

CASE REPORT

# Glomus Tumor of the Kidney: Case report

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**Introduction:** Glomus tumors are rare benign mesenchymal neoplasms accounting for only 2% of all types of soft tissue tumors. Commonly located in the peripheral soft tissues, they are most frequently encountered in the subungual areas of fingers and toes, and very rarely in visceral organs due to the absence of glomus bodies. To date, 22 cases of primary renal glomus tumors have been described in the literature, of which 17 benign, with no evidence of recurrence or metastasis, three cases of malignant glomus tumor, and two cases with uncertain malignant potential. **Case report:** We report the 18th case of a benign glomus tumor of the kidney in a 49-year-old female patient, presenting the microscopic appearance (round, uniform cells with indistinct borders, scant finely granular eosinophilic cytoplasm, round nuclei lacking prominent nucleoli, arranged in solid sheets, accompanied by slit-like vascular spaces), the immunohistochemical profile (tumor cells showed immunoreactivity for smooth muscle actin, vimentin, as well as for CD34; they were negative for AE1/AE3, desmin, HMB-45, S-100 protein, renin, and chromogranin), and the differential diagnosis of this rare entity (juxtaglomerular tumor, angiomyolipoma, hemangioma, epithelioid leiomyoma, solitary fibrous tumor, carcinoid tumor, and paraganglioma). **Conclusion:** Primary renal glomus tumors are rare tumors that radiologically can mimic other mesenchymal renal neoplasm. Accurate diagnosis is based on the microscopic appearance and especially the characteristic immunophenotype.

**Keywords:** glomus tumor, kidney tumor, immunohistochemistry

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## Introduction

Glomus tumors are rare benign mesenchymal neoplasms which account for only 2% of all soft tissue tumors. They originate from glomus bodies which are neuroarterial receptors with an essential role in thermoregulation [1]. Glomus tumors usually occur in the peripheral soft tissues, most frequently in the subungual areas of fingers and toes, and rarely in visceral organs due to the absence of glomus bodies [1, 2].

To date, 22 cases of primary renal glomus tumors have been described in the literature, of which 17 benign, with no evidence of recurrence or metastasis, three cases of malignant glomus tumor, and two cases with uncertain malignant potential [3-14]. We report the 18th case of a benign kidney glomus tumor, presenting the microscopic aspect, the immunohistochemical profile, and the differential diagnosis of this rare entity.

## Case report

Our 49-year-old female patient presented to the hospital with abdominal discomfort, without any other associated symptoms such as radiating pain, weight loss or hematuria. CT scan revealed a 4 cm heterogeneous mass in the renal parenchyma, suggesting a renal cell carcinoma, for which she subsequently underwent total nephrectomy. Macroscopically, the tumor was encapsulated, compact, and tan-grey in color, with a thin capsule which was visible on microscopy (Figure 1A). The cells displayed a solid sheet arrangement and were surrounded by slit-like vascular

spaces (Figure 1B). They were round, uniform, cell borders were indistinct, with a scant finely granular eosinophilic cytoplasm and round nuclei lacking prominent nucleoli (Figure 2A). There was no evidence of pleomorphism, necrosis, increased mitotic activity of more than 2/50 high power field and atypical mitoses. Capsular and lymphovascular invasion were not noticed. Tumor cells were immunoreactive for vimentin, smooth muscle actin (Figure 2B), but also for CD34 (Figure 2C). They were negative for AE1/AE3 (Figure 2D), desmin, HMB-45, S-100 protein, chromogranin, and renin. Morphological and immunohistochemical assessment prompted a diagnosis of primary solid glomus tumor of the kidney. The patient is free of disease six years after nephrectomy. Informed consent was obtained from the patient.

## Discussion

The first record of glomus tumors dates back to 1924 when Masson described perivascular mesenchymal neoplasms comprising cells which resembled modified smooth muscle cells of normal glomus bodies [15]. Although glomus tumors are characteristically located on the distal extremities and appear as small, red-blue, solitary, and painful nodules, few cases of such primary tumors have been described in the visceral organs: oral cavity, sinonasal region, larynx, trachea, lung, mediastinum, gastrointestinal tract, pancreas, liver, female genital tract, and bone [2].

Glomus tumors are rare in the kidney, with the first case reported in 1957 [5]. Since then, only 22 cases have been described, of which 15 men and 7 women, with patient ages ranging from 17 to 81 [2-14, 16-18].

