Editorial

The supraorbital “keyhole” approach

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Beseoglu et al.1 present us with a very detailed and careful appraisal of the cosmetic results they obtained using a relatively small supraorbital craniotomy that includes removal of the orbital rim and some of the anterior roof of the orbit. The authors described this approach, which is a slight modification of previously reported techniques, in detail in 2001.2 Although they do not describe the skin incision that they use in the current publication, they described a standard frontotemporal skin incision behind the hairline in their original report.

The authors studied 71 patients in detail. They found minor complications in 16.9% of their patients, including a small subdural hematoma that did not require evacuation, several partial facial palsies probably from damage or stretching of the frontalis branch, various degrees of periorbital and orbital swelling, and 5 subgaleal collections of CSF that required lumbar drainage but did not significantly increase the length of hospitalization. Additionally, they found 4 major complications that required reoperation (2 for CSF fistulas, 1 for pneumocephalus, and 1 for a serious orbital hematoma). Importantly, although the authors do not consider these complications related to the approach, they had to reoperate on 4 patients with anterior communicating artery (ACoA) aneurysms to reposition the initial clip. Four patients died as a result of their original subarachnoid hemorrhage and 10 additional patients were either lost to follow-up or refused to have a follow-up examination. Of the 54 patients that completed a follow-up questionnaire and were examined in the clinic, 2 experienced a persistent palsy of the frontalis and orbicularis muscles. The cosmetic results of the procedure were self-rated by 64.8% of the patients as “very good” and by 25.9% as “good.” The rest were dissatisfied with the results. It is important to understand that during these craniotomies the authors entered the frontal sinus in 38% of the patients. They note that the literature indicates the incidence of the frontal sinus violation with the standard pterional craniotomy in 38% of the patients. They note that the literature indicates the incidence of frontal sinus violation with the standard pterional craniotomy is approximately 10%.

The purpose of this article is to describe the cosmetic results; accordingly, the authors do not discuss in detail problems unrelated to the approach. Therefore, the important issue is to consider whether the cosmetic results, so carefully and honestly reported, are superior to the cosmetic results of the standard pterional craniotomy that would have been used to address these specific pathologies (mostly ACoA aneurysms) by most neurosurgeons. Certainly, the incidence of CSF leaks appears to be a bit higher than what we are used to observing with the pterional approach, but it appears that the authors were able to handle all of these leaks satisfactorily, albeit with reoperations in 4 patients (including 1 with pneumocephalus) and lumbar drains in several others. Certainly, frontalis palsies are noted after pterional craniotomies, but it is my impression that the incidence in most reported series of pterional craniotomies is somewhat lower than that reported by these authors using their technique. The incidence of persistent anosmia in this series is probably no different than that observed in patients undergoing operations using the standard pterional approach, and as the authors point out, many of these deficits may have been related to the initial subarachnoid hemorrhage rather than to the surgery per se. The incidence of entrance into the frontal sinus appears to be higher than that encountered using the pterional approach, and although this did not result in any cases of meningitis in the authors’ particular series, that potential is always there. The incidence of temporal muscle atrophy appears to be no different than what can be expected with a standard pterional craniotomy. It is difficult to compare the self-reported cosmetic results with those resulting from a pterional craniotomy, but it is my impression that the cosmetic difficulties reported by the authors’ patients are no different, and are similar in incidence, than what we observe after the pterional approach. In brief, it appears that the cosmetic results of the authors’ “keyhole” approach are similar to those achieved with the standard pterional craniotomy, although the incidence of entrance into the frontal sinus and CSF leaks may be slightly higher.

Given the above, what are the real advantages of the authors’ smaller craniotomy? One potential advantage is that the authors, using their approach, do not appear to require resection of the gyrus rectus for good exposure of ACoA aneurysms. Although to my knowledge this has not been addressed in a formal scientific fashion, it is my impression that it adds a small resection of the ipsilateral gyrus rectus to optimize exposure of an ACoA aneurysm leads to no detectable neurological consequence for the patient. I believe that most experienced neurovascular surgeons share this opinion and do not hesitate to use a small resection of the gyrus rectus whenever necessary, which is frequently the case when using the standard pterional approach. The only other potential advantage that I see by using this approach is that it may slightly shorten the time required to cut the craniotomy flap, but I doubt that this is a major concern to most neurosurgeons. Clearly, if the bone has to be removed because of an infection, the craniotomy flap to be removed is much smaller using the authors’ small craniocircular exposure; however, reconstruction of the orbital rim with cranioplasty is difficult and rarely achieves a perfect cosmetic result.

