An unusual presentation of intracranial metastasis
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Citation

Abstract
Solitary intraventricular metastasis is an extremely rare entity with poor outcome following surgery. A 26 years old male presented with features of raised intracranial pressure. An extensive intraventricular tumor was diagnosed as septal glioma on imaging. A gross total microsurgical excision of a vascular infiltrative tumour with subependymal infiltration resulted into marked pneumocephalus and progressive oedema of white matter. The patient died on 4th postoperative day the biopsy of tumor specimen revealed a metastatic papillary adenocarcinoma. Venous infarct was thought to be the cause of an extensive white matter infarct. Literature is reviewed to explore the primary sites, clinical manifestations and causes of mortality in these cases.

INTRODUCTION
The common intraventricular lesions in adult are colloid cyst, choroid plexus papilloma, intraventricular gliomas (septal) and subependymal giant cell astrocytomas. The rare tumours in this location include meningioma, oligodendroglioma and ependymoma. Solitary intraventricular metastasis is a rare entity with commonest primary site being renal cell carcinoma. Surgical resection is the main modality of treatment, if the primary disease is under control. Surgery for these lesions is difficult as compared to other parenchymal metastases owing to their deep location and complicated vascular (venous and arterial) anatomy in the region. We report a case of solitary intraventricular metastatic adenocarcinoma mimicking a glioma. Various aspects of such lesion are discussed here with pertinent review of literature.

CASE REPORT
A 26 years old male patient presented to our center with 3 months history of holocranial headache and vomiting. On examination he had bilateral papilledema without any neurological deficit. The routine investigations including x-ray chest were within normalcy. The patient was evaluated with a CT scan and MRI (Figure -1, 2, 3).

Figure 1
Figure 1 : CT scan showing intraventricular tumour extending into bilateral ventricles and tumour along the septum pellucidum involving body, and trigone as well as part of third ventricle.
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Figure 2
Figure 2 & 3: MRI contrast scans showing extent of tumour.

Figure 3
A radiological diagnosis of septal glioma was considered in view of the tumor being centered at foramen of Munro, involving septum pellucidum in a young patient with CT characteristic of mild hyperdense mass enhancing heterogeneously on contrast. The lesion was hypointense on T1W, hyperintense on T2W and enhancing on contrast heterogeneously. The patient was approached by interhemispheric transcallosal approach. Corpus callosum was thin and stretched, the tumour was encountered just beneath an opening in corpus callosum. It was very vascular, firm, grayish, extensive and relatively well defined intraventricular mass filling the body of both lateral ventricles. It was extending along with septum pellucidum up to its whole extent, at places it was going into subependymal region and posteriorly extending up to trigone on right side. There was a significant subependymal infiltration in the region of body of right lateral ventricle, which was also decompressed. The floor of body of lateral ventricle was however neither infiltrated nor distorted.

Thalamostriate veins were recognized and preserved bilaterally. A near total decompression of the tumour was achieved. On reversal from anesthesia, the patient was opening eyes, following command and moving all the limbs off the bed. After 1 hour, when there was no expected recovery in his sensorium, and the patient followed commands on coaxing only, a CT scan was done. CT revealed near total removal of the tumour, but intraventricular pneumocephalus causing a mass effect (Figure - 4).

Figure 4
Figure 4: Postoperative CT scan revealing presence of pneumocephalus and near total excision of tumour.

The pneumocephalus was evacuated by brain needle and he improved marginally. On the next day patient became irresponsive, hence a scan was repeated, which revealed that the pneumocephalus had reduced but an extensive edema appeared noted in the deep white matter surrounding operative site (Figure - 5).
Figure 5
Figure 5: CT scan revealing reduced pneumocephalus and presence of edema in right thalamus, basal ganglia.

The patient was managed on decongestants, but the patient never improved to die on 4\textsuperscript{th} postoperative day.

Histopathological examination of the specimen revealed it to be metastatic papillary adenocarcinoma (Figure - 6).