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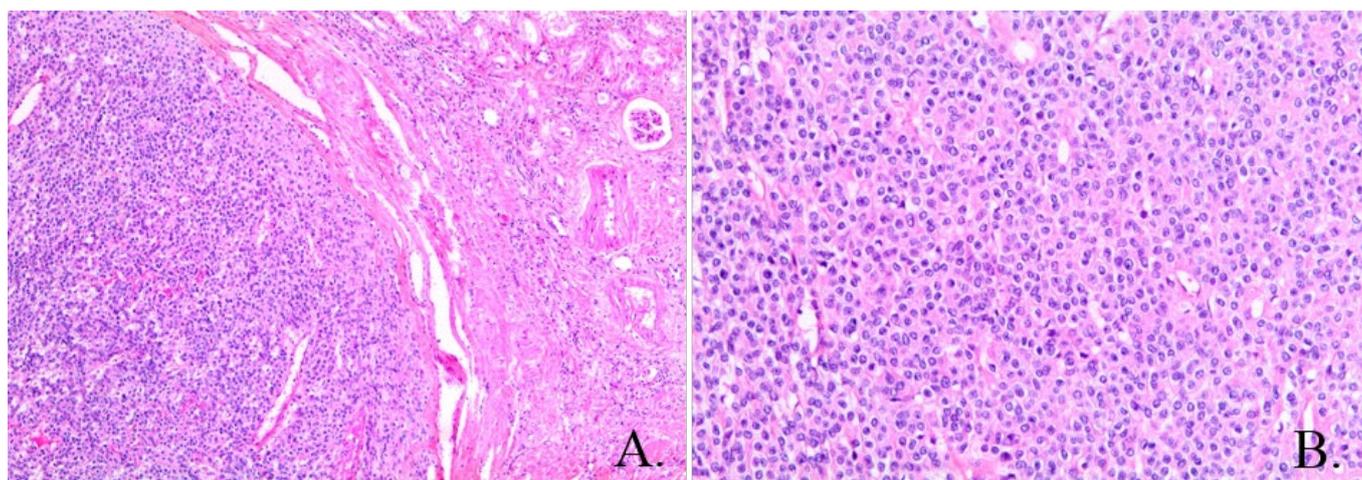


Fig. 1. A - A well-defined, encapsulated tumor, situated in the renal parenchyma (4x); B - Tumor cells arranged in solid sheets, accompanied by slit-like vascular spaces (10x).

