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Imaging Features of von Hippel–Lindau Disease: A Case Report

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Abstract **Case Report**

Von Hippel–Lindau (VHL) disease is a rare, genetically transmitted multisystemic disorder. It is characterized by benign and malignant tumors appearing in the central nervous system, and a variety of intra abdominal organs. It is generally revealed during adulthood; however, if the disease is suspected, the surveillance should start in a young age. Imaging has a major role in the diagnosis and surveillance of the various abnormalities that can be found in this disease. In this article we present some imaging aspects on the CT scans of a patient with von hippel-lindau disease.

Keywords: Von Hippel-Lindau disease, Imaging, Hemangioblastoma, EST, serous cystadenomas, renal cysts, Pheochromocytoma.

INTRODUCTION

VHL disease is named after the ophthalmologist Eugene von Hippel, and the pathologist Arvid Lindau [1]. It is a rare genetically transmitted disease, characterased by variant tumors appearing in multiple organs [2, 3]. It is a multisystem disorder with a predilection for the central nervous system (CNS) and retina, the retinal capillary hemangioma is one of the earliest manifestation of this disease [4]. Various lesions can be seen also in kidneys, adrenal glands, pancreas and reproductive adnexal organs. Different imaging modalities such as ultrasonography, computed tomography, magnetic resonance imaging, and nuclear medicine are the key to visualize the various manifestations that can be found in this disease and are also used for screening of asymptomatic gene carriers and the long-term surveillance of the patient [5]. The significantly reduced morbidity and mortality of patients with VHL disease in the past 20 years is owed to the combination of radiological and clinical screening that helps in the early detection of the tumors and allows to prevent the various possible complications [6].

CASE REPORT

A.K is a 48-year-old man who was referred for a routine surveillance of his disease. He has a family history of Von Hippel-Lindau disease. He had been first diagnosed at age 20 years, when he presented with vision loss in his left eye caused by retinal haemangioblastomas. His abdominal CT scan showed:

> Solid cystic lesion process centered on the pancreas, with macrocalcifications whose tissue portion is spontaneously isodense, heterogeneously enhancing after PDC injection, containing hypodense areas related to areas of necrosis.

Kidneys increased in size, with irregular contours, seat of multiple tissue formations spontaneously isodense, heterogeneously enhancing after PDC injection, seat of microcalcifications. Multiple bilateral renal cystic formations are associated, some of which are septate. Well limited hypodense adrenal nodular formation with peripherally enhanced parietal calcifications and central necrosis.

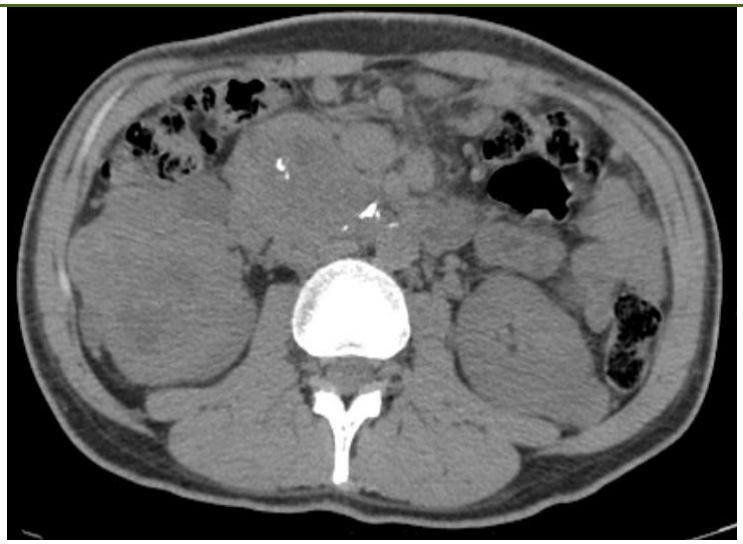

Figure 1: Axial non enhanced CT scan reconstruction; showing swollen pancreas with macrocalcifications

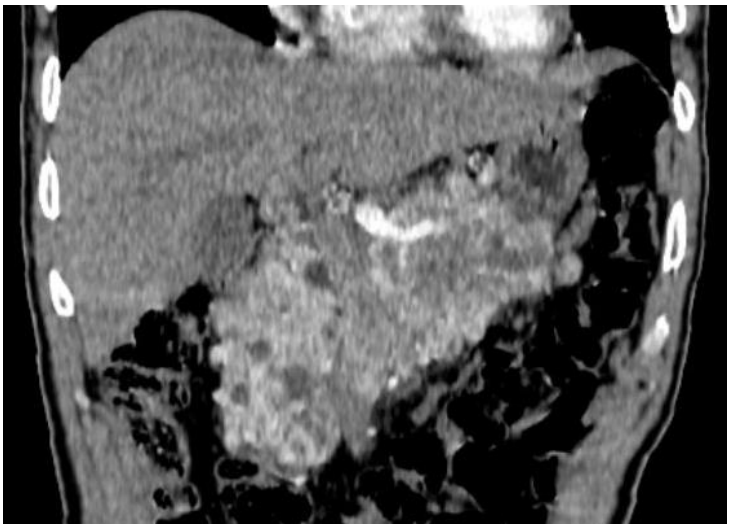

Figure 2: Coronal reconstruction of a contrast-enhanced CT scan: showing a heterogeneous swollen pancreas with multiple solid cystic lesions

