

Case report

Partial open tumorectomy for a renal tumor in a horseshoe kidney with a close contact with the vena cava: A case report

Mohamed Hafedh Saadi *, Marouene Chakroun, Ahmed Saadi, Amine Derouiche, Haroun Ayed, Mohamed Chebil

Urology Department, Charles Nicolle Hospital, Tunis, Tunisia

ARTICLE INFO

Article history:

Received 5 April 2021

Received in revised form 15 April 2021

Accepted 16 April 2021

Available online 27 April 2021

Keywords:

Horseshoe kidney

Tumorectomy

Renal tumor

Renal cell carcinoma

ABSTRACT

Introduction and importance: Horseshoe kidney has unique anatomical features, such as a complex blood supply. We report a patient with renal tumor in a horseshoe kidney in close contact with the vena cava, who underwent open tumorectomy.

Case presentation: A 72-year-old woman was referred to our hospital with a 4-cm enhancing mid-pole mass in the right moiety of a horseshoe kidney. Open tumorectomy was performed with parenchymal clamping. The warm ischemia time was 18 min. Pathologic examination confirmed a diagnosis of pT1a clear cell renal cell carcinoma with negative surgical margins. At 3 months postoperatively, computed tomography showed no local recurrence or metastasis and renal function was intact.

Clinical discussion: Horseshoe kidney is a rare congenital abnormality. Renal cell carcinoma is the most frequent tumor in adults having this anomaly and treatment in localised tumors is usually tumorectomy. Surgery may be challenging in some cases because of its difficulty.

Conclusion: Open surgery remains the standard treatment for horseshoe kidney tumors because of anatomic complexity and especially in cases where the tumor is difficult to extirpate.

© 2021 The Authors. Published by Elsevier Ltd on behalf of IJS Publishing Group Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

1. Introduction

Horseshoe kidneys are the most common renal fusion anomaly in about 0.15% to 0.25% of the population [1–3]. The association of renal tumors within a horseshoe kidney is extremely rare [4]. Renal cell carcinoma (RCC) accounts for about 50% of tumors found in the horseshoe kidney and the prognosis appears to be not different from those of the general population [5]. Due to anatomical issues, surgical planning is difficult when a tumor arises in a horseshoe kidney and open surgery remains the standard treatment in such tumors. Tumorectomy for horseshoe kidney tumors therefore remains challenging. We herein report a case of small renal cell carcinoma arisen in a horseshoe kidney with close contact with the vena cava successfully treated by open tumorectomy. The work has been reported in line with the SCARE 2020 criteria [6].

2. Case report

A 72-year-old woman was referred to our department for further examination of a right renal tumor incidentally discovered on a CT which

was performed to investigate a COVID-19 infection. The patient did not have any personal or family history of cancers or congenital anomalies and did not have any history of active or passive smoking. In physical examination, the patient looked well in appearance with a Karnofsky performance status at 100 and had a BMI of 24 kg.m². Abdominal palpation did not find a clinically palpable mass. Chest and abdominal enhanced CT revealed a right renal tumor of 42 × 36 mm in diameter buried in approximately 50%, graded as cT1aN0M0 in the horseshoe kidney, supplied by two arteries toward the right kidney and having a close contact with the inferior vena cava without any evidence of metastasis or lymph node lesions as shown in Figs. 1 and 2.

The patient was operated one month after the diagnosis' establishment on the decision of a multidisciplinary meeting. Under general anaesthesia, the patient was placed in a dorsal decubitus position. We did not utilise a ureteric stenting during the procedure because the tumor was judged to be distant from urinary tract. We performed a right ilioinguinal incision as described by Leriche. After a retroperitoneal dissection, the horseshoe kidney was exposed following the opening of the Gerota's fascia. A complete dissection of the right kidney was performed up to the isthmus, it was supplied by two main arteries entering the kidney on its upper pole. A careful dissection was done between the tumor and the vena cava as shown in Fig. 3. The two main arteries were dissected carefully. We then performed a parenchymal clamping which was preferred seeing the anarchic vascularization of the kidney, then

* Corresponding author at: Urology Department, Charles Nicolle Hospital, 1068 Tunis, Tunisia.

E-mail address: hafedhsaadi1291@gmail.com (M.H. Saadi).

