



INTRACRANIAL ANAPLASTIC HEMANGIOPERICYTOMA: A DIAGNOSTIC DILEMMA

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Article Info	ABSTRACT
<p>Received 27/03/2015 Revised 02/04/2015 Accepted 12/04/2015</p>	<p>Intracranial hemangiopericytoma (HPC) is an extremely uncommon and aggressive tumor with high rate of local recurrence and distant metastasis. These tumors represent <1% of all central nervous system neoplasms. The anaplastic variant is described as WHO grade III lesion. Here we describe a case of intracranial anaplastic hemangiopericytoma diagnosed at our institute. A fifty years old male patient presented with progressive headache and repeated bouts of vomiting for last three months. Imaging studies revealed a large dura based mass with evidence of cortical compression. Based on radiology, a provisional clinical diagnosis of meningioma was made and the patient subsequently underwent open craniotomy for excision of the tumour. Based on morphology with supplementary immunohistochemistry, a final diagnosis of anaplastic hemangiopericytoma was offered. Microscopically, these rare tumors are highly cellular, composed of oval to spindle cells, with rich vascular network and pericytomatous pattern. Hemangiopericytoma is more aggressive and has a relatively poorer prognosis than the commoner dural based tumor, meningioma. Post-operative radiotherapy may be considered to reduce recurrence and improve survival. A correct diagnosis is essential for a proper management of these cases.</p>
<p>Key words: Anaplastic; Hemangiopericytoma; Radiotherapy; Intracranial; Dura- Based.</p>	

INTRODUCTION

Intracranial hemangiopericytoma (HPC) is an uncommon tumor, accounts for <1% of all central nervous system tumors [1]. It arises from Zimmerman pericytes surrounding the capillaries and post-capillary venules [2]. These tumors can occur anywhere in the body, common sites being lower extremities, retro peritoneum, and pelvis [3], central nervous system is a rare location. The tumors are usually cellular, and have a rich vascular network with characteristic stag-horn blood vessels [4]. The soft tissue counterpart is considered under the histologic spectrum of solitary fibrous tumor/hemangiopericytoma (SFT/HPC); though the neuropathologists still differentiate between these two non-meningothelial meningeal tumors [5, 6]. The revised World Health Organization (WHO) classification (2007) of brain tumors described SFT as a benign

neoplasm, however HPC have been graded as grade II and III neoplasm. The anaplastic variant, WHO grade III, displays ≥ 5 mitoses/10 high power field (HPF) &/or necrosis, plus any two of the following, moderate to high cellularity, moderate to high nuclear atypia and hemorrhage. This variant has an aggressive clinical course and tendency to recur, and metastasize; thereby it is essential to correctly identify these neoplasms [7].

CASE REPORT

A 50 year-old-male presented with progressive headache with intermittent vomiting for three months. He gradually developed difficulty in hand grip on right side. MRI brain revealed a large hypo-intense vaguely lobulated dural based mass in the frontal region with evidence of



adjacent cortical compression and midline shift (Figure 1a). A provisional diagnosis of meningioma was made. The patient subsequently underwent open craniotomy. The tumor was soft to firm, highly vascular, arising near the superior sagittal sinus, and bled profusely, barring complete excision. The patient died immediate post-operative period due to complications from surgery. The operated specimen was sent for histopathological examination.

