He had a tendency to fall toward the right side while walking and a feeling of clumsiness and tremor over his right hand, more while holding objects suggestive of the right side cerebellar involvement. There was a feeling of pain and paresthesia over his right forearm and hand. His bladder and bowel habits were normal.

On examination, his pulse and blood pressure were normal. The patient was conscious and well-oriented to time, place, and person. His vision was 6/6 bilateral. His fundus was found to be normal bilaterally. There was no nystagmus. Muscle power was found to be 5/5 in all groups of muscle in both upper and lower limbs. Cerebellar sign (Finger–Nose Test) was positive over the right side. On sensory examination, all modalities of sensations were found to be intact.

Family history
The patient has three brothers and one sister. His eldest sister and elder brother suffered a sudden death 2 years back due to some unknown cause. According to the patient, his father died of brain tumor when he was 5-year-old, although they could not produce any relevant documents. He is married and has a 10-year-old daughter who is enjoying good health.

Case Report
A 45-year-old gentleman presented with 4-month history of headache, dizziness, and unsteadiness of gait. Headache was suboccipital and gradually progressive in nature with associated vomiting suggestive of raised intracranial pressure.
Investigations
Routine blood examination and complete blood count revealed neither polycythemia nor diabetes mellitus. Vanillylmandelic acid in the urine was found to be 7.2 mg/24 h (biological reference interval is 0.00–13.60 mg/24 h). Adrenaline in urine was 26.8 µg/24 h (Reference is <20 µg/24 h) and nor-adrenaline was 233.1 µg/24 h (Reference is <90 µg/24 h). Magnetic resonance imaging (MRI) of brain revealed a large and well-defined cystic intraaxial mass lesion predominantly in the cerebellar vermis extending to the right cerebellar hemisphere along with vascular voids, suggesting cerebellar hemangioblastoma [Figure 1a-c]. Further, MRI of the spine revealed an intramedullary mass lesion, involving the cervicodorsal cord, extending from C6 to T2 vertebral body level, causing cord expansion. The lesion showed peripheral enhancement with a nodular enhancing component showing the presence of intralesional cystic areas, suggestive of hemangioblastoma [Figure 2a-d]. We did an ultrasonography and contrast-enhanced computed tomography of the whole abdomen for screening of VHL disease that revealed bilateral pheochromocytoma and even a hepatic hemangioma in segment VII [Figure 3a-d].

Differential diagnosis
Hemangioblastoma, pilocytic astrocytoma of posterior fossa, spinal cord intramedullary ependymoma, glioma, and schwannoma were considered as the differential diagnosis.

Treatment
The patient underwent a midline suboccipital craniotomy. We encountered a cystic lesion which was carefully punctured under microscope and the cyst contents were sucked out. Meticulous microscopical dissection identified the mural nodule that was found to be reddish and vascular. The nodule was carefully dissected out from the surrounding structures and removed in piecemeal fashion [Figure 4a and b]. The capsule...
was excised as far as possible without injuring normal brain parenchyma. Total homeostasis was obtained. Then, the wound was closed in layers. Postoperative period was satisfactory. He was kept in Intensive Care Unit for 1 day. Postoperative MRI showed complete removal of the tumor [Figure 5a].

**Outcome**

The tumor tissue tested for histopathology confirmed hemangioblastoma [Figure 5b]. The patient showed good recovery and with no intraoperative or postoperative complications. His neurological status was back to normal. We have done a thorough counseling with the patient as well as his family members, and currently, they are in regular follow-up with periodic radiologic evaluations. For his spinal intramedullary hemangioblastoma as he is asymptomatic till writing this manuscript, we decided craniospinal irradiation and regular close follow-up.

**Discussion**

The diagnosis of VHL may be made on clinical grounds. In a patient with a positive family history of VHL, finding of a single retinal or cerebellar hemangioblastoma, pheochromocytoma, or RCC is sufficient to make the diagnosis. Renal or epididymal cysts alone are not sufficient enough for diagnosis because of their frequent occurrence in general population. Up to 30% of the patients with cerebellar hemangioblastoma seem to have VHL syndrome. However, spinal hemangioblastomas are more indicative of VHL syndrome, about 80% coexistent.

