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Hellenic Urology

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Reviews

- Prevention and Management of Intra and Perioperative Complications During Laparoscopic Urological Surgery
- Scrotal ultrasonography as a predictive tool for the severity of varicocele

Original Articles

- Laparoscopic nephrectomy: initial experience and 3 years follow-up with 68 cases
- Severe bleeding following laparoscopic partial nephrectomy treated by selective renal artery embolization - initial experience and review of the literature
- Large Adrenal lesions - Management at a tertiary centre in Greece

Case Reports

- A rare presentation of Matrix Stone and a short review of the literature
- Renocolic fistula following radio frequency ablation of a renal tumor. A rare case report and review of the literature



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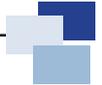


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REVIEW

Prevention and Management of Intra and Perioperative Complications During Laparoscopic Urological Surgery

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Abstract

Laparoscopy is the gold standard for many urological surgeries and the experience of the surgeons has significantly increased the last two decades. Inevitably surgeons are confronted with complications, some of them can be potentially life-threatening. Since the best way to deal with

complications is to prevent them, we review the literature for the most frequent intra or perioperative complications during laparoscopic urological surgeries and we propose measures to prevent them before happening and to manage them after they occur.

Introduction

Laparoscopic surgery was introduced in Urology in early 90s. The milestone in the development of urological laparoscopy include the diagnosis of impalpable testes reported in 1976 by Cortesi et al¹ but it took almost a decade for the first laparoscopic nephrectomy reported by Clayman et al. [2]. The main reasons for this delay included resistance to innovation, lack of certified training centers capable of releasing the

first highly trained generation of urologic laparoscopists who in turn, would be responsible for the training of the younger trainees, steep surgical learning curve, the advent of new complications and the rising difficulty for a mainly open surgeon to deal with them [3]. Despite the aforementioned difficulties pure laparoscopy clinical and training programs still run all over the world and so surgeons are inevitably confronted with complications. The best way to deal with complications is to prevent them from occurring. However,

Key words

non metastatic; castrate resistant; prostate cancer; management

Citation

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TABLE 1 *Check list prior to a Laparoscopic Operation*

The Laparoscopic Urologist Should:
Thoroughly inform and give ample time to the patient and close family
Provide details regarding the nature of the disease, the procedure, the laparoscopic approach, the existing alternatives, the risks and the likelihood of conversion
Give reassurance that the patient safety comes first
Fill confident with the selected approach
Know the patient and its surgical problem
Think in advance about the advent of a complication related to the procedure
Wonder whether he knows how to handle a complication

when they occur it is crucial to recognize them early, ideally intraoperative, and repair them immediately. We review the literature for the most frequent complications and we propose the most appropriate ways to confront them.

First things first

Proper training during residency and a dedicated post-graduate fellowship are of paramount importance to reduce complication rate. Even after proper training, mentoring during the first cases is also very important. In addition, the surgeon should be responsible to create a dedicated constant operating team including the anesthesiologist and the specially trained nursing staff [3]. Furthermore, the surgeon should be responsible for the proper operating room set up which again is crucial for the success of the operation [3].

As in every type of surgery, the laparoscopic urologist needs to follow a checklist before starting an operation (**Table 1**). Before starting the operation, the surgeon must check the operating room set up and the instrument availability and well performance. Proper patient positioning is crucial. The surgical team must provide adequate padding and avoid extreme bending and/or stretching while fixing the patient over the operating table. Selecting and preparing in advance the appropriate suture is also wise. The team nurse must be well trained to prepare the suture to the length of a trocar as this is a simple but mandatory rule, fitting to the majority of reconstructive necessities. To avoid anesthetic complications, intra-abdominal pressures must be kept below 15 mmHg, creation of subcutaneous emphysema must be avoided, and operation time must be reduced as much as possible. Very rarely a carbon dioxide gas embolism occurs. The surgeon and the anesthetist should suspect it when there is a decrease

TABLE 2 *Factors predisposing to access-related complications*

Patient parameters
Obesity
Previous Surgery
<i>Surgeon Experience</i>
<i>Port design</i>
Port size
Blunt/cutting/radially expanding edges

in end-tidal CO₂ and end-tidal O₂ along with a decrease in patient's blood pressure intra-operatively [4]. Immediate desufflation is mandatory. The anesthetist should be fully trained in order to immediately place the patient in Durant's position and make the appropriate ventilator adjustments [4]. Aspiration of CO₂ through the superior vena cava may be needed in severe cases.

Port site placement

Access to the peritoneal cavity or to the retroperitoneal space can be performed either by the Veress needle (closed technique), the Hasson technique (open technique) and the optical port technique. The site of insertion depends of the procedure and whether the site is approached trans or retro-peritoneally. Several factors may predispose to access related complications (**Table 2**).

The results of a recent meta-analysis of all open and closed laparoscopy conclude that open laparoscopy eliminates the risk of major vascular injury and reduces the rate of major visceral injury [5]. Other technique includes transillumination of the abdominal wall, use of hand held Doppler device, minimizing port insertion force and inserting ports under direct vision [6-7]. For visceral injuries, although there are no data concerning urological procedures, there are sufficient data from gynecological and general surgical literature that stress the importance of the insertion of the primary port, mainly in the presence of adhesions [8]. Again, the use of the Hasson technique and placement of the access away from area of previous surgery, if possible, could minimize the risk of this complication [8-9].

If a minor vascular injury, which results in a significant bleeding, does occur, then it must be controlled under direct vision. Suture ligation is preferable over extensive

Maintain	Normal Caliber
Sutures	Direction of blood flow
Lacerations	Monofilament polypropelene
>30% Circumference	<i>Vein of Gore-Tex patch graphs</i>
Complete transection	<i>End-to-End anastomosis</i>
Flash the vessel injury	Heparin

diathermy and can be accomplished via a figure of eight suture or via the use of a port closure device [10]. If the injury has occurred during port introducing, after controlling the bleeding, the port can be replaced through the same site. On the event of a major vascular injury during port placement, conversion is typically required even though major venous injuries hold a greater potential for laparoscopic repair. If the latter is decided the steps must include: increasing intra- abdominal pressure to 15mm Hg, holding both edges of vessel incision with atraumatic graspers during closure and continuous suturing of the opening. Nevertheless, it must be stressed that these maneuvers require not only a skilled surgeon but also an equally skilled assistant.

Even though the incidence of visceral injuries during port placement in laparoscopic urological procedures is not known, reports from other specialties place it between 0.06 and 0.08% [8]. Although, open placement seems to reduce the rate of visceral injury, it does not eliminate it [11]. As for the anatomical position of the injury, a recent literature review of bowel injury in laparoscopy reports a 58% small bowel injury, 32% colon injury and 7% stomach injury [9].

And from the latter depends the management of this complication. Since small bowel is the most frequent site of injury it should be noted that it requires meticulous repair that we can be performed laparoscopic if it is recognized early. If the diagnosis is delayed, then almost require laparotomy [9].

Intraoperative Complications

Vascular injuries

Major vascular injury can happen in 1-3% of the cases during laparoscopic urologic surgery with 0.5-3% uncontrollable bleeding [12-16]. Prevention and high level of vigilance are of paramount importance.

The general surgical principles must be followed with reverence: familiarization and respect to the anatomy, careful mobilization, retraction and dissection of the tissues and knowledge of physiology. If the bleeding is minimal, compression is adequate, and the procedure can continue. Otherwise, thermal (bipolar, ultrasonic, argon beam) or non-thermal (intracorporeal suturing and bolsters) measures might prove useful on controlling bleeding. Preventive sutures (par example on dorsal plexus during radical prostatectomy), increasing pneumoperitoneum to 20-25 mmHg, hemostatic figure of eight stitch, even the use of a metallic (Benique) urethral probe, all are measures that can be utilized to prevent or control bleeding during ligation of dorsal vein plexus [17]. Small vena cava lacerations are controlled with adequate pressure in 80-90% of the cases. Endoscopic clipping of arterial branches and vascular suturing of the vena cava may be mandatory to control the bleeding [13]. As a rule of thumb if the patient needs transfusion (more than 2 units) by the time you would be able to repair the vessel injury open conversion and a vascular surgeon consultation may be needed. Either way the urologist must know the basic principles of vascular reconstruction as shown in **Table 3**.

Bowel Injury

With a rate of 0.8% non-access related bowel injury during urologic laparoscopy is considered a rare complication [9]. However, the main problem is that more than 2/3 of these complications are not diagnosed intraoperatively. Nearly half of the cases are due to inappropriate electro cautery use [18]. For that reason, monopolar and bipolar instruments should always be checked for proper insulation before the procedure.

Other preventive measures that can be applied to minimize the risk for thermal injury is the use of low dissipation thermal energy, retraction rather than grasping the bowel and using monopolar electro cautery in close proximity [19]. As far as rectum is concerned, its injury is a relatively rare but serious complication and so every measure must be taken to avoid it. Proper dissection of the Denonvillier's fascia, careful retraction of the seminal vesicles and vas deference anteriorly and sigmoid colon posteriorly, recognition of the correct plane by visualization of the yellow perirectal fat are all important steps to accomplish the above mentioned goal [20, 21].

In the unlikely event of a bowel injury most authors agree that intraoperative repair provides significantly bet-



ter outcomes than conservative observation in hospital, even for superficial ones [22]. It is also well documented that thermal injuries result in a more extensive damage than expected and that laparoscopy results in a low metabolic and immune response that allows a quick progression into sepsis [23-24]. For these reasons foul smelling gas exiting trocar or greenish fluid that emerges in the operating field should prompt an immediate bowel exploration and if needed a wide excision should be performed with removal of all affected tissue and adequately draining of the injured area [21]. An experienced surgeon can safely perform a laparoscopic repair or the large bowel with intracorporeal suturing without colostomy (which must be reserved for patients unprepared preoperatively with colonic injuries that require segmental bowel resection). On the other hand, if clinical indications for bowel injury occur post operatively (sepsis, acute abdominal pain, nausea, fever, chills or trocar site pain), a CT scan should confirm the diagnosis (free air in the abdomen, extraluminal feces, contrast agent in the peritoneal cavity) and immediate laparotomy must be carried out [21]. If rectum is the anatomical site of the injury and it is diagnosed intraoperatively, the surgery field should be irrigated with saline after removing the prostate, and a rectal examination should follow identifying the rectal wall and the muscular layers of the defect. Rectal wall can be then closed laparoscopically or open (depends on surgeon's experience) in two layers (inner mucosa and outer seromuscular layer) with continuous 3-0 polyglactin sutures. The final step is to check the integrity of the repair (by filling the rectum with saline via a catheter) and if no leakage is identified two drains are placed [25].