Pathological Findings

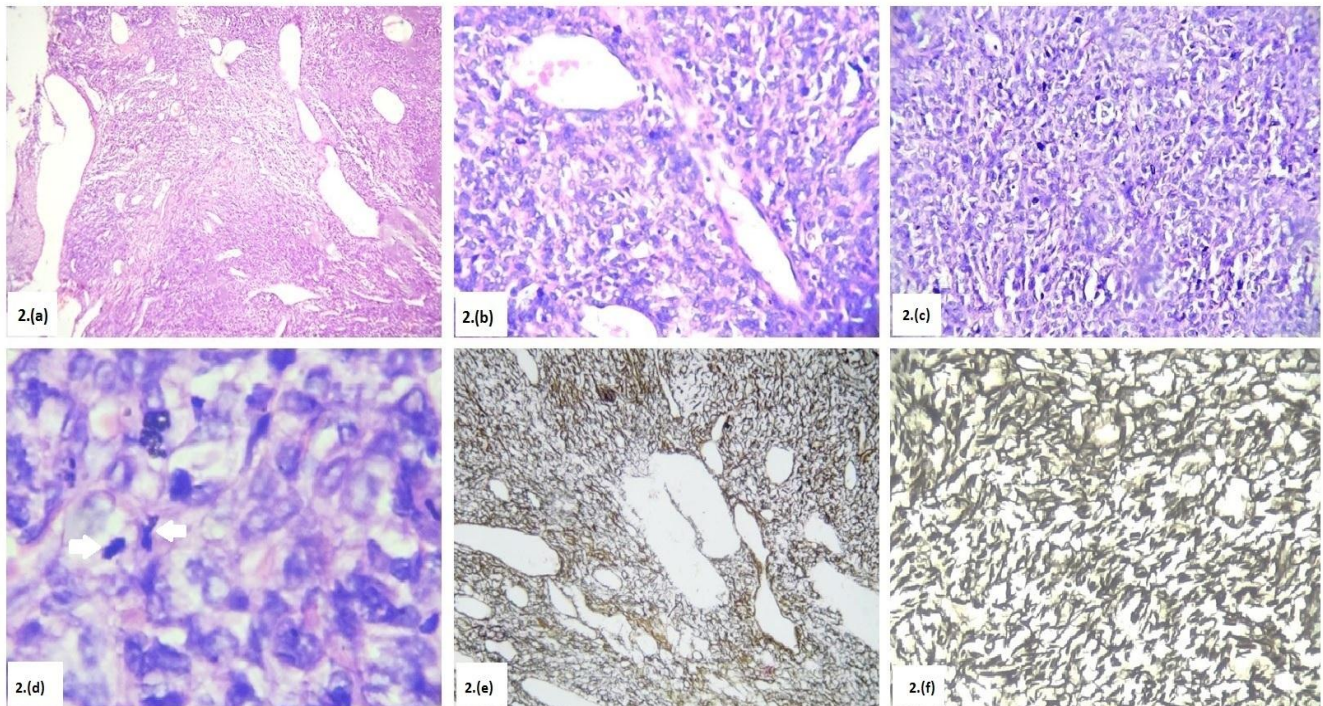
Grossly, the specimen comprised of multiple pieces of grey white soft tissues, together measured 8x5x3 cm, with focal areas congestion (Figure 1b). On microscopy, the tumor was highly cellular with presence of many vascular channels, capillaries, and displayed characteristic slit like and stag-horn blood vessels, lined by single layer of endothelium (Figure 2a). The tumor cells were arranged surrounding the blood vessels (Figure 2b);

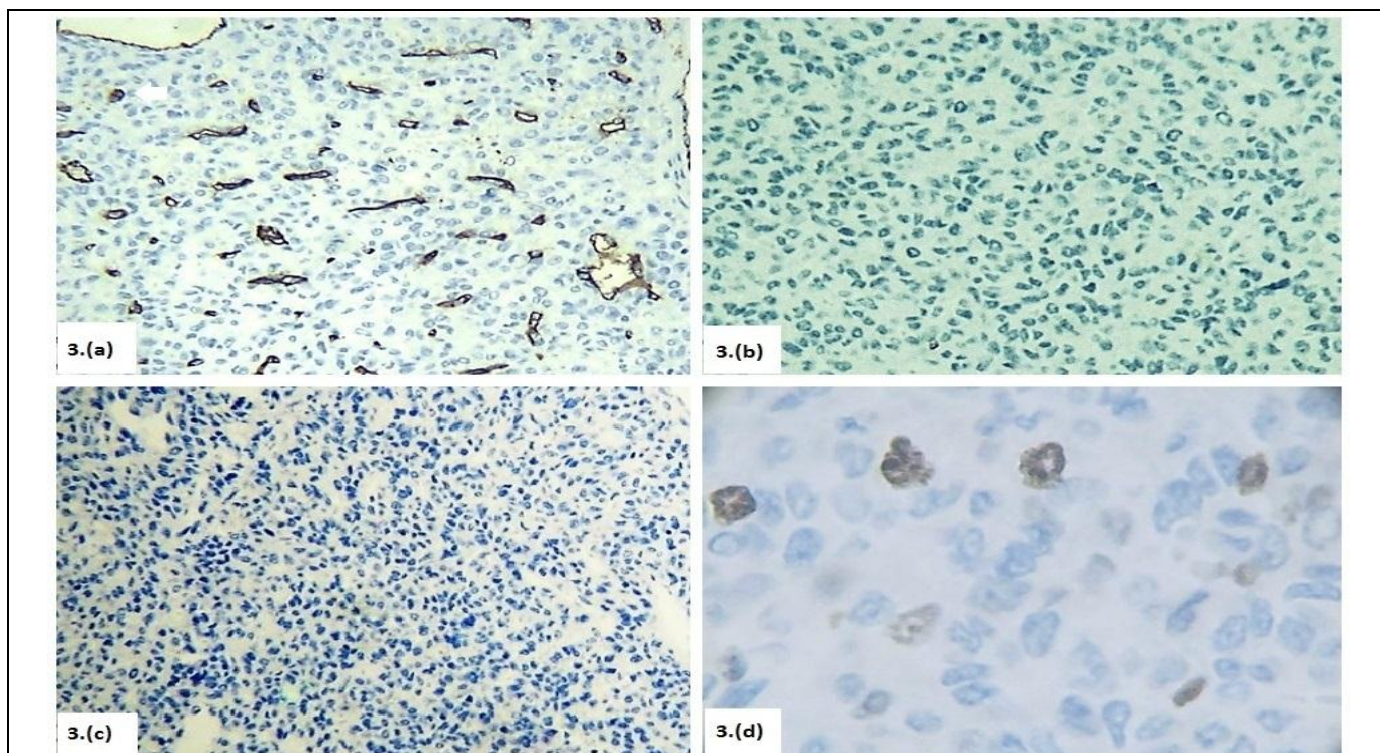
at many places cells were in diffuse sheets (Figure 2c). Individual tumor cells had plump oval to spindle nuclei, exhibiting moderate atypia with nuclear hyperchromasia and frequent mitotic figures, $\geq 5/10$ HPF (Figure 2d). The tumor was reticulin rich (Figure 2e); apart from the blood vessels, individual tumor cells were also invested by reticulin (Figure 2f). The histomorphological features suggested an initial diagnosis of anaplastic hemangiopericytoma (HPC). Immunohistochemistry revealed strong CD 34 expression in the vascular network; however the tumor cells were largely negative for CD 34 (Figure 3a). The tumor cells were also negative for epithelial membrane antigen (EMA) and progesterone receptor (PR) (Figure 3b, 3c respectively); ruling out the possibility of meningioma and confirming the diagnosis of HPC. Ki 67 index was $\sim 18\%$ in the highest proliferating area (Figure 3d). A final diagnosis of intracranial anaplastic HPC was offered.

