Brainstem glioma surgery

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- The LITTability study - evaluation of the applicability of LITT in a real-world cohort of glioma patients

Biopsy

Should not be performed when the MRI shows a diffuse infiltrating brainstem lesion (does not change treatment or outcome) [1)].

Treatment is usually non-surgical. Exceptions where surgery may be indicated:

1. tumors with a dorsally exophytic component: these may protrude into 4th ventricle or CP angle, tend to enhance with IV contrast, tend to be lower grade

2. some success has been achieved with non-exophytic tumors that are not malignant astrocytomas (surgery in malignant astrocytomas is without benefit) (detailed follow-up is lacking).

3. shunting for hydrocephalus

Dorsally exophytic tumors

These tumors are generally histologically benign (e.g. gangliogliomas) and are amenable to radical subtotal resection. Prolonged survival is possible, with a low incidence of disease progression at short-term follow-up.

Surgical goals in exophytic tumors include:

1. enhanced survival by subtotal removal of exophytic component: broad attachment to the floor of 4th ventricle is typical and usually precludes complete excision (although some “safe entry” zones have been described). An ultrasonic aspirator facilitates debulking.

2. establishing diagnosis: radiographic differentiation of exophytic brainstem gliomas tumors from other lesions (e.g. medulloblastoma, ependymoma and dermoids) may be difficult

3. tumors that demonstrate recurrent growth after resection remained histologically benign and were amenable to re-resection.

Complications of surgery generally consisted of exacerbation of pre-operative symptoms (ataxia, cranial nerve palsies...) which usually resolved with time.

Despite significant advances in the surgery for brainstem gliomas many aspects of this pathology are still unclear.

A total of 40 focal 'intrinsic' (“expanding variety”) tumors have been operated over a period of 8.5-years (January 1998-June 2007). Our criteria included patients with (1) well-defined gadolinium enhancing tumor; (2) relatively long duration of symptoms (> six months) and (3) good neurological functional status and independent for all activities of daily living. The cutoff size of 2 cm was not rigidly adhered to.

The 'intrinsic' brainstem tumors were classified into three types: Expanding, diffuse infiltrative and pure ventral varieties. Only patients with expanding variety of brainstem gliomas were subjected to surgery, mean age 19.2 years (range 4-55 years) and male to female ration mean: 3:2). The tumor location included pons (n=19), midbrain (n=13) and medulla (n=8). Surgical approaches included midline suboccipital (n=28), retromastoid (n=7), subtemporal (n=3) and supracerebellar-infratentorial (n=2). Thirty-two cases with 'diffuse infiltrative' and 'pure ventral' variety were given radiotherapy only. Histology pathology revealed pilocytic variety (n=10), Grade II (n=17) and Grade III (n=13). There was one death in the surgical series (due to aspiration). Complications included meningitis (n=2), wound infection (n=1), chest infection (n=5) and transient mutism (n=1). Follow-up ranged from 3-68 months. Overall, 36 improved /remained same and three worsened in their clinical status at the time of discharge.

The surgical management of intrinsic brainstem tumors presents a surgical challenge; radical excision yielded a good outcome in the majority of cases. The authors propose a classification system for 'intrinsic' brainstem tumors for defining surgical strategy [2].

1)
Albright AL, Packer RJ, Zimmerman R, et al. Mag- netic Resonance Scans Should Replace Biopsies for the Diagnosis of Diffuse Brain Stem Gliomas: A Report from the Children's Cancer Group. Neurosurgery. 1993; 33:1026–1030

2)
Mehta VS, Chandra PS, Singh PK, Garg A, Rath GK. Surgical considerations for 'intrinsic' brainstem gliomas: proposal of a modification in classification. Neurol India. 2009 May-Jun;57(3):274-81. doi: 10.4103/0028-3886.53272. PubMed PMID: 19587467.