International Journal of Research in Medical Sciences
Naveena S et al. Int J Res Med Sci. 2013 Aug;1(3):304-307
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012

DOI: 10.5455/2320-6012.ijrms20130833

Case Report

Horseshoe kidney: a case report

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Received: 30 May 2013
Accepted: 14 June 2013

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ABSTRACT

The horseshoe kidney was originally regarded as a rare anatomical curiosity, but with the aid of retrograde pyelogram, intravenous urogram and renal arteriograms in this present age of diagnosis, the incidence of horseshoe kidney is estimated at 1 in 200-400 individuals or 1 in 700 autopsies and usually remains asymptomatic. The present report is concerned with a case of horseshoe kidney, which was observed during routine cadaveric dissection, for student education in anatomy dissection hall of Osmania medical college, in a male cadaver. The kidneys formed a U-shaped structure as a result of fusion at the inferior poles of the original kidneys by a parenchymatous isthmus. As a whole, the structure presented a typical horseshoe shape. The location of the kidney was lower than that of the normal kidney. The renal arterial system was almost normal except for a surplus artery into the isthmus that directly originated from the aorta, at the origin of inferior mesenteric artery. Venous drainage of both the kidneys and the isthmus was through two veins which opened independently into the inferior vena cava. The hila on both sides opened towards the ventral direction, and the ureters descended in front of the isthmus and entered the bladder normally. This report is being made because it affords material for a review of embryological and gross anatomy findings in a case of horseshoe kidney, which could help in a thorough urologic evaluation in diagnosed cases prior to any surgical intervention.

Keywords: Horse shoe kidney, Retrograde pyelogram, Intravenous urogram, Renal arteriogram, Parenchymatous isthmus, Surplus artery, Renal blastema, Prostatectomy, Hydronephrosis, Pyelonephritis

INTRODUCTION

A horseshoe kidney is a rare non-fatal congenital malformation of renal development. It usually remains asymptomatic and in many cases it is discovered incidentally. This anomaly is found twice as often in men as in women. It results from an embryological fault which develops between the 4th and 8th week of intrauterine life. The bilateral renal blastema become fused before rotation and migration, this fusion prevents independent rotation and the vessels thus develop an abnormal relation to the renal pelvis and ureter. The normal kidney in the course of development travels upward from near the level of the second sacral vertebra to the lumbar region. Horseshoe kidneys on the contrary are usually found to be ectopic, low in position and sited at the aortic bifurcation.

The shape of the symmetrical organ is that of a horseshoe with a bridge of renal tissue uniting the lower poles across the middle line of vertebral column. If the union occurs at the upper poles, the organ in fact takes the shape of an irregular 'H'. The connection in a horseshoe kidney may be a solid renal parenchyma or a fibrous band. The ureter arises from the anterior surface of the

pelvis and tends to be obstructed if it crosses the lower pole or the bulky isthmus.

Anomalies in the blood vessels are common. There are frequently two or three arteries supply each kidney from aorta and one or two arteries supply the isthmus. About 25% of horseshoe kidneys are normal and give rise to no trouble, indeed, they are only revealed by accident, as for instance in an intravenous urogram performed before a prostatectomy. The danger nevertheless remains that they can lead to manifold complications.

An abdominal aortic aneurysm in the presence of the horseshoe kidney is a truly particular surgical challenge. A high origin of the ureter from the pelvis or a ureter which crosses a lower pole or a prominent isthmus, may well cause ureteric obstruction which leads to hydronephrosis with subsequent infection, pyelonephritis. The stagnation of urine may lead to stone formation; all these factors involve the patient in a remote risk of renal failure.