Adjacent structures injuries

The organs that can potentially be injured in a laparoscopic urological procedure are liver, spleen, stomach, duodenum and pancreas. From these the most catastrophic one is the duodenum due to the high morbidity associated with duodenal leakage. It is usually a complication of a

right renal surgery or retroperitoneal lymphadenectomy. Conversion, general surgery consultation and repair of the injury site are mandatory [21]. Liver or spleen injuries can be avoided by careful insertion of the initial trocars and by careful retraction and mobilization of these two organs. If injury does occur compression alone can be enough to manage minor injuries whereas lacerations can be dealt with electro cautery or argon beam diathermy (120-150 Watts) and/or hemostatic agents [26]. In case of more severe bleeding suturing of the liver parenchyma or conversion to hand assisted laparoscopy to proceed with partial or radical splenectomy may be required.

Diaphragmatic injuries may occur at initial trocar placement, when a large upper pole renal/adrenal tumor abutting the diaphragm is treated, or when dissecting renal hilum, as the crura may stop there. High level of suspicion along with observing paradoxical movements of the diaphragm should set the diagnosis. If the patient is stable from the ventilation standpoint defer repairing intraoperative pneumothorax until the end of the primary laparoscopic procedure. A small/moderate rent can be repaired by a 2/0 Vicryl figure-8 stitch on a CT-1 needle whereas larger defects tailor the position of a Dacron graft. When the pneumothorax is realized postoperatively, it occupies <30% of the pleural cavity and the patient is stable, the CO₂ will be absorbed spontaneously without requiring any treatment. When the pneumothorax is >30% or the patient is unstable a chest tube is necessary.

Conclusion

Most of the complications in laparoscopic urological surgery can be anticipated and potentially avoided. Basic principles, high level of suspicion, surgical experience and knowledge of the potential complication and their management are the keys for the success. 

Conflicts of interest

The author declared no conflict of interest.

Περίληψη

Η λαπαροσκόπηση είναι η μέθοδος εκλογής για πολλές ουρολογικές χειρουργικές επεμβάσεις με την εμπειρία των χειρουργών να έχει αυξηθεί σημαντικά τις τελευταίες δύο δεκαετίες. Με την αυξανόμενη χρήση των λαπαροσκοπικών τεχνικών οι χειρουργοί θα αντιμετωπίσουν και νέες επιπλοκές, μερικές δε από αυτές, μπορεί να είναι δυνητικά απειλητικές για

**Λέξεις
ευρητηριασμού**
μη μεταστατικός,
ευνοηχόντοχος, καρκίνος
προστάτη, αντιμετώπιση

τη ζωή. Δεδομένου ότι ο καλύτερος τρόπος αντιμετώπισης των επιπλοκών είναι η πρόληψή τους, εξετάζουμε τη βιβλιογραφία για τις πιο συχνές ένδο ή περιεγχειρητικές επιπλοκές κατά τη διάρκεια λαπαροσκοπικών ουρολογικών χειρουργικών επεμβάσεων και προτείνουμε μέτρα για την πρόληψή πριν συμβούν και για την αντιμετώπισή μετά την εμφάνισή τους.

References

- Cortesi N, Ferrari P, Zumbarda E, Manenti A, Baldina A, Pignatti-Morano F. Diagnosis of bilateral abdominal cryptorchidism by laparoscopy. *Endoscopy* 1976;8:33-34.
- Clayman RV, Kavoussi R, Soper NJ, Dierks SM, Meretyk S, Darcy MD et al. Laparoscopic nephrectomy: initial case report. *J Urol* 1991;146:278-282.
- Ramakumar S, Jarrett T. Complications of urologic laparoscopic surgery. Recognition, management and prevention. *Taylor & Francis Eds* 2005
- Smith I, White PF. Anesthetic Considerations for Laparoscopic Surgery. *Semin Laparosc Surg.* 1994 Dec;1(4):198-206.
- Larobina M, Nottle P. Complete evidence regarding major vascular injuries during laparoscopic access. *Surg Laparosc Endosc Percutan Tech* 2005;15:119-23.
- Quint EH, Wang FL, Hurd WW. Laparoscopic transillumination for the location of anterior abdominal wall blood vessels. *J Laparosc Surg* 1996;6:167-9
- Whiteley MS, Laws SA, Wise MH. Use of a hand-held Doppler to avoid abdominal wall vessels in laparoscopic surgery. *Ann R Coll Surg Engl* 1994;76:348-50.
- Bonjer HJ, Hazebroek EJ, Kazemier G, et al. Open versus closed establishment of pneumoperitoneum in laparoscopic surgery. *Br J Surg* 1997;84:599-602.
- Bishoff JT, Allaf ME, Kirkels W, Moore RG, Kavoussi L, Schroder F. Laparoscopic bowel injury: incidence and clinical presentation. *J Urol* 1999;161:887-90.
- Elashry OM, Nakada SY, Wolf Jr JS, Figenshau RS, McDougall EM, Clayman RV. Comparative clinical study of port-closure techniques following laparoscopic surgery. *J Am Coll Surg* 1996;183:335-44.
- Schafer M, Lauper M, Krahenbuhl L. Trocar and verus needle injuries during laparoscopy. *Surg Endosc* 2001; 15:275-80.
- Soulie M, Seguin P, Richeux L, et al. Urological complications of laparoscopic surgery: experience with 350 procedures at a single center. *J Urol* 2001;165:1960-1963.
- Soulie M, Salomon L, Seguin P, et al. Multi-institutional study of complications in 1085 laparoscopic urologic procedures. *Urology* 2001;58:899-903.
- Fahlenkamp D, Rassweiler J, Fornara P, Frede T, Loening SA. Complications of laparoscopic procedures in urology: experience with 2,407 procedures at 4 German centers. *J Urol* 1999;162:765-771.
- Thomas R, Steele R, Ahuja S. Complications of urological laparoscopy: a standardized 1 institution experience. *J Urol* 1996;156:469-471.
- Parra RO, Hagood PG, Boullier JA, Cummings JM, Mehan DJ. Complications of laparoscopic urological surgery: experience at St. Louis University. *J Urol* 1994;151:681-684.
- Madeb R, et al. Complications of Laparoscopic urologic surgery. *Journal of Laparoscopic & advanced surgical techniques* 2004;14(5): 287-301
- van der Voort M, Heijnsdijk EA, Gouma DJ. Bowel injury as a complication of laparoscopy. *Br J Surg.* 2004;91(10):1253-1258
- Odell RC. Surgical complications specific to monopolar electrosurgical energy: engineering changes that have made electrosurgery safer. *J Minim Invasive Gynecol.* 2013;20(3):288-298.
- Liatsikos E, et al. Prevention and management of perioperative complications in laparoscopic and endoscopic radical prostatectomy. *WJU* 2008;26:571-580
- Venkatesh R, Landman J. Laparoscopic complications: Gastrointestinal. Chapter 81. In: Gill IS, editors. *Textbook of laparoscopic urology.* USA; 2006. p. 911-922.
- Thompson BH, Wheelless CR, Jr. Gastrointestinal complications of laparoscopy sterilization. *Obstet Gynecol.* 1973;41(5):669-676
- Chapron C, Querleu D, Mage G, Madelenat P, Dubuisson JB, Audebert A et al. Complications of gynecologic laparoscopy. Multicentric study of 7,604 laparoscopies *J Gynecol Obstet Biol Reprod (Paris).* 1992;21(2):207-213.
- Mealy K, Gallagher H, Barry M, Lennon F, Traynor O, Hyland J. Physiological and metabolic responses to open and laparoscopic cholecystectomy. *Br J Surg.* 1992;79(10):1061-1064.
- Karadag M, et al. Gastrointestinal complications of laparoscopic/robot-assisted urologic surgery and a review of the literature. *J Clin Med Res* 2015;7(4):203-210
- Luciani LG, Porpiglia F, Cai T, D'Elia C, Vattovani V, Giusti G et al. Operative safety and oncologic outcome of laparoscopic radical nephrectomy for renal cell carcinoma >7 cm: a multicenter study of 222 patients. *Urology.* 2013;81(6):1239-1244.

REVIEW

Scrotal ultrasonography as a predictive tool for the severity of varicocele

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Abstract

Varicocele is a common finding in male population with a documented association with impaired spermatogenesis and subfertility. However, the majority of individuals with varicocele are not affected and thus, recognition of patients at high risk is mandatory before deciding surgical correction. Scrotal ultrasound is a noninvasive and low-cost tool for the evaluation of varicocele, which facilitates the diagnosis and adds useful information regarding its harmful potential. In this review, we discuss the significance of specific parameters of scrotal ultrasound as predictive markers in the severity of varicocele.