Fig 1. a: Magnetic resonance image of brain showing a radio-dense vaguely lobulated dural based mass arising in the frontal region with evidence of adjacent cortical compression and midline shift. 1.b: Gross Photograph: multiple pieces of grey white soft tissues with focal congestion



Fig 2. Photomicrographs





- a: small slit like and large 'staghorn' blood vessels (Haematoxylin & Eosin stain, 40X).
 b: Tumor cells arranged around the blood vessels (Haematoxylin & Eosin stain, 100X).
 c: Highly cellular area, tumor cells in diffuse sheets (Haematoxylin & Eosin stain, 100X).
 d: Plump oval to elongated tumor cell nuclei displaying moderate nuclear atypia and frequent mitosis (white arrow) (Haematoxylin & Eosin stain, 400X).
 e: Reticulin stain highlighting vascular arrays (Reticulin stain, 40X)
 2. f: Rich network of reticulin fibers investing individual cells (Reticulin stain, 100X)
 3. Photomicrographs of immuno-stains:
 a: Immunohistochemistry for CD 34 showing diffuse and strong CD 34 positivity in the blood vessels. An occasional tumor cells are positive (white arrow) (Hematoxylin counter stain; 100X).
 b: Immunohistochemistry for Epithelial Membrane Antigen (EMA) showing no expression of EMA (Hematoxylin counter stain; 100X).
 c: Immunohistochemistry for Progesterone Receptor (PR) showing no expression of PR (Hematoxylin counter stain; 100X).
 d: Immunohistochemistry for Ki 67 showing Ki 67 index ~ 18% (Hematoxylin counter stain; 100X).

DISCUSSION AND CONCLUSION

Hemangiopericytoma (HPC) within the central nervous system was once considered as a subtype of meningioma. It is now widely recognized that these tumors arise from pericytes of meningeal capillaries and the current WHO classification has categorised into the group of meningeal, mesenchymal nonmeningothelial tumors of uncertain malignant potential or borderline malignancy [7]. Incidence of these tumors is low, less than 1%; more common in males than females. Mean age is usually 38 to 44.9 years [8]. Commonly HPCs are dural based tumors, arising in the supratentorial area; though rarely they can be intraparenchymal [9].

Definite preoperative diagnosis of HPC is commonly difficult; but this has prognostic significance as HPC is often aggressive with more incidences of recurrences and distant metastasis than the commoner

meningiomas. A multilobulated tumor with a narrow dural attachment in the absence of intra-lesional calcification and hyperostosis, favour a radiological diagnosis of HPC rather than a meningioma [10]. HPC can sometimes display osteolysis, more commonly in the anaplastic variant. In the current case the mass was multi-lobulated with absence of intra-lesional calcification.