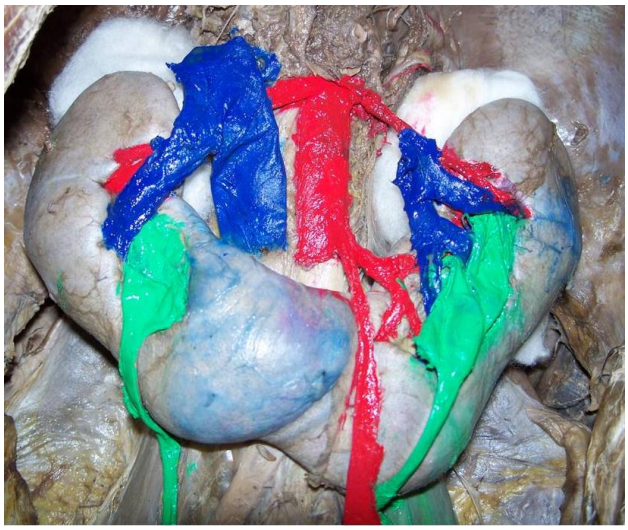
CASE REPORT

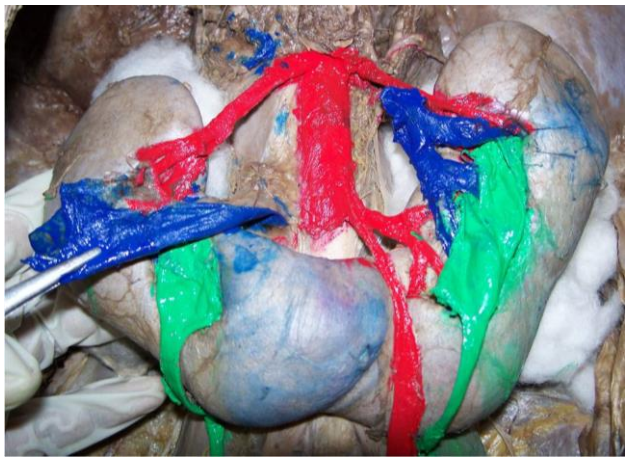
The case was reported in the routine dissection of embalmed cadaver in the dissection hall of Anatomy department at Osmania Medical College, Koti, Hyderabad.

The cadaver was received into the Anatomy department and embalmed with embalming fluid. After proper fixation, cadaver was kept on the dissection table in supine position. Sex of the cadaver was noted. An incision was given in the anterior wall of abdomen extending from the xiphoid process to the pubic symphysis. Lateral horizontal incisions were given extending posteriorly from the umbilicus. The peritoneum and the intestines were dissected and removed. On the posterior abdominal wall a large kidney mass consisting of two lateral lobes and an isthmus of apparently normal kidney tissue was seen.

A large kidney mass consisting of two lateral lobes and an isthmus of apparently normal kidney tissue between the lower lobes is seen along the posterior wall of abdomen. Each lateral lobe measured 13cms vertically and the entire mass measured 17cms transversely. The isthmus was lying over the bodies of fourth and fifth lumbar vertebrae. Both kidneys were in symmetrical ptosis and in close proximity to the vertebral column. Each lateral lobe possessed a hilum on its anterior surface from which the calices emerged to form the renal pelvis, which continued as ureter. The ureters passed downward over the antero lateral surface of the lower poles, then across the terminal parts of the common iliac vessels, to enter the bladder in a usual manner.

The right and left renal arteries originated normally from the aorta and entered the upper part of their respective hila. Their accompanying renal veins entered the inferior vena cava. Another artery originated from the aorta just above its bifurcation at the level of inferior mesenteric artery origin and entered the left hilum and the isthmus of the kidney. The vein draining the isthmus entered the left renal vein through the left hilum.





DISCUSSION

Horseshoe kidney is a congenital condition where two kidneys of opposite side are fused across the spine by an isthmus. It is found with an incidence of 1 in 304 in the general population, with an increased incidence in men.

Botez collected the statistics of 51,504 autopsies published by various authors up to 1912. Horseshoe kidney was found in 72 of these, or 1 to 715 autopsies. Carlier and Gerard, in I913, added some later observations to those of Botez, finding that this anomaly occurred eighty times in 69,989 autopsies or 1 to 862. Since 19I3, the observation of Motzfeld can be added, making a total of 73,489 autopsies in which horseshoe kidney was found in 92, or approximately I in 710 bodies. The incidence of the horseshoe kidney during the dissecting practice at Gifu University School of Medicine from 1971 to 1997 was estimated to be 0.36% (4 out of 1130 bodies). The incidence of horseshoe kidneys in

Japanese anatomical dissections has been reported as 0.15-0.48%.

Embryologically it represents the most common failure of migration and rotation of the metanephric buds from their pelvic position during the fourth to sixth week of gestation. Initially during the intrauterine life, the kidneys are located in the pelvis caudal to aortic bifurcation. During 7 to 8 months of intrauterine life, they migrate and ascend out of pelvis and also rotate medially, so that the anteriorly facing pelvis turns medially. A slight alteration in the position of the umbilical or common iliac artery could change the orientation of the migrating kidneys, thus leading to contact and fusion. The first description of a horseshoe kidney as a pathology of the kidney came from Morgagni in 1820. Boyden described a 6-week old embryo with a horseshoe kidney, the youngest foetus ever discovered with this anomaly.