Key words

varicocele; color Doppler; venous size; reflux; testicular volume; hemodynamics

1. Introduction

Varicocele is defined as the abnormal enlargement of the veins of the pampiniform plexus and is associated with the disturbance of normal testicular growth and reduced fertility [1]. The entry of left testicular vein via right angle to the renal vein is account for the dominance of left-sided varicocele, whereas absence of valves in the testicular vein and the nutcracker phenomenon are also implicated as possible causative factors [2]. The condition is found in up to 15% of general male population and shows a rising of 10% for each decade of life; moreover, in men with primary infertility, varicocele is found in up to 35% and

surges impressively up to 80% in men with secondary infertility [3]. The hypothesis that varicocele is a dynamic phenomenon is supported by evidence that up to 20% of normal subjects will eventually develop a subclinical varicocele [4], whereas this form rarely resolves and up to 28% will eventually progress to a clinical varicocele [5]. The deterioration of semen parameters is a well-documented finding in varicocele but theories such as scrotal hyperthermia and backflow within the veins do not conclusively explain the harmful potential of the condition; sperm count, concentration and morphology are mostly affected and fertility may be reduced [6]. Hopefully, the

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correction of varicocele is associated with improvement in semen characteristics and increase in pregnancy rate; nevertheless, the latter conclusion is controversial [7], [8]. The condition may also cause chronic orchialgia, worsened by increased physical activity and may require surgery [9]. In clinical practice, the diagnosis of varicocele is based on clinical examination, according to the classification of Dubin and Amelar, which divides the condition in three distinct groups accordingly to findings of palpation and observation [10]. However, this system cannot assess the severity of varicocele, as far as improvement in semen parameters after correction appears to be similar for all groups [10]. On the contrary, scrotal ultrasound and especially Color Doppler Ultrasound (CDU) is a promising tool for the evaluation of varicocele, as it may establish and stratify the condition and unmask the subclinical form [2]. In this paper, we review of the potential correlation between specific scrotal ultrasound characteristics and varicocele severity.

2. The role of ultrasound

2.1 The role of venous size

The measurement of maximal venous size is considered an objective tool for the diagnosis of the condition, although bibliography lacks an optimal cutoff [2]. Some authors propose a cutoff point of 2.6 mm in the supine position during the Valsava maneuver as the optimal cutoff for the detection of varicocele [11]. In another study, a cutoff of 2.95 mm during the Valsava maneuver in the supine position detected most varicoceles with high accuracy, albeit being unsuitable for distinguishing between varicocele grades [12]. Regarding the palpability of the condition and the identification of clinical form, an approximate cutoff of 3-3.5 mm may be used as Hoekstra et al observed that most varicoceles were found palpable above that range; however, setting this limit, smaller, significant varicoceles could be missed [13]. Regarding the prognostic role of vein diameter, Schiff et al mentioned that varicoceles with a largest vein diameter larger than 3 mm showed a significant improvement after varicocelectomy [14], whereas Hussein also observed that patients with a testicular vein diameter greater than 2.5 mm at the inferior pole of the left testis have a significant improvement in semen parameters after correction [15]. However, in another study, authors concluded that varicocele size was not correlated with the outcome as varicoceles both markedly dilated (>4 mm in diameter) and less dilated (less than 4 mm in

diameter) all exhibit similar postoperative paternity rates [16]. The latter findings are compatible with the observations by some authors that varicocele size is not a reliable prognostic tool for the outcome of varicocelectomy, with the exception of grade 3 varicoceles [17].

2.2 The role of testicular volume

Testicular volume is determined automatically by the ultrasound unit, based on the three dimensions of the testicles, according to the formula $\text{Volume (ml)} = 0.523 \times \text{Length} \times \text{Width} \times \text{Height}$. In general terms, the varicocele may affect negatively the testicular growth; asymmetry between left and right testis is a usual finding, irrespectively of the fertility potential [18]. However, grade cannot certainly predict the asymmetry [19]. The role of testicular volume differential is significant in adolescents, since no determined criteria exist for the prediction of future fertility in this subgroup of patients; discrepancy is an indication for surgery, carrying though the risk of overtreatment [1]. The main concern about overtreatment, renders to the fact that varicocelectomy may improve testicular volume, but improvement in semen parameters does not go hand in hand with rebound growth [20]. Therefore, some studies have evaluated the amount of discrepancy of volume between left and right testicles to stratify patients in high risk group. Diamond et al observed that a differential larger than 20% is associated with worsened sperm parameters, regarding concentration and motility and these patients should be at least tracked closely [21]. Further to the previous study, Kurtz et al observed that adolescents with a differential greater than 20% [calculated as $(\text{volumeright} - \text{volumeleft}) / \text{volumeright} \times 100$] carry a significant risk for low counts of motile sperm and moreover, a total testicular volume less than 30 cc quadruples the odds [22]. Moreover, adolescents with asymmetry greater than 20% will likely progress to greater asymmetry and observation may not be an option for this subgroup [19]. In adults and regarding the outcome of varicocelectomy, Alshehri et al observed that patients with normal-sized testes enjoy better paternity rates compared to patients with small volume tests [16]. Finally, in the special subgroup of subclinical varicocele, asymmetry between the testicles may also be observed, although controversy exists among studies [18], [23]. In a study trying to determine useful predictive factors for infertility, Chen et al observed that patients with subclinical varicocele and total testicular volume less than 27 cc may suffer from subfertility, regardless of age [24].



2.3 The role of reflux

Reflux within the veins of pampiniform plexus can be detected easily via Color Doppler Ultrasound and may provide useful information. Nevertheless, there is no consensus about the optimal framework for the diagnosis or stratification of varicocele according to reflux. A recent stratification system by Patil correlates the clinical grading of Dubin and Amelar in 3 grades based on the duration of reflux in milliseconds; this grading offers the additional benefit of detecting rare intratesticular varicoceles [25]. Complicated classification systems like those by Sarteschi and Chiou either lack of reproducibility or are limited to the diagnostic process [2], [26]. A simplified grading system proposed by Hirsch is a serviceable tool which divides varicoceles into 3 groups depending on the spontaneity of the reflux and seems that has a role in the assessment of the severity of the condition [2]. For example, spontaneous venous reflux associated with any grade of varicocele may result in testicular growth arrest and a strict follow-up is mandatory, as it has been observed by Zampieri et al [27]. In another study by Verim et al, increasing reflux grade by Hirsch had a negative impact on sperm concentration, motility and morphology; interestingly, total motile sperm count was constantly affected by any grade of reflux [28]. Regarding the progression, a continuous pattern of reflux during Valsava maneuver according to Hirsch classification, is associated with higher rate of progression of a subclinical varicocele to a clinical form in the next 4 years [5]. According to a more simplified grading system, varicoceles may be divided into two types according to characteristics of reflux; stop-type varicoceles bear a decrescendo bruit appeared at the beginning of a Valsava maneuver, whereas shunt-type varicoceles exhibit a steady flow caused by retrograde and orthograde flow; the latter type is associated with higher incidence of testicular asymmetry and may predict the necessity of surgery in adolescents [29]. In adults, patients with continuous reflux enjoyed a significantly higher paternity rate after correction compared to those with stop-type reflux [16]. Of note, these types of reflux may explain the pathophysiologic pathway, as reflux may be associated with increasing impotence of valves and consequent dramatic changes in testicular function [26]. Duration of reflux in milliseconds can also be used for the assessment of spermatogenesis, as varicoceles with reflux of longer than 1 second had significantly worse semen parameters [11]. Moreover, a duration of venous reflux longer than 4.5 seconds is associat-

ed with better outcomes after correction [17]. Regarding post-operatively findings, reversal of flow after varicocelectomy is strongly associated with significant improvements in sperm parameters [14]. No retrograde venous flow after surgical correction results also more likely in catch-up growth of the testicle, according to Batavia et al [30], while reflux on the first postoperative day was found to be pivotal in predicting recurrence [31]. Finally, regarding location of the reflux, Hussein concluded that reflux of any grade detected in the lower pole of the testis is associated with important improvement in sperm concentration, motility and morphology [15].

2.4 The role of venous hemodynamics

Peak retrograde flow (PRF) is defined as the velocity measured at the vein of varicocele with the maximal diameter, during Valsava maneuver; this parameter seems to carry prognostic value in selecting patients at risk of future subfertility [2]. Kozakowski et al have observed that when PRF is greater than 38 cm/s and testicular asymmetry > 20% spontaneous catch-up growth is unlikely and adolescents with such characteristics should be advised for surgical correction [19]. Moreover, PRF may be used as a prognostic tool for recurrence after varicocelectomy; postoperative PRF > 20 cm/s at 1 year follow-up is associated with a lower incidence of catch-up growth and higher need for re-operation [30]. In adults, Chen et al have also observed that higher PRF values (mean values of 32.4 cm/s) are combined with greater risk of deterioration of semen parameters within 5 years; this observation was common in patients with both initial normal and abnormal semen parameters [32]. Verim et al also concluded that PRF > 30 cm/s may be an indicator of progression as it is strongly associated with worsened semen parameters [28]. Similarly, patients with subclinical varicocele and a PRF > 29 cm/s may suffer from subfertility [24]. Finally, one study did not demonstrate the predictive role of PRF due to low values; however, the authors admit that the differences may be related to the technique, as standing position may impede flow within the veins [29].

2.5 The role of testicular artery hemodynamics

The testicular artery arises from the aorta and provides the main blood supply to the organ. In the supratesticular region, the artery can be easily visualized, exhibiting tortuosity and flow toward and away from the transducer, representing different planes of the same vessel [33]. Using

real-time images analysis via CDU, the ultrasound unit can calculate measurements of peak systolic velocity (PSV), end-diastolic velocity (EDV), resistive index (RI) and pulsatility index (PI) [33]. Measurement of testicular arterial blood flow ($TABF = V_m * A$, where V_m is the mean velocity and A is the cross-sectional area of the artery) may also be used for the assessment of spermatogenesis [34]. In case of varicocele, Biagiotti et al observed that varicoceles carry high PSV and RI values, irrespectively of fertility status and therefore, cannot differentiate between affected and unaffected individuals [35]. The same conclusion was made by Tarhan et al, but the authors also found a positive correlation of TABF and sperm count and testicular volume; this observation may reflect a defective energy metabolism within the organ [34]. However, in the post-operative period, significant increase in PSV of left testicular artery may be seen in patients with improved both sperm count and motility [36]. A similar conclusion was made by Akand et al, as increase of PSV in 6 months in the corrected side could predict both improvement in sperm concentration and relief of pain after varicocelectomy [37].

