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| Appendix Table I. Primary ICD-9 and ICD-10 Diagnosis Codes for Odontoid Fracture |
| Closed fracture of second cervical vertebra | 805.02 |
| Open fracture of second cervical vertebra | 805.12 |
| Unspecified displaced fracture of second cervical vertebra | S12.100A, S12.100B, S12.100D, S12.100G, S12.100S, |
| Unspecified nondisplaced fracture of second cervical vertebra | S12.101A, S12.101B, S12.101D, S12.101G, S12.101S |
| Anterior displaced Type II dens fracture | S12.110A, S12.110B, S12.110D, S12.110G, S12.110S |
| Posterior displaced Type II dens fracture | S12.111A, S12.111B, S12.111D, S12.111G, S12.111S |
| Nondisplaced Type II dens fracture | S12.112A, S12.112B, S12.112D, S12.112G, S12.112S |
| Other displaced dens fracture | S12.120A, S12.120B, S12.120D, S12.120G, S12.120S |
| Other nondisplaced dens fracture | S12.121A, S12.121B, S12.121D, S12.121G, S12.121S |
| Unspecified traumatic displaced spondylolisthesis of second cervical vertebra | S12.130A, S12.130B, S12.130D, S12.130G, S12.130S |
| Unspecified traumatic nondisplaced spondylolisthesis of second cervical vertebra | S12.131A, S12.131B, S12.131D, S12.131G, S12.131S |
| Type III traumatic spondylolisthesis of second cervical vertebra | S12.14XA, S12.14XB, S12.14XD, S12.14XG, S12.14XS |
| Other traumatic displaced spondylolisthesis of second cervical vertebra | S12.150A, S12.150B, S12.150D, S12.150G, S12.150S |
| Other traumatic nondisplaced spondylolisthesis of second cervical vertebra | S12.151A, S12.151B, S12.151D, S12.151G, S12.151S |
| Other displaced fracture of second cervical vertebra | S12.190A, S12.190B, S12.190D, S12.190G, S12.190S |
| Other nondisplaced fracture of second cervical vertebra | S12.191A, S12.191B, S12.191D, S12.191G, S12.191S |

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| Appendix Table II. Primary ICD-9 and ICD-10 Procedure Codes for Odontoid Fracture |
| **Operative** |  |
| Vertebral fracture repair | 035.3 |
| Fusion/ refusion 2-3 vertebrae | 816.2 |
| Atlas-axis fusion | 810.1 |
| Other cervical fusion post/post | 810.3 |
| Other cervical fusion ant/ant | 810.2 |
| Fusion of Cervical Vertebral Joint with Autologous Tissue Substitute | 0RG1070, 0RG1071, 0RG107J |
| Fusion of Cervical Vertebral Joint with Synthetic Substitute | 0RG10J0, 0RG10J1 |
| Fusion of Cervical Vertebral Joint with Nonautologous Tissue Substitute | 0RG10K0, 0RG10K1, 0RG10KJ |
| Fusion of 2 or more Cervical Vertebral Joints with Autologous Tissue Substitute | 0RG2070, 0RG2071,  |
| Fusion of 2 or more Cervical Vertebral Joints with Synthetic Substitute | 0RG20J0, 0RG20J1 |
| Fusion of 2 or more Cervical Vertebral Joints with Nonautologous Tissue Substitute | 0RG20K0 |
| Reposition Cervical Vertebra with Internal Fixation Device | 0PS304Z |
| Insertion of Internal Fixation Device into Cervical Vertebra | 0PH304Z |
| Fusion of Cervical Vertebral Joint with Interbody Fusion Device | 0RG10A0 |
| Reposition Cervical Vertebra | 0PS3XZZ |
| Fusion of Cervical Vertebral Joint with Interbody Fusion Device | 0RG10A1 |
| Fusion of Cervical Vertebral Joint | 0RG10Z0, 0RG10ZJ |
| Fusion of 2 or more Cervical Vertebral Joints with Interbody Fusion Device | 0RG20A0, 0RG20A1, 0RG20AJ |
| Fusion of 2 or more Cervical Vertebral Joints | 0RG20ZJ, 0RG20Z0 |
| Fusion of Cervicothoracic Vertebral Joint with Autologous Tissue Substitute | 0RG4071 |
