

Horse-shoe Kidney – Approach to Treatment

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SUMMARY

Horse-shoe kidney is a congenital anomaly which is associated with calculous formation and pelviureteric junction obstruction due to the abnormal lie of the pelvis and ureters. The patient presents as pain in abdomen, recurrent urinary tract infection, lump in abdomen, haematuria and pyuria. Division of the isthmus and simultaneous nephropexy corrects the lie of the pelvis and ureters and is recommended as the surgery for symptomatic horse-shoe kidney. If the pelviureteric junction is dependent and funnel shaped, simple nephropexy in lower polar diversion position will suffice but if there is high insertion of the ureter, some form of pyeloplasty is mandatory. A contralateral nephropexy, at a later stage, is also recommended.

KEY WORDS

Horse-shoe kidney, Symphysiotomy, Urolithiasis, Ureteropelvic junction obstruction, Pyeloplasty, Nephropexy.

Introduction

Horse-shoe kidney is the commonest fusion anomaly of the renal tract found in 1 in 425 autopsies (1). Due to the abnormal lie of the kidneys and ureter it may be associated with other conditions like stone formation; pelviureteric junction obstruction and urinary tract infection (2). In seventies the mainstay of the diagnosis was clinical suspicion and excretory urography only, though recently ultrasonography has replaced conventional urography (3). Opinion, as to the best method of surgical treatment, has changed in the last few years. A symphysiotomy followed by unilateral nephropexy is suggested as the ideal treatment while

treating calculi or pelviureteric junction obstruction in the horse-shoe kidney.

Material and Methods

During a 20 year period between 1973 to 1993, 26 patients with horse-shoe kidney were seen in one of the three surgical units of the Department of Surgery at Safdarjung Hospital and Guru Teg Bahadur Hospital, Delhi. Most of the patients were either young or middle aged. The age ranged from 11 years to 42 years. The male to female distribution was 22 : 4. The chief complaints were pain in the flank and recurrent urinary tract infection. The

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work up consisted of routine blood and urine investigations, x-ray abdomen, ultrasonography and intravenous urography.

The diagnosis was suspected initially on ultrasonography and later confirmed by excretory urography. The classical findings seen in excretory urography were – a relatively low level of the renal shadows, absence of lower pole shadows, interior convergence of renal axes, medially located and non-rotated pelvis, high insertion of the ureters on the anterior or lateral aspects of the renal pelvis and the short ureteral course near the midline over the fused portion of the kidney. Ultrasound showed the isthmus and an inverted triangular or inverted pyriform shape of one or both kidneys.

Surgery was carried out in all the cases as they reported late and had complications like stone formation and infection. Calculous disease accounted for all the cases. The associated problems requiring surgical treatment are as shown in Table 1.

The kidneys were approached reteroperitoneally by the anterior flank incision. The various surgical procedures carried out are shown in Table 2. In 3 patients calculi were present in the isthmus which were removed during symphysiotomy.

Table 1.–Horse-shoe kidney & associated diseases

Associated disease	No. of patients
1. Calculi – Unilateral	22
– Bilateral	4
2. Pelviureteric Junction obstruction	2
3. Hydronephrosis	22
4. Pyonephrosis	nil
5. Polycystic disease	nil
6. Malignancy	nil

Table 2.–Horse-shoe kidney – Surgical procedures

Surgical Procedure	No. of cases
1. Pyelolithotomy–Symphysiotomy–Nephropexy	18
2. Pyelolithotomy–Pyeloplasty–Symphysiotomy–Nephropexy	2
3. Pyelolithotomy–Symphysiotomy–Lower Polar Partial Nephrectomy–Nephropexy	6
4. Nephropexy of contralateral kidney	4

Results

There were no immediate postoperative complications such as haemorrhage, urinary fistula formation except wound infection in one patient. There was no operative mortality. All patients are alive and well. The follow-up period ranged from 3 to 10 years. None of the patients have had stone recurrences or fistula formation. The incidence of urinary tract infection fell considerably.