2.6 The role of intratesticular and capsular artery hemodynamics

Capsular arteries are branches of the testicular artery, as the latter enters the posterosuperior aspect of the organ and run along the periphery as a structure named tunica vasculosa. The centriceptal or intratesticular arteries are terminal branches arising from the capsular branches and are visualized relatively straight within the testicular parenchyma. Subcapsular and intratesticular arteries exhibit similar waveforms and comparable mean values of PSV, EDV, RI and PI; thus, these parameters can be combined for the assessment of blood flow within the parenchyma [33]. Among the above parameters, RI seems to be a reliable indicator of subfertility; a mean RI > 0.6 is considered suggestive of pathological sperm count in male patients [38]. A positive correlation between RI greater than 0.6 and decreased total motile sperm, testicular hypotrophy and increased values of FSH has been observed by Hillelsohn et al, highlighting the role of the parameter as a reliable tool for the assessment of testicular function [39]. In patients with left clinical varicocele, higher values of RI and PI in capsular and intratesticular arteries of the affected side may also imply impaired testicular microcirculation [40]. The hemodynamic parameters might also be used as indicators for the restoration of microcirculation, as Ener et al observed a significant increase in PSV

and EDV and a significant decrease in resistance parameters RI and PI, 3 months after the procedure [41]. Balci et al demonstrated similar findings as mean intratesticular RI decreased 6 months after the procedure, although no correlation could be made between improvement in semen parameters and values of RI [42]. On the other hand, other authors conclude that improvement on semen analysis was correlated with decrease in intratesticular and capsular RI and capsular PI in left testicles and thus, these parameters could be used for the assessment of the outcome of the procedure regarding fertility [36]. The same conclusion was made by Akand et al, as PSV of capsular arteries at 3 and 6 months had positive predictive value [37]. Finally, a study from Tanriverdi et al did not show any significant changes in RI after varicocelectomy; nevertheless, the authors admitted that the measurement 7 days after the procedure might be a too short interval and restoration of microcirculation may be a late phenomenon [43]. In case of subclinical forms, as opposed to clinical varicocele, RI values do not differ significantly among left and right sides [44]. However, patients with subclinical varicocele and mean RI > 0.55 and PI > 0.99 may be at risk of subfertility, regardless of age [24].

2.7 Bilaterality of the disease

The bilaterality of varicocele is not uncommon as up to 50% of men with varicocele have bilateral varicoceles [3]. If varicoceles are both clinical, then repair of both sides is advisable as positive impact on semen parameters is significant in bilateral varicocelectomy [8]. However, no clear consensus exists about the management of left clinical varicocele accompanied with a right subclinical form. Correction of isolated subclinical varicocele, defined as a varicocele non-palpable but unmasked via ultrasound, is debatable, as improvement in sperm motility does not come along with increase in pregnancy rates [45]. However, some studies have highlighted the positive impact of bilateral varicocelectomy in the setting of a clinical left-subclinical right varicocele; Pasqualotto et al concluded that correction of both left clinical and right subclinical varicocele resulted in increase in testicular size and in significant improvement in sperm concentration [46]. Improvement in all semen parameters and increase in pregnancy rates have also been found by another study, when bilateral varicocelectomy was performed [47]. In addition, the authors highlighted the necessity of scrotal ultrasound in cases of infertile patients with clinical left varicocele, as the

disclosure of a subclinical right form may alter beneficially the management of the disease [47].

3. Conclusion

To sum up, scrotal ultrasound is a versatile tool for the evaluation of varicocele. Although the measurement of venous diameter is limited mainly to diagnostic purposes, other ultrasonographic parameters can assess the severity of the condition reliably. Specifically, the accurate measurement of testicular volume can assist the management in young boys and adolescents. Furthermore, the quantitative and qualitative evaluation

of reflux may add useful information about the impact of varicocele on spermatogenesis and appraise the outcome of varicocelectomy. Finally, vein and arterial hemodynamics parameters are delicate tools which can predict the fertility status and the progression rate; of note, these tools may also act as prognostic markers for the final outcome after surgical correction, regarding the improvement of semen characteristics and risk of recurrence. 

Conflicts of interest

The author declared no conflict of interest.

Περίληψη

Η κισσοκήλη είναι ένα συχνό εύρημα στον ανδρικό πληθυσμό με τεκμηριωμένη σχέση με την διαταραχή της σπερματογένεσης και την υπογονιμότητα. Παρ' όλα αυτά, η πλειοψηφία των ατόμων με κισσοκήλη δεν βλάπτονται και για αυτό το λόγο, η αναγνώριση των ασθενών σε υψηλό κίνδυνο είναι αναγκαία πριν την απόφαση της χειρουργικής διόρθωσης. Το υπερηχογράφημα του οσχέου είναι ένα μη επεμβατικό και φθινό εργαλείο για την διερεύνηση της κισσοκήλης, που διευκολύνει τη διάγνωση και προσθέτει χρήσιμες πληροφορίες σχετικά με το επιβλαβές δυναμικό της πάθησης. Σε αυτή την ανασκόπηση, συζητείται η σημαντικότητα ειδικών παραμέτρων του οσχέου υπερηχογραφήματος ως προγνωστικών δεικτών για τη σοβαρότητα της κισσοκήλης.

Λέξεις ευρετηριασμού

κισσοκήλη, έγχρωμο
Doppler, διάμετρος αγγείου,
παλινδρόμηση, ορχικός όγκος,
αιμοδυναμική

References

1. A. Jungwirth, T. Diemer, G. Dohle, A. Giwercman, Z. Kopa, and C. Krausz, Guidelines on male infertility, European Association of Urology, *Eur. Urol.*, vol. 62, pp. 324-332, 2012.
2. T. Lorenc, L. Krupniewski, P. Palczewski, and M. Gołębowski, The value of ultrasonography in the diagnosis of varicocele *Wartość ultrasonografii w diagnostyce żyłaków powrózka nasiennego*, *J Ultrason*, vol. 16, no. 16, pp. 359-370, 2016.
3. B. Alsaikhan, K. Alrabeeah, G. Delouya, and A. Zini, Epidemiology of varicocele., *Asian J. Androl.*, vol. 18, no. 2, pp. 179-81, 2016.
4. N. Zampieri and A. Dall'Agnola, Subclinical varicocele and sports: A longitudinal study, *Urology*, vol. 77, no. 5, pp. 1199-1203, 2011.
5. R. M. Cervellione, M. Corroppo, and A. Bianchi, Subclinical varicocele in the pediatric age group, *J. Urol.*, vol. 179, no. 2, pp. 717-719, 2008.
6. A. Agarwal, R. Sharma, A. Harlev, and S. Esteves, Effect of varicocele on semen characteristics according to the new 2010 World Health Organization criteria: a systematic review and meta-analysis, *Asian J. Androl.*, vol. 18, no. 2, p. 163, 2016.
7. R. Yuan, H. Zhuo, D. Cao, and Q. Wei, Efficacy and safety of varicocelectomies: A meta-analysis, *Syst. Biol. Reprod. Med.*, vol. 63, no. 2, pp. 120-129, 2017.
8. A. Baazeem et al., Varicocele and male factor infertility treatment: A new meta-analysis and review of the role of varicocele repair, *Eur. Urol.*, vol. 60, no. 4, pp. 796-808, 2011.
9. J. T. Sigalos and A. W. Pastuszak, Chronic orchialgia: epidemiology, diagnosis and evaluation, *Transl. Androl. Urol.*, vol. 6, no. S1, pp. S37-S43, 2017.
10. L. Dubin and R. Amelar, Varicocele size and results of varicocelectomy in selected subfertile men with varicocele., *Fertil. Steril.*, vol. 21, no. 8, p. 1970, 1970.