Horseshoe kidney may function normally except in 25% of cases, when it requires surgery. Hydronephrosis, ureteric strictures are the common complication of horseshoe kidney. This is most common finding because of ureteropelvic junction (UPJ) obstruction, which occurs in up to 35% of patients. While most of the horseshoe kidneys remain asymptomatic, hydronephrosis can cause irreversible functional damage to the organ. Surgical treatment of the functionally reduced or even non-functional part of the kidney can therefore become inevitable.

In cases of ureteric strictures, long-term treatment with in situ ureteral stents should be avoided whenever possible; in particular, a definitive surgical procedure should be the aim in young patients where the risks associated with anaesthesia are low. Several treatment options for ureteric strictures, such as transient stenting, repair with intrinsic urinary tract tissues and partial or total ureteral replacement are described.

Transuretero-ureterostomy (TUU) can be used for the treatment. The criteria for TUU, as of a normal donor kidney and upper ureter on one side and a normal recipient ureter and bladder. In addition, since TUU may be associated with serious complications, including failure of the uretero-ureteral anastomosis as well as potential injury to both donor and recipient upper tracts transuretero-pyelostomy can be done in order to decrease the risk of postoperative morbidity.

A systematic approach and procedure for dealing with complex ureteral problems and congenital malformations is to be done for individual therapeutic strategies to ensure the highest benefit for the patients in their particular circumstances.

CONCLUSION

Horseshoe kidney is a congenital malformation which may predispose the patient to numerous complications including hydronephrosis and loss of renal function. Various complications of long-term ureteral stenting have been reported. Whenever possible, long-term stenting of the ureter should be avoided and a definitive therapeutic approach should be the goal, especially in patients with good general health.

Urologists are often faced with technically difficult cases that are not responsive to standard operative procedures. It highlights the improvement of the patient's quality of life as well as the long-term functional protection of the remaining part of the horseshoe kidney.

ACKNOWLEDGMENTS

We cordially wish to express our acknowledgement to the staff of Department of Anatomy, Osmania Medical College and Hospital, Hyderabad for giving the approval to do the dissection. We will be failing badly if we don’t mention the encouragement and support which we received from Apollo Institute of Medical Sciences and Research, Hyderabad in doing the dissection which has been our unique experience.

Funding: None
Competing interest: None declared
Ethical approval: Not required

REFERENCES

1. Successful transureteropyelostomy after heminephrectomy of a bilateral hydronephrotic horseshoe kidney: a case report Holger Gerullis, Christoph Eimer, Dietmar Betz and Thomas Otto. Journal of Medical Case Reports 2008, 2:231; doi:10.1186/1752-1947-2-231.
2. Morphometric study of a horseshoe kidney. Oktem H, Gozil R, Calguner E, Bahcelioglu M, Mutlu S, Kurkcuoglu A, Yucel D, Senol E, Babus T, Kadioglu D.Med Princ Pract. 2008;17(1):80-3.PMID:18059107.
3. Yakeishi A, Saga T, So H, Tetsuka M, Araki Y, Kobayashi S, Yamaki K. A case of horseshoe kidney with surplus renal arteries. Kurume Med J. 2007;54(3-4):89-93.
4. Madhur Gupta, Ajay Kumar Pandey and Neeru Goyal. Horseshoe kidney – A case report. Nepal Medical College Journal 2007; 9(1).
5. Bordei P, Antohe DS, Iliescu D, Sapte E. Horseshoe kidney in an ectopic position. A case report. Surg Radiol Anat. 2003 Jul-Aug;25(3-4):345-9.
6. Chen H, Hayakawa D, Emura S, Ozawa Y, Yano R, Shoumura S. Okajimas. A case of the horseshoe kidney. Folia Anat Jpn 2001 Dec;78(5):169-72.
7. Shoumura S, Emura S, Utsumi M, Chen H, Hayakawa D, Yamahira T, Tamada A, Terasawa K, Aoki T, Sato K, et al. Two cases of the horseshoe kidney. Kaibogaku Zasshi 1992 Jun;67(3):226-9.

8. Horseshoe Kidneys [Abridged] F. R. Kilpatrick Proc R Soc Med. 1967 May; 60(5): 433–438. PMCID: PMC1901808
9. Report of a Case of Horseshoe Kidney L. K. Emenhiser, M.D., J. C. King, M.D. Oklahoma City, Okla April 1936 Radiology, 26, 495-496. doi: 10.1148/26.4.495 .
10. Daniel N. Eisendrath, Frank M. Phifer, and Harry B. Horseshoe kidney. Culver Ann Surg. 1925 November; 82(5):735-64.

DOI: 10.5455/2320-6012.ijrms20130833
Cite this article as: Naveena S, Mrudula C. Horseshoe kidney: a case report. Int J Res Med Sci 2013;1:304-7.