Letters to the Editor

NEUROSURGICAL FORUM

Joining the masters: the Dolenc-Kawase approach

TO THE EDITOR: We have read with great interest the paper by Tripathi and colleagues⁵ (Tripathi M, Deo RC, Suri A, et al: Quantitative analysis of the Kawase versus the modified Dolenc-Kawase approach for middle cranial fossa lesions with variable anteroposterior extension. *J Neurosurg* 123:14–22, July 2015).

Basal extensions of the pterional and extended orbitozygomatic approach, such as the transcavernous approach (Dolenc technique), or the subtemporal, anterior petrosectomy (Kawase) approach, have been proposed to treat posterior and middle cranial fossa lesions.^{2,3} We have objectively studied these techniques, as we reported in previous papers,^{3,4} and call the attention of the authors to another study that we believe should have been cited in their paper.³

Using a computerized system to identify Cartesian coordinates and a robotic microscope, we quantitatively analyzed anterior petrosectomy and transcavernous techniques.³ We measured the area of exposure on the ventral surface of the brain stem, linear extension of the basilar artery, angles of approach to the midpoint of the retrosellar segment of the basilar artery, and the area available to manipulate surgical instruments, i.e., the superficial exposure (surgical freedom). Additionally, we evaluated the extent of the infrasellar basilar artery available for proximal control (caudal extent of exposure).³ Such information could have been relevant for their study.

One main methodological concern in performing this kind of work is related to how best to measure areas and angles.¹ The authors presented quantitative data related to area and volume of the bone window in dry temporal bones. Such measurements may not be extrapolated or realistic for clinical and anatomical settings, because the space-occupying and viscoelastic properties of the brain and neural and vascular structures limit bone resection in real surgical scenarios. These surgical approaches have been focused on the expansion of the deep windows of exposure, which often involve internal carotid artery and cranial nerve mobilization. Thus, areas and volumes resulting from fresh bone resection are not the best proxy for measurement, assessment, and description of the actual surgical exposure.

In their cadaver dissection, the authors obtained a fenestration of 20 × 18 mm when using the modified Dolenc-Kawase (MDK) approach and 10 × 5 mm after the Kawase approach.⁵ Nonetheless, there are no details about how

such fenestration was quantified. It appears that the increments in angulations and surgical freedom provided are only surgical impressions, because they were not corroborated by quantitative measurements. Values for angles of approach, areas of surgical exposure in the cadaver dissection, and surgical freedom, with their means, standard deviations, and p values, have not been provided. Statements that surgical exposure changed significantly between the approaches should be supported by objective data. Quantitative and anatomical study helps us to understand the advantages and limitations of different approaches and may support a surgeon's choice, which should not be based on intuition and personal impressions only.

Except for these methodological concerns, the authors should be commended for their surgical results and for using 3D scanning methods to scrutinize surgical techniques. This may have relevant applications in future studies.

Eberval Gadelha Figueiredo, MD, PhD¹

Manoel J. Teixeira, MD, PhD¹

Robert F. Spetzler, MD²

Mark C. Preul, MD²

¹University of Sao Paulo, Brazil

²Barrow Neurological Institute, St. Joseph's Hospital and Medical Center, Phoenix, AZ

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Disclosures

The authors report no conflict of interest.

Response

We are thankful to Figueiredo et al. for their interest and critical evaluation of our article. The MDK approach is a combination of two approaches for middle cranial fossa lesions with variable extension to the posterior cranial fossa. The purpose of this study was to expand the anatomical limitations to allow maximum petrous bone removal and exposure at the prepontine area.

We have previously evaluated cited articles by the reviewers and are glad to acknowledge the fact that these papers guided us to morphometric evaluation of the area and exposure obtained at the anterior petrous apex.²⁻⁴ We are happy to cite the paper by Figueiredo et al., which explains the comparative analysis of anterior petrosectomy and transcavernous approaches to retrosellar and upper clival basilar artery aneurysms.⁴

