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Brief Communication

Modified technique of renal pedicle lymphatic disconnection for chyluria through the laparoscopic surgery

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Abstract: Fifteen cases of chyluria were diagnosed by Sudan staining test and the sides of chylous reflux were determined by cystoscopy. All patients underwent the modified laparoscopic technique. The operations had been successfully without unexpected injury. The postoperative urine chyle tests were negative in all patients. Recurrence developed in 1 patient during the follow-up. The modified technique does not require complete disconnection of perirenal fat tissue and fasciectomy diminishing necessity of nephropexy and preventing renal torsion. It is a feasible and effective surgical procedure for chyluria with a short operation time, minimal invasion and few complications.

Keywords: Chyluria, laparoscopy, renal lymphatic vessels disconnection

Introduction

With the progress of the standardized retroperitoneoscopic surgery, this procedure is rapidly accepted as an important technique for chyluria. Retroperitoneoscopic renal pedicle lymphatic disconnection for chyluria has a desired therapeutic effect. Comparing with the conventional open surgical procedure, the advantages of the laparoscopic technique has been repeatedly demonstrated [1, 2]. However, complete disconnection of perirenal fat tissue result in more capillary hemorrhage and higher incidence of nephroptosis [2]. According to the feature of renal pedicle lymphatic backstreaming, we modify the technique of lymphatic vessel ligating and set a degree of perirenal fat separating. The therapeutic effect is satisfactory. In this paper, we summarize our clinical experience and explore the feasibility of a modified technique of renal pedicle lymphatic disconnection for chyluria through the laparoscopic surgery.

15 patients had typical manifestations including milky white urine (10 cases) and/or pink urine (5 cases), weight loss, fatigue and anemia. Five patients orally took powder preparation of Chinese materia medica. Other two patients were palindromia after renal pelvic instillation with silver nitrate. The conservative treatment started with a diet high in protein and restricted in fat. However, final therapeutic effect was not satisfactory. Urinary chyle test using the Sudan staining method was positive in all patients. Cystoscopic examination was performed to confirm the side of the lesion.

Materials and methods

Patients were under general anesthesia and the lateral decubitus position was used to make the waist expanded thoroughly. The basic step of any laparoscopic surgery is creation of a working space. In retroperitoneoscopy, this involves conversion of the potential space surrounding the kidney into a working area by blunt separation of the loose alveolar tissue. This procedure is similar to the original technique [1, 6, 9].

The customized procedure for chyluria successfully used techniques of retroperitoneoscopic surgery, contained nephrolympholysis, ureterolympholysis, hilar vessel stripping, fasciectomy and nephropexy [6, 10]. The modified technique

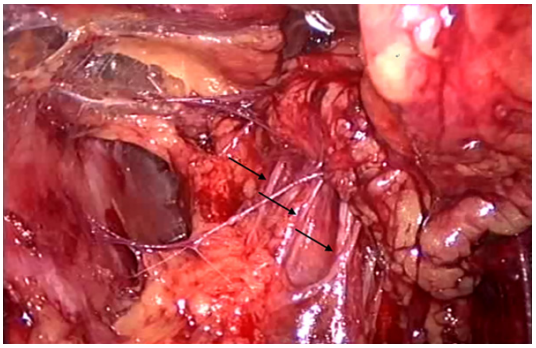

Figure 1. The kidney pedicle should be carefully searched between kidney and abdominal membrane. The renal perivascular lymphatic vessels were exposed and disconnected (The blue * indicates kidney and lymphatic vessels were indicated by black arrows).

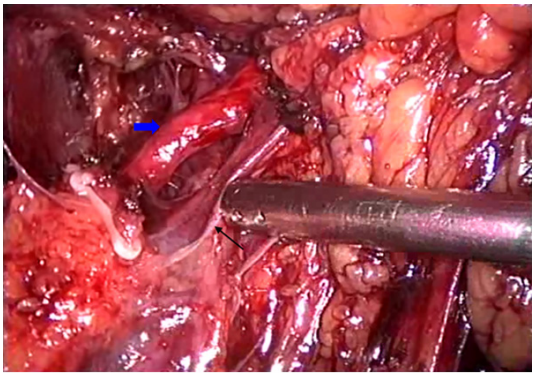

Figure 2. Loose connective tissues containing lymphatic vessels around the blood vessels were separated to exposure the vagina vasorum on the surface of the renal arteries and veins. Disconnection of lymphatic vessels between renal arteries and veins should be very carefully handled (The blue arrow indicates artery and lymphatic vessel was indicated by the black arrow).

was described as following: ① The Gerota's fascia of the kidney was incised longitudinally closed to the greater psoas muscle. The adipose capsule of the middle kidney was separated from renal parenchymal surface using an ultrasonic knife (5 mm). The kidney pedicle should be carefully searched between kidney and abdominal membrane. The renal perivascular lymphatic vessels were exposed and disconnected. The slender ones could be coagulated with an ultrasonic knife (**Figure 1**). ② Then loose connective tissues containing lymphatic vessels around the blood vessels were separated before splitting the vagina vasorum on the surface of the renal arteries and veins.

