

Letter to the Editor Regarding “Lumbar Interbody Fusion: Techniques, Pearls and Pitfalls”

We appreciated and read with great interest the manuscript by Kim *et al.*^[1] entitled “Lumbar Interbody Fusion (LIF): Techniques, Pearls and Pitfalls” published in October 2020 in *Asian Spine Journal*.

In their review, the authors analyzed literature reports about LIF pearls and pitfalls, providing useful indications and contraindications according to the recent literature evidence.

The authors summarize the approaches through which LIF can be performed in posterior, transforaminal, anterior, and lateral approaches by open surgery or minimally invasive surgery (MIS). Of course, each technique shows advantages and disadvantages. Posterior LIF is the most familiar procedure, which offers good fusion rates and low complication rates. Iatrogenic injuries to the neural structures and paraspinal muscles are its most important disadvantages. MIS transforaminal LIF reduces these iatrogenic injuries. Anterior LIF (ALIF) can restore the disk height and sagittal alignment but with risks of visceral and vascular complications. Lateral LIF and oblique LIF are performed using the MIS technique and have shown postoperative outcomes like ALIF; however, these approaches carry a risk of injury to psoas, lumbar plexus, and vascular structures.

We found this manuscript of great value, we agree with the authors’ suggestions, and we are glad to share with the international scientific community our concept and vision of minimally invasive neurosurgery, in spine and brain surgery, as a unitary concept. The development of new tools, materials, and technologies promoted minimally invasive techniques work wide, like the application of neuronavigation in spine surgery.^[2-4] Intraoperative imaging devices such intraoperative computed tomography, O-ARM, Ziehm rfd, and Loop-X allow to verify the accuracy during the entire time of the procedure making misplacement impossible since the trajectory can be modified until getting the desired result, thus avoiding redo surgery with its high medicolegal risks.^[5-11] Moving toward the cranial direction, also approaches to the craniovertebral junction are performed reducing of surgical damage to soft tissues; the use of endonasal approaches to C1–C2 has decreased morbidity and the odontoid screw fixation has been reported to be performed percutaneously.^[12-14] Furthermore, vertebral corpectomy, invasive as well all know, can be accomplished with MIS technique for both traumatic and tumoral diseases, reducing surgical blood loss, patient’s morbidity, and hospital stay saving costs.^[5,15] In brain surgery, endoscopic assisted brain surgery is a well-established technique and with proved efficacy. While if we look back in the past, transsphenoidal approaches aimed to reduce brain manipulation with direct access to

the pathology, reducing morbidity and mortality.^[16-19] In the end, the most common pathology of modern times of neurosurgery, the surgical evacuation of chronic subdural hematomas, experienced a progressive reduction of invasively shifting from craniotomy to burr hole or to the twist drill craniostomy.^[20-22] In consideration of the present study and based on our institutional experience, we think that the MIS technique must be advocated and powered by technological innovations. Experienced surgeons should support younger colleagues in using approaches with reduced invasiveness. The association of senior surgeons and ingenious, innovative, tech-friendly junior colleagues is a powerful alliance to boost MIS with special benefit for patients, reducing direct (hospital stay, redo surgery) and indirect (medico-legal issues) costs.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

Santino Ottavio Tomasi^{1,2}, Peter A. Winkler^{1,2}

¹Department of Neurological Surgery, Christian Doppler Klinik Paracelsus Medical University, ²Laboratory for Microsurgical Neuroanatomy, Christian Doppler Klinik, Salzburg, Austria

Address for correspondence:

Dr. Santino Ottavio Tomasi,
Department of Neurological Surgery, Christian Doppler Klinik Paracelsus Medical University, Ignaz-Harrer-Strasse 79A, Salzburg 5020, Austria.
E-mail: tomasi.brainandspinesurgery@gmail.com

References

1. Kim YH, Ha KY, Rhyu KW, Park HY, Cho CH, Kim HC, *et al.* Lumbar interbody fusion: Techniques, pearls and pitfalls. *Asian Spine J* 2020;14:730-41.
2. Umana GE, Passanisi M, Fricia M, Chiriatti S, Fagone S, Cicero S, *et al.* Letter to the editor regarding accuracy of pedicle screw insertion among 3 image-guided navigation systems: A systematic review and meta-analysis. *World Neurosurg.* 2020;138:595-7.
3. Du JP, Fan Y, Wu QN, Wang DH, Zhang J, Hao DJ. Accuracy of pedicle screw insertion among 3 image-guided navigation systems: Systematic review and meta-analysis. *World Neurosurg* 2018;109:24-30.
4. Umana GE, Scalia G, Perrone C, Garaci F, Pagano A, De Luna A, *et al.* Safety and efficacy of navigated trocarless pedicle screw placement: Technical note. *Interdiscipl Neurosurg* 2020;21:100771.
5. Yu JY, Fridley J, Gokaslan Z, Telfeian A, Oyelese AA. Minimally invasive thoracolumbar corpectomy and stabilization for unstable burst fractures using intraoperative computed tomography and computer-assisted spinal navigation. *World Neurosurg* 2019;122:e1266-274.