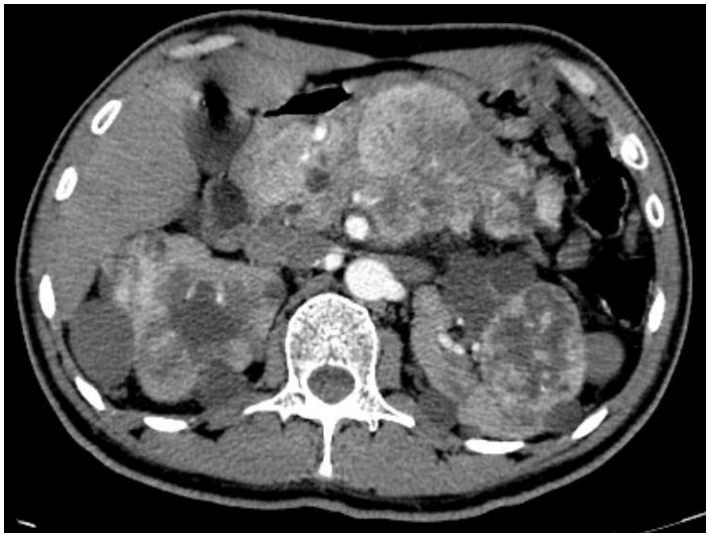

Figure 3: Axial reconstruction of a contrast-enhanced CT scan: showing a mixture of simple cysts and solid enhancing lesions in the kidney and pancreas

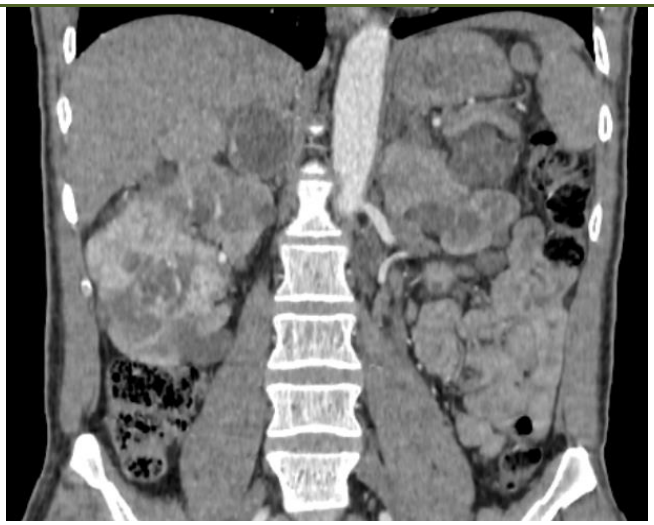

Figure 4: Coronal reconstruction of a contrast-enhanced CT scan: showing pheochromocytoma on the right adrenal gland

The cerebral non enhanced CT scan shows a lesion in the cerebral posterior fossa with destruction of the near bone structure and intralesionnel bone spicules.

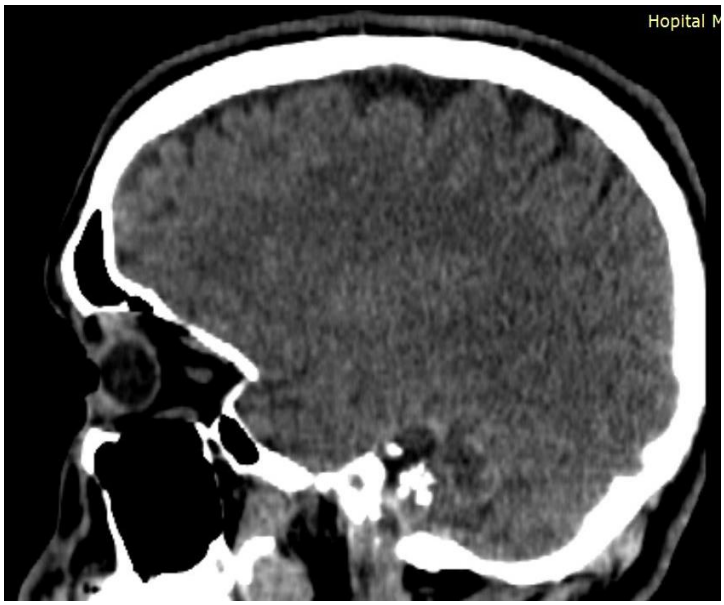

Figure 5: Sagital reconstruction of a non enhanced cerebral CT scan: showing a lesion in the cerebral posterior fossa with bone destruction

DISCUSSION

The VHL disease is rare with an estimated prevalence of 1:35,000-50,000. The first tumor is generally revealed in early adulthood for most patients [7].