All of our cadaver dissections were performed and recorded following a strict protocol in the well-equipped Neurosurgery Education and Training School of the All India Institute of Medical Sciences, New Delhi, India.⁷⁻¹⁰ Microneurosurgical principles were followed for dissection and all anterior petrous drilling was performed under fixed magnification (magnification factor 1.0, magnification 7.08) by the same surgical team. The head position and magnification were kept uniform for both approaches to minimize surgical and observation bias.⁹ The protocol has been explained in detail in the methodology section of the article. Fixed bone landmarks were previously defined for Kawase's triangle and the MDK rhomboid construct in dry temporal bones. The same landmarks were followed during cadaver dissection. The average dimensions for Kawase's triangle were 21.71 ± 0.79 mm $\times$ 17.11 ± 0.40 mm $\times$ 13.05 ± 1.01 mm. In comparison, the average dimensions of the rhomboid construct were 13.15 ± 0.84 mm $\times$ 24.53 ± 1.77 mm $\times$ 12.54 ± 0.94 mm $\times$ 14.69 ± 1.16 mm ($p < 0.001$). The dimensions and fenestration achieved are consistent with results in the existing literature. The same has been observed in another cadaveric study conducted by Day et al.^{1,5} During cadaver dissection, for the rhomboid construct, maximum diagonal dimensions were measured with a divider measurement instrument with submillimeter accuracy and compared with fenestration achieved by Kawase's triangle (Table 1). The same areas were drilled and exposed areas were objectively recorded at the prepontine area in both vertical and horizontal dimensions. Apart from the fenestration, other morphometric details such as area and volume of the drilled bones were not calculated during cadaver dissection as 3D laser scanning in cadavers was not possible. We agree that angle of approach and surgical freedom were not quantitatively measured, but our concept has definitely resulted in better exposure, tumor resection, and clinical outcome in these patients.

We agree with the comment that judicious bone removal and mobilization of neurovascular structures is the key for skull base approaches. The rhomboid construct can be obtained only after temporal dura mater and lobe retrac-

TABLE 1. Fenestration achieved at Kawase's triangle and the MDK rhomboid approach by cadaver dissections

Serial No.	Kawase Approach (mm)	MDK Rhomboid Approach (mm)
1	11.6×5.7	21.8×19.6
2	9.9×4.8	19.9×17.9
3	9.2×4.4	19.6×17.8
4	10.6×5.7	20.8×19.2
5	9.7×4.9	19.4×17.5
Mean $\pm$ SD	$10.2 \pm 0.6 \times 5.1 \pm 0.3$	$20.3 \pm 0.6 \times 18.4 \pm 0.3$

tion, interdural cavernous dissection, and medial mobilization of the mandibular division of the trigeminal nerve and Gasserian ganglion.⁹ A quantitative evaluation of dry temporal bones acts as a proxy for fixed bone landmarks of both the constructs and reflects increased exposure of the area at the prepontine space using the MDK approach. It might not be considered the best estimate, but translation of the MDK rhomboid approach into clinical cases has helped in providing better exposure, angulation, surgical freedom, and outcome, with no added morbidity.^{1,9} The surgical approach allows for intradural cisternal exposure of cranial nerves III–VIII, and a spectrum of lesions straddling the middle and posterior cranial fossae (Video 1).

VIDEO 1. Clip showing a multicompartimental epidermoid tumor: suprasellar, interpeduncular, prepontine, right ambient, right crural, and right cerebellopontine cisterns excised completely using the transcavernous anterior transpetrosal approach. Copyright Ashish Suri. Published with permission. Click here to view.

We are thankful to the reviewers for their comment on using 3D scanning methods to scrutinize surgical approaches. We have further analyzed 3D laser scanning for quantitative evaluation of exposure by variable extent of the anterior clinoidectomy using intradural and extradural techniques.¹⁰

Manjul Tripathi, MCh
Ashish Suri, MCh
Devi Prasad Patra, MCh
Rajesh Meena, MCh

All India Institute of Medical Sciences, New Delhi, India

Acknowledgments

The senior and corresponding author (A.S.) would like to thank Prof. Vinko V. Dolenc, of Ljubljana, Slovenia, from whom he learned (2000) the anatomy of and surgical approaches to the lesions in and around the cavernous sinus. Upon his return to India, he performed several cadaver dissections, followed by a clinical series. He presented the surgical works paper on "Posterior cavernous anterior transpetrosal approach to petroclival lesions" at The Second International Symposium on the Cavernous Sinus—20 Years Later, in Ljubljana, Slovenia, on September 10–13, 2006. The paper was commented on and appreciated by both Prof. Vinko V. Dolenc and Prof. Takeshi Kawase, and they re-phrased the posterior cavernous anterior transpetrosal approach as the "Dolenc-Kawase approach." We thank the scientific, technical, and application team of the Neurosurgery Education and Training School, especially Mr. Trivender Kumar Yadav, for his assistance in video and photo archiving and editing.