Four patients had bilateral stones. They were treated in the second stage in a similar manner i. e. pyelolithotomy–symphysiotomy and nephropexy. No complications have been seen in them.

Discussion

Horse-shoe kidney is the result of a developmental defect occurring between 4th to 8th week of embryogenesis. During this time, the definitive kidney, the metanephros develops in the pelvis and migrates to its lumbar position. The blood supply sequentially shifts from the iliac arteries to aorta and there is medial rotation about the longitudinal axis of each kidney. If, early in the course of events, the metanephric buds become fused to each other then their normal migration and medial rotation would be blocked and a typical horse-shoe kidney results. Renal position is just caudal to inferior



mesentric artery at L_{3,4}(1). The cause of the fusion is not known but may be due to a medial compression by the umbilical arteries (9). This would eliminate a specific gene defect as the basis of horse-shoe kidney.

Most reported cases of horse-shoe kidney consist of lower polar fusion, however, a small percentage of horse-shoe kidneys may exhibit upper pole fusion (5). The isthmus is usually composed of parenchymatous tissue and rarely, it is represented by a fibrous strand. About a 3rd of all horse-shoe kidneys have a normal pedicle blood supply, but in other 2/3rds an anomalous supply to the isthmus is seen.

Clinical findings are those of infection, calculi, obstruction or tumor due to anomalous position of pelvis and ureters. Sometimes pain may be the presenting symptom. On other occasion, it may be an incidental finding (23.5%) as reported by Glenn (5), or there may be gastrointestinal symptoms (renodigestive reflex) mimicking peptic ulcer, gall stone or appendicitis (10). A high incidence of abnormal external genitalia, ureteral anomalies, testicular pathology is seen. Rovsing syndrome i. e. pain, nausea and vomiting on hyperextension of the back is rare (2, 10). In contrast to neonates which may have associated fatal anomalies, a horse-shoe kidney in the adult is associated with a full span of life (1, 10).

A high incidence of calculous formation ranging from 21-60% (1, 4) and of infection (27-41.2%) has been reported (5, 1). Obstruction and infection result in hydronephrosis and at times pyonephrosis.

In this series, calculous disease was present in all the cases (100%), urinary tract infection was present in 22 (82%) cases. There was no incidence of calculous pyonephrosis, although back pressure changes were evident in most of the cases. Complication of infection

alone may be treated conservatively in many cases but calculi and hydronephrosis must be treated surgically. Opinion regarding surgery of horse-shoe kidney has varied over the last few years especially regarding the role of division of isthmus and nephropexy. Presently, it is believed that division of the isthmus is usually not required but many authors have, however, shown that symphysiotomy does lower the incidence of stone recurrence after pyelolithotomy. Without division, the reported stone recurrence rate is about 50% (4, 7, 8). Nephropexy, as an additional procedure to symphysiotomy, results in better drainage of the kidney and further lowers the incidence of stone recurrence after pyelolithotomy. A risk of haemorrhage and fistula formation has been reported after symphysiotomy in some cases (1). Therefore, anomalous vessels should be carefully looked for and any open calyces after division of the isthmus should be sutured (11).

In the present series, all patients had calculous disease and postoperatively, there has been no stone recurrence or any other complication like fistula formation etc. Rate of infection fell down tremendously due to proper drainage of urine as the fixation of the kidney was done in lower polar diversion position. This position helped in removal of small left over stones as well.

Although division of the isthmus remains a controversial point, it seems that it could be important while dealing with calculi in horse-shoe kidney. Since most of the patients with horse-shoe kidney have calculi either at the time of presentation or in subsequent follow up, a division of the isthmus should be done routinely alongwith nephropexy in lower polar diversion position so as to improve the drainage of the kidney. A pyeloplasty and/or lower polar partial nephrectomy may be added as required. A contralateral nephropexy may also be done at a later stage.



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