Supplementary Materials

Stability Evaluation of Different Oblique Lumbar Interbody Fusion Constructs in Normal and Osteoporotic Condition – a Finite Element Based Study

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|          | BPS               | LPS               | SSA               |
|----------|-------------------|-------------------|-------------------|
|          | Normal            | Osteoporosis      | Normal            | Osteoporosis      | Normal            | Osteoporosis      |
| Flexion  | ![Image](image1)  | ![Image](image2)  | ![Image](image3)  |                    | ![Image](image4)  | ![Image](image5)  |
| Extension| ![Image](image6)  | ![Image](image7)  | ![Image](image8)  |                    | ![Image](image9)  | ![Image](image10) |
| L.Bending| ![Image](image11) | ![Image](image12) | ![Image](image13) |                    | ![Image](image14) | ![Image](image15) |
| R.Bending| ![Image](image16) | ![Image](image17) | ![Image](image18) |                    | ![Image](image19) | ![Image](image20) |
| L.Rotation| ![Image](image21) | ![Image](image22) | ![Image](image23) |                    | ![Image](image24) | ![Image](image25) |
| R.Rotation| ![Image](image26) | ![Image](image27) | ![Image](image28) |                    | ![Image](image29) | ![Image](image30) |

Displacement (mm)

-0.15  0  +0.15

Cranial Displacement  Caudal Displacement

Right  Left

Anterior  Posterior

**Supplementary Figure 1.** Colour map of the cage displacements (U3) in the cranio-caudal direction in the three OLIF models with various fixation options (BPS: bilateral pedicle screw, LPS: lateral plate-screw, SSA: self-anchored standalone) in normal and osteoporotic bone material property condition. Displacement is represented by the colorbar (Blue/Green/Red), scale: -0.15–0.15 mm, bottom view.
Supplementary Table 1. The calculated Aspect Ratio (AR) of the volume elements building up the finite element mesh. According to the literature: $1<\text{AR}<3$: acceptable; $3<\text{AR}<10$: treated with caution, \text{AR}>10: treated with alarm [1].

| Level | Parts          | Element number | $1<\text{AR}<3$ | %  | $3<\text{AR}<10$ | %  | $10<\text{AR}$ | %  |
|-------|----------------|----------------|----------------|----|-----------------|----|----------------|----|
| L2    | Cortical bone  | 15182          | 15149          | 99,78 | 33              | 0,22 | 0               | 0   |
|       | Trabecular bone| 47612          | 47602          | 99,98 | 10              | 0,02 | 0               | 0   |
|       | Bony endplates | 28225          | 24909          | 88,25 | 3316            | 11,75 | 0               | 0   |
|       | Post. bony elements | 379801 | 378421          | 99,64 | 1380            | 0,36 | 0               | 0   |
|       | Facet joints   | 35317          | 35317          | 100,00 | 0             | 0,00 | 0               | 0   |
| L3    | Cortical bone  | 18169          | 18143          | 99,86 | 26              | 0,14 | 0               | 0   |
|       | Trabecular bone| 47264          | 47264          | 100,00 | 0             | 0,00 | 0               | 0   |
|       | Post. bony elements | 20147 | 18444          | 91,55 | 1703            | 8,45 | 0               | 0   |
|       | Post. elements | 490942         | 490526         | 99,92 | 416             | 0,08 | 0               | 0   |
|       | Facet joints   | 46430          | 46430          | 100,00 | 0             | 0,00 | 0               | 0   |
| L4    | Cortical bone  | 16444          | 16373          | 99,57 | 71              | 0,43 | 0               | 0   |
|       | Trabecular bone| 54631          | 54587          | 99,92 | 44              | 0,08 | 0               | 0   |
|       | Bony endplates | 30845          | 28583          | 92,67 | 2262            | 7,33 | 0               | 0   |
|       | Post. bony elements | 564319 | 562549         | 99,69 | 1770            | 0,31 | 0               | 0   |
|       | Facet joints   | 53032          | 53032          | 100,00 | 0             | 0,00 | 0               | 0   |
| L2-3  | Cartilage endplates | 3542 | 3538          | 99,89 | 4               | 0,11 | 0               | 0   |
|       | Nucleus        | 11470          | 11427          | 99,63 | 43              | 0,37 | 0               | 0   |
|       | Annulus        | 6240           | 6240           | 100,00 | 0             | 0,00 | 0               | 0   |
| L3-4  | Cartilage endplates | 3744 | 3612         | 96,47 | 132            | 3,53 | 0               | 0   |
|       | Nucleus        | 12600          | 12552          | 99,62 | 48              | 0,38 | 0               | 0   |
|       | Annulus        | 6120           | 6120           | 100,00 | 0             | 0,00 | 0               | 0   |

Implant

|         |                |                |                |     |                |     |                |     |
|---------|----------------|----------------|----------------|-----|----------------|-----|----------------|-----|
| CAGE    | 123722         | 123612         | 99,91          | 110 | 0,09           | 0   | 0              | 0   |
| GRAFT   | 71856          | 71758          | 99,86          | 98  | 0,14           | 0   | 0              | 0   |
| PLATE_SA| 48794          | 48708          | 99,82          | 86  | 0,18           | 0   | 0              | 0   |
| PLATE_ST| 59321          | 59126          | 99,67          | 195 | 0,33           | 0   | 0              | 0   |
| POST_SCREW| 151603        | 151581         | 99,99          | 22  | 0,01           | 0   | 0              | 0   |

References:

[1] Burkhart TA, Andrews DM, Dunning CE. Finite element modeling mesh quality, energy balance and validation methods: A review with recommendations associated with the modeling of bone tissue. J Biomech 2013;46:1477–88. https://doi.org/10.1016/j.jbiomech.2013.03.022.