Minimally Invasive Surgery
MIS is a Passing Fad and Its Limitations Will Kill It

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History


MIS Advantages
- Smaller incisions
- Less tissue disruption
- Less blood loss
- Faster healing
- Shorter hospital stay, faster return to activity
- Less pain
MIS Disadvantages

- Potential increased OR time
- Increased patient AND surgeon exposure to radiation
- Not appropriate for every case
- May be difficult to repair a spinal fluid leak
- Learning curve
- In deformity, less correction of SVA and Cobb and angle
- Complications

MIS Disadvantages

- Wang, 2010
  “Minimally invasive surgery for thoracolumbar spinal deformity: initial clinical experience with clinical and radiographic outcomes”
  - An early study of MIS for deformity correction showed promise for MIS, but the technique did not yet allow for corrections seen in OPEN surgery
MIS Disadvantages

- Tormenti, 2010
  “Complications and radiographic correction in adult scoliosis following combined transpsoas extreme lateral interbody fusion and posterior pedicle screw instrumentation”
  - Retrospective review of deformity cases.
  - Eight patients in transpsoas group
    - One patient suffered an intraop bowel injury requiring laparotomy and segmental bowel resection.
    - Two patients sustained motor radiculopathies (resolved in one, persisted 3 months in other)
    - Six patients experienced postoperative thigh paresthesias or dysesthesias, with 5/6 persisting at last follow up.

MIS Disadvantages

- Choll Kim, 2010
  “Complications and perioperative factors associated with learning the technique of minimally invasive transforaminal lumbar interbody fusion (TLIF)”
  - MIS TLIF vs OPEN TLIF
  - Although the MIS group had lower intraoperative transfusion rates, less required post-op drains, shorter drain period and less time to ambulation, they also had a higher rate of complications

MIS Disadvantages

- Dakwar, 2011
  “Trajectory of the main sensory and motor branches of the lumbar plexus outside the psoas muscle related to the lateral retroperitoneal transpsoas approach”
  - Laboratory investigation on cadaveric specimens for lateral approach
  - Main motor/sensory nerves supplying the anterior abdominal muscles and thigh are at risk of direct injury during the early stages of the lateral approach.
MIS Disadvantages

Keppler, 2013
“Comparison of open and minimally invasive techniques for posterior lumbar instrumentation and fusion after open anterior lumbar interbody fusion”

- Concluded MIS had less blood loss, less transfusion and shorter hospital stay.
- MIS and open had similar outcomes
- MIS had significantly longer fluoroscopy time

As discussed in commentary article, Arts(2013), the study had flaws.
- Posterior decompression only occurred in 26% MIS and 76% open. This could have impacted blood loss, hospital stay and transfusion outcomes.

MIS Disadvantages

Sclafani, 2014
“Complications Associated With the Initial Learning Curve of Minimally Invasive Spine Surgery”

- Systematic review of literature on MIS learning curve complications
- Most common complications were durotomy, implant malposition, neural injury and non-union.
- Need a standardized study design of collected parameters to fully understand complications from the learning curve.

MIS Disadvantages

Adogwa, 2014
“Comparative Effectiveness Study of Lumbar Spine Surgery in Morbidly Obese Patients: Does Minimally Invasive TLIF Result in Superior Outcomes”

- Both had similar improvement in pain and function disability (VAS back/leg, ODI).
- Post-op complications were similar
MIS Disadvantages
Uribe, ISSG, 2014
“Complications in adult spinal deformity surgery: an analysis of minimally invasive, hybrid, and open surgical techniques”
- MIS group had significantly fewer intraoperative complications than HYBRID and OPEN
- MIS had less blood loss than both groups, significantly less than OPEN
- No differences in overall complication rates between the groups
- MIS operating time was not statistically different compared to either group
- No difference in length of hospital stay
- All groups had significant improvement in ODI, and VAS
- MIS, although improved, did not have significant improvement in leg pain

MIS Disadvantages
Anand, 2014
“Limitations and ceiling effects with circumferential minimally invasive correction techniques for adult scoliosis: analysis of radiological outcomes over a 7-year experience”
- Found that circumferential MIS technique has limited ability to achieve SVA correction and lumbar lordosis in patients with large baseline deformity (ie. SVA>100mm).

MIS Disadvantages
Gursukhman, 2014
“Minimally Invasive versus Open Posterior Lumbar Interbody Fusion: A Systematic Review”
- Systematic Review of literature found that little evidence exists to support improved patient outcomes after MIS vs Open surgery.
- Literature review confirmed that randomized control studies are need to compare these two surgical approaches.
MIS Disadvantages

- Lehmen, 2015
  “MIS lateral spine surgery: a systematic literature review of complications, outcomes, and economics”
  - Systematic Review of literature found evidence to support MIS lateral
  - BUT
  - The reports of complications vary greatly depending on the technique and instrumentation.

MIS Disadvantages

- Jin-tao, 2015
  “Comparison of MIS Vs. open PLIF/TLIF with regard to clinical improvement, fusion rate, and incidence of major complication: a meta-analysis”
  - Meta-analysis to compare MIS TLIF to Open
  - Fusion rate were similar.
  - MIS TLIF had higher revision and readmission rate
  - Learning curve is steep, so extensive training is required for MIS

In conclusion, the present literature does not support a clear advantage of minimally invasive spinal fusion compared with open surgery. Class 1, high-quality evidence is lacking. The surgical strategy in deciding MISS versus open surgery should be based on surgeons’ and patients’ preferences. Proclaiming better results for MISS, as a general proposition, should be avoided.”
Conclusions

- There is no level 1 evidence or robust prospective studies to compare MIS vs Open surgical approaches
- Existing literature has varied results in complication rates
- Learning curve for MIS is extensive
- Large deformity cases cannot be corrected with MIS technique
- Exposure to radiation is significantly higher in MIS
Bibliography


Thank You!