

# Horseshoe Kidney in a Patient with Leriche Syndrome

Anil Ozen, Isa Civelek, Gorkem Yigit and Hakki Zafer Iscan

Department of Cardiovascular Surgery, Ankara City Hospital, Ankara, Turkey

## ABSTRACT

Horseshoe kidney (HSK) is one of the most common congenital renal fusion anomalies. Difficulties are encountered during surgery of aortic diseases associated with this anomaly. A 47-year male presented to the Outpatient Clinic with one-year history of intermittent claudication in 20 meters. He was diagnosed with Leriche syndrome and horseshoe kidney (HSK). The patient underwent aorto-bifemoral bypass surgery via transperitoneal approach. The proximal anastomosis was completed in an end-to-side fashion. The bifurcated graft was positioned posteriorly to the isthmus; and distal anastomoses were performed onto the common femoral arteries. He was discharged from the hospital on the eighth postoperative day without any complications.

**Key Words:** Abdominal aorta, Surgery, Horseshoe kidney, Leriche syndrome.

**How to cite this article:** Ozen A, Civelek I, Yigit G, Iscan HZ. Horseshoe Kidney in a Patient with Leriche Syndrome. *J Coll Physicians Surg Pak* 2022; **32(JCPSPCR)**:CR41-CR43.

## INTRODUCTION

Horseshoe kidney (HSK) is one of the most common congenital renal fusion anomalies.<sup>1</sup> It is seen in 0.1% to 0.25% patients undergoing aortic surgery. Renal anomalies are usually asymptomatic with normal renal function.<sup>2</sup>

Its presence complicates the surgical exposure during the surgery for abdominal aorta. The concomitant presence of this anomaly and aortic disease poses challenge to the surgeons. Great care should be taken regarding the preservation of isthmus of the kidney and accessory renal arteries originating from aorta.

Herein, we present a rare case of concomitant Leriche syndrome (LS) and HSK successfully treated surgically; and discuss our surgical approach in the light of literature data.

## CASE REPORT

A 47-year male presented to the Outpatient Clinic with one-year history of intermittent claudication in 20 meters. The patient's past medical history included varicose veins and the use of compression stockings with no relief of symptoms. Physical examination revealed the absence of lower extremity pulses. The lower extremity arterial doppler ultrasonography (DUS) showed monophasic arterial flow in all the lower extremity arteries.

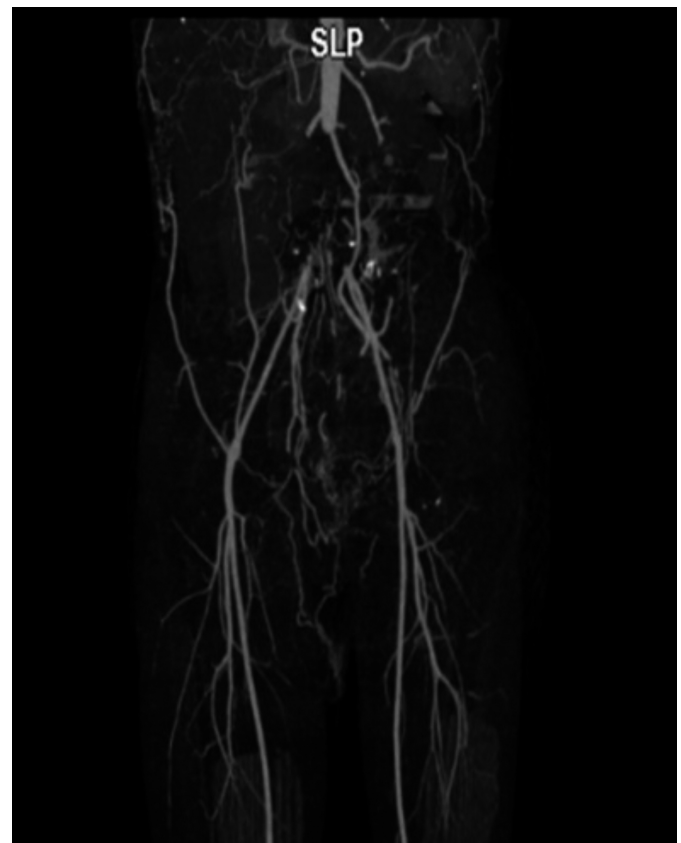
Correspondence to: Dr. Gorkem Yigit, Department of Cardiovascular Surgery, Ankara City Hospital, Ankara, Turkey

