**SUPPLEMENTAL DIGITAL MATERIAL**

**Table 1. Detailed study demographics, diagnoses, and treatment interventions for studies comparing discectomy vs. corpectomy. vs discectomy-corpectomy hybrid in patients with multi-level CSM.**

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| --- | --- | --- | --- | --- | --- |
| **Study** | **Study Design** | **Population** | **Diagnosis (levels)**  | **Treatment** | **Ancillary stabilization techniques** |
| Multiple discectomies (A) versus single or multiple corpectomies (B) |  |
| Oh (2009) | Retrospective cohortF/U time: 26.23 ± 15.0 mos (12-63) rangeF/U rate: NR | A | B | A | B | A | B |  |
| N = 31Mean age: 54.5 ± 11.6 range (28 - 77) yearsSex: 16/31 (51.6%) male | Two-level: 7/14 (50%)Three-level: 7/14 (50%) | Two-level: 17/17 (100%) | ACDF with:* Interbody cage
* Anterior cervical locking plate
* Segmental fixation
 | ACCF with:* Interbody cage
* Anterior cervical locking plate
 | No ancillary stabilization reported |
| n = 14Mean age: 52.6Sex: NRF/U rate: NRF/U time: 24.9 mos | n = 17Mean age: 55.1Sex: NRF/U rate: NRF/U time: 27.3 mos |
| Guo (2011) | Retrospective cohortF/U time: 37 monthsF/U rate: NR | N = 120\*Mean age: 53.5 ± 9.6 years Sex: 67/120 (56%) male | Three-level: 43/43 (100%) | Three-level: 24/24 (100%) | ACDF with:* Interbody cage
* Anterior cervical locking plate
* Segmental fixation
 | ACCF with:* Interbody cage
* Anterior cervical locking plate
 | * Philadelphia collar used for 3 months
 |
| n = 43Mean age: 52.7 ± 9.4 yearsSex: 24/43 (56%) maleF/U time: 37.7 ± 7.2 mo | n = 24Mean age: 55.2 ± 10.1 yearsSex: 13/24 (54%) maleF/U time: 37.3 ± 7.3 mo |

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| Lin (2012) | Retrospective cohortF/U time: 2 year min.F/U rate: NR | N = 120Mean age: 58.3 ± 9.8 (37-78) years Sex: 81/120 (67.5%) male | Three-level: 46/57 (81%)Four-level: 11/57 (19%) | Three-level: 51/63 (81%)Four-level: 12/63 (19%) | ACDF with:* Plating plus cages
 | ACCF with:* MC plus plating
 | * Philadelphia collar used for 6-8 weeks
 |
| n = 57Mean age: 58.7 ± 9.7 range (37 – 77) yearsSex: 38/57 (67%) maleF/U rate: NRF/U time: NR | n = 63Mean age: 57.9 ± 10 range (38 – 78) yearsSex: 43/63 (68%) maleF/U rate: NRF/U time: NR |
| Song (2012) | Retrospective CohortF/U time: NRF/U rate: NR | N = 40 | Three-level: 7/25 (28%)Four-level: 18/25 (72%) | Two-level: 10/15 (67%)Three-level: 5/15 (33%) | ACDF with: * Autogenous iliac bone graft with plating: 10/25
* Solis cage: 15/25
 | ACCF with: * Autogenous iliac bone with Halo-vest: 12/15
* Autogenous fibular bone graft with Halo-vest: 3/15
 | * All ACDF received Philadelphia collar for 6 wks F/B soft collar for 4 wks
* ACCF received halo vest
 |
| n = 25Mean age: 50.3 ± 7.5 range (42-73) yearsSex: 19/25 (76%) maleF/U rate: NRF/U time: 87.3 ± 21.7 range (61–132) mos | n= 15Mean age 54.1 ± 9.8 range (45-70) yearsSex: 11/15 (73%) maleF/U rate: NRF/U time: 94.3 ± 25.3 range (72–171) mos |
| Hilibrand (2002) | Retrospective cohortF/U time: 56 monthsF/U rate: 190/252 (75.4%) | N = 190 | Two-level: 98/131 (75%)Three-level: 33/131 (25%) | One-level: 16/59 (27%)Two-level: 21/59 (36%)Three-level: 20/59 (34%)Four-level: 2/59 (3%) | ACDF with:* Iliac crest grafting
 | ACCF with:* Iliac crest or fibular strut grafting
 | * Two-poster cervical orthosis or rigid collar (n = 174)
* Halo (n = 9)
* Soft collar (n = 4)
* Postop immobilization not recorded (n = 3)
 |
| n = 131Mean age: 53 range (24-81) yearsSex: 66/131 (50.4%) maleF/U rate: NRFU/ time: 73 months (range, 24**–**183 months) | n = 59Mean age: 58 range (19-83) yearsSex: 30/59 (51%) maleF/U rate: NRF/U time: 57 months (range, 24**–**149 months) |
| Yang Liu (2012) [Spine] | Retrospective cohortF/U time: average 26.1 range (11-40) monthsF/U rate: NR | N = 180Mean age: 46.7 range (31-74) yearsSex: NR | Three-level: 69/69 (100%) | Three-level: 39/39 (100%) | ACDF with:* Interbody cages
* Atlantis plate
 | ACCF with:* Titanium mesh cage
* Atlantis plate
 | * Philadelphia collar used for 6-8 weeks
 |
| n = 69/180 (38%)Mean age: 46.1 ± 6.8 yearsSex: 39/69 (56.5%)Mean follow-up: 26.8 range (12-39) months | n = 39/180 (22%)Mean age: 47.8 ± 6.4 yearsSex: 26/39 (66.7%)Mean follow-up: 26.4 range (12-37) months |  |
| Yang Liu (2012) [European Spine] | Retrospective cohortF/U time: 3.6 range (1.5-6) yearsF/U rate: NR | N = 286\*Mean age: 53.8 range (33-74) yearsSex: 166/286 (40.6%) male | Three-level: 103/103 (100%) | Three-level: 87/87 (100%) | ACDF with:* Titanium mesh or cage
* Semi-restricted plate
 | ACCF with:* Titanium mesh or cage
* Semi-restricted plate
 | * Philadelphia collar used for 3 weeks
 |
| n = 103Mean age: 53.5 ± 8.5 range (33-69) yearsSex: 57/103 (55%) male | n = 87Mean age: 53.7 ± 7.8 range (34-67) yearsSex: 51/87 (58.6%) male |
| Multiple discectomies (A) versus discectomy-corpectomy hybrid (C) |  |
| Guo (2011) | Retrospective cohortF/U time: 37 monthsF/U rate: NR | A | C | A | C | A | C |  |
| N = 120\*Mean age: 53.5 ± 9.6 years range (34-77) yearsSex: 67/120 (56%) male | Three-level: 43/43 (100%) | Three-level: 53/53 (100%) | ACDF with:* Interbody cage
* Anterior cervical locking plate
* Segmental fixation
 | ACHDF with:* Interbody cage
* Anterior cervical locking plate
* Segmental fixation
 | * Philadelphia collar used for 3 months
 |
| n = 43Mean age: 52.7 ± 9.4 yearsSex: 24/43 (56%) maleF/U time: 37.7 ± 7.2 mo | n = 53Mean age: 53.4 ± 9.5 yearsSex: 35/53 (66%) maleF/U time: 37.3 ± 7.0 mo |
| Yang Liu (2012) [Spine] | Retrospective cohortF/U time: average 26.1 range (11-40) monthsF/U rate: NR | N = 180\*Mean age: 46.7 range (31-74) yearsSex: NR | Three-level: 69/69 (100%) | Three-level: 72/72 (100%) | ACDF with:* Interbody cage
* Anterior cervical locking plate

Segmental fixation | ACHDF with:* One level ACDF/one level ACCF
 | * Philadelphia collar used for 6-8 weeks
 |
| n = 69/180 (38%)Mean age: 46.1 ± 6.8 yearsSex: 39/69 (56.5%)Mean follow-up: 26.8 range (12-39) months | n = 72/180 (40%)Mean age: 46.9 ± 7.1Sex: 44/72 (61%)Mean follow-up: 25.6 range (11-40) months |

