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The Lumbosacral Plexus and the TransPsoas Approach to the Intervertebral Disc Space: A Cadaveric Study. Is There a “Safe Zone”?

T.T. Davis¹, H. Bae¹, A. Rasouli¹, R. Delamarter¹

¹The Spine Institute, Santa Monica, CA, USA

Background: The transpsoas surgical approach is gaining in popularity. Post surgical thigh pain, parasthesias, and or weakness have been described.

Methods: Twenty cadaveric lumbar plexus were dissected. Once dissection was performed, a needle marker was placed in the lumbar discs at L2-3, L3-4, and L4-5 at the mid-coronal plane. The proximity of the needle to the femoral nerve was then observed. Dissection was also performed while a lateral approach retractor was in place.

Results: In all specimens the femoral nerve passed dorsal to or directly at the midpoint of the disc. Fifteen percent of femoral nerves came in contact with the needle at the midpoint of the disc. Seventy-five percent of the femoral nerves passed between the needle and the dorsal boundary of the L4-5 disc space. In 25% of the specimens the L2 and L3 contribution to the femoral nerve passed posterior to the L4-5 disc space and joined the L4 root below the L4-5 disc level. Dissection with the retractor in place revealed the lateral femoral cutaneous nerve and the femoral nerve both under significant traction and compression by the posterior blade of the retractor.

Conclusion: The transpsoas approach to the lumbar spine at the L4-5 interspace will consistently cause a variable degree of compromise to the lateral femoral cutaneous, femoral, and obturator nerve during retractor dilation. This is due to traction on the nerves and compression against the L5 transverse process. The “safe zone” which has been described in previous literature is relative. This does not take into account the added disruption and exposure required by expandable lateral approach retractors. In 75% of our specimens the femoral nerve would be placed under traction once the retraction was utilized. Care should be taken to monitor the actual retraction time during each transpsoas access surgery, specifically at the L4-5 interspace.

Clinical relevance: The lateral femoral cutaneous, femoral and obturator nerves are at significant risk during a transpsoas approach to the L4-5 intervertebral disc space. Care should be taken when placing and expanding lateral approach retractors. Neural structure injury caused by compression or traction is time sensitive. Surgical efficiency during retraction is paramount. The L5 transverse process is a posterior boundary against which neural structures may be compressed. Lateral breaching pedicle screws may have the potential to be as harmful to neural structures as medial or inferior breaching screws.