Figure 6
Figure 6 : Photomicrograph showing infiltration of brain parenchyma by metastatic papillary adenocarcinoma.

The ultrasound examination revealed presence of renal swelling about 3x4 cm. Since the patient died early postoperatively, we could not investigate him further for the renal pathology. The relatives of the patient did not give consent for a pathological autopsy.

DISCUSSION
The tumors of lateral ventricle arise from the walls of the ventricle or tissues within and around the ventricle notably choroid plexus, septum pellucidum and thalamus. Most of the tumours are low grade and slow growing which, includes astrocytoma, oligodendroglioma, choroid plexus papilloma, meningioma. Few of them are highly malignant like malignant ependymoma and choroid plexus carcinoma.

Metastasis accounts for a rare differential diagnosis of intraventricular mass. True intraventricular metastases arise within the ventricle, while paranchymal metastasis which protrudes into the ventricle are nodular deposits, seen in meningeal carcinomatosis and these should not be classified as intraventricular metastasis [1]. These comprise about 0.9% of all brain metastases [1]. Single intraventricular (IV) metastases were found in 0.14% cases only, in an autopsy series of cancer patients [1]. On reviewing case reports of IV metastasis in pubmed we could found only 21 case reports. In most of the cases it was the lateral ventricle, which is the site of metastasis followed by 4\textsuperscript{th} and 3\textsuperscript{rd} ventricle [Table -1].

Figure 7
Table 1 : Reference list of intraventricular metastases.

<table>
<thead>
<tr>
<th>Reference</th>
<th>Site of primary tumor (Pathology)</th>
<th>Presenting symptoms</th>
<th>Location in</th>
<th>Surgical Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Escott (6)</td>
<td>Melanoma</td>
<td>Headache</td>
<td>Left trigone</td>
<td>Gamma knife radiosurgery</td>
</tr>
<tr>
<td>Holmby and Rosenkrantz (14)</td>
<td>Lung ( oat cell carcinoma), Brain ( glioblastoma)</td>
<td>Decreased consciousness</td>
<td>Bilaterally</td>
<td>None (radiotherapy)</td>
</tr>
<tr>
<td>Karlotta (15)</td>
<td>Lung ( poorly differentiated), Brain ( glioblastoma)</td>
<td>Asymptomatic, Headache</td>
<td>Bilateral trigone</td>
<td>Stereotactic biopsy</td>
</tr>
<tr>
<td>Mettens et al. (16)</td>
<td>Hepatoblastoma</td>
<td>?</td>
<td>Right trigone</td>
<td>?</td>
</tr>
<tr>
<td>Wiener et al. (17)</td>
<td>Kidney ( renal cell carcinoma), Brain ( glioblastoma)</td>
<td>Headache</td>
<td>Left trigone, Petrolateral transtentorial</td>
<td></td>
</tr>
<tr>
<td>Bernet and Klay (18)</td>
<td>Mediastinum ( mixed malignant germ cell tumor, mature teratoma)</td>
<td>Decreased consciousness</td>
<td>?</td>
<td>Autopsy</td>
</tr>
<tr>
<td>Tanihoto et al. (19)</td>
<td>Lung ( large cell carcinoma)</td>
<td>Headache</td>
<td>Right trigone</td>
<td>Transtorial (middle temporal gyrus)</td>
</tr>
<tr>
<td>Nishio et al. (20)</td>
<td>Gastric (adenocarcinoma)</td>
<td>Decreased consciousness</td>
<td>Left paracentral</td>
<td>Anterior interhemispheric</td>
</tr>
<tr>
<td>Nishino et al. (21)</td>
<td>Kidney ( renal cell carcinoma), Brain ( glioblastoma)</td>
<td>Headache, Seizures</td>
<td>Left lateral, Bilaterally</td>
<td>Posterior interhemispheric transtentorial</td>
</tr>
<tr>
<td>Suda et al. (23)</td>
<td>Kidney ( renal cell carcinoma)</td>
<td>Decreased consciousness</td>
<td>Right trigone</td>
<td>Stereotacitic biopsy</td>
</tr>
<tr>
<td>Spezzer et al. (24)</td>
<td>Kidney ( renal cell carcinoma)</td>
<td>Decreased consciousness</td>
<td>Right trigone, Ventricular (floor)</td>
<td>Subcortical transtentorial</td>
</tr>
<tr>
<td>Brandicourt et al. (25)</td>
<td>Colon (adenocarcinoma)</td>
<td>?</td>
<td>Third ventricle</td>
<td>?</td>
</tr>
<tr>
<td>Matsunuma et al. (26)</td>
<td>Kidney ( renal cell carcinoma)</td>
<td>Headache</td>
<td>Right lateral</td>
<td>Transeptal ventricular small</td>
</tr>
<tr>
<td>Kushna et al. (27)</td>
<td>Kidney ( renal cell carcinoma)</td>
<td>Decreased consciousness</td>
<td>Left trigone, Bilaterally</td>
<td>Approach not specified</td>
</tr>
<tr>
<td>Abate et al. (28)</td>
<td>? (melanoma)</td>
<td>Headache, Right trigone</td>
<td>Transmedial transtentorial</td>
<td></td>
</tr>
<tr>
<td>Pia et al. (29)</td>
<td>Kidney ( renal cell carcinoma)</td>
<td>Headache and somnolence</td>
<td>Left trigone</td>
<td>Transmedial transtentorial</td>
</tr>
</tbody>
</table>

