ABSTRACT
The presented clinical case describes our first experience of laparoscopic transmesocolic partial nephrectomy in lower pole of left half of horseshoe kidney for renal cell carcinoma. All stages of the surgery performed through a “window” in mesocolon, which size conditioned optimal ergonomics during whole intervention. In our opinion, transmesocolic approach comprised with usual one, has several advantages because of more freedom in manipulations. Fast, through thinner tissue’s layer, direct access to the isthmus and abdominal aorta facilitates safe and precise dissection, lymphadenectomy and isthmotomy. The last of them was realized without ligation of the isthmic artery, without usage of linear staplers – just intracorporeal suturing and cutting with monopolar hook. Peculiarities of the collecting system enabled preparation of calices and segmental vessels in the hilum. Consequently, lower groups of major calices which were amenable to removal were prepared before the stage of cutting off lower half of the kidney. Such a maneuver prevented warm ischemia and Hem-o-lok clips made it possible to avoid intracorporeal pelvic suture. The ischemic time was 19 minutes, operating time – 210 minutes, no intra- and postop complications. Hospital stay was 5 days. In this case non-standard approach and non-standard usage of standard armamentarium enabled to perform laparoscopic partial nephrectomy despite anatomic features of the kidney

Key Words: Horseshoe kidney RCC, Laparoscopic partial nephrectomy, Transmesocolic approach

INTRODUCTION
Di Capri described horseshoe kidney for the first time in 1522. However mentions of manifestations associated with this anomaly appeared much later when Giovanni Battista Morgani published in 1761 landmark book «De Sedibus et Causis Morborum per Anatomen Indagatis» For the first time in this immortal tractate G.B. Morgani correlated pathologic changes in organs while autopsy with vital symptoms in different patients. (1, 2). At approximately 1 to 1000, in women twice more seldom than in men, horseshoe kidney is the result of chromosomal aneuploidies [in 20% of cases – trisomies, and in 60% - Turner syndrome]. From the standpoint of pathophysiology the problem occurs on the 2-6 weeks of prenatal development when lower portions of metanephrogenic blastemas are joined and form the isthmus. The latter in 90% of cases involves lower segments of kidney anteriorly to aorta and cava inferior. While embryonal ascending of kidneys the tangle of the isthmus and lower mesenteric artery determines anatomic and structure aberrations that are typical for horseshoe kidney. Features of collecting system’s structure in their turn predispose to
Kidney stones and hydronephrosis resulting in most frequent clinical manifestations. However, one third of patients have no symptoms (3, 4).

Renal cell carcinoma develops in horseshoe kidney very seldom. Up to 2012 only 200 such cases were described (5). Most efficient way of renal cell carcinoma's treatment is surgical one and organ-sparing interventions are of high-priority. The development of minimally invasive technologies resulted in almost total refusal of open techniques in localized tumors – laparoscopic nephrectomy and partial nephrectomy considered by EAU as treatment of choice for renal cell carcinoma of T1-T2 stages. But revising PubMed we could find only 3 references of laparoscopic partial nephrectomies in horseshoe kidneys (6-8). Moreover, there are no data about laparoscopic transmesocolic partial nephrectomies in adherent kidneys. So, here we present our first experience in laparoscopic transmesocolic partial nephrectomy for RCC in the lower pole of horseshoe left half.

CASE REPORT

The female patient of 27 years complained of fever up to 38°C, general weakness, tiredness and feeling of weight in lumbar area. After course of antibiotics general state improved – fever and pains subsided but in ultrasound examination horseshoe kidney with tumor of lower pole was suspected. Enhanced MRI was done and tumor of left lower pole in horseshoe kidney sized 3,8 x 4,9 x 4,1 cm and compressing lower calices was confirmed. Isthmus size was detected as 5,3 x 5,2 cm (Figures 1A-C, 2).

Diagnose was formulated as “RCC of the left half of horseshoe kidney cT1N0M0. Anemia” and laparoscopic transmesocolic partial nephrectomy of left lower pole was done on 24 Aug 2015.