11. A. Mahdavi, R. Heidari, M. Khezri, A. Shiravi, R. Pirjani, and R. Saheb Kashaf, Can Ultrasound Findings be a Good Predictor of Sperm Parameters in Patients With Varicocele? A Cross-Sectional Study, *Nephrourol. Mon.*, vol. 8, no. 5, pp. 4-7, 2016.
12. A. Pilatz, B. Altinkilic, E. K?hler, M. Marconi, and W. Weidner, Color Doppler ultrasound imaging in varicoceles: Is the venous diameter sufficient for predicting clinical and subclinical varicocele?, *World J. Urol.*, vol. 29, no. 5, pp. 645-650, 2011.
13. T. Hoekstra and M. A. Witt, The correlation of internal spermatic vein palpability with ultrasonographic diameter and reversal of venous flow., *J. Urol.*, vol. 153, no. 1, pp. 82-4, 1995.
14. J. D. Schiff, P. S. Li, and M. Goldstein, Correlation of ultrasound-measured venous size and reversal of flow withValsalva with improvement in semen-analysis parameters after varicocelectomy, *Fertil. Steril.*, vol. 86, no. 1, pp. 250-252, 2006.
15. A. F. Hussein, The Role of Color Doppler Ultrasound in Prediction of the Outcome of Microsurgical Subinguinal Varicocelectomy, *J. Urol.*, vol. 176, no. 5, pp. 2141-2145, 2006.
16. F. M. Alshehri, M. H. Akbar, A. K. Altwaigi, and O. J. AlThaqafi, Preoperative duplex ultrasound parameters predicting male fertility after successful varicocelectomy, *Saudi Med. J.*, vol. 36, no. 12, pp. 1439-1445, 2015.
17. M. R. Goren, G. Erbay, C. Ozer, M. V. Kayra, and E. Hasirci, Can we predict the outcome of varicocelectomy based on the duration of venous reflux?, *Urology*, vol. 88, no. 4, pp. 81-86, 2016.
18. H. Sakamoto, Y. Ogawa, and H. Yoshida, Relationship Between Testicular Volume and Varicocele in Patients With Infertility, *Urology*, vol. 71, no. 1, pp. 104-109, 2008.
19. K. A. Kozakowski, C. K. Gjertson, G. J. Decastro, S. Poon, A. Gasalberti, and K. I. Glassberg, Peak Retrograde Flow: A Novel Predictor of Persistent, Progressive and New Onset Asymmetry in Adolescent Varicocele, *J. Urol.*, vol. 181, no. 6, pp. 2717-2723, 2009.
20. T. Zhou et al. Effect of varicocelectomy on testis volume and semen parameters in adolescents: a meta-analysis, *Asian J. Androl.*, vol. 17, no. 6, p. 1012, 2015.
21. D. A. Diamond et al. Relationship of Varicocele Grade and Testicular Hypotrophy to Semen Parameters in Adolescents, *J. Urol.*, vol. 178, no. 4 SUPPLEMENT, pp. 1584-1588, 2007.
22. M. P. Kurtz et al. Semen parameters in adolescents with varicocele: Association with testis volume differential and total testis volume, *J. Urol.*, vol. 193, no. 5, pp. 1843-1847, 2015.
23. A. Zini, M. Buckspan, D. Berardinucci, and K. Jarvi, The influence of clinical and subclinical varicocele on testicular volume, *Fertil. Steril.*, vol. 68, no. 4, pp. 671-674, 1997.
24. S. S. S. Chen, Significant predictive factors for subfertility in patients with subclinical varicocele, *Andrologia*, vol. 49, no. 10, pp. 1-5, 2017.
25. V. Patil, S. M. C. Shetty, and S. K. Das, Redefining the Criteria for Grading Varicoceles Based on Reflux Times: A Clinicoradiological Correlation., *Ultrasound Q.*, vol. 32, no. 1, pp. 82-85, Mar. 2016.
26. G. Iosa and D. Lazzarini, Hemodynamic classification of varicoceles in men: Our experience, *J. Ultrasound*, vol. 16, no. 2, pp. 57-63, 2013.
27. N. Zampieri, V. Zuin, M. Corroppo, A. Ottolenghi, and F. S. Camoglio, Relationship between varicocele grade, vein reflux and testicular growth arrest, *Pediatr. Surg. Int.*, vol. 24, no. 6, pp. 727-730, 2008.
28. S. Verim et al. Prognostic predictors of fertility in young adult patients with varicocele: Peak retrograde flow velocity and reflux grade, *J. Ultrasound Med.*, vol. 35, no. 6, pp. 1241-1250, 2016.
29. M. J. Mohseni et al., Shunt-type and stop-type varicocele in adolescents: Prognostic value of these two different hemodynamic patterns, *Fertil. Steril.*, vol. 96, no. 5, pp. 1091-1096, 2011.
30. J. P. Van Batavia, A. M. Fast, S. N. Nees, M. A. Mercado, A. Gasalberti, and K. I. Glassberg, Incidence, significance and natural history of persistent retrograde venous flow after varicocelectomy in children and adolescents: Correlation with catch-up growth, *J. Urol.*, vol. 190, no. 2, pp. 689-695, 2013.
31. A. S. Cil, M. Bozkurt, D. Kara Bozkurt, and M. Gok, Investigating the relationship between persistent reflux flow on the first postoperative day and recurrent varicocele in varicocelectomy patients., *J. Clin. Med. Res.*, vol. 7, no. 1, pp. 29-32, 2015.
32. S. S. Chen and L. K. Chen, Risk factors for progressive deterioration of semen quality in patients with varicocele, *Urology*, vol. 79, no. 1, pp. 128-132, 2012.
33. W. Middleton, D. Thorne, and G. Melson, Color Doppler ultrasound of the testis, *AJR. Am. J. Roentgenol.*, vol. 152, pp. 293-297, 1989.
34. S. Tarhan, B. Gümüs, I. Gündüz, V. Ayyildiz, and C. Gökten, Effect of varicocele on testicular artery blood flow in men: Color doppler investigation, *Scand. J. Urol. Nephrol.*, vol. 37, no. 1, pp. 38-42, 2003.

35. G. Biagiotti, G. Cavallini, F. Modenini, G. Vitali, and L. Gianaroli, Spermatogenesis and spectral echo-colour Doppler traces from the main testicular artery, *BJU Int.*, vol. 90, no. 9, pp. 903-908, 2002.
36. S. Tarhan, O. Ucer, M. O. Sahin, and B. Gumus, Long-term effect of microsurgical inguinal varicocelectomy on testicular blood flow, *J. Androl.*, vol. 32, no. 1, pp. 33-39, 2011.
37. M. Akand et al. Color Doppler ultrasound characteristics after subinguinal microscopic varicocelectomy, *Med. Ultrason.* vol. 19, no. 1, pp. 59-65, 2017.
38. G. M. Pinggera et al. Assessment of the intratesticular resistive index by colour Doppler ultrasonography measurements as a predictor of spermatogenesis, *BJU Int.*, vol. 101, no. 6, pp. 722-726, 2008.
39. J. H. Hillelsohn, K. W. Chuang, E. Goldenberg, and B. R. Gilbert, Spectral doppler sonography: A noninvasive method for predicting dyspermia, *J. Ultrasound Med.*, vol. 32, no. 8, pp. 1427-1432, 2013.
40. A. Unsal, A. T. Turgut, F. Taskin, U. Kosar, and C. Z. Karaman, Resistance and pulsatility index increase in capsular branches of testicular artery: indicator of impaired testicular microcirculation in varicocele?, *J. Clin. Ultrasound*, vol. 35, no. 4, pp. 191-195, May 2007.
41. K. Ener et al. Comparison of arterial blood supply to the testicles in the preoperative and early postoperative period in patients undergoing subinguinal varicocelectomy., *Scand. J. Urol.*, vol. 49, no. 2, pp. 169-173, Apr. 2015.
42. A. Balci, S. Karazincir, S. Gorur, H. Sumbas, E. Egilmez, and T. Inandi, Long-term effect of varicocele repair on intratesticular arterial resistance index., *J. Clin. Ultrasound*, vol. 36, no. 3, pp. 148-152, 2008.
43. O. Tanriverdi, C. Miroglu, K. Horasanli, B. Altay, K. C. Caliskan, and E. Gumus, Testicular blood flow measurements and mean resistive index values after microsurgical and high ligation varicocelectomy, *Urology*, vol. 67, no. 6, pp. 1262-1265, 2006.
44. N. Akcar, M. Turgut, B. Adapinar, and I. R. Ozkan, Intratesticular arterial resistance and testicular volume in infertile men with subclinical varicocele., *J. Clin. Ultrasound*, vol. 32, no. 8, pp. 389-393, Oct. 2004.
45. H. J. Kim et al. Clinical significance of subclinical varicocelectomy in male infertility: systematic review and meta-analysis. *Andrologia*, vol. 48, no. 6, pp. 654-661, Aug. 2016.
46. F. F. Pasqualotto et al. Is it worthwhile to operate on subclinical right varicocele in patients with grade II-III varicocele in the left testicle?, *J. Assist. Reprod. Genet.*, vol. 22, no. 5, pp. 227-231, 2005.
47. M. A. Elbendary and A. M. Elbadry, Right subclinical varicocele: how to manage in infertile patients with clinical left varicocele? *Fertil. Steril.*, vol. 92, no. 6, pp. 2050-2053, 2009.

ORIGINAL ARTICLE

Laparoscopic nephrectomy: initial experience and 3 years follow-up with 68 cases

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Abstract

Introduction: Partial nephrectomy is considered the gold standard procedure in managing small renal masses less than 4cm, even less than 7 cm in the last decade. Minimal invasive surgery is a preferred option in those cases. Laparoscopic partial nephrectomy has equivalent oncological results with open partial nephrectomy, offering in the same time all the advantages of minimal invasive surgery. The purpose of our study is to present our initial experience in laparoscopic partial nephrectomy.

Material and Methods: Between May 2015 and December 2017, 68 selected patients with renal masses smaller than 7cm observed by CT scan, were submitted to laparoscopic partial nephrectomy. Patient demographics, preoperative tumor characteristics and detailed operative, postoperative and pathologic data were collected.

Results: Mean age of patients is 56,1 years (44-71), mean diameter of renal tumor 5,3 cm (3,3 - 7,4 cm). 36 patients

had a right partial nephrectomy and 32 a left one, with no intraoperative complications. In four patients a laparoscopic radical nephrectomy was done, there are no cases of conversion to open surgery. The operation time ranged from 90 to 211 min, estimated blood loss (EBL) ranged from 30 to 300 ml and warm ischemia time (WIT) ranged from 5 to 31 min. Overall, four cases of postoperative complications CDC ≥ 3 were observed. One patient presented with a ureteric stricture and 3 with bleeding which necessitate angiographic intervention. There was one patient with a microscopic positive surgical margin and all patients are disease free during follow up (3-20 months, mean 12,2 months). Mean serum creatinine level has increased 23 mcmol/L (0-114).

Conclusion: Laparoscopic partial nephrectomy is a safe and feasible approach in small renal masses, offering all the advantages of minimal invasive surgery

Key words

partial nephrectomy;
laparoscopy; initial
experience; renal tumor

Citation

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Introduction

The widespread use of abdominal imaging modalities and especially ultrasound has resulted in an increase in the detection of incidental small renal masses [1]. Open partial nephrectomy (OPN) is the gold standard procedure for the treatment of masses less than 4 cm and even in less than 7cm, if it is technically feasible [2], offering the same oncological results as radical nephrectomy [3]. Additionally, patients who undergo partial nephrectomy have better renal function and are less likely to require renal replacement therapy than patients who undergo radical nephrectomy [4,5].

Laparoscopic partial nephrectomy (LPN) is an alternative option to OPN demonstrating comparable oncological and functional results, adding reduced morbidity and offering all the advantages of minimal invasive surgery (less hospital stay, quicker recovery, less blood loss and need for transfusion, better cosmetic result, less postoperative complications etc.) [6] Unfortunately, LPN is technically challenging and laparoscopic experience is a prerequisite in order to reproduce the same results as the open procedure [7]. In our study we present our initial experience in laparoscopic partial nephrectomy for small renal masses.

