On "Evaluation of the Contribution of CAS in Combination with the Subcranial/Subfrontal Approach in Anterior Skull Base Surgery" (Skull Base 2001;11:59–76)

We greatly respect the surgical skills of Laedrach and coworkers (Evaluation of the contribution of CAS in combination with the subcranial/subfrontal approach in anterior skull base surgery. *Skull Base* 2001;11:59–76) in performing the complex surgeries described in their article. Doubtless, their well-known subcranial and subfrontal approach is very suitable and allows a safe and radical resection of complex pathologies by the inherent large exposure of anatomical structures. This approach also is suitable for correcting craniofacial deformations and malformations. However, reading the paper left us dissatisfied regarding a few issues.

The authors performed a set of surgeries through the subcranial/subfrontal approach. Not surprisingly, they found limited usefulness and benefit from a modern computer-assisted surgery (CAS) system. Inherently, a large access route provides enough anatomical landmarks for intraoperative orientation. Therefore, we do not understand the real purpose for the study: Was it to prove the usefulness of navigational aids or the opposite? From our reading, we suspect that costly navigational equipment is of no benefit. CAS systems were intended to aid surgeons during minimally invasive surgeries; in such settings, their value is evident to the scientific community. If the authors had chosen the now widely accepted endoscopic approach via the endonasal route, a totally different picture would have arisen.

The authors report a "measured accuracy" of 0.25 to 1.5 mm but no hint of how and what they measured: Was it a root-mean-square error as de-

livered by the system, or was it a clinical error?^{1,2} What anatomical landmarks were chosen?³

Finally, we must point out that we were among the first to report the development and use of an upper dental splint for frameless computer-assisted ENT surgery.^{4,5} This device is now widely used in ENT,⁶ radiology,⁷ radiotherapy,⁸ and neurosurgery.⁹ We have used the same mouthpiece to carry three-dimensional sensing equipment intraoperatively since 1997 (see Fig. 4A in Gunkel et al.).¹⁰

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Authors' Response

Most of the arguments in this letter are similar to those of Häusler and coworkers. It seems that our article has given rise to misunderstandings among those devoted to endonasal-endoscopic procedures. This is surprising because the objective of the study was clearly defined—to evaluate the contribution of computer-assisted surgery (CAS) using the subcranial/subfrontal approach in cases mandating a broad exposure, resection, and reconstruction of the afflicted anterior skull base locations.

Compared with other traditional external facial approaches, the less invasive subcranial approach provides broad exposure and direct visualization of anatomical landmarks and vital skull base structures, including intra- and extracranial loca-

tions, thus reducing the indication for CAS to 23% in our cases. This figure is in contrast to other external approaches that do not provide an equivalent optimal exposure—in such cases, the contribution of CAS would, as expected, be higher and even more so in endonasal approaches. These aspects were clearly depicted in our article as was the exclusion of endonasal-endoscopic procedures in this study. As emphasized in the Discussion from our article: “The degree of the CAS contribution is highly dependent on the choice of the approach.” The endoscopic-endonasal procedures as such are well known, as are their indications and limitations. However, these issues were not the subject of our article; further discussion is beyond the scope of this letter.

The query about the technical details of measured accuracy and further attributes, as referred to in our article (i.e., the technical aspects and the features of this CAS system), again were not the subject of the study. Accordingly, we referred readers to the related literature (see the Introduction, Material and Methods). However, the accuracy in these clinical/surgical cases was 0.25 to 1.5 mm (mean, <0.5 mm, which is clinically relevant).

To clarify: We do not oppose endonasal-endoscopic surgery given adequate indications. It simply was not the subject of our article. Actually, we neither understand the issue of this letter in relation to our article nor its message.

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