Article published online: 2022-09-14

Commentary

Bony Tumors of the Cranial Base: One Size does not Fit All

Bony lesions of the skull base include a wide range of pathologies in many different locations along the cranial base. These two parameters determine the tumor behavior to the surrounding neurovascular structures, possibility of safe radical removal of the tumor and its impact on the progression free survival of the patients, and thus selection of the most appropriate surgical strategy.

While some tumors are easily removed through a standard skull base approach, the other ones need to be operated via more complex skull base approaches and sometimes a combination of two or more classic approaches. According to patient-, surgeon-, and tumor-related factors, these complex operations may be done in one or staged into separate surgical sessions.

Tumor location seems to be the most important parameter in selecting the surgical corridor. Tumors arising close to vital neurovascular skull base structures are the most challenging ones, i.e. those with extension to cavernous sinus, optic foramen, carotid canal, petrous ridge and apex, jugular foramen, clivus, and craniocervical junction (CVJ). Whatever approach used for surgery, these tumors are associated with an inherent risk of morbidity and even mortality.

Traditionally, extensive approaches have been described to access these challenging areas in the skull base. Most of these approaches demand extensive drilling of the skull base bone to reach the area of interest and to gain access on the neighboring vital elements. The most famous ones among them are the infratemporal approaches of Fisch, presigmoid translabyrinthine/transotic approaches to petrous region, and far lateral transcondylar/transtubercular approach to the lower clival region and ventral CVJ. These approaches tend to expose many vital elements by drilling away their surrounding bone and thus have an inherent risk of injury to important cranial base structures.

With the advent of endoscope and its increasing popularity among neurosurgeons, some of the bony lesions of the skull base have been operated through endoscopic transnasal route. The prototype of this group is the chordoma of clivus and CVJ, which is now seldom operated through other approaches. During the last decade, there has been a great amount of improvement in endoscopic instruments and techniques making possible to access many different locations of the skull base via extended endoscopic approaches. The term "minimally invasive approach" is frequently used to denote the endoscopic skull base operations. I personally use the term "minimally invasive" very cautiously. The term may be applied to different aspects of neurosurgical procedures such as size of skin incision, size of craniotomy and dural opening, and size of pial and parenchymal dissection. This is to remind that although skin incision is replaced by mucosal dissection in some endoscopic approaches, this "incision sparing procedure" will not be the optimal goal for this surgery since the function of the normal mucosa is sometimes permanently compromised through surgery. The size of craniectomy done at skull base in extended endoscopic approaches is sometimes many times larger than what is done in classic approaches. The term "minimally access surgery"[1] seems to be more appropriate for some of these operations since the true minimal invasion in neurosurgery is defined mainly according to the neural tissue and not the supporting structures around it. Moreover, the final point in this regard would be that of Abla and Spetzler[2] that minimal invasion should not be at the cost of the maximal effectiveness in tumor removal.

As a judicious way in application of endoscope for skull base lesions, we have recently published two articles[3,4] about how endoscope-assistance can cover the blind points of microsurgical approaches and, furthermore, can obviate the need for the classic extensive approaches to complex and difficult to reach skull base regions. Application of endoscope as a supplement and not merely supplant to microsurgical approaches is the concept that may help neurosurgeons to reach a balance between endoscopic and microsurgical techniques.

In conclusion, I would like to stress that an individualized strategy is needed to select the best approach for each patient and algorithmic machinery does not fulfill the requirements of the diverse field of skull base surgery. This demands flexible, skilled surgeons without fixed and dogmatic predefined biases toward any facility in the armamentarium of neurosurgical instruments.

In this article, the authors have presented their institutional experience with 41 cases of bony skull base tumors during a 5 year period. Their series contains a nonhomogenous set of lesions at different locations along the skull base. The surgical approaches they used to apply are in most cases the traditional skull base approaches, some of which are used less commonly by modern skull base centers nowadays. Nevertheless, the article reflects well the flexibility and dexterity of the surgical team in selection of an individualized strategy tailored to the available facilities and patients' condition.

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Quick Response Code:

Website: www.asianjns.org

DOI: 10.4103/1793-5482.228576

How to cite this article: Alimohamadi M. Bony tumors of the cranial base: One size does not fit all. Asian J Neurosurg 2018;13:536-7.