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Supplemental Information

Videos

Video 1. <https://vimeo.com/146933579>.

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Bibliometric profiles for US neurosurgical residency programs

TO THE EDITOR: It was with great interest that we at the Walter Reed National Military Medical Center/National Capital Consortium read the article by Taylor et al.¹ (Taylor DR, Venable GT, Jones GM, et al: Five-year institutional bibliometric profiles for 103 US neurosurgical

residency programs. *J Neurosurg* 123:547–560, September 2015). We agree that their method provides an interesting way of tracking academic productivity within neurosurgical departments. We were disappointed to see that Walter Reed was one of two programs where data were not available for study. We reviewed the information available through our program's website. Government security requirements have heretofore limited what is made publicly available concerning our active-duty military neurosurgery staff, and therefore no specific faculty information was available for the authors to review.

With this in mind, we are writing this letter to humbly request that the authors use their bibliometric analysis to review the Walter Reed/National Capital Consortium program, with the relevant faculty information provided below.

Neurosurgery Core Faculty, National Capital Consortium, 2009–2013:

Michael K. Rosner, MD
Meryl A. Severson III, MD
Chris J. Neal, MD
Lisa Mulligan, MD
Leon Moores, MD
Randy S. Bell, MD
Rocco A. Armonda, MD
Patrick B. Cooper, MD
Robert Ecker, MD
Jeff Tomlin, MD
Robert Rosenbaum, MD
Walter Faillace, MD
Laurence Davidson, MD
Jonathan E. Gilhooly, MD

Randy S. Bell, MD
Chris J. Neal, MD

Walter Reed National Military Medical Center, Bethesda, MD

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Disclosures

The authors report no conflict of interest.

Response

We thank Drs. Bell and Neal for their interest in our article. During the preparation of our manuscript we made several attempts to contact both the group at Walter Reed and the one at Cleveland Clinic for inclusion in our study. The limitation of public information regarding active-duty military neurosurgery staff is certainly understandable, and we gladly present an analysis of the 2009–2013 productivity of the group at Walter Reed National Military Medical Center/National Capital Consortium.

Using the exact methodology as in our previous study, we present the bibliometric indices and a ranking of each index compared with the other 103 programs available for comparison. Data are reported as index, value (rank):

ih(5)-index, 13 (48); ih(5)-index/no. of faculty, 0.93 (56); total publications, 77 (52); total citations, 770 (47); ig(5)-index, 23 (47); ie(5)-index, 17 (40); il0(5)-index, 16 (51); publication Gini coefficient, 0.56 (44); and citation Gini coefficient, 0.70 (45).

The group at Walter Reed should be commended not only for their continual service to our country, but also for their substantial contributions to the neurosurgical literature, particularly in the area of neurotrauma.

Garrett T. Venable, BSc¹
Douglas R. Taylor, MD¹
L. Madison Michael II, MD^{1,2}
Paul Klimo Jr., MD, MPH^{1,2}

¹University of Tennessee Health Science Center, Memphis, TN

²Semmes-Murphey Neurologic & Spine Institute, Memphis, TN

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Low mortality in aneurysm treatment by cream skimming

TO THE EDITOR: We have read with interest the article by Lindekleiv et al.¹ (Lindekleiv H, Mathiesen EB, Førde OH, et al: Hospital volume and 1-year mortality after treatment of intracranial aneurysms: a study based on patient registries in Scandinavia. *J Neurosurg* 123:631–637, September 2015). The overall purpose of the study was to examine the relationship between hospital volume and long-term mortality after the treatment of intracranial aneurysms. This subject is extremely relevant in light of the current tendency to centralize all kinds of treatment in larger units. The authors could not confirm the suggestion that patients are better treated in high-volume centers.

However, the study has some weaknesses: its retrospective design and its singular focus on patients treated for cerebral aneurysms rather than the complete population of patients needing treatment. As part of their discussion, the authors admit that “selection criteria for treatment may vary across hospitals and could have influenced the results.” However, they do not go into details on that.

From the data in Table 3 it appears that 1-year mortality is higher in Norway (16.0%) than in Sweden (12.7%) and is even higher in Denmark (18.7%). In the same period there were about 9 million citizens in Sweden, 4.7 million in Norway, and 5.4 million in Denmark. That means that 3.3 cases/100,000 persons/year were treated in Sweden, 4.4 cases/100,000 persons/year in Norway, and 5.0 cases/100,000 persons/year in Denmark.

