Bifrontal Basal Interhemispheric Approach

Indications

The anterior interhemispheric approach, is an effective and a safe approach to tumorous, vascular and traumatic pathologies of the midline anterior skull base. This approach should be part of the armamentarium of skull base surgeons [1].

Suprasellar tumor

The minimally invasive anterior interhemispheric approach, with or without opening of the lamina terminalis, is useful for removal of tumors in and around the anterior third ventricle, such as craniopharyngiomas and hypothalamic gliomas [2].

The anterior interhemispheric approach offers us an excellent surgical view for suprasellar tumor. Following this approach, we occasionally encounter postoperative brain damage in the frontal lobes.

Potential causes for such brain damage were evaluated in 28 consecutive patients with suprasellar tumours extirpated using this approach.

Kubota et al. focused particularly on the influences of venous involvement during surgery. The draining territory index (DTI) was originally devised for estimating the extent of the draining area of the sacrificed bridging veins.

CT evident brain damage was observed in five of 28 patients (17.8%), but only one patient (3.6%) showed clinically significant postoperative deficits. The patient's age, tumour pathology, tumour character, tumour size, duration of surgery, and radicality of the surgery did not affect the incidence of the brain damage. Of the twelve patients whose bridging veins were sacrificed during surgery, four (33.3%) showed brain damage in the frontal lobes. In contrast, such damage was observed in only one patient out of 16 (6.3%) whose bridging veins were preserved. Among the brain-damaged group, the average DTI of the sacrificed veins was significantly higher than that among the non-brain-damaged group.

Venous involvement during surgery significantly aggravated postoperative brain damage following the anterior interhemispheric approach. The DTI was useful in predicting the risk of brain damage, and a large bridging vein with a DTI over 50% should not be sacrificed during surgery [3].

Distal anterior cerebral artery (ACA) aneurysm

The anterior interhemispheric approach is a well-known operative technique for a distal anterior cerebral artery aneurysm. However, a frontal parasagittal bridging vein is occasionally sacrificed in this approach, creating a risk of postoperative venous infarction.

The basal interhemispheric approach for neck clipping of aneurysm located on genu or infracallosal portion of anterior cerebral artery would provide wide view of aneurysm and its surrounding structures with minimum retraction of frontal lobe, short distance to the aneurysm, and low risk of

bridging vein damage [4].

Techniques

Fujitsu et al., described a method for a frontal anterior interhemispheric approach when treating craniopharyngiomas of the third ventricle or anterior communicating artery aneurysms. This technique ensures preservation of the bridging veins and the olfactory nerves. This “basal interfalcine approach” involves a craniotomy in the centrobasal portion of the frontal bone (the frontal sinus), removal of the inner tables and the crista galli, and splitting the basal portion of the falx into two leaves, through which the basal interhemispheric fissure is opened. The olfactory nerves are protected by the leaves of the falx, and the bridging veins are preserved because the approach is low enough to spare them. The surgical techniques are described together with a unilateral variation of this approach. The significance of preserving the bridging veins is discussed in connection with avoidance of postoperative contusional hemorrhage [5].

Disadvantages

As a disadvantage, the anterior communicating artery (ACoA) often limits the surgical exposure in the anterior interhemispheric fissure.

Intentionally dividing the ACoA during a surgical procedure is commonly avoided to preserve perforating branches emerging from the ACoA, which can act as the main feeders of the infundibulum, optic chiasm and anterior hypothalamus [6] [7].

Especially in retrochiasmatic tumors, the ACoA, which is usually located anterior to the tumor, not only limits but also obstructs the surgical corridor in the basal interhemispheric approach. While some authors have proposed ACoA division if necessary [8] [9] [10] , it appears that interrupting the ACoA intentionally during a surgical procedure has only rarely been practiced. It is well known that the ACoA is encountered in a great number of anatomic variations [11] [12] [13]. In some cases with normal ACoA, it may not be easy to divide the artery because of its tortuous form or because it harbors several perforating branches. Also, it must be taken into account that in the limited anterior interhemispheric area, surgical manipulation may cause damage not only to the frontal lobes but, particularly in pediatric patients with fragile arterial wall, may also induce inadvertent ACoA rupture as Teramoto and Bertalanffy have experienced in two cases. Such arterial rupture may potentially be associated with serious problems for the patient. Consequently, predicting the necessity of controlled ACoA division before surgery appears meaningful and may help reduce the surgical risk.

Results suggest that controlled ACoA division may be required in central lesions with a depth of 38 mm or more and in lateral lesions with an angle of 23 degrees or more [14].

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see also Anterior contralateral interhemispheric transcallosal approach.

Case series

Bifrontal Basal Interhemispheric Approach case series.

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