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| --- | --- | --- | --- | --- | --- | --- | --- |
| Yang Liu (2012) [European Spine] | Retrospective cohortF/U time: 3.6 range (1.5-6) yearsF/U rate: NR | N = 286\*Mean age: 53.8 range (33-74) yearsSex: 166/286 (58%) male | Three-level: 103/103 (100%) | Three-level: 96/96 (100%) | ACDF with:* Titanium mesh or cage
* Semi-restricted plate
 | ACHDF with:* Titanium mesh or cage
* Semi-restricted plate
 | * Philadelphia collar used for 3 weeks
 |
| n = 103Mean age: 53.5 ± 8.5Sex: 57/103 (55%) male | n = 96Mean age: 54.4 ± 7.8Sex: 58/96 (60%) male |
| Multiple corpectomies (B) versus discectomy-corpectomy hybrid (C) |  |
| Wei-bing (2009) | Retrospective cohortF/U time: median 20 months (range: 1.5-2 yrs)F/U rate: 59/66 (89.4%) | B | C | B | C | B | C |  |
| N=59Mean age: NRSex: NR | Chord compression:>50%: 8/39 (21%)<50%: 31/39 (79%)OPLL:Positive: 8/39 (21%)Negative: 31/39 (79%) Osteoporosis:Yes: 7/39 (18%)No: 32/39 (82%)2-level: 39/39 (100%) | Chord compression:>50%: 4/20 (20%)<50%: 16/20 (80%)OPLL:Positive: 4/20 (20%)Negative: 16/20 (80%)Osteoporosis:Yes: 4/20 (20%)No: 16/20 (80%)2-level: 20/20 (100%) | ACCF with:* Segmental fixation
 | ACHDF with:* Segmental fixation
* Cervical fusion cage
 | * Philadelphia collar used for 3 months
 |
| n = 39Mean age: 61.9 ± 9.7 yearsSex: 29/39 (74%) male | n = 20Mean age: 58.8 ± 10.1 yearsSex: 12/20 (60%) male |
| Yong Liu (2009) [Zhejiang] | Retrospective cohortF/U time: mean 17.3 mos, range (6-36) mosF/U rate: NR | N = 28Mean age: 53.5 range (45-66) yearsSex: 19/28 (67.9 %) male | Two-levels: 16/16 (100%) | Three-levels: 12/12 (100%) | ACCF with:* Hybrid plate/Zephir plate fixation
* Cervical fusion cage
 | ACHDF with:* Hybrid plate fixation
* Cervical fusion cage (Solis)
 | No ancillary stabilization reported |
| n = 16Mean age: NRSex: NR | n = 12Mean age: NRSex: NR |
| Lian (2010) | Randomized Control TrialF/U time: mean 31.5 range (24–48) monthsF/U rate: 105/110 (95%) | N= 105Mean age: 60.2 range (38–78) yearsSex: 63/105 (60%) male | Three-levels: 42/50 (84%)Four-levels: 8/50 (16%) | Three-levels: 45/55 (82%)Four-levels: 10/55 (18%) | ACCF with:* Titanium mesh cage
* Anterior cervical plate
 | ACHDF with:* PEEK cage or titanium mesh cage
* Anterior cervical plate
 | * Cervical collar applied within 3 months
 |
| n = 50/105 Mean age: 60.8 yearsSex: 30/50 (60%) male | n = 55/105Mean age: 59.7 yearsSex: 33/55 (60%) male |
| Yang Liu (2012) [Spine] | Retrospective cohortF/U time: average 26.1 range (11-40) monthsF/U rate: NR | N = 180\*Mean age: 46.7 range (31-74) yearsSex: NR | Three-levels: 39/39 (100%) | Three-levels: 72/72 (100%)  | ACCF with:* Titanium mesh cage
* Atlantis plate
 | ACHDF with:* One level ACDF/one level ACCF
 | * Philadelphia collar used for 6-8 weeks
 |
| n = 39/180 (22%)Mean age: 47.8 ± 6.4 yearsSex: 26/39 (66.7%)Mean follow-up: 26.4 range (12-37) months | n = 72/180 (40%)Mean age: 46.9 ± 7.1 yearsSex: 44/72 (61%)Mean follow-up: 25.6 range (11-40) months |
| Yang Liu (2012) [European Spine] | Retrospective cohortF/U time: 3.6 range (1.5-6) yearsF/U rate: NR | N = 286\*Mean age: 53.8 range (33-74) yearsSex: 166/286 (58%) male | Three-levels: 87/87 (100%) | Three-levels: 96/96 (100%) | ACCF with:* Titanium mesh or cage
* Semi-restricted plate
 | ACHDF with:* Titanium mesh or cage
* Semi-restricted plate
 | * Philadelphia collar used for 3 weeks
 |
| n = 87Mean age: 53.7 ± 7.8 range (34-67) yearsSex: 51/87 (58.6%) male | n = 96Mean age: NRSex: NR |
| Guo (2011) | Retrospective cohortF/U time: 37 monthsF/U rate: NR | N = 120\*Mean age: 53.5 ± 9.6 range (34-77) years Sex: 67/120 (56%) male | Three-level: 24/24 (100%) | Three-level: 53/53 (100%) | ACCF with:* Interbody cage
* Anterior cervical locking plate
 | ACHDF with:* Interbody cage
* Anterior cervical locking plate

Segmental fixation | * Philadelphia collar used for 3 months
 |
| n = 24Mean age: 55.2 ± 10.1 yearsSex: 13/24 (54%) maleF/U time: 37.3 ± 7.3 mo | n = 53Mean age: 53.4 ± 9.5 yearsSex: 35/53 (66%) maleF/U time: 37.3 ± 7.0 mo |

**Liu 2012 [Spine]: \***This number represents the full population used in the study, however the comparisons only include 2 of the multiple experimental groups.

**Liu 2012 [European Spine]: \***This number represents the full population used in the study, however the comparisons only include 2 of the multiple experimental groups.

**Guo 2011:** \*This number represents the full population used in the study, however the comparisons only include 2 of the multiple experimental groups.

ACCF: anterior cervical discectomy and fusion

ACDF: anterior cervical corpectomy and fusion

ACHDF: anterior cervical hybrid decompression and fusion

**Table 2. Detailed clinical outcome results for studies comparing discectomy vs. corpectomy. vs discectomy-corpectomy hybrid in patients with multi-level CSM**

