

FUSION RATE FOLLOWING THE MINIMALLY INVASIVE ANTEPISOAS (MIS-ATP) TECHNIQUE FOR LUMBAR AND LUMBOSACRAL ARTHRODESIS: A RETROSPECTIVE STUDY

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Background

- Pseudarthrosis is a feared complication following spinal fusions and may affect their clinical outcomes. Many techniques are reported to have different rates of successful arthrodesis. To date there is no sufficient data on the fusion rate following anteropsoas (ATP) lumbar and lumbosacral arthrodesis.

Purpose

- Evaluate the prevalence of pseudarthrosis following ATP lumbar and lumbosacral fusions.

Methods

- This is a retrospective review of 226 patients who underwent lumbar MIS-ATP fusions between January 2008 and February 2019 who have at least 6 months postoperative computed tomography (CT) follow-up scans. Following ATP lumbar discectomy and interbody cage(s) placement, all patients received percutaneous posterior pedicle-screws-rods fixation.
- Fusion was graded using CT scans imaging and adopting a 1-4 grading scale (1-definitely fused, 2-likely fused, 3- likely not fused, 4-definitely not fused/nonunion). Grades 3 or 4 indicate pseudarthrosis.

Results

- In this study, a total of 226 patients [average age: 66 years, 84 Male (37.2%), and 130 (57.5%) smokers] were included. Eight patients (3.5%) developed pseudarthrosis.
- A total of 707 discs were addressed using the ATP approach. Of those, 695 (98.3%) were considered fused [654 levels (92.5%) were “definitely fused” and 41 levels (5.8%) were “Likely fused”] and 12 discs (1.7%) developed pseudarthrosis [7 levels (1.0%) were “likely not fused” and 5 levels (0.7%) were “definitely not fused”].

Results

- The intervertebral disc with the highest occurrence of pseudarthrosis (8 out of 12 levels) was L5-S1. Of 130 smokers, 6 developed pseudarthrosis (Odds Ratio = 2.3, $p = 0.3$).
- The fusion rates were 95.4% and 97.9% for smokers and nonsmokers, respectively. Of the eight patients who developed pseudarthrosis, only 4 (50%) were symptomatic, of whom 2 (25%) required revision surgery. Both of these patients were smokers.
- The overall revision rate due to pseudarthrosis was 0.9% (2/226 patients).

Table 1: MIS-ATP Fusion Success Rate at Each Level

MIS-ATP Fusion	L1-L2	L2-L3	L3-L4	L4-L5	L5-S1
Number of levels studied	63	100	151	220	173
Fused discs % (1-2)*	100%	100%	98%	99.5%	95.4%
Non-Fused discs % (3-4)*	0%	0%	2%	0.5%	4.6%

*Interbody fusion (F) is assessed using CDI criteria and scores: 1-definite F, 2-probable F, 3- probable non-F, 4-definite non-F, 5-indeterminate. Scores 1 and 2 indicate successful fusion, whereas scores 3 or 4 suggest pseudarthrosis.

Post ATP AP radiographs



Post ATP lateral radiographs



Conclusions

- The MIS-ATP technique results in a high fusion rate (96.5% of patients; 98.3% of levels). Pseudarthrosis was noted mostly at the L5-S1 discs and in smokers. Future larger studies should be performed to better understand the risk factors associated with pseudarthrosis following MIS-ATP lumbar and lumbosacral fusions.

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