SHORT REPORT

Abdominal Aortic Aneurysm in Association with Horseshoe Kidney

C. McIlhenny* and R. N. Scott

Department of Surgery, Monklands Hospital, Airdrie, Lanarkshire ML6 0JS, U.K.

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Introduction

The presence of a horseshoe kidney (HSK) may complicate an anterior approach to reconstructive surgery of aorta and iliac vessels, because the isthmus of the HSK lies across the aorta and because HSK is often associated with anomalous renal vessels. Routine preoperative assessment may not reveal the presence of HSK. We report two cases of abdominal aortic aneurysm (AAA) associated with HSK, which were diagnosed intra-operatively. Authoritative textbooks of vascular surgery advise against division of the isthmus of the HSK.1,2 In the cases reported here, division of the isthmus was helpful in simplifying successful repair of the AAA.

Case Reports

Case 1

A hypertensive 74-year-old male was referred after a lumbar spine X-ray suggested a possible calcified abdominal aortic aneurysm. Ultrasound scan confirmed the diagnosis of an aortic aneurysm. Both kidneys were described as small on ultrasound, but otherwise normal.

At operation, the abdomen was explored through a long midline incision and the presence of an HSK with a narrow isthmus overlying the aneurysm was noted. Careful retroperitoneal dissection revealed normal renal arteries above the aneurysm, and showed that it would be possible to clamp the aorta infra-renal. At this point it was felt that division of the isthmus of the HSK would achieve better exposure of the aneurysm neck. The isthmus was divided between clamps and the cut surface on each side was oversewn with running Dexon sutures. After division of the isthmus, repair of the aneurysm was technically straightforward. An 18 mm Gel-Soft (Sulzer Vascutek, Renfrewshire, U.K.) tube graft was implanted. The patient made an uneventful recovery and was discharged home on day 10.

Case 2

A 68-year-old male was noted to have an asymptomatic abdominal aortic aneurysm on clinical examination, after being admitted to an orthopaedic ward because of soft tissue infection of the left foot. Ultrasound confirmed an AAA and “normal kidneys”.

At operation the abdomen was explored via a long midline incision and the presence of the HSK became immediately apparent. Careful retroperitoneal dissection revealed the presence of several aberrant blood vessels. The inferior mesenteric artery arose high above the isthmus of the HSK, above a large lower pole left renal artery, which arose from the aneurysm sac. On the right side there was also a large lower polar right renal artery arising from the aneurysm sac, and a smaller left upper polar artery arising from normal aorta above the aneurysm.

To the left of the midline, a pale, narrow and what looked to be relatively avascular portion of the isthmus was identified. In order to facilitate exposure of the aneurysm, the isthmus was divided through this
portion, between clamps, and then oversewn with continuous 2/0 Dexon. This gave better access to the neck of the aneurysm.

The aorta was initially clamped above the level of the right upper polar renal artery and a 16 mm Gel-Soft tube graft was anastomosed to the proximal aorta. The clamp was then re-applied beyond the proximal anastomosis to allow perfusion of the right upper polar renal artery while the distal aortic anastomosis was being performed.

Both lower polar renal arteries were then implanted into the graft. The IMA was ligated. The patient made an uneventful post-operative recovery and was discharged home on day 7.

**Discussion**

The co-existence of abdominal aortic aneurysm and horseshoe kidney is rare, occurring only 0.12% of patients undergoing aneurysm replacement.³ The presence of the renal isthmus overlying the aneurysm and the very variable vascular supply to the horseshoe kidney can substantially complicate aortic reconstruction in these patients. Despite over 100 cases now reported in the literature, the management of this combination of conditions remains controversial.

Pre-operative diagnosis of the co-existence of HSK and AAA, and identification of the attendant anomalies of the renal arterial and collecting systems, greatly facilitates surgical management of these patients, and allows careful pre-operative planning of the approach and technique best suited to each individual case. If diagnosed pre-operatively, utilisation of the retro-peritoneal approach, or endo-vascular repair can avoid complications associated with the HSK.

CT scanning is the most accurate imaging modality for the diagnosis of horseshoe kidney,⁴ and also provides important information about the aneurysm itself, thus obviating the need for any other form of imaging. The accuracy of ultrasound scanning has been well established in the diagnosis of abdominal aortic aneurysm,⁵ and reconstructive surgery can be performed on the basis of ultrasound scans alone. Unfortunately ultrasound scanning tends to underestimate the problem, as illustrated by our cases, in both of which the diagnosis of horseshoe kidney was missed by ultrasound.

If AAA surgery is performed on the basis of ultrasound scanning alone, cases of co-existent HSK and AAA may be diagnosed unexpectedly at laparotomy. Traditional teaching can be contradictory on the best management of these cases, but most advise against division of the renal substance, even when the presence of the HSK hinders exposure of the AAA.⁶⁻⁷

**To Divide or not Divide the Isthmus in HSK and AAA**

A review of the literature suggests that with the trans-peritoneal approach, division of the isthmus is only necessary in about 34% of cases.⁷ In the majority where the trans-peritoneal approach was utilised, the isthmus of the horseshoe kidney was left intact, and the graft was simply tunnelled behind it. However, we feel that division of the isthmus can be a safe manoeuvre that can improve access and simplify repair of an AAA.

Opponents of the midline, transperitoneal approach suggest that division of the isthmus increases the risks of urinary fistula, because the isthmus may contain elements of the collecting system.⁴⁻⁸ Urinary tract infection is common in HSK, and graft sepsis is quoted as a potential risk.⁹ It has been suggested that there is also an increased risk of haemorrhage from the divided renal parenchyma and that renal necrosis may be another potential complication of isthmus division. While the latter two complications have been reported after division of an HSK prior to transplantation,¹⁰ none of these theoretical complications have been reported after division of the renal isthmus for HSK and AAA.

In cases of co-existent AAA and HSK, if the isthmus is to be divided, a pre-operative IVP may be helpful. Culture and Sensitivity of a sample of isthmus may provide relevant bacteriology to guide treatment in any cases of suspected graft infection.¹¹ The risk of haemorrhage from the renal surface can be minimised by carefully selecting a place for division of the isthmus and by overrunning the cut edges with a haemostatic suture.

**Summary**

The presence of HSK in patients with co-existing AAA may complicate reconstructive surgery. There are concerns that division of the isthmus may cause infection, haemorrhage, and renal failure, but this is not supported by a review of the world literature. We conclude that division of the isthmus of an HSK can safely enhance access if it is necessary for trans-peritoneal repair of AAA, especially in the presence of a fibrous isthmus.
References


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