Case Report

Intraoperative surprise in a patient with aorto-iliac occlusive disease: Horseshoe kidney

Kadir Kaan Özsin, Umut Serhat Sanrı

Department of Cardiovascular Surgery, University of Health Sciences, Bursa Yüksek İhtisas Research and Trainning Hospital, Bursa, Turkey

Date Received: 04-Oct-2017
Revision Received: 18-Dec-2017
Date Accepted: 06-Jan-2018

Correspondence:Kadir Kaan Özsin (kkozsin@gmail.com)

https://dx.doi.org/10.4314/mmj.v30i4.14

Case Presentation

A 65-year-old male presented with rest pain for 2 weeks in the right lower extremity and he had ischemic wound in the distal part of first phalanx of right foot. He had controlled hypertension and hyperlipidemia for 10 years. There were no abnormalities in routine blood tests and hemodynamic parameters. No pulse was palpable in both lower extremities. Preoperative investigations revealed ankle-brachial index of 0.57 on the right and 0.73 on the left. Also, we determined poikilothermia (cold) in lower extremities. The case was assessed as critical limb ischemia (CLI). Bilateral lower extremity angiogram was performed according to 2016 AHA/ACC Guideline[1]; it showed that right common iliac artery was completely occluded and there was 70-90% lesion in the left external iliac artery (Fig.1A). Preoperative angiographic evaluation using the Trans-Atlantic Inter-Society Consensus (TASC II) classification showed our case in class TASC-II C lesion. Therefore, Aorto-bifemoral bypass was planned for the patient.

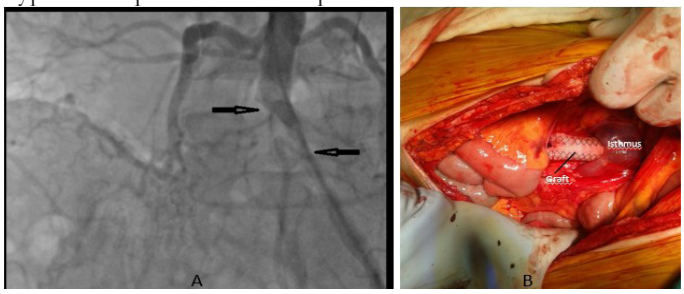

Figure 1A: Aorto-iliofemoral angiography (arrows show the lesions); Figure 1B: After anastomosis, graft-isthmus configuration with dacron Y-graft under horseshoe kidney

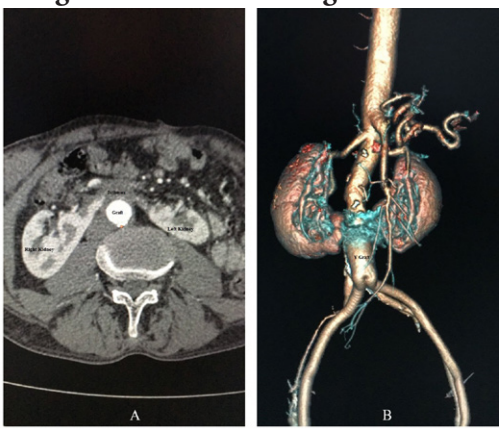

Figure 2A: The appearance of horseshoe kidney and dacron graft in postoperative computed tomography; Figure 2B: Horseshoe kidney and dacron graft appearance on multisite computed tomography at postoperative 5th month.

Under general anaesthesia, abdominal aorta was explored at the upper portion of iliac bifurcation with transperitoneal approach. Aorta was in the form of porcelain aorta in this region. For a proper region of anastomosis, exploration was risen towards to proximal aorta. In the course of the exploration, we found form of solid structure which settled in front of the abdominal aorta. After examination, it was thought to be a horseshoe kidney. The appropriate anastomotic segment was palpated under isthmus. We did not get information about the morphological and functional condition of horseshoe kidney which the patient had, preoperatively. Therefore, we did not apply any intervention to isthmus. End to side proximal anastomosis with a 14x7 mm dacron Y-graft was carefully performed without the isthmus injury (Fig.1B). No complications occurred during operation. There were no complications related to renal function and operation in postoperative intensive care and service follow-ups. Horseshoe kidney was confirmed by computerized tomography on the third postoperative day (Fig.2A). There was no pathology between proximal anastomosis and horseshoe kidney in control multislice computed tomography at 5 months postoperatively (Fig.2B). The patient is still doing well.

Discussion

Horseshoe kidney is a common urologic anomaly, occurring approximately in 0.15%-0.33% of the population; the isthmus connecting the lower poles may be a fibrous band or may contain functional parenchymal tissue[2]. The renal isthmus is located in front of the abdominal aorta and complicates the aortic reconstruction in patients with abdominal aortic disease. Renal fusion anomalies occur between 4-9 weeks of embriyonic period. The various mechanisms can be considered as: positional factors and anomalous fusion related to proximity, abnormalities in migration of metanephric cells, intrauterine factors (maternal environment and exposure to teratogens), and associated genetic factors and chromosomal abnormalities[3]. The isthmus of horseshoe kidney is placed in the level of L2-L3 vertebra corpus (40%), in the level of L4 vertebra below the inferior mesenteric artery (40%) and in the pelvis (20%). The bridge connecting the two renal masses has variable anatomical relations and substance. Its midline or lateral position relative to the vertebral column establishes whether the horseshoe kidney is symmetric or asymmetric. Asymmetrical systems are more commonly left dominant (70%)[3]. In our case, isthmus was configured at middle line and level of L2-L3 vertebra corpus.