Surgical Technique

Patient was positioned supine with the bed rotated to 30 degrees. Optical port was located in umbilicus. Tree working trocars were settled in epigastric, left iliac areas and according to lateral margin of left rectal abdominal muscle. Restricted with branches of left colic artery, lower mesenteric vein and Riolan arc., a “window” in the mesocolon of descending colon was created (Figure 3). Above the isthmus of horseshoe kidney abdominal aorta was approached and isthmic artery was dissected (Figure 4). Paraaortal dissection was done. Vascular pedicle of left half kidney, consisting of 2 arteries and a vein, was mobilized. Pelvis and left ureter were stripped. In the hilum...
both major calices of lower segment compressed by the tumor were dissected, clipped by Hem-o-lok and cut (Figure 5). The isthmus was ligated twice, sutured and then cut by monopolar hook. (Figure 6). Renal arteries were separately compressed by vascular clamps. The lower segment was cut within the bounds of normal tissues by cold scissors including tumor, lower calices and isthmus. Running suture of renal parenchyma was covered by hemostatic plate “Tachocomb” (Figures 7A,B). Ischemia time – 19 minutes. Bleeding Control. Drainage through the one of trocar’s wound; operating area was covered with omentum. The “window” in the mesocolon was not sutured. The specimen was removed in container through mini - Pfannenstiel cut (Figures 8, 9A,B). Blood loss - 100 ml. OR time- 210 minutes.

There were no intra- or postoperative complications. Patient was aroused in the day of operation. Prophylaxis of infectious and thromboembolic complications was performed. Drainage
Laparoscopic Transmesocolic Partial Nephrectomy in a Horseshoe Kidney

Figure 6: Isthmus is ligated intracorporeally.

Figure 7: Running encircling stitch of renal parenchyma (A) covered by hemostatic plate “Tachocomb” (B).

Figure 8: Postoperative wounds view.

Figure 9: A,B] Specimen: lower segment of left half horseshoe kidney cut with tumor, lower group of calices and isthmus.
A tube was removed on the next day. Patient was discharged on the 5th postop day. In the same day intravenous urography was done – good renal function was found (Figure 10).

Pathology report: clear-cell type of renal cell carcinoma, negative margin, no lymph node metastasis.

**DISCUSSION**

Surgery of cancer in horseshoe kidney believes to be difficult case even with traditional, open technique. This fact is conditioned not only by anatomic features of collecting system, variability of blood supply, but also by presence of isthmus which significantly restricts renal mobility, troubling approach to posterior surface of the kidney. In review of articles about laparoscopic heminephrectomy in different diseases of horseshoe kidney, A. Khan noticed that in most cases of isthmotomy linear stapler was used, sometimes – combination of ultrasound dissection and bipolar coagulation. More than half operations were performed laparoscopically with standard mobilization of the colon. Seldom - extraperitoneal and hand-assisted approaches [9].

On the other hand, laparoscopic partial nephrectomy is a procedure that demands possession of sufficient experience and manual skills by a surgeon. Mobilization of vascular pedicle, tumor excision and suturing the renal wound are the most important stages of the operation [10, 11]. In our case the size of a “window” in the mesocolon was sufficient for optimal ergonomics during all stages of intervention. Moreover, on our opinion, while manipulating the isthmus, transmesocolic approach has benefits of more freedom of the maneuver. Fast, through thinner tissue’s layer, direct access to the isthmus and abdominal aorta facilitates safe and precise dissection, lymphadenectomy and isthmotomy. The last one was performed without ligation of isthmic artery, avoiding using of suturing devices and linear staplers, just with intracorporeal isthmic ligation and cutting with monopolar hook. Particularities of collecting system in horseshoe kidney enabled perform preparation calices and segmental vessels in its hilum. Consequently, lower group of major calices were prepared before cutting off lower segment of the left renal half. This maneuver did not require any ischemia and Hem-o-lok clips gave an opportunity to seal collecting system without intracorporeal suturing the pelvis.

**CONCLUSION**

Possibility to implement principles of traditional oncology in laparoscopic surgery led to almost total refuse from open operations in localized renal tumors. In the presented case non-usual approach and non-usual appliance of standard instruments enabled to perform laparoscopic segmental partial nephrectomy despite particularities of the organ.

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