|  |  |  |  |
| --- | --- | --- | --- |
| **Study** |  **Neurological** | **Function**  | **Pain** |
| Multiple discectomies (A) versus single or multiple corpectomies (B) |
| Oh(2009) | A | B | A | B | A | B |
| JOA: Pre: 13.5 ± 1.2 Post: 15.25 ± 1.5 | JOA: Pre: 13.38 ± 2.1 Post: 14.72 ± 1.7 | Total ROM: Pre: 35.00 ± 17.8 Post: 28.13 ± 13.4Segmental ROM: Pre: 12.85 ± 8.9 Post: 3.88 ± 3.4 | Total ROM: Pre: 41.67 ± 9.2 Post: 30.23 ± 15.1Segmental ROM: Pre: 16.43 ± 7.8 Post: 5.12 ± 4.8 | VAS: Neck: Pre: 5.71 ± 3.0‡ Post: 2.93 ± 2.5‡Arm:  Pre: 6.93 ± 2.0 Post: 2.79 ± 2.3 | VAS: Neck: Pre: 3.69 ± 2.9 Post: 3.63 ± 2.3Arm:  Pre: 5.63 ± 3.2 Post: 2.63 ± 2.7 |
| Hilibrand(2002) | NR | NR | NR | NR | Clinical Outcomes:\* Excellent: 50/131 (38.2%) Good: 60/131 (45.8%) Fair: 19/131 (14.5%) Poor: 2/131 (1.5%) | Clinical Outcomes:\* Excellent: 23/59 (39%) Good: 29/59 (49.2%) Fair: 6/59 (10.2%) Poor: 1/59 (1.6%) |
| Guo(2011) | JOA:  Pre: 8.3 ± 1.7 Post: 13.7 ± 1.9† Improvement: 0.6 ± 0.2 | JOA:  Pre: 7.7 ± 1.6 Post: 13.0 ± 2.0†Improvement: 0.6 ± 0.1 | NR | NR | NR | NR |
| Lin(2012) | JOA:  Pre-op: 9.25 ± 1.9 Post-op: 13.86 ± 1.6 | JOA: Pre-op: 8.86 ± 1.9 Post-op: 13.27 ± 1.8 | NDI: Pre-op: 12.56 ± 3.0 Post-op: 3.44 ± 1.7\*Odom’s Scale: Excellent: 16/57 (28%) Good: 29/57 (51%) Fair: 9/57 (16%) Poor: 3/57 (5%) | NDI: Pre-op: 12.21 ± 3.4 Post-op: 5.68 ± 2.6\*Odom’s Scale: Excellent: 14/63 (22%) Good: 30/63 (47%) Fair: 13/63 (21%) Poor: 6/63 (10%) | NR | NR |
| Song(2012) | JOA: Pre: 11.1 ± 3.1 3 mo: 14.1 ± 2.3\* Final: 13.9 ± 2.2Recovery rate: 3 mo: 56.7 ± 30.6 %  Final: 52.3 ± 29.1 % | JOA: Pre: 11.4 ± 3.4 3 mo: 14.9 ± 2.7\*\* Final: 13.6 ± 2.9Recovery rate: 3 mo: 60.1 ± 23.3 % Final: 59.74 ± 22.2 %  | NR | NR | VAS: Pre: 6.84 ± 3.8 3 mo: 3.21 ± 2.7 | VAS: Pre: 5.97 ± 2.3  3 mo: 2.53 ± 2.3 |
| Yang Liu(2012)[Spine] | JOA:  Pre: 10.8 ± 1.8 Post: 14.1 ± 1.6\* | JOA:  Pre: 10.6 ± 1.4 Post: 14.5 ± 1.8\* | NDI:  Pre: 35.1 ± 2.9 Post: 13.6 ± 2.8\* | NDI:  Pre: 35.3 ± 3.0 Post: 14.0 ± 2.9\* | Odom’s Criteria: Excellent: 23/69 (33.3%) Good: 35/69 (50.7%) Fair: 9/69 (13%) Bad: 2/69 (3%) | Odom’s Criteria: Excellent: 10/39 (25.6%) Good: 21/39 (53.8%) Fair: 5/39 (12.8%) Bad: 3/39 (7.8%) |
| Yang Liu(2012)[European Spine] | JOA: Pre: 10.2 ± 2.7 Post: 14.8 ± 2.2 | JOA: Pre: 10.7 ± 3.1 Post: 14.5 ± 2.7 | NDI: Pre: 35.6 ± 3.3 Post: 14.7 ± 3.0 | NDI: Pre: 35.2 ± 2.8 Post: 16.0 ± 3.1 | SF-36: Pre: 33.2 ± 2.1 Post: 58.5 ± 2.7 | SF-36: Pre: 34.5 ± 3.3 Post: 49.6 ± 2.9 |
| Multiple discectomies (A) versus discectomy-corpectomy hybrid (C) |
| Guo(2011) | A | C | A | C | A | C |
| JOA:  Pre: 8.3 ± 1.7 Post: 13.7 ± 1.9†Improvement: 0.6 ± 0.2 | JOA:  Pre: 8.1 ± 2.2 Post: 13.1 ±2.3†Improvement: 0.6 ± 0.2 | NR | NR | NR | NR |
| Yang Liu(2012)[Spine] | JOA:  Pre: 10.8 ± 1.8 Post: 14.1 ± 1.6\* | JOA:  Pre: 11.2 ± 1.9 Post: 13.8 ± 1.9\* | NDI:  Pre: 35.1 ± 2.9 Post: 13.6 ± 2.8\* | NDI:  Pre: 34.7 ± 2.6 Post: 14.2 ± 3.1\* | Odom’s Criteria: Excellent: 23/69 (33.3%) Good: 35/69 (50.7%) Fair: 9/69 (13%) Bad: 2/69 (3%) | Odom’s Criteria: Excellent: 21/72 (29.2%) Good: 39/72 (54.2%) Fair: 10/72 (13.9%) Bad: 2/72 (2.7%) |
| Yang Liu(2012)[European Spine] | JOA: Pre: 10.2 ± 2.7 Post: 14.8 ± 2.2 | JOA: Pre: 11.3 ± 2.5 Post: 13.9 ± 2.8 | NDI: Pre: 35.6 ± 3.3 Post: 14.7 ± 3.0 | NDI: Pre: 34.9 ± 2.9 Post: 14.3 ± 2.6 | SF-36: Pre: 33.2 ± 2.1 Post: 58.5 ± 2.7 | SF-36: Pre: 35.8 ± 2.3 Post: 52.2 ± 2.4 |

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| --- |
| Multiple corpectomies (B) versus discectomy-corpectomy hybrid (C) |
| Wei-bing(2009) | B | C | B | C | B | C |
| JOA:Pre-op: 12.3 ± 2.9Post-op: 1 wk: 14.1 ± 1.8 6 mo: 15.4 ± 1.3 12 mo: 15.6 ± 1.4 18 mo: 15.7 ± 1.2 | JOA:Pre-op: 12.6 ± 2.8Post-op: 1 wk: 14.4 ± 1.5 6 mo: 15.5 ± 1.1 12 mo: 15.6 ± 1.0 18 mo: 15.5 ± 0.9 | Functional Improvement Rate:Post-op: 1 wk: 32.1 ± 21.4 6 mo: 67.7 ± 20.1  12 mo: 70.4 ± 33.4 18 mo: 71.1 ± 26.2\* | Functional Improvement Rate:Post-op: 1 wk: 31.2 ± 27.1 6 mo: 64.1 ± 22.2  12 mo: 62.7 ± 31.3 18 mo: 54.7 ± 35.3 | NR | NR |
| Yong Liu(2009)[Zhejiang] | JOA: Pre: 10.9 ± 0.6 Post: 14.3 ± 0.7Improvement rate (%): 56.8 ± 8.9 | JOA: Pre: 11.2 ± 0.8 Post: 14.3 ± 0.5Improvement rate (%): 55.8 ± 4.0 | NDI: Pre: 34.6 ±3.4 Post: 17.2 ± 3.0 | NDI: Pre: 34.3 ± 2.8 Post: 14.9 ± 2.8 | NR | NR |
| Lian(2010) | JOA: Pre: 8.8 6 mo: 13.4 Final: 14.1 | JOA: Pre: 9.1  6 mo: 13.2 Final: 14.0 | NR | NR | VAS:Pre-op: 49.3 ± 13.3Post-op:1 day: 44.8 ± 9.61 week: 31.2 ± 9.61 month: 15.7 ± 8.13 months: 12.6 ± 7.56 months: 13.3 ± 7.1\*Final: 14.3 ± 8.1\* | VAS:Pre-op: 50.1 ± 13.7Post-op:1 day: 45.2 ± 12.71 week: 29.8 ± 10.31 month: 13.6 ± 8.23 months: 9.3 ± 6.46 months: 8.2 ± 5.9\*Final: 9.5 ± 5.8\* |
| Yang Liu(2012)[Spine] | JOA:  Pre: 10.6 ± 1.4 Post: 14.5 ± 1.8\* | JOA:  Pre: 11.2 ± 1.9 Post: 13.8 ± 1.9\* | NDI:  Pre: 35.3 ± 3.0 Post: 14.0 ± 2.9\* | NDI:  Pre: 34.7 ± 2.6 Post: 14.2 ± 3.1\* | Odom’s Criteria: Excellent: 10/39 (25.6%) Good: 21/39 (53.8%) Fair: 5/39 (12.8%) Bad: 3/39 (7.8%) | Odom’s Criteria: Excellent: 21/72 (29.2%) Good: 39/72 (54.2%) Fair: 10/72 (13.9%) Bad: 2/72 (2.7%) |
| Yang Liu(2012)[European Spine] | JOA: Pre: 10.7 ± 3.1 Post: 14.5 ± 2.7 | JOA: Pre: 11.3 ± 2.5 Post: 13.9 ± 2.8 | NDI: Pre: 35.2 ± 2.8 Post: 16.0 ± 3.1 | NDI: Pre: 34.9 ± 2.9 Post: 14.3 ± 2.6 | SF-36: Pre: 34.5 ± 3.3 Post: 49.6 ± 2.9 | SF-36: Pre: 35.8 ± 2.3 Post: 52.2 ± 2.4 |
| Guo(2011) | JOA:  Pre: 7.7 ± 1.6 Post: 13.0 ± 2.0†Improvement: 0.6 ± 0.1 | JOA:  Pre: 8.1 ± 2.2 Post: 13.1 ±2.3†Improvement: 0.6 ± 0.2 | NR | NR | NR | NR |

**Oh 2009: \*** P = 0.047 for preoperative segmental height; \*\* P = 0.047 for immediate segmental height; † P = 0.018 for postoperative segmental height; †† P = 0.009 for cervical lordosis; ‡ Neck VAS was significantly different pre to post-operative at ACDF group (P < 0.01).