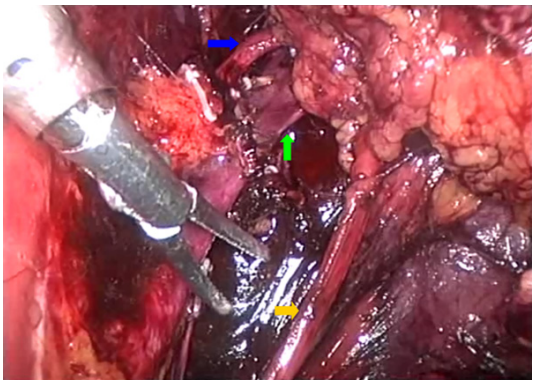

Figure 3. Lymphatic and fatty tissue between kidney pedicle and epimere-ureter (1/3) were ligated to be suspended in midair around pedicle and epimere-ureter (The blue arrow indicates artery. The green arrow indicates vein, and the blue one indicates ureter).

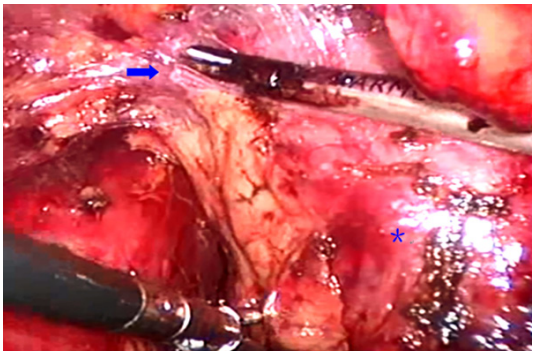

Figure 4. Up to this step, most of fatty capsule was not separated from the kidney and upper pole of kidney and subtotal dorsi-adipose capsule were still remained (The blue arrow indicates fatty capsule, and the blue * indicates kidney).

Disconnection of lymphatic vessels between renal arteries and veins should be very carefully handled (**Figure 2**). ③ Lymphatic and fatty tissue between kidney pedicle and epimere-ureter (1/3) were ligated to be suspended in midair around kidney pedicle and epimere-ureter (**Figure 3**). Up to this step, most of fatty capsule was not separated from the kidney and upper pole of kidney and subtotal dorsi-adipose capsule were still remained (**Figure 4**). Therefore nephropexy was not necessary in all patients.

All operations were successful. The operating time was ranged from 55 to 75 minutes (mean, 65.5 minutes) and intraoperative blood loss was 40-80 ml (mean, 52.5 ml). The postoperative urine chyle tests were negative in all

Table 1. Comparison between preoperative and postoperative* (x ± s)

Time	Body weight (kg)	Albumin (g/l)	Hemoglobin (g/l) (No.)	Positive chylo-test
Preoperative	49.8 ± 7.7	28.6 ± 3.4	102.6 ± 15.7	15
Postoperative	56.6 ± 6.5	39.8 ± 4.1	128.5 ± 16.3	1
P value (t test)	< 0.05	< 0.05	< 0.05	< 0.05

*6 months after operation.

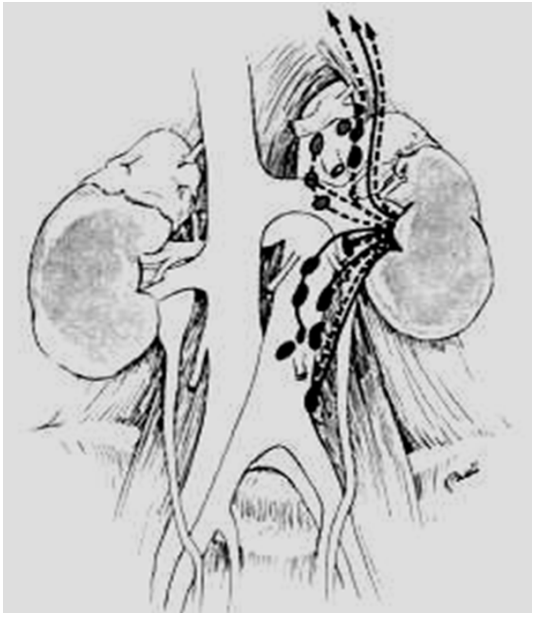

Figure 5. Regional lymphatic drainage of the left kidney. *Dark nodes,* anterior; *light nodes,* posterior. *Solid lines,* anterior lymphatic channels; *dashed lines,* posterior lymphatic channels. *Arrows* lead to the thoracic duct [10].