In literature, abdominal aortic aneurysm (AAA) is commonly associated with horseshoe kidney, and rates of association with aorto-iliac occlusive disease are not clear. The coexistence of horseshoe kidney and an abdominal aortic aneurysm was reported to be in only 0.12% of patients undergoing aneurysm surgery[4]. Computed tomography is reported to give the most detailed information regarding the horseshoe kidney morphology and the anatomic features and relations of the kidney, its vessels, and the aneurysm in 90% of the cases[4]. In this case, we did not get information about the morphological and functional condition of horseshoe kidney which this patient had, because we had assessed the patient as CLI and, preoperatively, performed only invasive angiographic imaging.

Although the horseshoe kidney usually provides the patient with normal renal function, it does present challenging anatomy for interventions. There is great variety with regards to the position of the vessels, collecting system, and isthmus. Renal artery anomalies are frequent in patients with horseshoe kidney, and accessory renal arteries were documented in 70-80% of patients[5]. Anatomically, the blood supply to the horseshoe kidney is controlled segmentally by the accessory arteries, and the collateral blood flow between the segments is minimal. If important accessory arteries that supply the significant amount of renal parenchyma are not included within reconstruction, postinterventional renal insufficiency may occur.

Since the connection tissue between both kidneys commonly has a functional renal parenchyma, there is no consensus whether or not to divide the isthmus. Division increases the risk for graft infection because of high rates of urinary system infection in horseshoe kidney patients[6]. Furthermore, the isthmus tissue, which contains renal collecting system elements, carries a high risk for urinary fistula development after the operation[7]. Massive haemorrhage and renal necrosis are other risks. Although division may provide better exposure and technical ease, many authors advocate avoidance from division because of these potential complications[8]. Because we diagnosed horseshoe kidney intraoperatively, we had no information for the morphological and functional condition of horseshoe kidney. Therefore, the proximal anastomosis of the synthetic graft was performed without isthmus division.

Han et al. stated that in patient with AAA, the optimal method of access is still controversial because the isthmus usually lies in front of the aneurysm[9]. Although the transperitoneal approach has been more commonly used, the retroperitoneal approach provides good visualization of both the AAA and the aberrant arteries arising from the aneurysm regardless of the presence of the isthmus[10]. Therefore, a preoperative evaluation about what renal isthmus tissue contains is important.

We think that transperitoneal approach with left medial visceral rotation provided appropriate exploration of the abdominal cavity and the access to the abdominal aorta, renal isthmus and both renal and iliac arteries, while avoiding potential injury of the urinary tract. Division of the isthmus is sometimes necessary during the transperitoneal approach but in our case we did not apply any intervention because we had no information about what isthmus tissue contains.

Conclusion

In open abdominal approaches, it is possible to encounter surprises such as horseshoe kidney and intraabdominal mass that has unknown pathology. We suggest that, if possible, computed tomography angiography should be the first choice in a patient with aorto-iliac occlusive disease instead of invasive angiography, even if the clinical presentation be CLI.

Acknowledgement

The article was presented as poster (EP-010) at the 14th Congress of the Turkish Society of Cardiovascular Surgery, November 03-06, 2016, Antalya, Turkey.

Declaration of authorship

All the authors have directly participated in the planning, execution, analysis or reporting of this research paper. The authors have read and approved the final version of the manuscript.

Conflict of interest

The authors declare that there are no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

References

1. Gerhard-Herman MD, Gornik HL, Barret C, Barshes NR, Corriere MA, Drachman DE, et al. 2016 AHA/ACC Guideline on the Management of Patients with Lower Extremity Peripheral Artery Disease: Executive Summary. Vasc Med. 2017;22(3):1-43. doi: 10.1177/1358863X17701592.

2. De Caridi G, Massara M, Greco M, Mastrojeni C, Serra R, Salomone I, et al. Surgical treatment of a voluminous infrarenal abdominal aortic aneurysm with horseshoe kidney: tips and tricks. Ann Vasc Dis 2015;8(4):324-7. doi: 10.3400/avd.cr.15-00083

3. Taghavi K, Kirkpatrick J, Mirjalili SA. The horseshoe kidney: Surgical anatomy and embryology. J Pediatr Urol 2016;12(5):275-80. doi: 10.1016/j.jpurol.2016.04.033.

4. İkizler M, Dernek S. A case of abdominal aortic aneurysm accompanied by horseshoe kidney. Turk Gogus Kalp Dama 2005;13(4):381-3.

5. Petrunic M, Stern-Padovan R, Mestrovic T. Abdominal and iliac arterial aneurysms associated with a horseshoe kidney. Should aberrant vascular anatomy mandate the treatment modality? EJVES Extra 2010;20(5):36-8. doi: https://doi.org/10.1016/j.ejvsextra.2010.08.002

6. Shortell CK, Welch EL, Ouriel K, Green RM, DeWeese JA. Operative management of coexistent aortic disease and horseshoe kidney. Ann Vasc Surg 1995;9(1):123-8

7. O'Hara PJ, Hakaim AG, Hertzer NR, Krajewski LP, Cox GS, Beven EG. Surgical management of aortic aneurysm and coexistent horseshoe kidney: review of a 31-year experience. J Vasc Surg 1993;17(5):940-7.

8. Stroosma OB, Kootstra G, Schurink GW. Management of aortic aneurysm in the presence of a horseshoe kidney. Br J Surg 2001;88(4):500-9.

9. Han A, Kim SM, Choi C, Min S, Ha J, Min SK. Open surgical repair of abdominal aortic aneurysm coexisting with horseshoe kidney. Vasc Spec Int 2015;31(2):54-7.doi: 10.5758/vsi.2015.31.2.54

10. McIlhenny C, Scott RN. Abdominal aortic aneurysm in association with horseshoe kidney. Eur J Vasc Endovasc Surg 2002;23(6):556-558. doi:10.10 /ejvs.2002.1624