\*spinal chord function improvement rate in the 2 groups (X ± S, %)

**Song 2012: \*** P = 0.027 for JOA score 3 months postoperatively for Group A; \*\* P = 0.021 for JOA score 3 months postoperatively for Group B.

**Lian 2010: \***P < 0.05 for VAS score at 6 months and final follow-up for both groups.

**Liu 2012 [Spine]: \*** P < 0.05 within group for JOA, NDI.

**Table 3. Detailed radiographic and perioperative outcome results for studies comparing discectomy vs. corpectomy. vs discectomy-corpectomy hybrid in patients with multi-level CSM.**

|  |  |  |  |
| --- | --- | --- | --- |
| **Study** | **Fusion Rate (%)** | **Sagittal Alignment (degrees)** | **Complication Rate (%)** |
| Multiple discectomies (A) versus corpectomy (B) |
| Oh(2009) | A | B | A | B | A | B |
| 6 months:14/14 (100%) | 6 months:17/17 (100%) | Segmental Height (cm): Pre: 5.54 ± 0.6 \* Immediate: 5.69 ± 0.7\*\* Post: 5.60 ± 0.7†Cervical Lordosis: Pre: 20.5 ± 11.2 Post: 23.43 ± 7.4†† | Segmental Height (cm): Pre: 5.18 ± 0.5 Immediate: 5.12 ± 0.3 Post: 4.99 ± 0.5 Cervical Lordosis: Pre: 17.35 ± 10.9 Post: 14.59 ± 10.6 | HD (days): 15.14 ± 8.5Bleeding (cc): 306.43 ± 151.1\*\*OP time (min): 140.71 ± 44.5\*\* | HD (days): 16.82 ± 7.7Bleeding (cc): 778.8 ± 644.3\*\*OP time (min): 210 ± 6\*\*Surgery-related complications: 3/17 (17.6%)Hoarseness: 1/17 (5.9%)Dura laceration: 1/17 (5.9%)Upper extremity weakness: 1/17 (5.9%) |
| Hilibrand (2002) | Arthrodesis: Multilevel: 87/131 (66.4%)2-level: 68/98 (69%)3-level: 19/33 (58%) | Arthrodesis: Total: 55/59 (93.2%)1-level: 15/16 (94%)2-level: 18/21 (88%)3-level: 20/20 (100%)4-level: 2/2 (100%) | NR | NR | NR | Graft-related complications: 6/59 (10.2%) |
| Guo(2011) | 42/43 (97.7%) | 23/24 (95.8%) | Segmental angle:  Pre: 0.6 ±10.4  Post: 15.6 ± 6.4†Mean improvement (°): 15.1 ± 8.4‡C2-C7 angle (°): Pre: -0.1 ± 12.6 Post: 14.9 ± 7.2†Mean improvement (°): 15.1 ± 9.9‡ | Segmental angle: Pre: 7.5 ± 6.8 Post: 9.8 ± 7.0†Mean improvement (°): 2.3 ± 1.9‡C2-C7 angle (°): Pre: 8.7 ± 9.5 Post: 11.4 ± 7.5†Mean improvement (°): 2.7 ± 4.5‡ | Overall: 1/43 (2.3%)Hematoma: 0/43 (0%)Pseudarthrosis: 1/43 (2.3%)C5 palsy: 0/43 (0%)Implant failure: 0/43 (0%)Titanium mesh subsidence: 0/43 (0%)CSF leaks: 0/43 (0%) | Overall: 6/24 (25%)§Hematoma: 1/24 (4.2%)Pseudarthrosis: 0/24 (0%)C5 palsy: 0/24 (0%)Implant Failure: 1/24 (4.2%)Titanium mesh subsidence: 3/24 (12.5%)CSF leaks: 1/24 (4.2%) |
| Lin(2012) | NR | NR | Segmental Lordosis: Pre-op: 9.79 ± 3.4 Post-op: 17.75 ± 2.6\*\* | Segmental Lordosis: Pre-op: 9.54 ± 3.0 Post-op: 14.49 ± 2.5\*\* | Surgery related complications: 11/57 (19.3%)Blood Loss: 102.81 ± 51.3 ml†Operation time: 138.07 ± 30.9 min‡CSF: 2/57 (3.5%)Hoarseness: 2/57 (3.5%)Epidural hematoma: 1/57 (1.8%)C5 radiculopathy: 2/57 (3.5%)Dysphagia: 4/57 (7.0%)Instrumentation/graft-related complications: 0/57 (0%)§Dislodgment: 0/57 (0.0%)Subsidence: 0/57 (0.0%) | Surgery related complications:20/63 (31.7%)Blood Loss: 149.05 ± 74 ml†Operation time: 125.08 ± 26.4 min‡CSF: 1/63 (1.6%)Hoarseness: 3/63 (4.8%) Epidural hematoma: 2/63 (3.2%)C5 radiculopathy: 3/63 (4.8%)Dysphagia: 5/63 (8.0%)Instrumentation/graft-related complications: 6/63 (9.5%)§Dislodgment: 2/63 (3.2%)Subsidence: 4/63 (6.3%) |
| Song(2012) | Fusion rate:22/25 (88.0%) | Fusion rate:14/15 (93.3%) | Final difference of segmental height: 2.1 ± 1.6\* Cervical Lordosis: Pre: 2.47 ± 5.56 (-3 to 9°) 3 mo: 10.21 ± 3.4 (7 to 14°)\*\* Final: 7.21 ± 4.1 (3 to 12°)† | Final difference of segmental height: 4.7 ± 2.6\*Cervical Lordosis: Pre: 1.04 ± 11.07 (-10 to 13°) 3 mo: 6.07 ± 5.9 (1 to 13°)\*\* Final: 3.93 ± 6.7 (-3 to 9°)† | Hospital stay (days): 10.74 ± 4.1 Blood loss (ml): 621.33 ± 138.7OP time (min): 186.3 ± 58.3ALD: 16/25 (64%)Revision surgery: 2/25 (8%)Hardware related: 2/25 (8%)Pseudoarthrosis: 3/25 (12%)Pseudoarthrosis in smokers: 2/10 (20%)Dysphagia: 3/25 (12%)Hoarseness: 2/25 (8%)Donor site pain: 1/25 (4%)Graft related: 0/25 (0%)Dural tear: 0/25 (0%) | Hospital stay (days): 18.43 ± 7.7Blood loss (ml): 1011.28 ± 533.4OP time (min): 268.4 ± 65.2ALD: 8/15 (53.3%)Revision surgery: 1/15 (6.7%)Hardware related: 0/15 (0%)Pseudoarthrosis: 1/15 (6.7%)Pseudoarthrosis in smokers: 1/6 (16.7%)Dysphagia: 3/15 (20%)Hoarseness: 2/15 (13.3%)Donor site pain: 4/15 (26.7%)Graft related: 2/15 (13.3%)Dural tear: 1/15 (6.7%) |
| Yang Liu (2012)[Spine] | 69/69 (100%) | 33/39 (84.6%) | Cervical Lordosis:C2-C7 angle (°): Pre: 11.87 ± 11.71 Final: 24.27 ± 10.17\*Segmental lordosis (°): Pre: 4.97 ± 8.26 Post: 18.66 ± 7.78\* | Cervical Lordosis:C2-C7 angle (°): Pre: 12.07 ± 11.82 Final: 15.63 ± 12.41Segmental lordosis (°): Pre: 5.98 ± 8.63 Post: 15.73 ± 6.31 | Operation time: 143.6 ± 31.7\*\*Blood loss: 107.5 ± 49.6\*\*Hardware breakage: 0/69 (0%)Graft dislodgement: 0/69 (0%)Subsidence: 0/69 (0%)Dysphagia: 8/69 (11.6%)Hoarseness: 3/69 (4.3%)C5 palsy: 2/69 (2.9%)Cerebral fluid leakage: 1/69 (1.4%)Epidural hematoma: 1/69 (1.4%)Infection: 0/69 (0%)Total: 15/69 (21.7%) | Operation time: 116.5 ± 29.8\*\*Blood loss: 172.3 ± 68.2\*\*Hardware breakage: 0/39 (0%)Graft dislodgement: 2/39 (5.1%)Subsidence: 3/39 (7.7%)Dysphagia: 4/39 (10.3%)Hoarseness: 2/39 (5.1%)C5 palsy: 4/39 (10.3%)Cerebral fluid leakage: 0/39 (0%)Epidural hematoma: 1/39 (2.6%)Infection: 1/39 (2.6%)Total: 17/39 (43.6%) |
| Yang Liu (2012) [European Spine] | 100% | 92.0% | NR | NR | Graft malfunction: 0/0 (0%)Dysphagia: 6/103 (5.82%)Hoarneness: 4/103 (3.88%)C5 palsy: 4/103 (3.88%)Cerebral fluid leakage: 2/103 (1.94%)Wound infection: 0/0 (0%)Total: 16/103 (15.53%) | Graft malfunction: 7/87 (8.05%)Dysphagia: 2/87 (2.30%)Hoarneness: 3/87 (3.45%)C5 palsy: 10/87 (11.49%)Cerebral fluid leakage: 0/0 (0%)Wound infection: 1/87 (1.15%)Total: 23/87 (26.44%) |