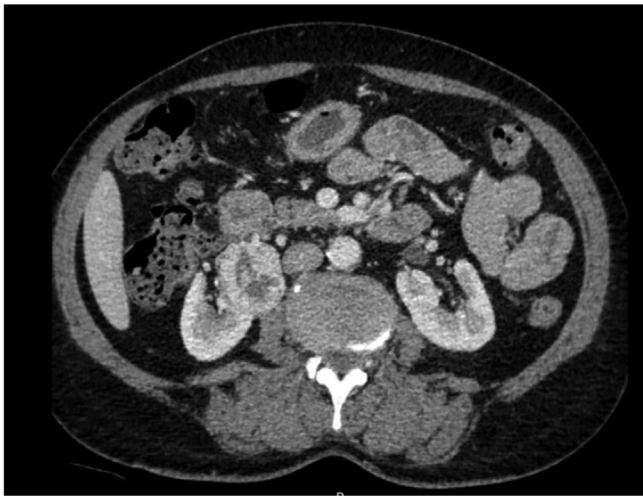


Fig. 1. CT showing a 4-cm renal tumor having a close contact with the vena cava.



Fig. 2. Coronal view on CT.

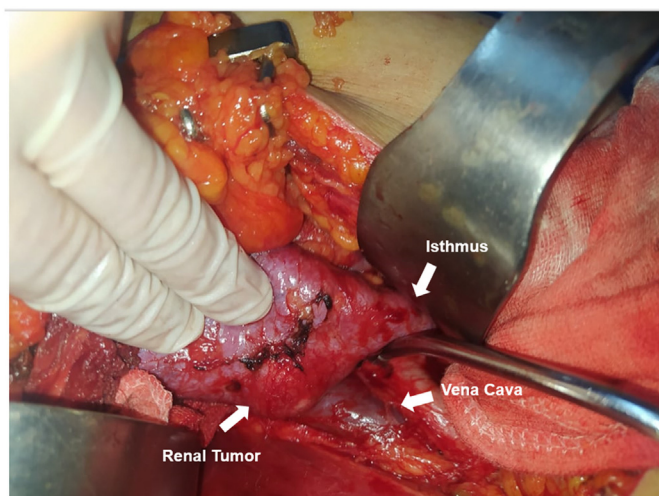


Fig. 3. Intraoperative view after dissection of the right kidney and the tumor.

we cut the tumor with a 2 mm surgical margin allowing the excision of a 3-cm tumor. No urinary tract leakage was observed. Finally, renorrhaphy was performed in 2 plans using Vicryl 2-0 and 1 (Ethicon, Cincinnati, OH, USA). After confirming the lack of active bleeding, we placed a drainage tube and closed the incision. The total operation time was 1 h 20 min, with 13 min of parenchymal clamping.

The postoperative course was uneventful, and the patient was discharged 2 days post-operatively. The histopathological examination revealed clear cell carcinoma (grade 2, $\text{INF}\alpha$, $v[-]$, $pT1a$ $N0$ and $ISUP$ 2) with safe surgical margins. The CT performed 3-months after surgery showed no abnormalities.

3. Discussion

Horseshoe kidney is a congenital abnormality in 1 of every 400 to 1000 individuals, and the incidence in men is twice compared with that in women. Horseshoe kidney is often seen in patients who have a chromosome disorder, with a rate of 7% in those with Turner syndrome [2]. Tumors arising from kidneys with fusion anomalies are reported in 5% to 13% of the patients [5]. Renal cell carcinoma is the most commonly reported tumor of the horseshoe kidney in adults, identified in about 50% of cases [5,7]. While kidneys with fusion anomalies appear to have a higher risk of developing nephroblastoma and urothelial carcinoma, the incidence of RCC is no higher than that of the general population and prognosis depends on the same factors as in nonfused kidneys [5]. Similarly, no significant difference between the grade of tumors developing in horseshoe kidneys versus those developing in anatomically normal kidneys.

The treatment of horseshoe kidney tumors is surgical, although cases of ablative treatment for small tumors have been reported in the literature. Huang et al. reported a series of five cases of tumors developing on horseshoe kidney treated by percutaneous cryoablation as an initial experience in 2016 [8].

Concerning the surgical treatment, the unique anatomic features of horseshoe kidneys, such as highly variable vasculature, abnormal kidney position, the presence of the isthmus, and possible associated anomalies, can make surgery for a horseshoe kidney tumor technically challenging. Therefore, detailed preoperative radiological evaluation of these anatomical factors and proper surgical planning are essential [5,6,9,10]. Open radical heminephrectomy or partial nephrectomy has been used for most tumors involving kidneys with fusion anomalies. Recent series suggest they can be treated with partial nephrectomy, when feasible, with limited blood loss and preservation of renal function, but overall and major complication rates are reportedly relatively high [5]. Many authors have recently reported renal tumors in horseshoe kidney treated laparoscopically. In our opinion, laparoscopic approach could not be used in our case because of the location of the tumor and the close contact between the tumor and the vena cava.