To our knowledge there is no difference in the incidence of aneurysms or subarachnoid hemorrhage (SAH) among the 3 Nordic countries. Thus, there must have been a significant difference in visitation criteria for treatment in the 3 countries.

Denmark is geographically a much smaller country than both Norway and Sweden. Because of the relatively

short distance between the primary hospital and a hospital with a neurosurgical service in Denmark, national guidelines for the treatment of ruptured aneurysms recommends the referral of practically all patients with SAH to a neurosurgical department. Only patients in very poor condition, who are expected not to survive transfer to the neurosurgical department, stay at the primary hospital.

We believe that part of the difference in the relative number of treated patients with aneurysmal SAH among the 3 Nordic countries reflects a difference in referral policy, where poor-grade patients in local hospitals far from a neurosurgical department stay in that local hospital. This means that neurosurgically treated patients with aneurysmal SAH in Norway and Sweden simply are in better condition than the patients in Denmark. It is not very difficult to get lower mortality rates if you selectively admit and treat patients in less serious condition. We find that it is likely that such a selection bias not only exists among the countries, but is also likely to exist between departments in the individual countries.

Through the patient registries in the 3 Nordic countries, the authors found all patients with an age ≥ 18 years and both a discharge diagnosis of SAH and a procedure code for surgical or endovascular treatment. Through these same registries, it would have been easy to find all patients with SAH, not just the patients who underwent treatment in a neurosurgical department. As every individual neurosurgical department serves a well-defined region in every country, it would have been easy for the authors, with knowledge of the number of citizens in every region, to calculate the incidence of SAH in every region and thus to get an impression of the visitation criteria. Furthermore, the transfer of patients between unit catchment areas would also need to be elucidated for a stringent analysis. As a supplement, it would have been very interesting if the authors had calculated the 1-year mortality in the group of patients who were not admitted for neurosurgical treatment.

Concerning the patients with unruptured aneurysms treated in the study, no details about the indication for treatment or conservative wait-and-see approach are described. Furthermore, it is not possible to get more information from the patient registries. As for the patients with SAH, a comparison of treatments between the different departments requires more information about the aneurysms that are treated.

Still, the authors have a point about treatment in smaller or larger units. It is not our agenda to argue for larger neurosurgical departments. However, as the basic data in the study clearly show that the patients are significantly selected, it would very interesting to perform a new outcome study containing the necessary information about the patients and their aneurysms.

All in all we find the conclusions in the article doubtful, and we especially believe that it would have been appropriate to look more into the obviously large difference in the number of annual cases in the countries as compared with the population size.

Per Rochat, MD
John Hauerberg, MD

Jesper Kelsen, MD
 Vagn Eskesen, MD
 Lars Poulsgaard, MD
 Jannick Brennum, DMSc

Copenhagen University Hospital, Rigshospitalet, Copenhagen, Denmark

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Disclosures

The authors report no conflict of interest.

Response

We appreciate the interest from Rochat et al. on our paper.

Studies of hospital discharge registries have numerous limitations, for example, differences in the selection of patients for treatment. Although our multivariable logistic regression analyses were adjusted for country, residual confounding may be present, as suggested by Rochat et al. We agree that the differences in treatment rates among the Nordic countries described in our article may indicate selection bias. We acknowledge this in the *Discussion* of

our paper. We still argue that the risk for and the probable effect sizes of such bias are likely to be smaller than in previously published studies from the US; therefore, we believe our results are important.

We also agree that the additional analyses suggested by Rochat et al. would be of interest, but we regret that we are unable to do them, as the data protection authorities in Denmark, Norway, and Sweden required us to erase all data at the completion of the study.

Rochat et al. state that it is not their agenda to argue for larger neurosurgical departments. Neither is it ours to uncritically ignore possible correlations between treatment volumes and outcomes. We emphasize that the results from both our and other studies using data from hospital discharge registries should be interpreted with caution. We encourage neurosurgeons to establish prospective, clinical, quality registries for evaluating patient outcomes after treatment for intracranial aneurysms.

Haakon Lindekleiv, PhD

Tor Ingebrigtsen, PhD

Faculty of Health Sciences, University of Tromsø, Norway

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