In the lateral ventricle also, it is the region of trigone which remained the commonest site, possibly due to high vascularity of choroid plexus. Most of these patients presented with features of non localized raised intracranial pressure like headache, vomiting and altered sensorium. Few
of them presented with seizures and one patient presented as an intraventricular hemorrhage \[1,5]. Reviewing the literature for primary site, (Table -1) the most common site of primary was renal cell carcinoma followed by melanoma, breast cancer and lung cancer \[6,7]. The reason why renal cell carcinoma has predilection for IV metastasis is not known but definitely it is in contrast to parenchymal brain metastasis where commonest primary sites are lung and breast \[6,7].

Treatment options available are surgical excision, radiotherapy and radiosurgery. Since in all intracranial metastases the death of the patient is secondary to progression of the primary disease rather than by brain involvement \[8,9], hence surgery is considered in only those patients, whose control of primary disease is such that his/her life expectancy is more than 4 months. The patients who don't satisfy this criteria the radiotherapy or radio surgery is an alternative option. Surgery appears to be superior than radiotherapy in single brain metastasis because of the rapidity with which the lesion is removed, ability to get tissue for histopathological diagnosis, rapid reversal of symptoms and specific treatment depending on tumour histology. The special intraoperative features of IV metastasis are:

Usually they are well defined lesions with gliotic pseudocapsule, which enable and total resection. Derive blood supply from choroid plexus, so early interruption of attachment from choroid plexus helps in excision.

**SURGICAL APPROACH**

The routes to lateral ventricle are divided into anterior, posterior and inferior. The anterior approach is directed for frontal horn and body lesions, while posterior approaches are directed to atrium and inferior approaches are mainly to temporal horn. The approaches can be further divided into trans-callosal and transcortical. Transcallosal approaches are more suitable for the lesion where ventricles are normal in size or if the tumor has bilateral extension. Transcortical approach is easier if ventricles are dilated. The mortality following removal of intraventricular tumors varied from 70% in older series to 5% in some recent series \[9,10]. In a few cases where cause of death was determined, it was found to be massive brain edema and intraventricular hemorrhage \[10,11]. The cause of edema is proposed to be either due to surgical trauma or due to venous infarct secondary to trauma to the veins in the vicinity. The main preventive measure would be to prevent injury to any major venous tributary, which may be become difficult in extensive lesions.

**References**

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