Patients and methods

Between May 2015 and December 2017, 68 consecutive patients (46 males and 22 females) were diagnosed with small renal masses discovered in computed tomography (CT). Laparoscopic partial nephrectomy was performed by a single surgeon with previous laparoscopic experience in upper urinary tract. There were no cases with multiple renal tumors or previous renal surgery. Perioperative data included operative time, estimated blood loss (EBL), warm ischemia time (WIT) and intraoperative complications. Intraoperative complications included significant injury to an adjacent organ, major vessel, ureter or pleura and conversion for visceral injury or hemorrhage. The pathology results and postoperative complications were followed-up. Patients with renal tumors were scheduled to perform a CT scan in a 6 month interval follow up according to European Urology Guidelines follow up protocol.

Surgical technique

The patients were placed in the flank position with the operative side facing up, and the operating table par-

tially flexed. The abdomen was insufflated with CO₂ via transperitoneal optical trocar access to a maximum pressure of 12 mmHg. Five trocars were placed at the end (two 5 mm ports, two 12mm port and the optical trocar for the camera). After insufflation was observed, the colon was reflected medially and the kidney was exposed from the lower pole to the upper pole. The renal pedicle was identified and the Gerota's fascia was dissected over the kidney. The lesion was identified and the edges of it were marked with electrocautery. A laparoscopic Bulldog clamps were placed and both the renal artery and vein was occluded. Using laparoscopic scissors the lesion was excised. The collecting system was repaired using a 3-0 V loc suture. For renal reconstruction 1-0 polyglactin suture was placed through the renal capsule in a continuous manner using sliding Hemolok clips at the edges of it. The bulldog clamps were released and the intraabdominal pressure was lowered to 6mmHg. The tumor was placed in a laparoscopic organ bag and a 20F Jackson -Pratt drain was placed around the kidney.

Results

Mean age of patients is 56,1 years (44-71), mean diameter of renal tumor 5,3 cm (3,3 - 7,4 cm). 36 patients had a right partial nephrectomy and 32 a left one, with no intraoperative complications. In two patients a laparoscopic radical nephrectomy was done, there are no cases of conversion to open surgery. The operation time ranged from 90 to 211 min, estimated blood loss (EBL) ranged from 30 to 300 ml and warm ischemia time (WIT) ranged from 5 to 31 min. Overall, four cases of postoperative complications CDC \geq 3 were observed. One patient presented with a ureteric stricture and 3 with bleeding which necessitated angiographic intervention.

Four patients (5,8 %) had a conversion to laparoscopic radical nephrectomy because of intraoperative re-assessment of feasibility and safety of partial nephrectomy because of tumor characteristics. None of the other patients had an intraoperative complication or conversion to open surgery. Tumor sizes ranged between 5,3 cm (3,3 - 7,4 cm) as it were measured in the final pathology report. 31 patients (45,58 %) had a lower pole tumor, 17 (25 %) had an upper pole tumor and 20 (29,41 %) had a mid pole tumor. Mean operative time was 115 min (90 to 211 min), estimated blood loss (EBL)

ranged from 30 to 300 ml, warm ischemia time (WIT) ranged from 5 to 31 min (mean 14,7 min) and mean hospital stay was four days (3 -6). Three patients needed a transfusion (4,4 %). All patients had a satisfactory renal function after surgery ; none suffered from transient or permanent kidney failure or developed a clinical significant urine leak. Mean serum creatinine level has increased 23 mcmol/L (0-114). Three patients developed a small subcutaneous hematoma in port side (4,4 %) and one presented with a mild hematuria (1,4 %). Overall, four cases of postoperative complications CDC \geq 3 were observed [9,10] One patient presented with a ureteric stricture and 3 with bleeding which necessitated angiographic intervention. The patient with ureteric stricture was been subjected to percutaneous nephrostomy postoperatively and to combined antegrade/retrograde ureteroscopy at a later time which restore ureteral patency. All three patients with post-opp bleeding were treated successfully with angiographic procedure.

No patient required operative reintervention. The pathology report demonstrated the following results; sixty-two patients had a renal-cell carcinoma, one patient had a chomophobe carcinoma , and three had an angiomyolipoma. One patient had a microscopic positive surgical margin. Patients with low risk tumors defined as stage pT1a -b Fuhrman grade 1 or 2 had an ultrasound and a chest radiograph in 6 month period and a CT scan in one year . Patients with intermediate risk tumors defined as high grade (Fuhrman 3 -4) had a 6 month CT scan and a chest X-ray. All patients are disease free during follow up (3-20 months, mean 12,2 months).

Discussion

Over the past two decades the role of partial nephrectomy has been expanding. By providing oncologic outcomes equivalent to radical nephrectomy , along with improved preservation of renal function, partial nephrectomy has become established as a standard of care for renal masses, even in patients with a normal kidney [5,7].

Laparoscopic partial nephrectomy has become the less invasive alternative approach, offering equivalent oncological results to open partial ,while offering patients a shorter hospital stay and recovery time [6,11-13].

In our study we present our initial experience in laparoscopic partial nephrectomy, performed by single surgeon with previous laparoscopic experience in upper urinary tract. Upper pole tumors were more difficult because a greater mobilization of the kidney was needed in order to have a better exposure of the tumor. Unfortunately no intraoperative ultrasound was used and the excision of the masses was based on meticulous study of the preoperative CT scan. Both renal artery and vein was occluded and that was necessary in order to have a bloodless field and clear visibility, which lowers the positive surgical margin. The important of hilar control prior to mass excision, in order to obtain adequate hemostasis, has been suggested by other authors [14-16]. The median ischemia time was 14,7 minutes which is lower than the 30 minutes limit which is set as safety for renal preservation . In one case we avoided hilar clamping because the tumor was small and mostly exophytic. No major intraoperative complication occurred in our series. Estimated blood loss, peri and post operative complications and mean hospital stay are comparable with those in published literature for laparoscopic partial nephrectomy series [14-16].

Laparoscopic partial nephrectomy may be the most challenging and complex laparoscopic technique performed by any surgeon , given the requirement for perfect extirpation and satisfactory reconstruction within a limited time [17]. In experienced hands laparoscopic procedure can duplicate both functional and oncological results of open partial nephrectomy. Warm ischemia time is the most important factor that has to be lowered as much as possible. Clampless partial nephrectomy is an option but it is quite difficult in big , central located tumors, needs great experience and it raises the percentage of positive surgical margins [18].

The present study has several limitations because it is a retrospective study with a relatively limited cohort of patients (with no control arms) who were followed for a medium-term period of time. Nevertheless, the present study was able to show that laparoscopic partial nephrectomy is a safe and feasible option for the management of selected small renal tumors. Furthermore, our operative time, estimated blood loss and WIT results were comparable to those of previous LPN studies, which is rather en-

couraging because the present series reflects our initial experience.

Open partial nephrectomy is still considered to be the gold standard for the treatment of renal tumors less than 7cm according to the EAU Guidelines . However, laparoscopic partial nephrectomy is alternative procedure which in experienced hands has equivalent oncologic and functional outcomes with a slightly bigger proportion of WIT and Clavien III/IV complication rate [19,20]. Our future perspectives are to expand our indications in bigger and more endophytic tumors in order to offer to our patients all the advantages of laparo-

scopic partial nephrectomy, with accepted oncological and functional results.

Conclusions

Laparoscopic partial nephrectomy is a feasible and safe approach to remove small renal masses amenable to partial nephrectomy, offering all the advantages of laparoscopic surgery (less blood loss, less pain , shorter hospital stay, quicker recovery time, etc). 

Conflicts of interest

The author declared no conflict of interest.

Περίληψη

Εισαγωγή: Η μερική νεφρεκτομή θεωρείται η χειρουργική θεραπεία εκλογής για την αντιμετώπιση των μικρών νεφρικών μαζών (μικρότερων των 4 εκ), όσο και των ακόμα μικρότερων των 7εκ, την τελευταία δεκαετία. Η ελάχιστη επεμβατική χειρουργική είναι η προτιμώμενη μέθοδος σε αυτές τις περιπτώσεις. Η λαπαροσκοπική μερική νεφρεκτομή έχει αντίστοιχα ογκολογικά αποτελέσματα με την ανοικτή, προσφέροντας την ίδια στοιγμή όλα τα πλεονεκτήματα της ελάχιστη επεμβατικής χειρουργικής. Ο σκοπός της μελέτης είναι η παρουσίαση της αρχικής μας εμπειρίας στη λαπαροσκοπική μερική νεφρεκτομή.

Υλικό και Μέθοδος: Μεταξύ Μαΐου 2015 και Δεκεμβρίου 2017, 68 επιλεγμένοι ασθενείς με νεφρικές μάζες μικρότερες των 7 εκ στην αξονική τομογραφία, προσήλθαν για λαπαροσκοπική μερική νεφρεκτομή. Ε'γινε καταγραφή των δημογραφικών στοιχείων των ασθενών, των προεγχειρητικών χαρακτηριστικών των όγκων και επίσης έγινε λεπτομερής καταγραφή των διεγχειρητικών, μετεγχειρητικών και παθολογοανατομικών στοιχείων.

Αποτελέσματα: Η μέση ηλικία των ασθενών ήταν 56,1 έτη (44-71), η μέση διάμετρος του όγκου 5,3 εκ (3,3 - 7,4 εκ). 36 ασθενείς υποβλήθηκαν σε ΔΕ μερική νεφρεκτομή και 32 σε ΑΡ, χωρίς διεγχειρητικές επιπλοκές. Σε 4 ασθενείς έγινε λαπαροσκοπική ριζική νεφρεκτομή, ενώ δεν έγινε καμία μετατροπή σε ανοιχτή επεμβαση. ο χειρουργικός χρόνος κυμαινόταν από 90 έως 211 λεπτά, η εκτιμώμενη απώλεια αίματος (EBL) μεταξύ 30 και 300 ml και ο χρόνος θερμής ισχαιμίας (WIT) μεταξύ 5 και 31 λεπτών. Σε τέσσερις περιπτώσεις παρατηρήθηκαν μετεγχειρητικές επιπλοκές CDC ≥ 3. Ένας ασθενής εμφάνισε ουρητηρικό στένωμα και 3 με αιμορραγία που χρειάστηκε αγγειογραφική διερεύνηση. Σε ένα ασθενή υπήρξε μικροσκοπικό θετικό χειρουργικό όριο, ενώ όλοι οι ασθενείς ήταν ελεύθεροι νόσου κατ'ά την περίοδο παρακολούθησης (3-20 μήνες, μέση τιμή οι 12,2 μήνες). Η μέση αύξηση των επιπέδων κρεατινίνης ορού ήταν 23 mcmol/L (0-114).

