Study Quality |
|---|---|
| 80 (17361377) | 2 |
| 79 (24792612) | 4 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bone scan whole body | May be appropriate | Strong | ☢☢☢ 1-10 mSv | ☢☢☢☢ 3-10 mSv [ped] | 5 | 5 | 1 | 0 | 1 | 6 | 6 | 5 | 1 | 0 | 0 |

| References | Study Quality |
|---|---|
| 56 (21165311) | 3 |
| 55 (26364958) | 3 |
| 54 (18349795) | 2 |
| 53 (20706042) | 3 |
| 52 (22927151) | 3 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FDG-PET/CT skull base to mid-thigh | May be appropriate | Limited | ☢☢☢☢ 10-30 mSv | ☢☢☢☢ 3-10 mSv [ped] | 5 | 5 | 3 | 2 | 4 | 1 | 8 | 1 | 0 | 1 | 0 |

| References | Study Quality |
|---|---|
| 64 (3277565) | 4 |
| 63 (12811277) | 1 |
| 62 (11914890) | 4 |
| 61 (12195540) | 4 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SPECT or SPECT/CT spine area of interest | May be appropriate | Strong | ☢☢☢ 1-10 mSv | ☢☢☢☢ 3-10 mSv [ped] | 5 | 5 | 0 | 0 | 0 | 2 | 17 | 1 | 0 | 1 | 0 |

| References | Study Quality |
|---|---|
| 59 (22208854) | 2 |
| 60 (29893749) | 2 |
| 58 (24694774) | 3 |
| 57 (23559712) | 4 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CT spine area of interest without and with IV contrast | Usually not appropriate | Strong | Varies | Varies | 3 | 3 | 9 | 1 | 4 | 5 | 2 | 0 | 0 | 0 | 0 |

| References | Study Quality |
|---|---|

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 78 (20528649) | | 2 | | | | | | | | | | | | |
| | | 77 (15690210) | | 4 | | | | | | | | | | | | |
| | | 76 (22637642) | | 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 |
| | | References | | Study Quality | | | | | | | | | | | | |
| | | 78 (20528649) | | 2 | | | | | | | | | | | | |
| | | 77 (15690210) | | 4 | | | | | | | | | | | | |
| | | 76 (22637642) | | 2 | | | | | | | | | | | | |
| | | 39 (22091375) | | 4 | | | | | | | | | | | | |
| | | 12 (14519867) | | 4 | | | | | | | | | | | | |
| MRI spine area of interest with IV contrast | Usually not appropriate | Limited | O 0 mSv | O 0 mSv [ped] | 3 | 3 | 7 | 1 | 6 | 0 | 7 | 0 | 0 | 0 | 0 |
| | | References | | Study Quality | | | | | | | | | | | | |
| | | 80 (17361377) | | 2 | | | | | | | | | | | | |
| | | 79 (24792612) | | 4 | | | | | | | | | | | | |
| CT myelography spine area of interest | Usually not appropriate | Expert Consensus | Varies | Varies | 3 | 3 | 7 | 2 | 4 | 5 | 2 | 0 | 0 | 0 | 0 |

**Variant 4: Asymptomatic 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 | O 0 mSv | O 0 mSv [ped] | 9 | 9 | 0 | 0 | 0 | 0 | 1 | 0 | 3 | 6 | 10 |
| | | References | | Study Quality | | | | | | | | | | | |
| | | 96 (23960179) | | 4 | | | | | | | | | | | |
| | | 95 (27441748) | | 4 | | | | | | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 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 |
| | | 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 | O 0 mSv | O 0 mSv [ped] | 7 | 7 | 1 | 0 | 0 | 0 | 3 | 1 | 7 | 8 | 0 |
| | | 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 |
| | | 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 |
| | | 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 |
| | | 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 |
| | | 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 |

| 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 |

| 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 | O 0 mSv | O 0 mSv [ped] | 3 | 3 | 8 | 0 | 5 | 0 | 7 | 1 | 0 | 0 | 0 |

| 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 |

| Procedure | Appropriateness Category | SOE | Adults RRL | Peds RRL | Rating | Median | Final Tabulations 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CT myelography spine area of interest | Usually not appropriate | Expert Consensus | Varies | Varies | 3 | 3 | 6 | 2 | 4 | 3 | 4 | 1 | 0 | 0 | 0 |

**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 |

**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 |

| 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 | 0 |
| Systemic radionuclide therapy | Usually not appropriate | Expert Consensus | N/A | N/A | 1 | 1 | 17 | 1 | 2 | 0 | 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 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Medical management only | May be appropriate | Limited | N/A | N/A | 5 | 5 | 0 | 1 | 2 | 0 | 12 | 6 | 0 | 0 | 0 |

| References | Study Quality |
|---|---|
| 36 (24325929) | 4 |
| 108 (19478654) | 1 |
| 107 (24077202) | 3 |
| 104 (1627411) | 4 |
| 103 (1836154) | 4 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Percutaneous ablation spine | Usually not appropriate | Limited | N/A | N/A | 1 | 1 | 13 | 2 | 5 | 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 | 16 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| Systemic radionuclide therapy | Usually not appropriate | Expert Consensus | N/A | N/A | 1 | 1 | 16 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |

**Variant 9: Pathological VCF with ongoing or increasing mechanical pain. Initial treatment.**

| 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 | Strong | N/A | N/A | 8 | 8 | 0 | 0 | 0 | 0 | 2 | 1 | 3 | 9 | 5 |

| References | Study Quality |
|---|---|
| 154 (16112300) | 1 |
| 14 (21709187) | 3 |
| 137 (21629164) | 4 |
| 155 (28937455) | 4 |
| 153 (15450879) | 4 |
| 152 (26337716) | Good |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 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.**