| Fusion of 2 or more Cervical Vertebral Joints with Nonautologous Tissue Substitute | 0RG20KJ |
| **Nonoperative** |  |
| Insert/ replace skill tong | ICD-9-P-0294 |
| Spine traction with skull deviation | ICD-9-P-9341 |
| Neck support application | ICD-9-P-9352 |
| Insertion of Internal Fixation Device into Skull | 0NH004Z, 0NH044Z, 0NH034Z |
| Traction of Back using Traction Apparatus | 2W65X0Z |
| Traction of Head using Traction Apparatus | 2W60X0Z |
| Immobilization of Neck using Other Device | 2W32XYZ |
| Immobilization of Neck using Brace | 2W32X3Z |
| Traction of Neck using Traction Apparatus | 2W62X0Z |
| Immobilization of Neck using Cast | 2W32X2Z |
| Halo Vest | 0294, 9341, 0NH004Z, 0NH044Z, 0NH034Z, 2W65X0Z, 2W60X0Z, 2W62X0Z |
| Hard Cervical Collar | 9352, 2W32XYZ, 2W32X2Z, 2W32X3Z |

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| Appendix Table III. Excluded ICD-9 and ICD-10 Diagnosis and Procedure Codes  |
| Unspecified Injury of the Cervical Spinal Cord | 952.00, 952.05, S14.101A, S14.102A, S14.103A, S14.104A, S14.105A, S14.106A, S14.107A, S14.108A |
| Complete Lesion of the Cervical Spinal Cord | 952.01, 952.06, S14.111A, S14.112A, S14.113A, S14.114A, S14.115A, S14.116A, S14.117A, S14.118A |
| Central Cord Syndrome of the Cervical Spinal Cord | 952.03, 952.08, S14.121A, S14.122A, S14.123A, S14.124AS, 14.125A, S14.126A, S14.127A, S14.128A |
| Anterior Cord Syndrome of the Cervical Spinal Cord | 952.02, 952.07, S14.131A, S14.132A, S14.133A, S14.134A, S14.135A, S14.136A, S14.137A, S14.138A  |
| Other Incomplete Lesions of the Cervical Spinal Cord | 952.04, 952.09, 952.9, S14.151A, S14.152A, S14.153A, S14.154A, S14.155A, S14.156A, S14.157A, S14.158A, S14.109A, S24.109A, S34.109A, S34.139A |
| Monoplegia of the Upper Limbs | 344.4, 344.5, G83.20, G83.21, G83.22, G83.23, G83.24, G83.30 |
| Diplegia of the Upper Limbs | 344.2, G83.0 |
| Quadriplegia | 344.0, G82.50, G82.51, G82.52, G82.53 |
| Paraplegia | 344.1, G82.20 |
| Paralysis, unspecified | 344.89, 344.9, G83.81, G83.9 |
| Injury of Nerve Root of Cervical Spine | 953.0, 953.1, 953.8, 953.9, S14.2XXA, S24.2XXA |
| Injury of Peripheral Nerves of the Neck | 957.0, S14.4XXA |
| Injury of Cervical Sympathetic Nerves | 954.0, S14.5XXA |
| Pathologic Fracture | 733.1, 733.10, 733.13, M84.40XA, M48.50XA, M80.08XA, M84.48XA, M84.68XA |
| Stress Fracture | 733.95, M48.40XA, M48.41XA, M48.42XA |
| Infection | 324.1, 730.00, 730.10, 730.20, 730.90, G06.1, M86.10, M86.20, M86.9, M86.60 |
| Malunion/ Nonunion | 733.81, 733.82, 733.8, S12.100K, S12.101K |

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| Appendix Table IV. ICD-9 and ICD-10 Codes for Inpatient Complications |
| Congestive Heart Failure | 410.00, 410.01, 410.10, 410.11, 410.30, 410.31, 410.40, 410.41, 410.50, 410.51, 410.60, 410.61, 410.70, 410.71, 410.80, 410.81, 410.90, 410.91,427.5,428.0, 428.1, 428.21, 428.23, 428.31, 428.33, 428.41, 428.43, 428.9,785.51 ,998.01,997.1, I43\*, I50\*, I09.9, I11.0, I13.0, I13.2, I25.5, I42.0, I42.5, I42.6, I42.7, I42.8, P29.0 |
| Pulmonary | 415.11, 415.13, 415.19,518.4,518.82,480.\*,481, 482.2, 482.0, 482.1, 482.3\*, 482.4\*, 482.8\*, 482.9, 483.\* 484.\*, 485, 486,507.0, 507.1, 507.8,997.31, 997.32,518.0, 518.81, 518.84,958.1,518.5\*,512.1,998.81,518.7, I26.02, I26.09, I26.92, I26.93, I26.94, I26.99,J81.0,J80,J12.0, J12.1, J12.3, J12.4, J12.81, J12.89, J12.9,J13, J14, J15.0, J15.1, J15.20, J15.211, J15.212, J15.29, J15.3, J15.4, J15.5, J15.6, J15.7, J15.8, J15.9, J16.0, J16.8, J18.0, J18.1, J18.2, J18.8, J18.9,J69,J95.851,J96.00, J96.01, J96.02, J96.20, J96.21, J96.22, J96.90, J96.91, J96.92,T79.1,J95.2, J95.3,J95.811,J95.821, J95.822,T81.82\*,J95.84,J95.88, J95.89 |