Συμπέρασμα: Η λαπαροσκοπική μερική νεφρεκτομή είναι ασφαλής και αποτελεσματική μέθοδος στις μικρές νεφρικές μάζες, προσφέροντας όλα τα πλεονεκτήματα της ελάχιστη επεμβατικής χειρουργικής.



Λέξεις ευρετηριασμού

Μερική νεφρεκτομή,
λαπαροσκόπηση, αρχική
εμπειρία, νεφρικός όγκος

References

1. Belldegrun A, Tsui KH, deKernion JB, Smith RB: Efficacy of nephron-sparing surgery for renal cell carcinoma: analysis based on the new 1997 tumor-node-metastasis staging system. *J Clin Oncol*. 1999; 17: 2868-75.
2. European Urology Guidelines 2014.
3. Fergany AF, Hafez KS, Novick AC: Long-term results of nephron sparing surgery for localized renal cell carcinoma: 10-year follow up. *J Urol*. 2000; 163: 442-5.
4. McKiernan J, Simmons R, Katz J, Russo P: Natural history of chronic renal insufficiency after partial and radical nephrectomy. *Urology*. 2002; 59: 816-20.
5. Lau WK, Blute ML, Weaver AL, Torres VE, Zincke H: Matched comparison of radical nephrectomy vs nephron-sparing surgery in patients with unilateral renal cell carcinoma and a normal contralateral kidney. *Mayo Clin Proc*. 2000; 75: 1236-42.
6. Gill IS, Kavoussi LR, Lane BR, Blute ML, Babineau D, Colombo JR Jr, et al.: Comparison of 1,800 laparoscopic and open partial nephrectomies for single renal tumors. *J Urol*. 2007; 178: 41-6.
7. Porpiglia F, Volpe A, Billia M, Scarpa RM : Laparoscopic versus open partial nephrectomy: analysis of the current literature *Eur Urol* 2008;53:732-42;discussion 742-3.
8. Kutikov A., Uzzo RG., The R.E.N.A.L. Nephrometry score :a comprehensive standardized system for quantitating renal tumor size location and depth *J Urol* 2009 Sep;182(3) 844-53.
9. Clavien PA, Sanabria JR, Strasberg SM. Proposed classification of complications of surgery with examples of utility in cholecystectomy. *Surgery* 1992 May;111(5):518-26.
10. Dindo D, Demartines N, Clavien PA. Classification of surgical complications: a new proposal with evaluation in a cohort of 6336 patients and results of a survey. *Ann Surg* 2004 Aug;240(2):205-13.
11. Uzzo RG, Novick AC. Nephron sparing surgery for renal tumors: indications, techniques and outcomes. *J Urol* 1993;149:1633-6.
12. Gong EM., Orvieto MA., Zorn KC, et al. Comparison of laparoscopic and partial nephrectomy in clinical T1a renal tumors *J Endourol* 2008;22:953-7.
13. Lane BR, Gill IS. 5-year outcomes of laparoscopic partial nephrectomy. *J Urol* 2007;177:70-4.
14. Abukora F, Nambirajan T, Albqami N, et al. Laparoscopic nephron sparing surgery : evolution in a decade. *Eur Urol* 2005;47:488-93.
15. Kim FJ, Rha KH, Hernandez F, et al. Laparoscopic radical versus partial nephrectomy: assessment of complications. *J Urol* 2003;170:408.
16. Finelli A, Gill IS, Laparoscopic partial nephrectomy: Contemporary technique and results. *Urol Oncol* 2004;22:139.
17. Guillonnet B., Bermudez H, Gholami S, et al Lparoscopic partial nephrectomy for renal tumor : single center experience comparing clamping and no clamping techniques of the renal vasculature. *J Urol* 2004;171:1443.
18. Gordon A., Brown. MD, Surena F, Matin MD Laparoscopic partial nephrectomy: Experience in 60 cases.
19. White WM, Goel RK, Haber GP, Kaouk JH: Robotic partial nephrectomy without renal hilar occlusion.
20. Aliaf ME, Bhayani SB, Rogers C, Varkarakis I, Link RE, Inagaki T, et al. Laparoscopic partial nephrectomy: evaluation of long term oncological outcomes *J Urol* 2004;172:871-3.

ORIGINAL ARTICLE

Severe bleeding following laparoscopic partial nephrectomy treated by selective renal artery embolization - initial experience and review of the literature

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Abstract

Purpose: Partial nephrectomy (PN) is an accepted alternative to radical nephrectomy for nephron sparing surgery to treat renal tumors. Although complications are relatively rare after PN, they may include renal hemorrhage that can be massive and life threatening. Artery embolization can have a major role in the management of these cases and to avoid radical nephrectomy.

Materials and methods: We report three consecutive patients with massive hemorrhage after LAPN, treated by arterial embolization and review the literature to discuss the

Key words

embolization;
nephrectomy;
postoperative hemorrhage

clinical presentation, imaging evaluation and clinical outcome.

Results: After selective catheterization and identification of the bleeding site, micro-coils were used as embolization material. Immediate technical and clinical success was achieved in all cases.

Conclusion: Superselective artery embolization of renal hemorrhage is a simple, safe and efficient procedure. It has a high clinical success and should be considered as an alternative to nephrectomy, minimizing the morbidity and preserving renal tissue.

Purpose

Nephron-sparing surgery, also known as partial nephrectomy (PN), has been established as the standard treatment for renal masses as it preserves renal

function [1-3]. In the recent decades, laparoscopic partial nephrectomy (LAPN) has established itself as a viable alternative to open partial nephrectomy (OPN) as it offers a less invasive approach while pro-

Citation

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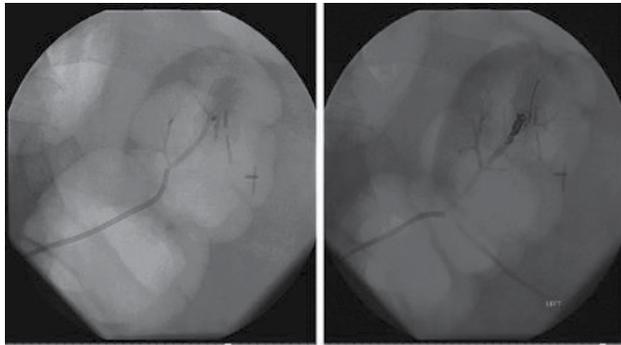


Figure 1. Selective angiography showing contrast extravasation and AVF. B, Closure of fistula and resolution of contrast extravasation after selective coil embolization.

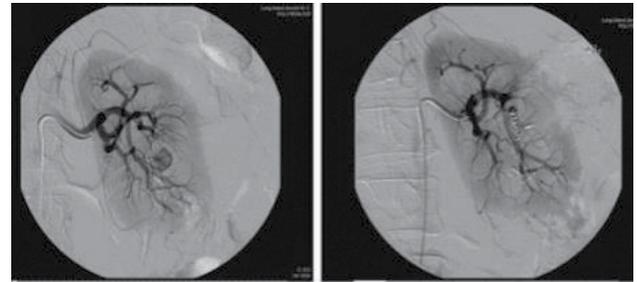


Figure 2. Selective angiography showing RAP. B, Resolution of RAP after selective coil embolization.

viding comparable oncological outcomes and morbidity [4].

The benefit of PN, however, may be hampered by its newly discovered complications; PN is associated with serious vascular complications owing to the difficulty recognizing the vascular border and abundant renal vascularity [5]. In particular, post-PN hematuria, such as renal artery pseudoaneurysm or arteriovenous fistula (AVF) formation, can lead to clinically significant blood loss [5-12]. With the wider application of nephron-sparing surgery, i.e. OPN, conventional laparoscopic partial nephrectomy (LPN), and RALPN, there has been an increase in the occurrence of postoperative hemorrhage.

Renal artery embolization (RAE) has been reported to be an effective, minimally invasive treatment option for controlling post-PN hemorrhage [7, 12-14]. However, there are only a limited number of reports regarding the safety and efficacy of RAE for the management of postoperative bleeding after laparoscopic PN, especially RALPN. Hence, the purpose of this study was to investigate the incidence of postoperative hemorrhage that requires RAE and to evaluate the clinical feasibility of embolization after LAPN.

Materials and methods

We retrospectively reviewed our cases of urgent selective RAE after a life-threatening hemorrhage following LAPN. Our series includes three patients treated in our department from May 2015 until December 2017. During this period 48 LAPN and 2 RAPN were performed, so RAE for severe bleeding was needed in 6% (3/50) of the cases. The patients include two men and one woman (age range 41-72 years, median 51.6 years), who underwent LAPN for renal-cell cancer. They developed renal hemorrhage post-

operatively (range 1-3 days after surgery) with significant hemodynamic instability. Blood through surgical drain was the most common sign, present in all three patients, combined with macroscopic hematuria in 2 (66%) and flank pain was also observed in all three patients. No one had coagulopathy. Pre-intervention imaging included CT and US with Doppler before the arterial angiogram. Complete blood count, mean systolic and diastolic blood pressure were recorded before embolization. Before embolization, hemoglobin levels were 80 g/L, 85 g/L and 75 g/L with need of transfusion of 2 units in the first two cases and 3 units of red blood cells in the third patient. Using the Seldinger technique, a 4 Fr or 5 Fr sheath was placed in the right common femoral artery after local anesthesia of the groin (Lidocaine 2%) [15,16]. We performed a global aortogram using a pigtail catheter. This first evaluation allowed the identification of renal arteries anatomy as well as to identify the exact bleeding vessel responsible for the hemorrhage. Catheterization of the homolateral renal artery and superselective access using a Progreat micro-catheter 2.7 Fr (Terumo, Tokyo, Japan) was performed. The bleeding site was identified in all cases and we used as embolization material tornado® coils with a size range of 2 × 3 mm to 2 × 4 mm (Cook, Bjaeverksov, Denmark) and 2 × 2 mm and 3 × 2 mm (Azur, Terumo, Tokyo, Japan). The end point for embolization was complete occlusion of the bleeding vessel and most efforts were paid to save as much as possible of normal remaining renal parenchyma. Immediate technical success was defined as the ability to stop the angiographic bleeding with absence of flow in the target bleeding vessels. Immediate clinical success was defined as normalization of BP and pulse rate, cessation of clinical bleeding, absence of need of more blood cell transfusion and absence of need for additional inter-



ventions (re-embolization or nephrectomy). Clinical follow-up was obtained in all patients.