E-mail: drgorkemyigit@gmail.com

Received: January 03, 2020; Revised: March 15, 2020;

Accepted: April 08, 2020

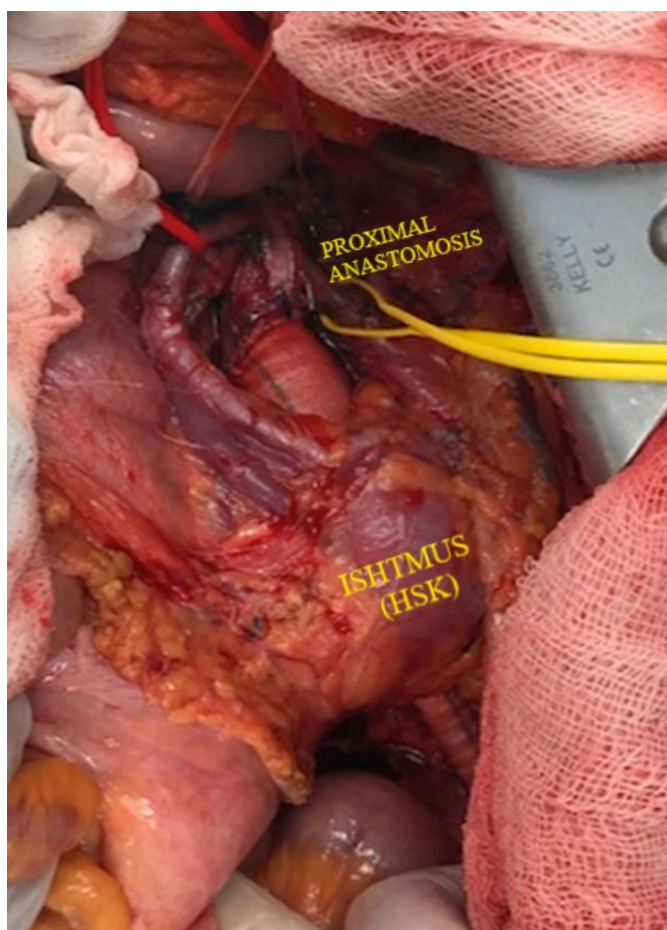
DOI: <https://doi.org/10.29271/jcpsp.2022.JCPSPCR.CR41>



**Figure 1:** Computed tomography angiography (CTA) revealed an aortic occlusion at the infra-renal level and the fusion of the lower lobes of the kidneys.

Computed tomography angiography (CTA) revealed an aortic occlusion at the infra-renal level and the fusion of the lower lobes of the kidneys (Figure 1). He was diagnosed with LS and HSK. The patient underwent aorto-bifemoral bypass surgery. Transperitoneal approach was used to reach the abdominal aorta. Following median laparotomy, the abdominal aorta was

evaluated and a general surgeon was invited to the operation for aid in preparation and access to HSK in order to minimise the risk of possible kidney injury. After determining the most effective approach, the general surgeon mobilised the isthmus of HSK, so that the aorto-bifemoral bypass graft could be placed posteriorly to the isthmus of the HSK. Separation of the isthmus was avoided because of the possibility of urinary leak and risk of bleeding. Anatomically, the right renal artery was just above the occlusion, slightly below its usual origin. The left renal artery originated from its usual level. Therefore, the cross-clamp had to be placed between these arteries. An 18-9 mm bifurcated Dacron graft was placed successfully. The proximal anastomosis was completed in an end-to-side fashion in 18 minutes; after which perfusion of the left renal artery was restored (Figure 2). Finally, the bifurcated graft was positioned posteriorly to the isthmus; and distal anastomoses were performed onto the common femoral arteries (CFAs) on both sides in an end-to-side fashion, using a 5/0 prolene-running suture.