Microscopically these tumors are highly cellular with numerous staghorn vascular channels; typically displays a pericytomatous pattern. The blood vessels can be beautifully highlighted by Reticulin stain. The other differentials include solitary fibrous tumor (SFT) and fibroblastic meningiomas. SFT characteristically shows presence of bland spindle cells with dense collagen deposition at places; HPC display minimal collagenisation and presence of numerous vessels [11]; fibroblastic meningioma shows presence of meningothelial cells with



variable amount of collagen. SFT, HPC and meningioma all express Vimentin; however only meningiomas express progesterone receptors (PR) and epithelial membrane antigen (EMA). SFT and HPC both show CD 34 positivity with different degree of expression; SFT shows strong and diffuse CD 34 positivity, whereas HPC show variable CD 34 immuno-positivity, usually occasional tumor cells are positive apart from the blood vessels. A combination of PR, EMA and CD 34 is very helpful in the solving diagnostic dilemma. In the current case, PR and EMA were negative, CD 34 was positive in very occasional tumor cell (Figure 3). Expression of proliferative marker, Ki67 index, depends on the WHO grade of the tumor. The grade III tumors, anaplastic variant, show moderate to high cellularity, moderate to high nuclear atypia, $5 \geq$ mitoses/10 high power fields, with or without necrosis and hemorrhage. The anaplastic variant shows mean Ki 67 index around 18%; while the grade II tumors show a very low Ki 67 index [10].

Conventionally the patients are managed by surgical treatment, though intra-operative control of bleeding sometimes becomes difficult. Some neurosurgeons advocate an initial embolization therapy to minimise the risk of intra-operative bleeding. The current patient died due to intra-operative complication related to haemostasis. As these tumors are biologically aggressive and recur sometimes, institution of post-operative radiotherapy is being investigated in some centres as an adjunct therapy [10].

Intracranial anaplastic hemangiopericytoma is a very rare tumor, sometimes poses significant diagnostic challenge. These tumors are associated with significant mortality. Histopathology is the gold standard for definitive diagnosis and it is crucial to differentiate and precise grading of these tumors. Patients usually need aggressive treatment and close follow up, due to high rate of local recurrence and distant metastasis.

REFERENCES

1. Begg CF, Garret R. (1954). Hemangiopericytoma occurring in the meninges: case report. *Cancer*, 7(3), 602-6.
2. Guthrie BL, Ebersold MJ, Scheithauer BW, Shaw EG. (1989). Meningeal hemangiopericytoma: histopathological features, treatment, and long-term follow-up of 44 cases. *Neurosurgery*, 25(4), 514-22.
3. Zhang P, Hu J, Zhou D. (2014). Hemangiopericytoma of the cervicothoracic spine: a case report and literature review. *Turk Neurosurg*, 24(6), 2014, 948-53.
4. Otani N, Nawashiro H, Wada K, Minamimura K, Takeuchi S, Shima K. (2012). Anaplastic hemangiopericytoma manifesting as a rapidly enlarging extracranial mass lesion. *Asian J Neurosurg*, 7(1), 2012, 29-31.
5. Schweizer L, Koelsche C, Sahm F, Piro RM, Capper D, Reuss DE, Pusch S, Habel A, Meyer J, Gock T, Jones DT, Mawrin C, Schittenhelm J, Becker A, Heim S, Simon M, Herold-Mende C, Mechttersheimer G, Paulus W, König R, Wiestler OD, Pfister SM, von Deimling A. (2013). Meningeal hemangiopericytoma and solitary fibrous tumors carry the NAB2-STAT6 fusion and can be diagnosed by nuclear expression of STAT6 protein. *Acta Neuropathol*, 125(5), 651-8.
6. Ambrosini-Spaltro A, Eusebi V. (2010). Meningeal hemangiopericytomas and hemangiopericytoma/solitary fibrous tumors of extracranial soft tissues: a comparison. *Virchows Arch*, 456(4), 343-54.
7. Gianni C. (2007). Hemangiopericytoma. In: Louis DN, editor. WHO classification of tumors of the central nervous system. *IARC*, 178-80.
8. Alén JF, Lobato RD, Gómez PA, Boto GR, Lagares A, Ramos A, Ricoy JR. (2001). Intracranial hemangiopericytoma: study of 12 cases. *Acta Neurochir*, 143(6), 575-86.
9. Kim JH, Jung HW, Kim YS, Kim CJ, Hwang SK, Paek SH, Kim DG, Kwun BD. (2003). Meningeal hemangiopericytomas: long-term outcome and biological behavior. *Surg Neurol*, 59(1), 47-53.
10. Park BJ, Kim YI, Hong YK, Jeun SS, Lee KS, Lee YS. (2013). Clinical analysis of intracranial hemangiopericytoma. *J Korean Neurosurg Soc*, 54(4), 309-16.
11. Goldsmith JD, van de Rijn M, Syed N. (2001). Orbital hemangiopericytoma and solitary fibrous tumor: a morphologic continuum. *Int J Surg Pathol*, 9(4), 295-302.