| Gastrointestinal | 560.1, 997.49, 787.2\*, K56.0, K56.7, K91.89, R13.1\* |
| Genitourinary | 584.5, 584.6, 584.7, 584.8, 584.9, 595.0, 595.9,599.0, 997.5, N17.0, N17.1, N17.2, N17.8, N17.9, N30.0\*, N30.8\*, N30.9\*, N39.0, N99.0, N99.89 |
| Central Neurologic | 431,433.01, 433.11, 433.21, 433.31, 433.81, 433.91, 434.01, 434.11, 434.91, 997.02, I61.\*,I63.\*, I97.811, I97.821 |
| Infectious | 038.0, 038.10, 038.11, 038.12, 038.19, 038.2, 038.038.3, 038.40, 038.41, 038.42, 038.43, 038.44, 038.49, 038.8, 038.9, 995.91, 995.92, 785.52, 988.02, A41.01, A41.02, A41.1, A41.2, A41.3, A41.4, A41.50, A41.51, A41.52, A41.53, A41.59, A41.81, A41.89, A41.9, R65.20, R65.21, T81.44\*, T81.12\* |
| Deep Venous Thrombosis | 453.4\*, 453.2, 453.89, 453.9, I82.4\* |
| Soft Tissue Injury | 874.00, 874.01, 874.10, 874.11, 874.02, 874.12, 874.2, 874.3, 874.4, 874.5, S11.011\*, S11.012\*, S11.013\*, S11.014\*, S11.019\*, S11.021\*, S11.022\*, S11.023\*, S11.024\*, S11.029\*, S11.031\*, S11.032\*, S11.033\*, S11.034\*, S11.039\*, S11.11\*, S11.12\*, S11.13\*, S11.14\*, S11.10\*, S11.21\*, S11.22\*, S11.23\*, S11.24\*, S11.20\*, S16.2\*, S16.8\*, S16.9\* |
| Vascular Injury | 900.0\*, 900.81, 900.1, 900.89, 900.9, 900.82, S15.0\*, S15.1\*, S15.2\*, S15.3\*, S15.8\*, S15.9\* |
| Neurologic Injury | 952.00, 952.05, 952.01, 952.06, 952.03, 952.08, 952.02, 952.07, 952.04, 952.09, 952.9, 951.7, 344.4\*, 344.5, 344.2, 344.0\*, 344.1, 344.89, 344.9, 953.0, 953.1, 953.8, 953.9, 957.0, 954.0, 954.9, 353.2, 337.9, 478.30, 478.31, 478.32, 478.33, 478.34, 784.4\*, S14.0\*, S14.10\*, S14.11\*, S14.12\*, S14.13\*, G83.82, S14.14\*, G83.81, S15.15\*, S04.89\*, S04.9\*, G83.2\*, G83.3\*, G83.0, G82.5\*, G82.2\*, G83.89, G83.9, G83.83, S14.2\*, S14.4\*, S14.5\*, S14.8\*, S14.9\*, G54.2, G90.2, J38.0\*, R49.0, R49.1 |
| Dural Tear | 349.31, 349.39, G97.41, G96.11 |
| Mechanical Injury | 996.49, 996.70, 996.75, 996.78, 996.2, 996.59, 728.1\*, T84.216\*, T84.226\*, T84.296\*, T84.418\*, T84.428\*, T84.498\*, M61.00, M61.08, M61.09, M61.20, M61.28, M61.29, M61.40, M61.48, M61.49, M61.50, M61.58, M61.59, M61.9 |
| Fusion Disorders | 722.0, 722.2, 722.4, 722.6, 722.71, 722.91, M96.0, M50.2\*, M50.3\*, M50.8\*, M50.9\* |
| Wound Complications | 998.11, 998.12, 998.13, 998.30, 998.31, 998.32, 998.33, 998.83, 998.13, 707.00, 707.03, 707.09, 707.20, 707.21, 707.22, 707.23, 707.24, 707.252, T81.30\*, T81.31\*, T81.32\*, G97.63, L89.90, L89.139, L89.149, L89.159, L89.819, L89.899, L89.15, L89.81, L89.810, L89.95, L89.150 |
| Hematoma/ Hemorrhage | 998.12, 998.9, 998.1, 998.3, 998.5, 998.83, 999.3, 432, 998.11, 285.1, G97.61, I62.1, G97.31, D62, G97.51 |
| Localized Infections | 998.59, 996.63, 998.02, 998.51, 998.59, 998.51, 996.60, 996.67, 996.69, 730.00, 730.08, 730.09, 730.10, 730.18, 730.19, 730.20, 730.28, 730.29, 730.80, 730.88, 730.89, 730.90, 730.98, 730.99 , 324.1, 322.9, T81.40\*, T81.41\*, T81.42\*, T81.43\*, T81.49\*, T81.60\*, T84.63\*, T84.7\*, M46.30, M46.31, M46.32, M46.33, M46.39, M46.40, M46.41, M46.42, M46.43, M46.49, M46.50, M46.51, M46.52, M46.53, M46.59, M46.20, M46.21, M46.22, M46.23, G06.1, G03.0, G03.8, G03.9 |
| CSF Leak | G97.0 |