|  |
| --- |
| Multiple discectomies (A) versus discectomy-corpectomy hybrid (C) |
| Guo(2011) | A | C | A | C | A | C |
| 42/43 (97.7%) | 53/53 (100%) | Segmental angle:  Pre: 0.6 ±10.4  Post: 15.6 ± 6.4†Mean improvement (°): 15.1 ± 8.4‡C2-C7 angle (°): Pre: -0.1 ± 12.6 Post: 14.9 ± 7.2†Mean improvement (°): 15.1 ± 9.9‡ | Segmental angle:  Pre: 6.9 ± 8.3 Post: 16.3 ± 7.2†Mean improvement (°): 9.4 ± 5.2‡C2-C7 angle (°): Pre: 9.7 ± 8.6 Post: 17.8 ± 7.7†Mean improvement (°): 8.1 ± 5.2‡ | Overall: 1/43 (2.3%)Pseudarthrosis: 1/43 (2.3%)Hematoma: 0/43 (0.0%)C5 palsy: 0/43 (0.0%)Titanium mesh subsidence: 0/43 (0.0%)CSF leaks: 0/43 (0.0%) | Overall: 8/53 (15.1%)Pseudarthrosis: 0/53 (0.0%)Hematoma: 1/53 (1.9%)C5 palsy: 1/53 (1.9%)Titanium mesh subsidence: 5/53 (9.4%)CSF leaks: 1/53 (1.9%) |
| Yang Liu (2012)[Spine] | 69/69 (100%) | 68/72 (94.4%) | Cervical Lordosis:C2-C7 angle (°): Pre: 11.87 ± 11.71 Final: 24.27 ± 10.17\*Segmental lordosis (°): Pre: 4.97 ± 8.26 Post: 18.66 ± 7.78\* | Cervical Lordosis:C2-C7 angle (°): Pre: 13.75 ± 10.98 Final: 23.21 ± 9.55Segmental lordosis (\*): Pre: 7.83 ± 9.87 Post: 20.30 ± 10.38 | Operation time: 143.6 ± 31.7\*\*Blood loss: 107.5 ± 49.6\*\*Hardware breakage: 0/69 (0%)Graft dislodgement: 0/69 (0%)Subsidence: 0/69 (0%)Dysphagia: 8/69 (11.6%)Hoarseness: 3/69 (4.3%)C5 palsy: 2/69 (2.9%)Cerebral fluid leakage: 1/69 (1.4%)Epidural hematoma: 1/69 (1.4%)Infection: 0/69 (0%)Total: 15/69 (21.7%) | Operation time: 129.4 ± 25.9\*\*Blood loss: 141.5 ± 52.8\*\*Hardware breakage: 1/72 (1.4%)Graft dislodgement: 2/72 (2.8%)Subsidence: 1/72 (1.4%)Dysphagia: 7/72 (9.7%)Hoarseness: 2/72 (2.8%)C5 palsy: 2/72 (2.8%)Cerebral fluid leakage: 0/72 (0%)Epidural hematoma: 0/72 (0%)Infection: 1/72 (1.4%)Total: 16/72 (22.2%) |
| Yang Liu (2012) [European Spine] | 100% | 95.8% | NR | NR | Graft malfunction: 0/0 (0%)Dysphagia: 6/103 (5.82%)Hoarneness: 4/103 (3.88)C5 palsy: 4/103 (3.88)Cerebral fluid leakage: 2/103 (1.94%)Wound infection: 0/0 (0%)Total: 16/103 (15.53%) | Graft malfunction: 4/96 (4.17%)Dysphagia: 5/96 (5.21%)Hoarneness: 3/96 (3.13%)C5 palsy: 8/96 (8.33%)Cerebral fluid leakage: 1/96 (1.04%)Wound infection: 1/96 (1.04%)Total: 22/96 (22.92%) |
| **Study** | **Fusion Rate (%)** | **Sagittal Alignment (degrees)** | **Complication Rate (%)** |
| Multiple corpectomies (B) versus discectomy-corpectomy hybrid (C)  |
| Wei-bing (2009) | B | C | B | C | B | C |
| NR | NR | NR | NR | Graft dislodgment: 3/39 (7.7%)Graft/plate migration: 4/39 (10.3%)Loosening rate: 17.9%Revision: 4/39 (10.3%)>3mo. Stabilization: 3/39 (7.7%) | >3mo. Stabilization: 2/20 (10%) |
| Yong Liu (2009) [Zhejiang] | 94% | 100% | Segmental lordosis (°): Pre: 5.063 ± 11.980 Post: 13.000 ± 4.351 | Segmental lordosis (°): Pre: 3.750 ± 9.450 Post: 10.667 ± 3.676 | Unilateral deltoid weakness: 1/16 (6.3%)C5 palsy: 1/16 (6.3%)Implant complications: 0/16 (0%) | Implant complications: 0/12 (0%) |
| Lian(2010) | 6 months: 32/50 (64%)1 year: 48/50 (96%) | 6 months: 52/55 (94.5%)1 year: 55/55 (100%) | Lordosis of C2-7 (°):Pre-op: 6.7 ± 8.0 Post-op:1 day: 13.1 ± 7.8 6 months: 11.2 ± 7.2 Final: 9.1 ± 6.8 Loss of cervical lordosis (°):6 months: 2.0 ± 1.0 Final: 4.0 ± 1.4 Loss of height of fusion segments (mm):6 months: 1.9 ± 0.7 Final: 3.1 ± 0.9 | Lordosis of C2-7 (°):Pre-op: 6.4 ± 8.6 Post-op:1 day: 14.2 ± 7.2 6 months: 13.4 ± 6.6 Final: 12.8 ± 6.3 Loss of cervical lordosis (°):6 months: 0.8 ± 0.9 Final: 1.4 ± 1.3 Loss of height of fusion segments (mm):6 months: 0.8 ± 0.5 Final: 1.0 ± 0.6  | Operative time (min): 168.3 ± 31.7\*Blood loss (ml): 378.6 ± 111.4\*\*Hematoma: 1/50 (2%)Cerebral fluid leakage: 1/50 (2%)Re-operation posteriorly: 2/50 (4%)Recurrent laryngeal nerve palsy: 1/50 (2%)C5 paresis: 0/50 (0%)Axial pain: 4/50 (8%) | Operative time (min): 140.2 ± 27.1\*Blood loss (ml): 269.1 ± 97.2\*\*Hematoma: 0/55 (0%)Cerebral fluid leakage: 2/55 (3.6%)Re-operation posteriorly: 0/55 (0%)Recurrent laryngeal nerve palsy: 1/55 (1.8%)C5 paresis: 2/55 (3.6%)Axial pain: 3/55 (5.5%) |
| Yang Liu(2012)[Spine] | 33/39 (84.6%) | 68/72 (94.4%) | Cervical Lordosis: Pre: 12.07 ± 11.82†C2-C7 angle (°): Final: 15.63 ± 12.41Segmental lordosis (°):† Pre: 5.98 ± 8.63 Post: 15.73 ± 6.31 | Cervical Lordosis: Pre: 13.75 ± 10.98†C2-C7 angle (°): Final: 23.21 ± 9.55Segmental lordosis (°):† Pre: 7.83 ± 9.87 Post: 20.30 ± 10.38 | Operation time: 116.5 ± 29.8\*\*Blood loss: 172.3 ± 68.2\*\*Hardware breakage: 0/39 (0%)Graft dislodgement: 2/39 (5.1%)Subsidence: 3/39 (7.7%)Dysphagia: 4/39 (10.3%)Hoarseness: 2/39 (5.1%)C5 palsy: 4/39 (10.3%)Cerebral fluid leakage: 0/39 (0%)Epidural hematoma: 1/39 (2.6%)Infection: 1/39 (2.6%)Total: 17/39 (43.6%)† | Operation time: 129.4 ± 25.9\*\*Blood loss: 141.5 ± 52.8\*\*Hardware breakage: 1/72 (1.4%)Graft dislodgement: 2/72 (2.8%)Subsidence: 1/72 (1.4%)Dysphagia: 7/72 (9.7%)Hoarseness: 2/72 (2.8%)C5 palsy: 2/72 (2.8%)Cerebral fluid leakage: 0/72 (0%)Epidural hematoma: 0/72 (0%)Infection: 1/72 (1.4%)Total: 16/72 (22.2%)† |
| Yang Liu(2012)[European Spine] | 92.0% | 95.8% | NR | NR | Graft malfunction: 7/87 (8.05%)Dysphagia: 2/87 (2.30%)Hoarneness: 3/87 (3.45%)C5 palsy: 10/87 (11.49%)Cerebral fluid leakage: 0/0 (0%)Wound infection: 1/87 (1.15%)Total: 23/87 (26.44%) | Graft malfunction: 4/96 (4.17%)Dysphagia: 5/96 (5.21%)Hoarneness: 3/96 (3.13%)C5 palsy: 8/96 (8.33%)Cerebral fluid leakage: 1/96 (1.04%)Wound infection: 1/96 (1.04%)Total: 22/96 (22.92%) |

