Anatomical location of the bowel in different surgical positions: implications for lateral access in prone single position surgery

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Objective: Retroperitoneal transpsoas lateral lumbar interbody fusion (LLIF) has recently been described in the prone position, with the benefit of performing both lateral and posterior surgical approaches in a single position. Changes in the morphology of the psoas muscle between prone, supine, and lateral positions have been reported previously. However, positional changes of the bowel have not been reported to date. The goal of this study is to evaluate the anatomical relationship of the bowel to the lateral surgical corridor to the spine in various patient positions.

Methods: Ten healthy volunteers underwent MRI scans in the supine, prone with hips extended, and lateral decubitus (left side up) with hips flexed positions. The anatomical relationship of the bowel to fixed spinal landmarks were assessed at each disc space (L1-5). The changes with each patient position were compared.

Results: Anterior bowel movement was noted in both the prone-extension (range: 0.32-1.39cm)and the lateral decubitus flexion positions (range: 0.97-2.18cm) relative to the supine position, however these changes did not reach the level of statistical significance. The percent of patients with bowel located in the operative corridor was similar between the different positions (all $p > 0.07$). 3D-volumetric analysis demonstrates the magnitude of these changes is greatest in the upper left colon.

Conclusions: In this MRI-based evaluation of healthy subjects, we report no statistically significant difference in bowel position between the supine, lateral decubitus, and prone positions. This differs from a recent cadaveric study. Overall, the magnitude of positional changes are small and there is high variability. These findings suggest the bowel does not fall away from the surgical corridor when performing retroperitoneal access for single position prone surgery.