

Key Hole Craniotomy: When, Where, and How to Apply?

The authors of this manuscript have presented the output of their review about “keyhole approach for cerebral aneurysms,” located mainly in the anterior circulation and have reviewed remarkable amount of references published during the previous 20 years as mentioned in the abstract. Reading this review might certainly be informative for the young neurosurgeons trying to get familiar with the content of relevant literature in this regard. Respectfully, there are few issues worthy to be added as an editorial to this manuscript.

I wonder if the review is either a systematic review or a type of meta-analysis? There is no flow chart, and two of the mentioned keywords do not match with the MESH linked with aneurysm surgery, i.e., “commonest anterior circulation aneurysm treated by keyhole approach” and “complete occlusion rate.” The “occlusion rate” is in common usage for endo-techniques and in comparing the outcome of endo-treatment and open surgery of cerebral aneurysms.

The introduction describes the objective of the researchers as conveying “the current concept and proper patient selection for such an approach.” They selected 17 manuscripts and analyzed their materials and then included a summary of those data in the form of three tables that are easy to be reviewed by the readers. In such kind of “narrative review,” the least would be to declare the characteristics for the inclusion of the manuscript selected for review, the level and the number of the reviewers for each manuscript and the type of statistical analysis used for comparing the outcome. The kind researchers have mentioned a summary of each manuscript in the discussion and apparently, the readers might reach a conclusion with either reading the brief concept highlighted by the authors or select any one of the references for further review.

The different modalities of the conventional frontal, frontotemporal, frontolateral, and low pterional craniotomies are the most frequently used approaches to the aneurysms of the anterior or posterior cerebral circulation. Selection among the possible routes is influenced by the personal interest and experience of the operating surgeon. The beneficiaries of keyhole surgery are mentioned by the authors but, for the surgeon who only occasionally operates in the para- and parasellar regions, this type of approach may be a prescription for disaster.

The incision is made within the eyebrow, it is almost always visible, and the hair loss at the margin of the incision makes the incision more visible. In contrast, a pterional type of incision within the hairline is never visible, unless the patient is bald. Any cosmetic problems caused by burr holes can be eliminated using the currently

available plating systems. Therefore, the number of burr holes drilled has become irrelevant, except for cost considerations. The location of the keyhole technique is in an area in which, if the patient has a thin scalp, a plate may be visible. Therefore, the esthetic consequences of the incision really are not an issue.

The frontalis branch of the facial nerve is rarely if ever injured when a one-layer scalp flap elevation is used in the pterional approach. It is also seldom injured in a two-layer technique if the surgeon knows the proper method. Therefore, protecting the frontalis branch of the facial nerve is not a major advantage of the more limited technique.

The risk of a complication from frontal sinus violation is also overstated. The time required to prepare a pterional opening is roughly 20–30 min or less. The benefit derived by taking a few extra minutes to create added exposure and more angles of manipulation is certainly worthy enough for the safety.

The size of the bone flap has no importance, and the brain can be kept covered by the dura and wet cottonoids. The most striking aspects of the approach are that the surgeon must position his patient as optimally as possible so that gravity can be used to let the frontal lobe fall by itself and that the surgeon is forced to minimize frontal lobe retraction and manipulation. This cannot be achieved with small opening, and if an unexpected event happens and could not be managed by the anesthesiologist, might end in a catastrophe.

Keyhole surgery has been heralded as the future for medicine, but the keyhole approach is acceptable if it fits with the surgeon’s philosophy of minimally invasive surgery and if the surgeon’s experience and technical skill allow such an approach to be taken. It has been estimated that 70% of operations will one day be carried out using this technique. It involves miniature cameras and long, coaxial instruments being inserted into the tiny hole and cistern, hardly kept opened by cerebrospinal fluid drainage and anesthesiologists if not bloody enough. The operation might be performed through a screen if endoscopic assistance is needed to shed light in the depth where microscope might not elucidate due to limitations of the axis of keyhole approach. As the authors mentioned, “keyhole surgery” started in the 1980s but unfortunately, has spread in an uncontrolled and haphazard way while formal training has been brought in only recently. There is no question that small approaches can minimize normal tissue disruptions and brain retraction. The small or minipterional approach offers a direct avenue for other lesions such as certain sphenoid wing and parasellar meningiomas, tumors of the

cavernous sinus and Meckel's cave, orbital lesions, temporal lobe gliomas, and metastatic brain tumors.^[1-5]

In summary, the craniotomy should be only as large as necessary to guide instruments safely and effectively to the pathology.

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