For brain hemangioblastomas, within the brain, the vast majority are infratentorial, mainly in the cerebellar hemispheres. The pituitary stalk is the most common site for the development of supratentorial hemangioblastomas in individuals with VHL syndrome. Clinical symptoms depend on the site of the tumor: With infratentorial tumors, headache, vomiting, and gait disturbances or ataxia predominate; with tumors above the tentorium, symptoms depend on the location of the lesion.

Spinal hemangioblastomas are generally intradural, most commonly occur in the cervical or thoracic regions, and occasionally may involve the entire cord. Most symptom-producing spinal hemangioblastomas are associated with cysts/syringomyelia/syrinx.

Families without a history of pheochromocytomas are labeled type 1 and families with a history of pheochromocytomas which constitute 7–20% of total incidence are designated as type 2. It seems that the case we encountered here is of type 2.

VHL type 1: Retinal angioma, central nervous system (CNS) hemangioblastoma, RCC, pancreatic cysts, and neuroendocrine tumors.

VHL type 2 is further subdivided as follows:

- Type 2A: Pheochromocytoma, retinal angiomas, and CNS hemangioblastoma; low-risk for RCC
- Type 2B: Pheochromocytoma, retinal angiomas, CNS hemangioblastomas, pancreatic cysts, and neuroendocrine tumor with a high risk for renal carcinoma
- Type 2C: Risk for pheochromocytoma only.

CNS hemangioblastoma is the prototypic lesion of VHL syndrome.

**Genetics**

The responsible tumor suppressor gene for VHL disease was recently identified from chromosome 3p25, and inactivating germline mutations of this gene, VHL, were found in the majority of VHL disease patients. Therefore, a genetic analysis and a chromosomal study are required in such patients not only to establish a diagnosis but also for counseling. The disease is inherited in an autosomal dominant pattern, and hence, all family members require screening. We intended to carry out a thorough genetic workup in our patient. However, they had declined.

**Operative approach**

Most CNS hemangioblastomas can be surgically removed completely and safely. Cerebellar hemangioblastomas as for describing the optimal approach, authors have recommended suboccipital ipsilateral approach, modified far lateral approach, suboccipital midline approach, and suboccipital supracerebellar approach. Under microscope, the tumors can be identified as superficial racemose hemangiomas appearing bright or dark red. All authors followed the principle that the feeding arteries should be divided prior to the division of draining veins, which should be ligated last. We followed the same principle.

**Follow-up**

Although documented growth on serial MRIs and the need for pathological diagnosis have been suggested as indications for in otherwise asymptomatic patients, Harati et al. in their series showed a potentially larger group of asymptomatic patients with spinal hemangioblastoma associated with VHL.
disease which would benefit from microsurgical resection and also have favorable prognosis. Their result suggested staging and early treatment for spinal hemangioblastomas larger than 55 mm, especially in patients with VHL disease. Small spinal hemangioblastomas may be followed up, if asymptomatic. Our case was asymptomatic, so we decided to follow-up. Closely monitored long-term follow-up is mandatory for monitoring the recurrence of primary tumors, once cerebellar hemangioblastoma with VHL has been diagnosed and treated.[9] The frequency and length of the follow-up period should be considered when cystic lesions of abdominal organs are known to exist given that this seemingly benign condition can progress into malignancy.[9]

**Conclusion**

With proper follow-up and screening of the family members of a patient with VHL disease, we can decrease the morbidity and mortality associated with this disease. Patient counseling is of paramount importance as the disease is inherited in an autosomal dominant pattern and this would aid us screen the family members as well, necessitating further interventions wherever deemed necessary to ensure patient well-being.

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**Conflicts of interest**

There are no conflicts of interest.

**References**