In general terms, I personally object to small, restricted craniotomies to address most aneurysms, particularly if they have bled recently or are large and/or complex. Working through a small craniotomy such as

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that used by the authors, the surgeon is confined to a narrow angle of vision, and the ability to address complex situations, particularly aneurysmal rupture, is more limited than with the broader base afforded by a standard pterional craniotomy. With the latter, the surgeon has a much greater ability to change the angle of vision in a much broader arch from anterior to lateral to be able to see better on both sides of the aneurysm and behind the aneurysm without having to move the aneurysm itself, which may be required when the angle of vision is more limited. In this respect, it should be noted that the authors had to reoperate on 4 patients with an ACoA aneurysm to reposition the clip. One could argue that this relatively high rate of reoperation was unrelated to the approach, but I can’t help but wonder whether with the wider angle of vision offered by the standard pterional approach and the ability to look better on each side and behind the aneurysm, some of these instances of reoperation could have been avoided.

Clearly, very experienced operators, such as the present authors, and several others who have refined these minimally invasive approaches can use them safely and obtain excellent results, as these authors have. However, I see no need for the majority of neurosurgeons to compromise safety to offer the patients a minimally invasive approach. In general, I believe it would be good if we thought of invasiveness as likelihood of complications or difficulty in dealing with them when they occur intraoperatively, rather than being related to the size of the incision or the bone flap. In this context, the least invasive approach would be the one that offers maximum safety and optimal ability to effectively attend to the pathology at hand. For most neurosurgeons, I believe that the standard pterional approach continues to offer maximal safety and efficiency in approaching most aneurysms of the ACoA region. Clearly a larger cranioorbital exposure is frequently necessary to address more complex pathology in this region.

I applaud the authors for their meticulous and candid evaluation of the cosmetic results of their small cranioorbital craniotomy technique.

References

Response

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The authors would like to thank Dr. Heros for his thought-provoking editorial regarding our paper in which he also questions the indications to use small craniotomies in aneurysm surgery. We wish to point out that the rationale of the transorbital keyhole approach was not to achieve just a “smaller craniotomy,” which certainly could be dangerous, especially in aneurysm surgery as noted by Dr. Heros. The idea of the transorbital keyhole approach is to achieve a custom-tailored approach, in particular to the ACoA artery complex, to reduce necessary retraction of the frontal lobe and resection of the gyrus rectus.

The goal of the current study was exclusively to analyze the approach-related morbidity as well as cosmetic results of this skull-base approach. The present study was not designed to analyze the potential neurological benefits of minimizing frontal lobe retraction and gyrus rectus resection. Based on an earlier analysis on ACoA aneurysms, we know that neuropsychological outcome is influenced by multiple factors and the relationship to single surgical aspects is difficult to prove statistically.2

With regard to potential problems, we agree that reconstruction after removal of an infectious transorbital craniotomy flap requires additional effort to achieve perfect cosmetic results. Nevertheless, in our series we did not have a single infection that required removal of the bone flap, so this concern appears to be remote.

With regard to the incidence of incompletely excluded aneurysms due to the more restricted view, the rate of necessary reclipping was 4 (5.6%) of 71 patients in the present series. In the literature, the rate of incorrect clip placement without using intraoperative digital subtraction angiography is documented as 5%–8%.1 Hence, the rate of incorrect clip placement using the orbitocraniotomy in the present study was consistent with other series using standard approaches.

We completely agree that this custom-tailored approach should be reserved for more experienced vascular neurosurgeons. In our hands, it has been demonstrated to be safe for various vascular pathologies around the ACoA complex and to be associated with low morbidity and good cosmetic results. The hypothesis that this approach is associated with lower neurological morbidity should be analyzed in a scientific fashion because it is our strong conviction that vascular microsurgery needs progress and innovation to remain competitive with the constantly advancing endovascular strategies.

References

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