The central nervous system hemangioblastomas, renal cysts and carcinoma; pancreatic cysts; pheochromocytoma; and papillary cystadenoma of the epididymis are the most common manifestations of VHL disease [8]. The diagnosis of VHL disease requires one hemangioblastoma or visceral lesion (pheochromocytoma, pancreatic cysts or tumors, renal tumors, papillary cystadenomas of the epididymis) associated with family history of retinal or central nervous system hemangioblastoma [4]. Some markers as renal and epididymal cysts are too frequent in the general population to be reliable in making the diagnosis. If we don't have informations about family history, two or more hemangioblastomas or one hemangioblastoma and a visceral manifestation are required to make the diagnosis [1]. All the manifestations of VHL disease are rarely seen; about 50% of the patients will present one manifestation of the disease [8].

Central Nervous System Manifestations:

Retinal Hemangioblastomas:

Generally, the first CNS lesions to appear are retinal hemangioblastomas. Their prevalence is between 45% and 59%, bilateral in half cases. Close surveillance

is important because new lesions may develop quickly [9]. Depending on the location of the hemangioblastomas, symptoms vary, they are commonly asymptomatic if located in the peripheral retina (85%) and may cause vision loss, when large or involving the optic disc. Some complications may appear, such as macular edema, glaucoma, cataracts, retinal detachment, ophthalmitis and uveitis [10].

Central Nervous System Hemangioblastomas:

Even though central nervous system hemangioblastomas are benign, they are a major cause of morbidity. They can appear along the craniospinal axis and can be associated with oedema or cysts (30–80%), or both. They are often found in the cerebellum (predilection zone), followed by spinal cord, medulla, and supratentorial region is the less commun location. If untreated, these tumours can remain the same size for years; they have several periods of growth separated by periods where they remain latent [11].

In imaging, hemangioblastomas are readily enhance with contrast material due to their highly vascular structure. They may be hemorrhagic, solid, cystic, or mixed. They appear generally as cystic with a solid enhancing mural nodule [12].

Endolymphatic Sac Tumors:

At the end of the endolymphatic duct is found the endolymphatic sac, at the aperture of the vestibular aqueduct, and lies within the dura of the posterior fossa. It's role is the production and resorption of endolymph. The endolymphatic sac tumors appear generally in the cerebellopontine angle it can cause confusion of the radiologist because there are many other tumors commonly found in this location [13]. The CT scan shows a geographic bone destruction associated with intratumoral bone spicules. Seeing the location of the lesion in our patient's cerebral CT with bone destruction we can say that he has and endolymphatic sac tumor, an MRI would have given us more details about the lesion, but we couldn't realize it. The MR imaging, usually shows heterogeneous signal intensity, with either a peripheral rim of high signal intensity or hyperintense foci, and contrast enhancement is heterogeneous. Hypervascular aspect is reveiled in angiograms. Using imaging features essentially MRI and CT scan to detect early this tumor, can prevent from the hearing by surgical intervention [14].

Abdominal Manifestations:

Pancreas:

A pancreatic neuroendocrine tumour, cyst, or cystadenoma can be found in 35 to 70% of the cases. The difficulty can be found in imaging is to distinguish between a PNET and a benign multicystic cystadenoma, as we can see on the abdominal CT of our patient [11]. Radiographically pancreatic neuroendocrine tumour become less well defined as their size increases. These tumors will show enhancement on contrast enhanced imaging due to their highly vascular structure, the strong enhancement is shown between the two abdominal CTs of our patient [15].

Pancreatic serous cystadenomas can be developed too by patients with VHL disease. it is benign, located generally in the tail or body of the pancreas, and revealed by abdominal pain. A malignant transformation can occur in some cases [16].

Kidney:

Clear cell carcinomas and multiple benign renal cysts are the principal renal manifestations of VHL disease. Multiple bilateral renal cysts are found on the imaging exploration of 50% to 70% patients with the disease [13], as it is the case of our patient. Some of the cysts found in VHL disease can have malignant potential, that will transform ulteriorly and some tumors can appear de novo. Renal cell carcinomas are the major malignant tumor in VHL disease and the primary cause of inherited renal cancer. Which explains the role of imaging (essentially Contrast-enhanced abdominal CT), in the surveillance and detection of appearing tumors or transforming cysts at an early stage [5]. For patients with reduced renal function, MRI can be used instead [11].

Adrenal Pheochromocytoma:

The pheochromocytomas found in VHL disease, are characterized by: Appearing at a younger age, ectopic, multiple and bilateral in 50% of the case, and are rarely malignant [6].

There are clinical, biochemical and radiological aspects of pheochromocytoma, that should be surveilled routinely in individuals with known VHL mutation. On Imaging (CT, MR imaging, (MIBG) scintigraphy and iodine 131) pheochromocytoma van have various aspects, large tumors may have a cystic or necrosis portion, smaller ones are generally solid and hyper vascular which explains the marked enhancement [13]. We complete by MR imaging If the CT reveals an adrenal lesion to search for ectopic sites of pheochromocytoma [5].

CONCLUSION

Imaging plays an important role in surveillance of patients with a family history of VHL disease, to search for different abnormalities that can appear in various organs essentially, the central nervous system and organs of the abdominal cavity (kidneys, adrenal glands and pancreas) to treat them early and prevent from the eventual complications.

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