reason therefore that column 1 of Table 1 and column 1 of Table 2 describe the exact same cohort of patients and therefore it is quite correct that for both, \( n = 3330 \). All data in both Tables 1 and 2 are from aSAH cases, and therefore any criticism suggesting the mixing of elective and acute outcomes is unfounded.

Finally, we would agree with the observation that “Higher microsurgical volume may simply mean that the center is more selective about which patients undergo endovascular treatment.” We have implied as much within our paper. We would recommend that neurovascular patients be treated in departments that have appropriately skilled clinicians in both the microsurgical and endovascular management of cerebral aneurysms to allow for judicious treatment decisions to be made; in the United Kingdom, this would most frequently mean treatment by a collaborative microsurgical-endovascular service rather than a dual-trained neurosurgeon. In countries where the dual-trained neurosurgeon is commonplace, further work would be required to ascertain the influence of the endovascular-microsurgical ratio and patient outcome.

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Prognostic molecular panel for skull base chordoma

TO THE EDITOR: We read with great interest the recent article by Zenonos et al. 1 (Zenonos GA, Fernandez-Miranda JC, Mukherjee D, et al: Prospective validation of a molecular prognostication panel for clival chordoma. J Neurosurg [pub ahead of print June 15, 2018. DOI: 10.3171/2018.3.JNS172321]) on a molecular prognostication panel for clival chordoma after resection. The authors performed a prospective laboratory study to validate the prognostic value of tumor Ki-67 expression and genetic aberrations on chromosomal loci 1p36 and 9p21 in clival chordoma. With univariate and multivariate Cox analyses, the authors found that percentages of cells with 1p36 and homozygous 9p21 deletions are independent predictors of clival chordoma outcome. Furthermore, a combination of these two biomarkers could effectively separate patients into different risk subgroups with significantly different survival. These findings would be useful for prognostic risk stratification and therapeutic optimization of patients with skull base chordoma (SBC).

Currently, many factors have been shown to contribute to SBC prognosis. 2–4 Among them, complete or total resection and chondroid chordoma type are consistently reported to be associated with better survival of SBC patients. 5–8 In this study, however, the authors only assessed the prognostic effect of the molecular panel in SBC without adjusting for other clinicopathological parameters or molecular features, which may likely introduce bias and fail to provide accurate information on prognosis. As the authors stated, although certain tumors’ molecular characteristics can be related to the subtotal resection of a tumor, whether the 1p36 and homozygous 9p21 deletions are correlated with the choice of resection type remains unknown. Previous studies have demonstrated that recurrent tumor and a large tumor size are risk factors of subtotal resection of SBC lesions. 4 In addition, it has been shown that epigenetic dysregulation and aberrant protein expression are linked with a more aggressive chordoma phenotype, 9–10 thus leading to a subtotal resection. Taken together, these results strongly indicate that resection of SBC lesions may be influenced by a complex clinical and molecular profile, which deserves further elaboration.

Published data have suggested that the tumor immune microenvironment plays a key role in cancer development and progression. 2 Similarly, in chordoma, recent studies have revealed that the tumor-infiltrating lymphocytes within the tumor microenvironment were significant predictors of chordoma outcome, which even displayed stronger prognostic power than the traditional classification system in survival prediction. 7 As analysis of the immune microenvironment is less affected by the intratumoral heterogeneity, researchers have recently recommended to add this microenvironmental component to prognostic analysis in order to improve outcome prediction. 6 However, because previous studies mainly focused on spinal chordomas, data on the immune microenvironment in SBC are still lacking. Considering the different biological behavior between spinal chordoma and SBC, 1 further studies are largely needed to disclose the prognostic role of the immune microenvironment in SBC and evaluate its correlation with the genetic abnormalities, including losses of the 1p36 and 9p21 chromosomal loci.

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Disclosures
The authors report no conflict of interest.