**Oh 2009: \***P < 0.001 for Bleeding (cc) and OP time (minutes) between groups.

**Song 2012:** \*P = 0.041 for difference of segmental height between groups; \*\* P = 0.037 for cervical lordosis 3 months postoperatively between groups; † P = 0.024 for cervical lordosis at final follow-up between groups.

**Guo 2011:** PR-SA preop-segmental angle; PO-SA postop-segmental angle; PR-CA preop-C2-C7 angle; PO-CA postop-C2-C7 angle; MSAI mean segmental angle improvement; MCAI mean C2-C7 angle improvement. P < 0.01, compared with the preoperative data using paired t test; ‡ P < 0.01, compared with the other two groups using analysis of variance, § P < 0.05, compared with (A) using Fisher exact test.

**Lin 2012:** \*P = 0.000 for Post-op NDI scores between groups, \*\*P = 0.000 for Post-op Segmental lordosis between groups, †P = 0.000 for blood loss; ‡ P = 0.021 for operation time; § P = 0.032 for overall instrumentation and graft related complications.

**Lian 2010:** \*P < 0.05 for operative time between groups; \*\* P < 0.001 for blood loss between groups.

**Liu 2012 [Spine]: \*** P < 0.01 within group for C2-C7 angle at final follow-up and for the postoperative segmental angle at the final follow-up; \*\* P < 0.05 between groups for operation time and blood loss; † P < 0.05 between groups C and D for cervical lordosis, segmental lordosis and complication rates.

**Results tables:**

**Neck Disability Index**

**Table 4. Studies comparing discectomy to corpectomy for CSM based on NDI scores at last follow up.**

|  | **Discectomy** | **Corpectomy surgery** |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Author** | **Pre and post score****(mean ± SD)** | **Change score****(mean ± SD\*)** | **Pre and post score****(mean ± SD)** | **Change score****(mean ± SD)**  | **Difference in** **change scores\*\*** | **p-value** | **SMD†** |
| **Lin****(2011)** | **Pre**n = 57 | **Post**58.7 mos | -9.2 ± 1.93 | **Pre**n = 63 | **Post**57.9 mos | -6.5 ± 2.04 | -2.7 ± 1.26 | <.0001 | -2.140 |
| 12.6 ± 3.0 | 3.4 ± 1.7 | 12.2 ± 3.4 | 5.7 ± 2.6 |
| **Liu (Spine)****(2012)** | **Pre**n = 69 | **Post**26.1 mos | -21.5 ± 1.80 | **Pre**n = 39 | **Post**26.1 mos | -21.3 ± 1.87 | -0.2 ± 1.16 | .59 | -0.172 |
| 35.1 ± 2.9 | 13.6 ± 2.8 | 35.3 ± 3.0 | 14.0 ± 2.9 |
| **Liu (ESJ)****(2012)** | **Pre**n = 103 | **Post**3.6 years | -20.9 ± 2.01 | **Pre**n = 87 | **Post**3.6 years | -19.2 ± 1.89 | -1.7 ± 1.24 | <.0001 | -1.372 |
| 35.6 ± 3.3 | 14.7 ± 3.0 | 35.2 ± 2.8 | 16.0 ± 3.1 |

\*Imputed using formula that includes pre and post standard deviation and a correlation coefficient coefficient of .80

\*\*Calculated by subtracting the posterior surgery change score from the anterior surgery change scores.

**Table 5. Studies comparing discectomy to discectomy-corpectomy hybrid surgery for CSM based on NDI scores at last follow up.**

|  | **Discectomy** | **Discectomy-Corpectomy hybrid surgery** |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Author** | **Pre and post score****(mean ± SD)** | **Change score****(mean ± SD\*)** | **Pre and post score****(mean ± SD)** | **Change score****(mean ± SD)**  | **Difference in** **change scores\*\*** | **p-value** | **SMD†** |
| **Liu (Spine)****(2012)** | **Pre**n = 69 | **Post**26.1 mos | -21.5 ± 1.80 | **Pre**n = 72 | **Post**26.1 mos | -20.5 ± 1.86 | -1 ± 1.16 | .002 | -0.861 |
| 35.1 ± 2.9 | 13.6 ± 2.8 | 34.7 ± 2.6 | 14.2 ± 3.1 |
| **Liu (ESJ)****(2012)** | **Pre**n = 103 | **Post**3.6 years | -20.9 ± 2.01 | **Pre**n = 96 | **Post**3.6 years | -20.6 ± 1.76 | -0.3 ± 1.22 | .27 | -0.246 |
| 35.6 ± 3.3 | 14.7 ± 3.0 | 34.9 ± 2.9 | 14.3 ± 2.6 |

**†**Calculated by subtracting the mean change scores and dividing by the change score standard deviations. Positive scores indicate treatment favors anterior surgery.

NC = not calculable (standard deviations not reported)

**Table 6. Studies comparing corpectomy to discectomy-corpectomy hybrid surgery for CSM based on NDI scores at last follow up.**

|  | **Corpectomy** | **Discectomy-Corpectomy hybrid surgery** |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Author** | **Pre and post score****(mean ± SD)** | **Change score****(mean ± SD\*)** | **Pre and post score****(mean ± SD)** | **Change score****(mean ± SD)**  | **Difference in** **change scores\*\*** | **p-value** | **SMD†** |
| **Liu (Spine)****(2012)** | **Pre**n = 39 | **Post**26.1 mos | -21.3 ± 1.87 | **Pre**n = 72 | **Post**26.1 mos | -20.5 ± 1.86 | -0.8 ± 1.18 | .03 | -0.678 |
| 35.3 ± 3.0 | 14.0 ± 2.9 | 34.7 ± 2.6 | 14.2 ± 3.1 |
| **Liu (ESJ)****(2010)** | **Pre**n = 87 | **Post**3.6 years | -19.2 ± 1.89 | **Pre**n = 96 | **Post**3.6 years | -20.6 ± 1.76 | 1.4 ± 1.16 | <.0001 | 1.207 |
| 35.2 ± 2.8 | 16.0 ± 3.1 | 34.9 ± 2.9 | 14.3 ± 2.6 |
| **Liu (Zhejiang)****(2009)** | **Pre**n = 16 | **Post**17.3 mos | -17.4 ± 2.06 | **Pre**n = 12 | **Post**17.3 mos | -19.4 ± 1.77 | 2 ± 1.24 | .01 | 1.611 |
| 34.6 ± 3.4 | 17.2 ± 3.0 | 34.3 ± 2.8 | 14.9 ± 2.8 |

**†**Calculated by subtracting the mean change scores and dividing by the change score standard deviations. Positive scores indicate treatment favors anterior surgery.

