Robotic-guided prone transpsoas approach

Single-position prone lateral interbody fusion is a recently introduced technical modification of the minimally invasive retroperitoneal transpsoas approach for lateral lumbar interbody fusion (LLIF).

Nine patients were treated, 4 women and 5 men. Mean age was 65.4 years (range, 46-75 years), and body mass index was 30.2 kg/m2 (range, 24-38 kg/m2). The most common surgical indication was adjacent segment disease (44.4%), followed by pseudarthrosis (22.2%), spondylolisthesis (11.1%), degenerative disc disease (11.1%), and recurrent stenosis (11.1%). Postoperative approach-related complications included pain-limited bilateral hip flexor weakness (4/5) and pain-limited left knee extension weakness (4/5) in 1 patient (11.1%) and right lateral thigh numbness and dysesthesia in 1 patient (11.1%). All cages were placed within quarters 2-3, signifying the middle portion of the disc space. There were no instances of misguidance by navigation.

Integration of spinal navigation and robotic assistance appears feasible, accurate, and safe as an alternative to fluoroscopic guidance for single-position LLIF [1].

Case reports

A 73-year-old female patient with a history of degenerative lumbar scoliosis, L4-5 pseudarthrosis, and resulting L5-S1 adjacent segment following prior unsuccessful lateral L4-5 interbody fusion presented to the clinic with severe lower back pain and lower extremity radiculopathy. The decision was made to proceed with surgical correction via a robotic-guided prone transpsoas (PTP) approach, which is a novel approach similar to lateral lumbar interbody fusion (LLIF) with the patient in a prone decubitus position. Excellent spinal alignment was achieved with no complications. On two-month follow-up, imaging revealed pedicle screws at the L3, L4, L5 levels and at the sacrum without change and continued interbody cages position with no signs or symptoms of infection.

Minimally invasive spine surgery have demonstrated benefit especially for at risk populations. The LLIF procedure has been well established for use in a wide range of spinal pathologies given its noted benefits in increasing spinal column stability through posterior fixation and indirect decompression. However, only marginal improvements in segmental lordosis are expected and there are reports of neurological complications. The robotic-guided prone transpsoas approach procedure has emerged as an alternative to LLIF for the treatment of spinopelvic pathologies. This approach enables greater improvements to spinal lordosis through single-position surgery while simultaneously reducing intraoperative repositioning and providing the known benefits of lateral interbody surgery.

These experience suggests that the PTP approach is safe and effective because it does not require patient repositioning, easily interfaces with robotic guidance, and achieves increased lordosis gains via the prone positional effect compared to LLIF and comparable approaches [2].

1)
North RY, Strong MJ, Yee TJ, Kashlan ON, Oppenlander ME, Park P. Navigation and Robotic-Assisted Single-Position Prone Lateral Lumbar Interbody Fusion: Technique, Feasibility, Safety, and Case Series. World Neurosurg. 2021 Aug;152:221-230.e1. doi: 10.1016/j.wneu.2021.05.097. Epub 2021 May 29. PMID: 34058358.
2)
Shahrestani S, Brown NJ, Acharya N, Diaz-Aguilar LD, Pham MH, Taylor WR. A case report of robotic-

guided prone transpsoas lumbar fusion in a patient with lumbar pseudarthrosis, adjacent segment disease, and degenerative scoliosis. Int J Surg Case Rep. 2022 Apr 1;94:106999. doi: 10.1016/j.ijscr.2022.106999. Epub ahead of print. PMID: 35413668.