Response
We really appreciate Dr. He’s and Dr. Dai’s interest in our study and the stimulating discussion they initiate. Congruent with the existing literature, our experience has shown the extent of resection to be a crucial prognostic factor in chordomas.² ³ The reason our analysis did not further subclassify the tumor according to the extent of resection was to avoid a type II statistical error due to the lack of power. Such an analysis is in our future plans as we accumulate more data, and could be expedited by multi-institutional efforts. Nonetheless, one has to distinguish the true oncological resections that can be achieved in spinal chordomas (either en bloc or with a rim of negative margin) from the so-called gross-total resections reported for their skull base counterparts. As such, one can view SBCs as analogous to gliomas, in which, while the extent of resection matters, the biology of the microscopic remnants is what ultimately dictates prognosis. Furthermore, it remains unclear how the biology can affect the invasiveness of a tumor and ultimately the extent of resection.¹

To further support these points, we show two illustrative cases. In the first case (Fig. 1A–C), the tumor was...
originally misdiagnosed as an “ectopic pituitary” at another facility, as it had been stable for several years before starting to grow. The surgical specimen was a group B tumor. Although impossible to prove retrospectively, one is led to postulate that the biology of the original lesion was different than the one that was excised. Is it possible that the original tumor belonged to group A? Perhaps chordoma, like glioma, has lower-grade precursors that evolve into more aggressive subtypes? Either way, one can see here how it would be easier to obtain a gross-total resection for the original tumor had it been correctly diagnosed from the beginning, but one can also see how the biology of the microscopic remnants of that original tumor would allow for a longer progression-free survival, which could misleadingly be attributed to the extent of resection. On the other end of the spectrum, a rapid recurrence was observed in the second illustrative case (Fig. 1D–F) of a group C tumor, despite a gross-total resection, as well as adjuvant radiation.

Undoubtedly, multiple prognostic factors are important in chordoma. Notably, the immune score cited by the authors for spinal chordomas changes the prognosis by a factor of 3.5 (HR 0.282), and incomplete resections in the cited meta-analysis changed the prognosis by a factor of 2 (HR 2.01), while none of the factors reviewed changed the prognosis by a factor of more than 12.5 We believe that the importance of our findings is the wide range of prognoses (up to 76-fold change) that can be predicted by simply two factors, allowing for an educated approach to their management. In the future, we are hopeful that, with the invaluable help of researchers such as Drs. He and Dai, collaborative efforts will help unlock some of the physiological underpinnings of these tumors and lead to a significant impact on the lives of our patients.

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Contralateral transmaxillary approach

TO THE EDITOR: We enjoyed seeing the application of the contralateral transmaxillary (CTM) approach by Pamias-Portalatin et al.3 (Pamias-Portalatin E, Mahato D, Rincon-Torroella J, et al: Endoscope-assisted contralateral transmaxillary approach to the clivus and the hypoglossal canal: technical case report. J Neurosurg [epub ahead of print June 22, 2018; DOI: 10.3171/2018.1.JNS171972]). In this single case report, a subtotal resection of a petroclival chondrosarcoma was performed. The article fails to adequately recognize, however, the original contribution and clinical experience of the article by Patel et al.4 We reported on 5 clinical cases in which patients underwent a CTM approach for chordoid neoplasms involving the petrous apex. In all cases, the CTM approach greatly enhanced our ability to remove tumor deep to the petrous internal carotid artery (ICA) with minimal risk to the artery. It is disingenuous of the authors to state, “to our knowledge, this is the first non-cadaveric presentation of this specific approach in a patient,” especially when referencing our publication.

On average, the CTM approach improved the angle of approach by 25°. In follow-up research performed in our laboratory, we have demonstrated both angle and reach advantages. Anatomical limits include the internal auditory canal and jugular foramen. In general, the hypoglossal canal is accessible with relative ease via a simple endonasal corridor, given the naturally enhanced lateral access inferior to the petrous ICA.1,2,5 An ipsilateral transpterygoid approach with sacrifice or mobilization of the medial Eustachian tube provides adequate lateral exposure. The primary benefit of the CTM approach is for access to the petrous apex deep to the petrous segment of the ICA, which is well illustrated by the tumor presented in this paper.

There are nuances of the surgical technique that facilitate access to the contralateral petrous apex. Figure 4B suggests that additional bone could be removed from the lateral margin of the maxillary opening. The maxillotomy should extend to the lateral limit of the maxillary sinus in order to provide the maximal angle of approach. If preservation of the sphenopalatine artery is not a consideration for reconstruction, the CTM corridor can be enhanced by drilling the base of pterygoid on the side of the approach.

Figure 5 does not clearly indicate the use of the CTM corridor for tumor dissection. It is not clear how the authors position the endoscope and dissecting instruments. Review of the surgical video suggests that the entire procedure was performed via the CTM corridor. Exposure and visualization of skull base landmarks was limited, and, unfortunately, access to the hypoglossal canal is not well demonstrated. Use of a single corridor also constrains positioning of multiple instruments and limits options in the