NC = not calculable (standard deviations not reported)

**Japanese Orthopedic Association Scores**

**Table 7. Studies comparing discectomy to corpectomy for CSM based on JOA scores at last follow-up.**

|  | **Discectomy** | **Corpectomy surgery** |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Author** | **Pre and post score****(mean ± SD)** | **Change score****(mean ± SD\*)** | **Pre and post score****(mean ± SD)** | **Change score****(mean ± SD)**  | **Difference in** **change scores\*\*** | **p-value** | **SMD†** |
| **Oh****(2009)** | **Pre**n = 14 | **Post**24.9 mos | 1.8 ± 0.90 | **Pre**n = 17 | **Post**27.3 mos | 1.3 ± 1.26 | 0.5 ± 0.76 | .22 | 0.655 |
|  | 13.5 ± 1.2 | 15.3 ± 1.5 | 13.4 ± 2.1 | 14.7 ± 1.7 |
| **Guo****(2011)** | **Pre**n = 43 | **Post**37.7 mos | 0.6 ± 0.2 | **Pre**n = 24 | **Post**37.3 mos | 0.6 ± 0.1 | 1.77636E-15 ± 0.13 | 1.0 | 0.000 |
| 13.7 ± 1.9 | 14.3 | 13.0 ± 2.0 | 13.6  |
| **Song****(2012)** | **Pre**n = 25 | **Post**3 mos | 3.0 | **Pre**n = 15 | **Post**3 mos | 3.5 | NC | NC | NC |
| 11.1± 3.1 | 14.1 ± 2.3 | 11.4 ± 3.4 | 14.9 ± 2.7 |
| **Post** 87.3 mos | 2.8 ± 1.88 | **Post** 94.3 mos | 2.2 ± 2.05 | 0.6 ± 1.25 | .35 | 0.479 |
| 13.9 ± 2.2 | 13.6 ± 2.9 |
| **Lin****(2011)** | **Pre**n = 57 | **Post**58.7 mos | 4.6 ± 1.14 | **Pre**n = 63 | **Post**57.9 mos | 4.4 ± 1.17 | 0.2 ± 0.73 | .35 | 0.273 |
| 9.3 ± 1.9 | 13.9 ± 1.6 | 8.9 ± 1.9 | 13.3 ± 1.8 |
| **Liu (Spine)****(2012)** | **Pre**n = 69 | **Post**26.1 mos | 3.3 ± 1.09 | **Pre**n = 39 | **Post**26.1 mos | 3.9 ± 1.08 | -0.6 ± 0.69 | .007 | -0.873 |
| 10.8 ± 1.8 | 14.1 ± 1.6 | 10.6 ± 1.4 | 14.5 ± 1.8 |
| **Liu (ESJ)****(2010)** | **Pre**n = 103 | **Post**3.6 years | 4.6 ± 1.62 | **Pre**n = 87 | **Post**3.6 years | 3.8 ± 1.87 | 0.8 ± 1.13 | .002 | 0.708 |
| 10.2 ± 2.7 | 14.8 ± 2.2 | 10.7 ± 3.1 | 14.5 ± 2.7 |

NC – difference in change scores, P-values, and SMDs only calculated at final follow up.

\*Imputed using formula that includes pre and post standard deviation and a correlation coefficient coefficient of .80

\*\*Calculated by subtracting the posterior surgery change score from the anterior surgery change scores.

**Table 8. Studies comparing discectomy to discectomy-corpectomy hybrid surgery for CSM based on JOA scores at last follow up.**

|  | **Discectomy** | **Discectomy-Corpectomy hybrid surgery** |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Author** | **Pre and post score****(mean ± SD)** | **Change score****(mean ± SD\*)** | **Pre and post score****(mean ± SD)** | **Change score****(mean ± SD)**  | **Difference in** **change scores\*\*** | **p-value** | **SMD†** |
| **Guo****(2011)** | **Pre**n = 43 | **Post**37.7 mos | 0.6 ± 0.2 | **Pre**n = 53 | **Post**37.3 mos | 0.6 ± 0.2 | 1.77636E-15 ± 0.13 | 1.0 | 0.000 |
| 13.7 ± 1.9 | 14.3 | 13.1 ± 2.3 | 13.7 |
| **Liu (Spine)****(2012)** | **Pre**n = 69 | **Post**26.1 mos | 3.3 ± 1.09 | **Pre**n = 72 | **Post**26.1 mos | 2.6 ± 1.20 | 0.7 ± 0.73 | .0004 | 0.955 |
| 10.8 ± 1.8 | 14.1 ± 1.6 | 11.2 ± 1.9 | 13.8 ± 1.9 |
| **Liu (ESJ)****(2010)** | **Pre**n = 103 | **Post**3.6 years | 4.6 ± 1.62 | **Pre**n = 96 | **Post**3.6 years | 2.6 ± 1.70 | 2 ± 1.05 | <.0001 | 1.900 |
| 10.2 ± 2.7 | 14.8 ± 2.2 | 11.3 ± 2.5 | 13.9 ± 2.8 |

**†**Calculated by subtracting the mean change scores and dividing by the change score standard deviations. Positive scores indicate treatment favors anterior surgery.

NC = not calculable (standard deviations not reported)

**Table 9. Studies comparing corpectomy to discectomy-corpectomy hybrid surgery for CSM based on JOA scores at last follow up.**

|  | **Corpectomy** | **Discectomy-Corpectomy hybrid surgery** |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Author** | **Pre and post score****(mean ± SD)** | **Change score****(mean ± SD\*)** | **Pre and post score****(mean ± SD)** | **Change score****(mean ± SD)**  | **Difference in** **change scores\*\*** | **p-value** | **SMD†** |
| **Wei-bing****(2009)** | **Pre**n = 39 | **Post**1 week | 1.8 | **Pre**n = 20 | **Post**1 week | 1.8 | NC | NC | NC |
| 12.3 ± 2.9 | 14.1 ± 1.8 | 12.6 ± 2.8 | 14.4 ± 1.5 |
| **Post**6 mos | 3.1 | **Post**6 mos | 2.9 | NC | NC | NC |
| 15.4 ± 1.3 | 15.5 ± 1.1 |
| **Post**12 mos | 3.3 | **Post**12 mos | 3.0 | NC | NC | NC |
| 15.6 ± 1.4 | 15.6 ± 1.0 |
| **Post**18 mos | 3.4 ± 2.07 | **Post**18 mos | 2.9 ± 2.15 | 0.5 ± 1.34 | .39 | 0.374 |
| 15.7 ± 1.2 | 15.5 ± 0.9 |
| **Liu (Spine)****(2012)** | **Pre**n = 39 | **Post**26.1 mos | 3.9 ± 1.08 | **Pre**n = 72 | **Post**26.1 mos | 2.6 ± 1.20 | 1.3 ± 0.73 | <.0001 | 1.779 |
| 10.6 ± 1.4 | 14.5 ± 1.8 | 11.2 ± 1.9 | 13.8 ± 1.9 |
| **Liu (ESJ)****(2010)** | **Pre**n = 87 | **Post**3.6 years | 3.8 ± 1.87 | **Pre**n = 96 | **Post**3.6 years | 2.6 ± 1.70 | 1.2 ± 1.14 | <.0001 | 1.051 |
| 10.7 ± 3.1 | 14.5 ± 2.7 | 11.3 ± 2.5 | 13.9 ± 2.8 |
| **Liu (Zhejiang)****(2009)** | **Pre**n = 16 | **Post**17.3 mos | 3.4 ± 1.37 | **Pre**n = 12 | **Post**17.3 mos | 3.1 ± 0.50 | 0.3 ± 1.01 | .48 | 0.296 |
| 10.9 ± 1.8 | 14.3 ± 0.6 | 11.2 ± 0.8 | 14.3 ± 0.5 |
|  | 14.0 |  | 14.1 |

**†**Calculated by subtracting the mean change scores and dividing by the change score standard deviations. Positive scores indicate treatment favors anterior surgery.