**Figure 2:** Intraoperative image of the proximal anastomosis *via* Dacron graft and the horseshoe kidney.

The patient's HSK was a Crawford type 1.<sup>3</sup> There were no accessory arteries; hence, renal revascularisation was deemed unnecessary. There was also no need to selectively perfuse the left renal artery because the predicted cross-clamp time was below the 30-minute threshold.

The patient was transferred to the intensive care unit after completion of the operation. He had an uneventful recovery. Postoperatively, the distal lower extremity pulses were palpable, and urea and creatinine levels were normal. He was discharged from the hospital on the eighth postoperative day without any complications.

## DISCUSSION

The association of HSK and renal ectopia with abdominal aortic disease was first reported in 1956 by Julian.<sup>4</sup> This association may result in technical difficulties during abdominal aortic procedures. These cases must be treated in experienced centres. If open surgery is necessary, it is up to the experienced surgeons to determine the appropriate surgical approach.

Prior to surgery, the patient and his CTA imaging were discussed with an experienced general surgeon, including the type of surgical approach and access, the presence of any renal artery anomalies, and mobilisation of HSK. Carefully accessing the HSK, followed by the abdominal aorta, was the key to achieving operative success.

Surgical approaches include anterior transperitoneal and retroperitoneal incisions; and both have their own advantages and disadvantages. The anterior approach provides better exposure, direct visualisation of accessory arteries, and better control of the abdominal aorta. Nevertheless, the isthmus is a direct limitation of the surgery in the anterior approach. The division of the isthmus can be problematic and should be avoided, considering the risk of urinary leak and bleeding.<sup>5</sup>

On the retroperitoneal approach, the HSK and other viscera can be retracted antero-medially and the isthmus is no longer an obstacle for the exposure of the aorta. However, this approach does not provide satisfactory exposure of the right arterial vasculature. Hence, the anterior approach is more frequently used, as was the case in our patient.<sup>6</sup>

The possible vascular anomalies should be meticulously evaluated preoperatively; and operative planning should be made carefully. Crawford's classification is based on the origins of renal arteries and has a greater surgical significance than other classifications.<sup>7</sup> In a Crawford type I HSK, there are two renal arteries of normal origin. In Crawford II, in addition to the two normal arteries, there are one to three anomalous renal arteries originating from the infra-renal aorta or iliac arteries. In a Crawford III kidney, all renal arteries have an anomalous origin. Our case was a Crawford type 1 with two renal arteries.<sup>3</sup> As in this case, if renal perfusion is to be re-established within 30 minutes, then simple aortic cross-clamping can be performed, and renal

protection strategies are not necessary.<sup>8</sup> In the presence of any accessory renal arteries, a renal protection strategy must be planned, especially if the ischemia time is going to exceed 30 minutes. The choices for the perfusion of accessory arteries are Gott-like shunts or infusion of cold Ringers lactate solution.<sup>2</sup> However, our patient did not require any type of protection strategy since the cross-clamping time was only 18 minutes.

In the literature, limited number of cases are reported concerning the surgical treatment of LS with concomitant HSK. In the presence of suitable anatomy that enables placing a cross-clamp to a higher part of the aorta, Y graft can be performed onto this side, like in the case of Dorweiler *et al.*<sup>9</sup> Similarly, we performed the proximal anastomosis of the Y graft onto the abdominal aorta that was above the HSK in an end-to-side manner. Then, the bifurcated graft was passed through the posterior side of the HSK isthmus; and distal anastomoses were performed onto the CFAs on both sides. However, Depboylu *et al.*<sup>10</sup> performed a different technique which included ligation and separation of both common iliac arteries combined by suturing them together in order to form a tubular shape to extend the distal aorta beyond the HSK location. Then, the proximal part of the Dacron Y graft was anastomosed to this newly created distal aorta. The reason that they chose such an approach was due to the presence of accessory renal arteries related to the isthmus and, hence, the inability to reach the proximal aorta. The division of the isthmus of the HSK bears the risks of complications.