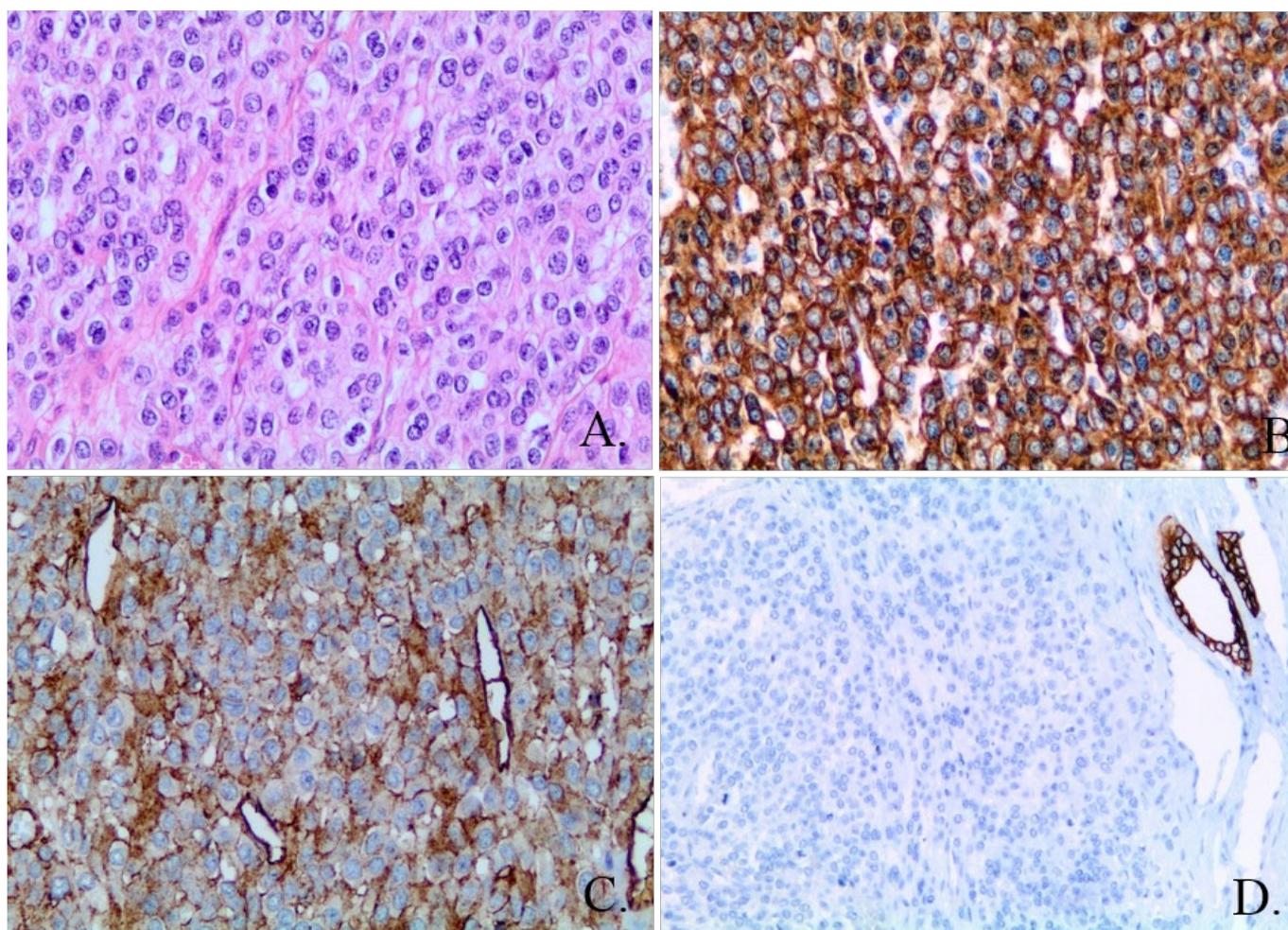


Fig. 2: A - On high magnification, cells are round, uniform, have indistinct cell borders, scant finely granular eosinophilic cytoplasm, round nuclei without prominent nucleoli (20x); B - Smooth muscle actin is strongly positive in the tumor cells (20x); C - CD 34 is expressed by the tumor and endothelial cells (20x); D - AE1/AE2 is negative in the tumor cells and positive in the epithelium of the tubes (20x).

The majority of these tumors are discovered incidentally during imaging examinations, because the clinical presentation is nonspecific, with symptoms such as flank and abdominal pain, and microscopic hematuria. Due to the lack of characteristic radiological findings, the preoperative diagnosis of glomus tumors is difficult.

For a definitive diagnosis, histological examination and immunohistochemical staining are mandatory. Generally,

such tumors are composed of round ovoid epithelioid glomus cells, blood vessels, and smooth muscle cells [1]. They can be subcategorized as solid glomus tumors, glomangiomas, or glomangiomyomas based on the prevalence of one of the above mentioned components. Solid glomus tumors represent 75% of cases and are composed of nests of glomus tumor cells surrounding capillary sized vessels, in some cases with a hyaline or myxoid stroma. Glomangiomas are

composed of cavernous hemangioma-like structures surrounded by glomus cells and represent 20% of cases. In much rarer cases of glomangiomyomas, a transition from typical glomus cells to elongated cells resembling mature smooth muscle can be observed [1, 8].

Although they are epithelioid in appearance and are closely associated with vessels, glomus cells do not express any epithelial (cytokeratin and EMA) marker, but they stain intensely with smooth muscle actin, common muscle actin, and vimentin. Tumor immunoreactivity for desmin is variable, ranging from no expression to only focal positivity. CD 34 positivity is significantly stronger in peripheral glomus tumors compared with visceral ones. In our case, CD34 was positive as in the cases described by Al-Ahmadie et al. and Gravet C et al. [5, 8].

Although the majority of glomus tumors are benign, some malignant cases have also been described as very aggressive tumors. Because of tumor progression, most patients with malignant glomus tumors in the visceral organs die shortly after diagnosis [16-18]. Folpe et al. analyzed 52 cases of atypical glomus tumors of the peripheral soft tissue in order to establish criteria of malignancy, suggesting the following: size (more than 2 cm), subfascial or deep location, atypical mitotic figures, moderate to high nuclear grade, and mitotic activity (5 mitoses/50high-power fields) [19].