NC = not calculable (standard deviations not reported)

**Visual Analog Scale for pain**

**Table 10. Studies comparing discectomy to corpectomy for CSM based on VAS scores at last follow up.**

|  | **Discectomy** | **Corpectomy surgery** |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Author** | **Pre and post score****(mean ± SD)** | **Change score****(mean ± SD\*)** | **Pre and post score****(mean ± SD)** | **Change score****(mean ± SD)**  | **Difference in** **change scores\*\*** | **p-value** | **SMD†** |
| **Oh****(2009)** | **Pre**n = 14 | **Post**24.9 mos | -2.78 ± 1.8 | **Pre**n = 17 | **Post**27.3 mos | -0.06 ± 1.7 | -2.7 ± 1.1 | .0002 | -2.4 |
|  | 5.71 ± 3.0 | 2.93 ± 2.5 | 3.69 ± 2.9 | 3.63 ± 2.3 |
| **Song****(2012)** | **Pre**n = 25 | **Post**3 mos | -3.63 | **Pre**n = 15 | **Post**3 mos | -3.44 | -.07 ± 1.4 | .92 | -.05 |
| 6.84 ± 3.8 | 3.21 ± 2.7 | 5.97 ± 2.3 | 2.53 ± 2.3 |
| **Post** 87.3 mos | -3.08 ± 2.3 | **Post** 94.3 mos | -3.01 ± 1.6 |
| 3.76 ± 2.9 | 2.96 ± 2.7 |

\*\*Calculated by subtracting the corpectomy surgery change score from the discectomy surgery change scores.

**Sagittal alignment**

**Table 11. Studies comparing discectomy to corpectomy for CSM based on sagittal alignment scores.**

|  | **Discectomy** | **Corpectomy surgery** |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Author** | **Pre and post score****(mean ± SD)** | **Change score****(mean ± SD\*)** | **Pre and post score****(mean ± SD)** | **Change score****(mean ± SD)**  | **Difference in** **change scores\*\*** | **p-value** | **SMD†** |
| **Lin****(2012)** | **Pre**n = 57 | **Post**24 mos | 7.96 ± 2.04 | **Pre**n = 63 | **Post**24 mos | 4.95 ± 1.8 | 3.01 | <.0001 | 2.432194 |
|  | 9.79 | 17.75 | 9.54 | 14.49 |
| **Liu****(2012)** | **Pre**n = 69 | **Post**26.1 mos | 12.4 ± 7.07 | **Pre**n = 39 | **Post**26.1 mos | 3.56 ± 7.68 | 8.84 | <.0001 | 1.880224 |
| 11.87 | 24.27 | 12.07 | 15.63 |
| **Oh****(2009)** | **Pre**n = 14 | **Post**24.9 mos | 2.93 ± 6.9 | **Pre**n = 17 | **Post**27.3 mos | -2.76 ± 6.8 | 5.69 | .95 | 1.312767 |
|  | 20.5 | 23.43 | 17.35 | 14.59 |
| **Song****(2012)** | **Pre**n = 25 | **Post**87.3 mos | 4.74 ± 3.35 | **Pre**n = 15 | **Post**94.3 mos | 2.89 ± 6.98 | 1.85 | .26 | 0.389677 |
| 2.47 | 7.21 | 1.04 | 3.93 |
| **Guo****(2009)** | **Pre**n = 43 | **Post**37.7 mos | 15.0 ± 8.09 | **Pre**n = 24 | **Post**37.3 mos | 2.7 ± 5.7 | 12.3 | <.0001 | 2.502612 |
| -0.1 | 14.9 | 8.7 | 11.4 |

\*\*Calculated by subtracting the corpectomy surgery change score from the discectomy surgery change scores.

**Table 12. Studies comparing discectomy to discectomy-corpectomy hybrid surgery for CSM based on sagittal alignment scores.**

|  | **Discectomy** | **Hybrid surgery** |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Author** | **Pre and post score****(mean ± SD)** | **Change score****(mean ± SD\*)** | **Pre and post score****(mean ± SD)** | **Change score****(mean ± SD)**  | **Difference in** **change scores\*\*** | **p-value** | **SMD†** |
| **Liu****(2012)** | **Pre**n = 69 | **Post**26.1 mos | 12.4 ± 7.07 | **Pre**n = 72 | **Post**26.1 mos | 9.46 ± 6.63 | 2.94 | .01 | 0.675307 |
|  | 11.87 | 24.27 | 13.75 | 23.21 |
| **Guo****(2009)** | **Pre**n = 43 | **Post**37.7 mos | 15.0 ± 8.09 | **Pre**n = 53 | **Post**37.3 mos | 8.1 ± 5.22 | 6.9 | <.0001 | 1.376785 |
| -0.1 | 14.9 | 9.7 | 17.8 |

\*\*Calculated by subtracting the hybrid surgery change score from the discectomy surgery change scores.

**Table 13. Studies comparing corpectomy to discectomy-corpectomy hybrid surgery for CSM based on sagittal alignment scores.**

|  | **Corpectomy** | **Hybrid surgery** |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Author** | **Pre and post score****(mean ± SD)** | **Change score****(mean ± SD\*)** | **Pre and post score****(mean ± SD)** | **Change score****(mean ± SD)**  | **Difference in** **change scores\*\*** | **p-value** | **SMD†** |
| **Liu****(2012)** | **Pre**n = 39 | **Post**26.1 mos | 3.56 ± 7.68 | **Pre**n = 72 | **Post**26.1 mos | 9.46 ± 6.63 | -5.9 | <.0001 | -1.272882 |
| 12.07 | 15.63 | 13.75 | 23.21 |
| **Liu****(2009)** | Pren = 16 | Post17.3 mos | 7.937 ± 8.89 | Pren = 12 | Post17.3 mos | 6.917 ± 6.87 | 1.02 | .74 | 0.191009 |
| 5.063 | 13.0 | 3.75 | 10.667 |
| **Guo****(2009)** | **Pre**n = 24 | **Post**37.3 mos | 2.7 ± 5.7 | **Pre**n = 53 | **Post**37.3 mos | 8.1 ± 5.22 | -5.4 | .0001 | -1.54977 |
| 8.7 | 11.4 | 9.7 | 17.8 |

\*\*Calculated by subtracting the hybrid surgery change score from the corpectomy surgery change scores.

Table 14. Level of Evidence

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Methodological Principle** | **Guo****(2011)** | **Oh****(2009)** | **Hilibrand****(2002)** | **Lin****(2011)** | **Song****(2012)** | **Liu [Spine]****(2012)** | **Liu [ESJ]****(2010)** | **Liu [Zhejiang]****(2009)** | **Wei-bing****(2009)** | **Lian****(2010)** |
| Study design |  |  |  |  |  |  |  |  |  |  |
| Randomized controlled trial |  |  |  |  |  |  |  |  |  |  |
| Cohort Study | ⏹ | ⏹ | ⏹ | ⏹ | ⏹ | ⏹ | ⏹ | ⏹ | ⏹ | ⏹ |
| Case-series |  |  |  |  |  |  |  |  |  |  |
| Statement of concealed allocation† |  |  |  |  |  |  |  |  |  |  |
| Intention to treat† |  |  |  |  |  |  |  |  |  |  |
| Independent or blind assessment |  |  |  |  |  |  |  |  |  |  |
| Co-interventions applied equally |  |  |  |  |  |  |  |  |  |  |
| Complete follow-up of >85% |  |  |  |  |  |  |  |  | ⏹ | ⏹ |
| Adequate sample size | ⏹ | ⏹ | ⏹ | ⏹ | ⏹ | ⏹ | ⏹ |  | ⏹ | ⏹ |
| Controlling for possible confounding |  |  |  |  | ⏹ | ⏹ | ⏹ |  |  | ⏹ |
| Prospective study |  |  |  |  |  |  |  |  |  |  |
| **Evidence Level** | III | III | III | III | III | III | III | III | III | III |