The type of incision in case of open surgery for horseshoe kidney tumors may differ from an operator to another: midline transperitoneal approach, flank approach, ilio-inguinal approach. There are no series in the literature comparing these different approaches in case of horseshoe kidney tumor.

Tumorectomy by open surgery for this type of tumors follows the same steps as usual. All types of clamping have been described in the literature. In our case, parenchymal clamping was used due to the difficulty of performing arterial clamping and the absence of significant bleeding during tumorectomy. Even so, the two main arteries of the right kidney were well dissected in case of uncontrollable bleeding.

4. Conclusion

We report a case of an open tumorectomy for a 3-cm renal cell carcinoma in a horseshoe kidney having a close contact with the vena cava and found that open surgery was the safest approach to perform a nephron-sparing surgery in a safe way.

Ethical approval

N/a

Sources of funding

None declared.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Author contribution

Saadi Mohamed Hamed: data collection, data analysis or interpretation, writing the paper, references
 Chakroun Marouene: Paper writing and revision
 Ahmed Saadi: Paper writing and revision
 Amine Derouiche: Paper revision
 Ayed Haroun: Paper and figures revision
 Chebil Mohamed: Paper revision

Research registration

None declared.

Guarantor

Saadi Mohamed Hamed is the guarantor of the study and accept full responsibility for the work and/or the conduct of the study, had access to the data and controlled the decision to publish.

Provenance and peer review

Not commissioned, externally peer-reviewed.

Declaration of competing interest

The authors declare that they have no competing interests.

References

- [1] J.F. Glenn, Analysis of 51 patients with horseshoe kidney, *N. Engl. J. Med.* 261 (1959) 684–687, <https://doi.org/10.1056/NEJM195910012611402>.
- [2] B.I. Lippe, M.E. Geffner, R.B. Dietrich, et al., Renal malformations in patients with Turner syndrome: imaging in 141 patients, *Pediatrics* 82 (1988) 852–856.
- [3] J.J. Kirkpatrick, S.W. Leslie, Horseshoe kidney. 2021 Feb 10, StatPearls [Internet], StatPearls Publishing, Treasure Island (FL), 2021 Jan 28613757.
- [4] M. Petrovic, V. Andrejevic, L. Djurasic, et al., Tumors of the horseshoe kidney - characteristics and literature review, *Acta Chir Iugosl.* 59 (2012) 53–55, <https://doi.org/10.2298/ACI1201053P>.
- [5] R. Mano, A. Hakimi, A.I. Sankin, et al., Surgical treatment of tumors involving kidneys with fusion anomalies: a contemporary series, *Urology*. 98 (2016 Dec) 97e102.
- [6] R.A. Agha, T. Franchi, C. Sohrabi, G. Mathew, for the SCARE Group, The SCARE 2020 guideline: updating consensus surgical CAse REport (SCARE) guidelines, *Int. J. Surg.* 84 (2020) 226–230.
- [7] Benidir T, Coelho de Castilho TJ, Lobo Cherubini GR, de Almeida Luz M. Laparoscopic partial nephrectomy for renal cell carcinoma in a horseshoe kidney. *Can. Urol. Assoc. J.* 2014 Nov;8(11e12):E918eE920. doi: <https://doi.org/10.5489/cuaj.2289>.
- [8] J. Huang, T.D. Atwell, A.N. Kurup, S.A. Boorjian, R.H. Thompson, G.D. Schmit, Percutaneous cryoablation of the horseshoe kidney: an initial experience, *J. Vasc. Interv. Radiol.* 28 (4) (2017 Apr) 498–501, <https://doi.org/10.1016/j.jvir.2016.10.026>.
- [9] Y.S. Lee, H.S. Yu, M.U. Kim, et al., Retroperitoneoscopic partial nephrectomy in a horseshoe kidney, *Kor. J. Urol.* 52 (11) (2011 Nov) 795e797, <https://doi.org/10.4111/kju.2011.52.11.795>.
- [10] W.R. Molina, I.S. Gill, Laparoscopic partial nephrectomy in a horseshoe kidney, *J. Endourol.* 17 (10) (2003 Dec) <https://doi.org/10.1089/089277903772036244905e906>.