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Biomechanical advantages of robot-assisted pedicle screw fixation in posterior lumbar interbody fusion compared to free-hand technique in a prospective randomized 2 controlled trial – perspective for patient-specific finite element analysis 3 4 Ho-Joong Kim, MD¹, Kyoung-Tak Kang, PhD², Sung-Cheol Park, MD¹, Bong-Soon Chang, 5 MD³, Choon-Ki Lee, MD³, Jin S. Yeom, MD¹, Lawrence G. Lenke, MD⁴ 6 7 8 ¹Spine Center and Department of Orthopaedic Surgery, Seoul National University College of Medicine and 9 Seoul National University Bundang Hospital, 166 Gumiro, Bundang-gu, Sungnam, 463-707, Republic of Korea ²Department of Mechanical Engineering, Yonsei University, 134 Shinchon-dong, Seodaemun-gu, Seoul, 10 11 Republic of Korea 12 ³Department of Orthopaedic Surgery, Seoul National University College of Medicine and Seoul National 13 University Hospital, 101 Daehangno, Jongno-gu, Seoul, 110-744, Republic of Korea 14 ⁴Columbia University Department of Orthopedic Surgery, Division of Spinal Surgery, The Spine Hospital at 15 New York-Presbyterian/Allen Hospital 5141 Broadway, 3 Field West, New York, New York, USA 16 Ho-Joong Kim and Kyoung-Tak Kang equally contributed to this work. 17 This study was partially supported in kind by Mazor Robotics and Medtronic Inc. which 18 provided the robot system. 19 20 21 Address correspondence and reprint requests to: Jin S. Yeom, MD 22

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