Lamba et al. described the first aggressive metastatic malignant glomus tumor in the kidney with distal organ metastases and no response to chemotherapy, a tumor which was in line with the criteria suggested by Folpe et al. [16]. In a recent study, Li R et al. confirmed the malignant potential, reporting one case of metastatic glomus tumor, 7 years after the initial diagnosis and also a glomus tumor with uncertain malignant potential with tumor thrombus in the renal vein and the inferior vena cava [18].

If the differential diagnosis from epithelial tumors of the kidney is relatively easy, their differentiation from other non-epithelial renal tumors may be difficult, frequently requiring immunohistochemical staining. One of the most important differential diagnosis is made with juxtaglomerular tumor, but it should also include angiomyolipoma, hemangioma, epithelioid leiomyoma, solitary fibrous tumor, carcinoid tumor, and paraganglioma.

Juxtaglomerular cell tumor is associated with excessive renin secretion. Patients experience severe and poorly controlled hypertension and hyperkalemia in combination with high plasma renin levels. Although it may present overlapping morphological characteristics with glomus tumors, it may also exhibit a tubular and/or papillary architecture. The cells contain renin granules which can be highlighted by immunohistochemistry with antibodies to renin [20].

Angiomyolipoma, the most common mesenchymal tumor of the kidney, can be considered in the differential diagnosis of glomus tumor in cases with a predomi-

nant muscular component. Proper sampling and careful examination will prove the presence of adipose tissue, blood vessels, and smooth muscle, the three components of angiomyolipoma. Perivascular epithelioid cells can be highlighted by immunohistochemistry with HMB-45 and Melan A [21].

Capillary or, more commonly, cavernous renal hemangiomas are fairly rare tumors which are composed of blood vessels of different sizes containing blood, lined by endothelial cells. These vessels lie in a hyalinized stroma containing red blood cells and hemosiderin deposits. Since the vessel walls of these tumors may focally contain smooth muscle, although not being a predominant pattern, it should be differentiated from a glomus tumor [21, 22].

Epithelioid leiomyomas of the kidney are also rare and consist of bundles of smooth muscle positive for desmin, but, unlike glomus tumors, they lack the intimate relationship with blood vessels [21].

Hemangiopericytoma is a proliferation of cells with slight variability in cellularity, having a “staghorn” vascular pattern with packed pericytes around a vascular endothelium and minimal collagenization which can be variable vary both in size and shape. Immunohistochemically, the tumor cells are positive for CD31, CD34, CD99, S-100, vimentin, cytokeratin, and negative for smooth muscle actin, unlike glomus tumor [23].

Solitary fibrous tumors present a pattern similar to a hemangiopericytoma with a typical spindle or oval cell proliferation. The cells are arranged in a storiform and fascicular pattern in a hyalinized stroma. They are positive for CD34 [21, 23].

Carcinoid tumors have morphological features similar to carcinoid tumors encountered in other organs, i.e. trabeculae intertwined between nests of monotonous cuboidal cells which show “salt and pepper” nuclear appearance. The tumor cells stain positive for keratin 18, synaptophysin, chromogranin, and CD56 [24].

Paraganglioma is composed of tumor cell nests arranged in a Zellballen pattern and having a highly vascularized fibrous stroma. Immunohistochemically, it typically expresses synaptophysin and chromogranin and contains sustentacular cells positive for S100 [2].

## Conclusion

We report the 18th case of a benign glomus tumor of the kidney. Primary renal glomus tumors are rare tumors that radiologically can mimic other mesenchymal renal neoplasm. Accurate diagnosis is based on the microscopic appearance and especially the characteristic immunophenotype.

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The present case was previously reported as a poster presentation at the 26th European Congress of Pathology (ECP 2014), 30 August – 3 September 2014, London, United Kingdom.

**Authors' contribution**

ED – Conceptualization, resources, writing original draft, writing review and editing

AL – Conceptualization, methodology, resources, writing original draft, writing review and editing

TT – Conceptualization, methodology, resources; writing original draft, writing review and editing

AN – Writing original draft, writing review and editing

AB – Conceptualization, supervision, validation, writing original draft, writing review and editing

**Conflict of interest**

None to declare

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