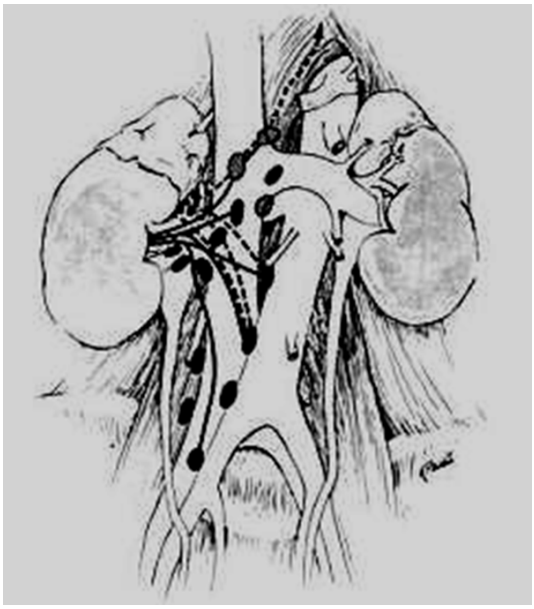

Figure 6. Regional lymphatic drainage of the right kidney. *Dark nodes,* anterior; *light nodes,* posterior. *Solid lines,* anterior lymphatic channels; *dashed lines,* posterior lymphatic channels. *Arrow* leads to the thoracic duct [10].

patients. Average postoperative hospital stay was 5.5 days. The follow up extended from 6 to 24 months. No nephroptosis or vessel torturing of kidney happened and recurrence developed in 1 patient during the follow-up. And body weight, albumin, and hemoglobin of the 15 patients significantly increased 6 months after operation compared to preoperative levels (**Table 1**).

Discussion

Chyluria is an abnormal condition in which chyle appears in urine because of fistulous communication between lymphatics and the urinary tract. The etiological factors of chyluria are classified into parasitic and nonparasitic. As well known, filarial infestation is a major etiological factor. It is a frequent complication of advanced stage in filariasis. Bancroft's filarial infection is predominant in mainland of China. Mild chyluria is usually intermittent. It may resolve spontaneously with bed rest and the use of abdominal binder. Other treatments may be efficacious, such as antisecosis, sclerosing therapy, renal pelvis instillation, and so on. However, surgical interventions are suitable for the patients with severe anemia, intractable hematochyluria, weight loss, hypoalbuminemia, recurrent urinary retention due to mass of chyle clot and recurring chyluria after conservative treatment [3, 4]. With the advance of laparoscopic technology, traditional open surgery has been seldom used.

Retroperitoneoscopic lymphatic disconnection for intractable chyluria had many advantages over open surgery [5-7]. Because of amplified action for visual field, tiny lymphatic vessel can be observed clearly and ligated with laparoscope. At present, retroperitoneoscopic renal pedicle lymphatic disconnection for chyluria

has been accepted by most people [8]. The commonly described technique includes nephrolympholysis, ureterolympholysis, hilar vessel stripping, fasciectomy till the kidney is only held by the renal vessels and the ureter. This runs the risk of nephroptosis and renal torsion, which is prevented by nephropexy at the end [1, 2, 5-7, 9].

However, the customized procedure may be result in series complications such as accidental injury of accessory renal artery, more capillary hemorrhage, higher incidence of nephroptosis and long bed stay after operation. Up to now, the exact pathogenesis of chyluria remains controversial. After studying the backstreaming of celiac lymphatics, we consider that regardless of cause or pathogen, the final reason about chyluria is that lymph fluid from intestinal trunk cannot smoothly flow to ampulla chyli. With the change of pressure and system dynamics in lymphatic vessel, lymph fluid converts to urinary system. Because of the rupture of crimp lymphatic vessel at pelvis, chylous lymph mixes with urine. Eventually, it can result in a series of clinical symptoms.

There are two groups about the backstreaming of intra-kidney lymphatic ducts. The superficial lymphangions located at inner tunica fibrosa renis drain lymph fluid from renal capsule and vicinal tissue. The deep ones situated around intra-kidney blood vessel drain lymph fluid from renal parenchyma. Two groups inosculate each other and confluences to form gross lymphatic trunks at the renal pedicle. Communicating lymphatic vessels of renal pelvis, upper ureter and the renal capsule join these trunks. At last, these large lymphatic trunks recirculate to every cluster of lumbar lymph node (**Figures 5** and **6**) [11].

Therefore, we suggest that the key point of surgical intervention for chyluria is to prevent intestinal tract chylo-liquid from getting into the urinary system. Drainage of renal lymphatic to lumbar lymph node is via renal pedicle. According to the anatomical feature of renal pedicle lymphatic backstreaming, we modified the operative procedure: We only performed renal pedicle lymphatic disconnection without fasciectomy and nephropexy. It maintains fatty capsule in the upper pole and dorsal aspect of the kidney, which adheres the kidney to the posterior abdominal wall. It is based on the anatomy of regional lymphatic drainage of the kidneys, where the large trunk confluences at the renal pedicle.

Therefore, the modified technique of renal pedicle lymphatic disconnection is a safe and effective procedure with many advantages, such as mini-invasiveness, less blood loss and few complications.

Disclosure of conflict of interest

None.

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