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| **Supplemental Table** 1**:** Fusion rates, complications, and patient-reported outcomes from 28 studies, by graft material  **Study Information** |  |  |  |  | **Complications (%)** |  |  |  |  |  |  |  | **Patient-Reported Outcomes** |  |  |
| **Graft** **Material** | **Study** | **Cage** (**if** **specified**) | **# Patients in graft study arm** | **Fusion Rate (%)** | **Overall** | **Radiculitis** | **Graft site pain** | **Lumbar** **infection** | **Pseudoar-throsis** | **Heterotropic Ossification** | **Vertebral Osteolysis** | **ASD** | **Δ VAS-back** | **Δ VAS-leg** | **Δ ODI** |
| Local Autograft |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Abou-Madawi et al. | PEEK | 54 | 93 |  |  |  |  |  |  |  |  | 4.6 ± 4.2 |  | 29.1 ± 10.6 |
|  | Adams CL et al. | PEEK or CFRP | 19 |  |  | 5.3 |  |  |  |  |  | 5.3 | 5.01 ± 3.6 | 1.01 ± 3.1 | 20.2 ± 23.3 |
|  | Kersten et al. | PEEK | 48 | 88 |  |  |  |  |  |  |  |  | 2.75 ± 3.33 | 3.5 ± 3.3 | 11.3 ± 13.0 |
|  | Kersten et al. | Silicon Nitride Si3N4 | 44 | 82 |  |  |  |  |  |  |  |  | 2.35 ± 3.4 | 2.9 ± 4.2 |  |
|  | Li et al. | Static PEEK | 178 |  |  |  |  |  |  |  |  |  | 2.28 ± 3.0 | 2.99 ± 2.5 |  |
|  | Li et al. | Expandable PEEK | 106 |  |  |  |  |  |  |  |  |  | 2.25 ± 2.9 | 3.18 ± 2.3 |  |
|  | Nemoto et al. | Titanium | 23 | 96 |  |  |  |  |  |  |  |  | 4.47 ± 2.6 | 4.3 ± 2.5 |  |
|  | Nemoto et al. | PEEK | 25 | 76 |  |  |  |  |  |  |  |  | 3.64 ± 2.9 | 4.24 ± 2.0 |  |
|  | Sasaki et al. | PEEK | 20 |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Sasaki et al. | Titanium | 16 |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Sasaki et al. | Titanium + PEEK | 13 |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Sasaki et al. | Tantalum | 35 |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Sleem et al. | - | 23 |  |  |  |  |  |  |  |  |  | 5.57 ± 1.4 |  |  |
|  | Zhu et al. | Uncoated PEEK | 32 | 100 |  |  |  |  |  |  |  |  | 4.3 ± 1.7 | 4.6 ± 1.7 |  |
|  | Zhu et al. | Ti- and HA-coated PEEK | 32 | 100 |  |  |  |  |  |  |  |  | 4.5 ± 1.9 | 5.0 ± 1.6 |  |
|  | Sethi et al. | PEEK or Allograft spacer | 19 | 100 |  |  |  |  |  |  |  |  | 3.0 ± 3.9 | 3.4 ± 4.5 | 37 ± 24.8 |
|  | Lv et al. | PEEK | 84 |  |  |  |  |  |  |  |  |  |  |  | 21 |
|  | Lv et al. | non-PEEK | 96 |  |  |  |  |  |  |  |  |  |  |  | 26 |
|  | Yang et al. | Nanohydroxyapatite/polyamide-66 | 87 | 96.6 |  |  |  |  |  |  |  |  | 1.95 ± 1.7 | 5.1 ± 1.2 | 32.6 ± 8.0 |
| Allograft |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Crandall et al. | PEEK | 509 |  |  |  |  |  |  |  |  |  |  | 3.2 | 24.8 |
|  | Kotani et al. | PEEK | 142 |  |  |  |  |  | 4 |  |  | 10 | 2.86 ± 4.4 | 2.8 ± 5.1 |  |
|  | Tally et al. | Titanium | 75 | 96 |  |  |  |  |  |  |  |  |  |  |  |