6. Umana GE, Passanisi M, Fricia M, Cicero S, Narducci A, Nicoletti GF, *et al.* Letter to the editor regarding minimally invasive thoracolumbar corpectomy and stabilization for unstable burst fractures using intraoperative computed tomography and computer-assisted spinal navigation. *World Neurosurg* 2020;139:692-3.
7. Kim TT, Drazin D, Shweikeh F, Pashman R, Johnson JP. Clinical and radiographic outcomes of minimally invasive percutaneous pedicle screw placement with intraoperative CT (O-arm) image guidance navigation. *Neurosurg Focus* 2014;36:E1.
8. Nicoletti GF, Umana GE, Chaurasia B, Ponzo G, Giuffrida M, Vasta G, *et al.* G. Navigation-assisted extraforaminal lumbar disc microdiscectomy: Technical note. *J Craniovert Spine* 2020;11:316-20.
9. Scalia G, Umana GE, Graziano F, Tomasi SO, Furnari M, Giuffrida M, *et al.* Letter: Image-guided navigation and robotics in spine surgery. *Neurosurgery* 2020;nyaa404. doi: 10.1093/neuros/nyaa404.
10. Nicoletti G, Furnari M, Giuffrida M, Ponzo G, Iacopino DG, Cammarata G, *et al.* A new tool to improve pedicle screw placement accuracy in navigated spine surgery: A monocentric study. *J Neurosurg Sci* 2020. doi: 10.23736/S0390-5616.20.04957-7.
11. Umana GE, Passanisi M, Fricia M, Distefano G, Cicero S, Nicoletti GF, *et al.* Letter to the editor regarding radiolucent carbon fiber-reinforced pedicle screws for the treatment of spinal tumors: Advantages for radiation planning and follow-up imaging. *World Neurosurg* 2020;139:674-5.
12. Umana GE, Visocchi M, Scalia G, Passanisi M, Fricia M, Fagone S, *et al.* Minimally invasive percutaneous anterior odontoid screw fixation: Institutional experience with a simple and effective technique. *J Neurosurg Sci* 2020. doi: 10.23736/S0390-5616.20.04886-9.
13. Wu AM, Wang XY, Xia DD, Luo P, Xu HZ, Chi YL. A novel technique of two-hole guide tube for percutaneous anterior odontoid screw fixation. *Spine J* 2015;15:1141-5.
14. Aldea S, Brauge D, Gaillard S. How I do it: Endoscopic endonasal approach for odontoid resection. *Neurochir* 2018;64:194-7.
15. Visocchi M, Germano' A, Umana G, Richiello A, Raudino G, Eldella AM, *et al.* Direct and oblique approaches to the craniovertebral junction: Nuances of microsurgical and endoscope-assisted techniques along with a review of the literature. *Acta Neurochir Suppl* 2017;124:107-16.
16. Fraioli MF, Marciani MG, Umana GE, Fraioli B. Anterior microsurgical approach to ventral lower cervical spine meningiomas: Indications, surgical technique and long term outcome. *Technol Cancer Res Treat* 2015;14:505-10.
17. Rigante L, Borghei-Razavi H, Recinos PF, Roser F. An overview of endoscopy in neurologic surgery. *Cleve Clin J Med* 2019;86:16ME-24ME.
18. Fraioli MF, Umana GE, Fiorucci G, Fraioli C. Ethmoidal encephalocele associated with cerebrospinal fluid fistula: indications and results of mini-invasive transnasal approach. *J Craniofac Surg* 2014;25:551-3.
19. Fraioli MF, Umana G, Pagano A, Fraioli B, Lunardi P. Prolactin secreting pituitary microadenoma: Results of transsphenoidal surgery after medical therapy with dopamine agonist. *J Craniofac Surg* 2017;28:992-4.
20. Jablawi F, Kweider H, Nikoubashman O, Clusmann H, Schubert GA. Twist drill procedure for chronic subdural hematoma evacuation: An analysis of predictors for treatment success. *World Neurosurg* 2017;100:480-6.
21. Umana GE, Chiriatti S, Fricia M, Alberio N, Cicero S, Nicoletti GF, *et al.* Letter to the editor regarding twist drill procedure for chronic subdural hematoma evacuation-an analysis of predictors for treatment success. *World Neurosurg* 2020;139:698.
22. Umana GE, Chiriatti S, Roca E, Scalia G, Fricia M, Alberio N, *et al.* A New tools in percutaneous minimally invasive chronic subdural hematomas evacuation. *Interdisciplinary Neurosurg* 2020100771:100736. [doi.org/10.1016/j.inat.2020.100736].

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

Access this article online	
Quick Response Code: 	Website: www.asianjns.org
	DOI: 10.4103/ajns.AJNS_82_21

How to cite this article: Tomasi SO, Winkler PA. Letter to the editor regarding "lumbar interbody fusion: Techniques, pearls and pitfalls". *Asian J Neurosurg* 2021;16:665-6.

Submitted: 26-Feb-2021 **Revised:** 10-Apr-2021
Accepted: 10-Apr-2021 **Published:** 14-Sep-2021

© 2021 Asian Journal of Neurosurgery | Published by Wolters Kluwer - Medknow