We present a rare case of aorto-iliac occlusive disease and HSK for which anterior transperitoneal approach was used and the division of the HSK isthmus was avoided. The patient had an uneventful recovery and was discharged from the hospital on the eighth postoperative day. There was no impairment of renal function on follow-up. The patient has palpable distal pulses and is free of intermittent claudication.

In conclusion, we ought to emphasise that the main principles in managing aortic surgery in concomitant HSK are detailed imaging protocols and a well-planned surgical preparation technique.

#### **PATIENTS' CONSENT:**

As the study was designed retrospectively, data were collected from the clinical archive after ethical approval.

#### **CONFLICT OF INTEREST:**

The authors declared no conflict of interest.

#### **AUTHORS' CONTRIBUTION:**

AO, GY: Study design, data collection, literature review and

writing the manuscript.

IC: Data collection.

HZI: Drafting of work, and literature review.

## **REFERENCES**

1. Bauer SB, Perlmutter AD, Retik AB. Anomalies of the upper urinary tract. In: Walsh PC, ed. *Campbell's Urology*, 6th edn. Philadelphia, PA: Saunders, 1992; 1357-442.
2. Faggioli GL, Freyrie A, Pilato A, Ferri M, Curti T, Paragona O, *et al.* Renal anomalies in aortic surgery: Contemporary results. *Surgery* 2003; **133**(6):641-6. doi: 10.1067/msy.2003.156.
3. Crawford ES, Coselli JS, Safi HJ, Martin TD, Pool JL. The impact of renal function and ectopia on aortic surgery. *J Vasc Surg* 1988; **8**(4):375-83. doi: 10.1067/mva.1988.avs0080375.
4. Julian OC. Diagnosis in arterial disease. *Surg Clin North Am* 1956; **36**:177-91. doi: 10.1016/s0039-6109(16)34796-x.
5. Shortell CK, Welch EL, Ouriel K, Green RM, De Weeze RAL. Operative management of coexistent aortic disease and horseshoe kidney. *Ann Vasc Surg* 1995; **9**(1):123-8. doi: 10.1007/BF02015326.
6. Connelly TL, McKinnon W, Smith RB III, Perdue GD. Abdominal aortic surgery and horseshoe kidney: Report of six cases and a review. *Arch Surg* 1980; **115**(2):1459-63. doi: 10.1001/archsurg.1980.01380120031008.
7. Lotina SL, Davidovic LB, Kostic DM, Velimirovic DV, Petrović PLJ, Perišić-Savić MV, *et al.* Surgery of abdominal aorta with horseshoe kidney. *Srp Arh Celok Lek* 1997; **125**(1-2): 36-44.
8. Kasahara H, Shimizu H, Yozu R. Postoperative renal function after juxtarenal aortic aneurysm repair with simple cross-clamping. *Ann Vasc Surg* 2013; **27**(3): 291-8. doi: 10.1016/j.avsg.2012.04.024.
9. Dorweiler B, Neufang A, Schmiedt W, Oelert H. Distal aortic occlusion and horseshoe kidney: Vascular reconstruction with aortobifemoral bypass. *EJVES Extra* 2001; **3**:41-3.
10. Depboylu BC, Harmandar B, Yazman S, Arslan K. Struggle in struggle: Surgical treatment of Leriche syndrome in a horseshoe kidney patient. *Turk Gogus Kalp Dama* 2019; **27**(4):586-9. Doi:10.5606/tgkdc.dergisi.2019.18062.

• • • • •