| BMP |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Adams et al. | PEEK or CFRP | 51 |  |  | 27.5 |  |  |  |  |  | 5.9 | 4.19 ± 3.4 | 4.2 ± 3.7 | 23 ± 24.5 |
|  | Ahn et al. | - | 36 |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Haws et al. (2018) | - | 49 |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Haws et al. (2019) | PEEK or titanium | 101 |  |  |  |  |  |  |  |  |  | 3.3 | 3.4 | 18.4 |
|  | Kolcun et al. | OptiMesh cage | 100 |  |  |  |  |  |  |  |  |  |  |  | 12.4 ± 22.8 |
|  | Overley et al. | PEEK | 39 | 78.1 | 17.9 |  |  |  | 2.6 |  |  |  |  |  |  |
|  | Niu et al. | PEEK | 867 | 92.5\* |  |  |  |  |  | 13.5 |  |  |  |  |  |
|  | Wang et al. | - | 159 |  | 32.1 | 13.2 |  | 1.9 | 2.5 |  |  |  |  |  |  |
|  | Rihn et al. (2009a) | - | 86 |  | 29.1 | 14 |  | 3.5 |  |  | 5.8 |  |  |  |  |
|  | Knox et al. | PEEK or Allograft spacer | 39 |  |  |  |  |  |  |  | 20.5 |  |  |  |  |
|  | Rihn et al. (2009b) | CFRP | 48 | 95.8 | 27 | 16.7 |  | 2.1 | 4.2 | 2.1 | 6.3 |  |  |  |  |
| DBM |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Kamenova et al. | Titanium rods | 67 |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Kamenova et al. | PEEK | 76 |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Lin et al. | PEEK cage | 25 | 92\*\* |  |  |  |  |  |  |  |  | 4 | 6 | 30 |
| HA |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Heinz et al. | PEEK, bicortical load-bearing design | 87 | 93.2 |  |  |  |  |  |  |  |  | 4.6 ± 2.0 |  | 26.1 ± 15.9 |
|  | vonderHoeh et al. |  | 25 | 91.7 |  |  |  | 2 |  |  |  |  |  |  | 30.2 ± 20.6 |
| ICBG |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Abou-Madawi et al. | PEEK | 54 | 94.5 |  |  |  |  |  |  |  |  | 4.4 ± 4.1 |  | 26.0 ± 12.0 |
|  | Haws et al. (2018) | - | 49 |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Haws et al. (2019) | PEEK or titanium | 48 |  |  |  |  |  |  |  |  |  | 3.5 | 3.7 | 19.1 |
|  | vonderHoeh et al. | Ti-coated PEEK | 25 | 95.3 |  |  |  | 4 |  |  |  |  |  |  | 21.2 ± 20.6 |
|  | Xu et al. | - | 42 |  |  |  |  |  |  |  |  |  |  | 6.2 ± 1.4 |  |
|  | Rihn (2009a) | - | 33 |  | 45.5 | 3 | 30.3 | 6.1 |  | 2.3 |  |  |  |  |  |
| MSC |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Overley et al. | PEEK | 39 | 59 | 23.1 |  |  |  | 7.7 |  |  |  |  |  |  |
| Synthetic Peptide |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Sardar et al. (P150) | PEEK | 8 | 50 |  |  |  |  |  |  |  |  | 4.1 |  | 20.1 |
|  | Sardar et al. (P750) | PEEK | 7 | 100 |  |  |  |  |  |  |  |  | 5.7 |  | 33.3 |

Fusion rates were reported at least 1-year postoperatively unless otherwise noted. Ti: Titanium; CFRP: Carbon Fiber Reinforced Polymer.

\*Fusion rate at last follow-up (mean 6.0 months)

\*\*Fusion rate at last follow-up (mean 9.0 months)