Results

In all three patients, angiography showed the site of extravasation of contrast (**Figs. 1-2**). One patient had a renal pseudoaneurysm. Immediate technical and clinical results were achieved in all cases. No one has post-embolization syndrome. We observed in one patient a transient increase of serum creatinine levels that returned to the preoperative level after 48 hours. All patients were discharged with stable Hb level and normal renal function. During the post-embolization period, the remaining renal parenchyma showed normal perfusion and no significant damage was observed immediately after and at follow-up examinations, using CT and Doppler-US with follow-up ranged 2-12 months (mean 8 months). No major complications were observed immediately after or during the follow-up period.

Discussion

In this retrospective study, transcatheter RAE as a treatment for postoperative hemorrhage after LAPN and RALPN was both angiographically and clinically successful in all patients. No further relevant surgical interventions or repetitive embolization procedures were necessary. These results correlate with previous studies (17, 18) and demonstrate RAE to be a safe and effective procedure by showing its high rate of efficacy (95%) and lack of embolization-related complications [19]. Hence, transcatheter RAE should be considered as a treatment option for postoperative hemorrhage after LAPN. Furthermore, RAE is also associated with minimal morbidity, lower hospital costs, and nephron preservation, while avoiding further re-operative surgical intervention, with a risk of completion radical nephrectomy; additionally, it usually provides definitive therapy [20, 21].

Inci et al. reported that of the 25 patients who underwent conventional LPN, one patient developed a loss of kidney function after two sessions of embolization [22]. Accordingly, highly selective embolization of the renal artery branches in patients with postoperative bleeding is very important to preserve residual renal function. Catheterization of the third-fifth order renal artery and selective embolization is possible, allowing improved preci-

sion in accessing the bleeding locations; thus, avoiding surrounding parenchymal damage [23, 24, 25].

Although the exact evaluation of the embolized volume was not possible, this could be estimated based on the order of embolized branch of the renal artery. A highly selective (third-fifth order) renal arterial embolization in this study preserve residual renal volume and minimize damage to the surrounding normal parenchyma (theoretically, less than 1/25-1/23 of the total renal volume).

The occurrence of postoperative vascular complications has been reported in 0.4% of patients after OPN and up to 4.9% after conventional LPN [18,20,21]. In our study, 6% of patients (3 of 50) had postoperative hemorrhage, following LAPN. A few studies have suggested a contrast-enhanced CT angiography for an accurate diagnosis of vascular pathology after invasive kidney surgery [26]. In this study, however, active bleeding foci, such as contrast leakage or pseudoaneurysm formation in the PN site on the catheter-directed angiography, was not demonstrated by contrast-enhanced CT angiography in one patients (1/3, 33%). Therefore, catheter-directed angiography is indicated in patients with persistent need of transfusions or hemodynamic instability in spite of false-negative CT images. A catheter-directed renal angiography provides accurate identification of the specific bleeding source and successful treatment. When a retroperitoneal hematoma or any other bleeding focus is observed at the extrarenal site in patients who undergo PN, an angiographic evaluation of extrarenal arteries as well as renal arteries, i.e. renal capsular arteries, lumbar arteries, or intercostal arteries, should be considered.

There are some limitations to this study. The number of patients included is small and it was conducted retrospectively in a single institution, limiting the generalizability of the results. Further prospective studies with larger groups are needed.

In conclusion, RAE is recommended to patients with post-LAPN hemorrhage because catheter-directed angiography can identify the origin of the bleeding and successfully provide minimally invasive treatment, preserving the residual renal function without the need for re-operation. 

Conflicts of interest

The author declared no conflict of interest.

Περίληψη

Εισαγωγή: Η μερική νεφρεκτομή είναι μια αποδεκτή εναλλακτική της ριζικής νεφρεκτομής, ως μέθοδος διατήρησης υγιούς νεφρικού παρεγχύματος. Αν και οι επιπλοκές είναι σχετικά σπάνιες μετά μερική νεφρεκτομή, μπορεί να περιλαμβάνουν τη νεφρική αιμορραγία, η οποία μπορεί να είναι μαζική και απειλητική για τη ζωή. Ο αρτηριακός εμβολισμός μπορεί να έχει μείζονα ρόλο στην αντιμετώπιση αυτών των περιπτώσεων, σε μια προσπάθεια αποφυγής της ριζικής νεφρεκτομής.

Υλικό και Μέθοδος: Περιγράφουμε 3 περιπτώσεις διαδοχικών ασθενών με μαζική αιμορραγία μετά λαπαροσκοπική μερική νεφρεκτομή, η οποία αντιμετωπίστηκε με αρτηριακό εμβολισμό και γίνεται και μια ανασκόπηση στη βιβλιογραφία σχετικά με την κλινική εμφάνιση, την απεικονιστική εκτίμηση και το κλινικό αποτέλεσμα.

Αποτελέσματα: Μετά από εκλεκτικό καθετηριασμό και αναγνώριση της θέσης αιμορραγίας, χρησιμοποιήθηκαν μικροσπίρες ως μέσο εμβολισμού, με άμεση επιτυχία όσον αφορά τόσο το τεχνικό όσο και το κλινικό αποτέλεσμα.

Συμπέρασμα: Ο υπερεκλεκτικός αρτηριακός εμβολισμός μιας νεφρικής αιμορραγίας είναι μια απλή, ασφαλής και αποτελεσματική μέθοδος αντιμετώπισης. Έχει υψηλό ποσοστό κλινικής επιτυχίας και μπορεί να θεωρείται ως εναλλακτική της νεφρεκτομής, ελαχιστοποιώντας τη νοσηρότητα διατηρώντας παράλληλα νεφρικό παρέγχυμα.

**Λέξεις
ευρετηριασμού**
εμβολισμός, νεφρεκτομή,
μετεγχειρητική αιμορραγία

References

- Delakas D, Karyotis I, Daskalopoulos G, et al. Nephronsparing surgery for localized renal cell carcinoma with a normal contralateral kidney: a European three-center experience. *Urology* 2002;60:998-1002.
- Lee CT, Katz J, Shi W, et al. Surgical management of renal tumors 4 cm. or less in a contemporary cohort. *J Urol* 2000;163:730-736.
- Uzzo RG, Novick AC. Nephron sparing surgery for renal tumors: indications, techniques and outcomes. *J Urol* 2001;166:6-18.
- Benway BM, Bhayani SB, Rogers CG, et al. Robotassisted partial nephrectomy: an international experience. *Eur Urol* 2010;57:815-820.
- Uberoi J, Badwan KH, Wang DS. Renal-artery pseudoaneurysm after laparoscopic partial nephrectomy. *J Endourol* 2007;21:330-333.
- Albani JM, Novick AC. Renal artery pseudoaneurysm after partial nephrectomy: three case reports and a literature review. *Urology* 2003;62:227-231.
- Cohenpour M, Strauss S, Gottlieb P, et al. Pseudoaneurysm of the renal artery following partial nephrectomy: imaging findings and coil embolization. *Clin Radiol* 2007;62:1104-1109.
- Moore CJ, Rozen SM, Fishman EK. Two cases of pseudoaneurysm of the renal artery following laparoscopic partial nephrectomy for renal cell carcinoma: CT angiographic evaluation. *Emerg Radiol* 2004;10:193-196.
- Parsons JK, Schoenberg MP. Renal artery pseudoaneurysm occurring after partial nephrectomy. *Urology* 2001; 58:105.
- Singh D, Gill IS. Renal artery pseudoaneurysm following laparoscopic partial nephrectomy. *J Urol* 2005;174: 2256-2259.
- Wright JL, Porter JR. Renal artery pseudoaneurysm after laparoscopic partial nephrectomy. *Urology* 2005; 66:1109.e17-1109.e19.
- Zorn KC, Starks CL, Gofrit ON, et al. Embolization of renal-artery pseudoaneurysm after laparoscopic partial nephrectomy for angiomyolipoma: case report and literature review. *J Endourol* 2007;21:763-768.
- Netsch C, Bruning R, Bach T, et al. Management of renal artery pseudoaneurysm after partial nephrectomy. *World J Urol* 2010;28:519-524.
- Zelen' a' k K, Sopilko I, S' vihra J, et al. Successful embolization of a renal artery pseudoaneurysm with arteriovenous fistula and extravasations using Onyx after partial nephrectomy for renal cell carcinoma. *Cardiovasc Intervent Radiol* 2009;32:163-165.
- Seldinger SI. Catheter replacement of the needle in percutaneous arteriography: a new technique. *Acta Radiol* 1953;39:368-376.
- Sacks D, McClenny TE, Cardella JF, et al. Society of Interventional Radiology clinical practice guidelines. *J Vasc Interv Radiol* 2003;14:S199-S202.
- Zabkowski T, Piasecki P, Zieliński H, et al. Superselective renal artery embolization in the treatment of iatrogenic bleeding into the urinary tract. *Med Sci Monit* 2015;21: 333-337.

18. Morita S, Tajima T, Yamazaki H, et al. Early postoperative screening by contrast-enhanced CT and prophylactic embolization of detected pseudoaneurysms prevents delayed hemorrhage after partial nephrectomy. *J Vasc Interv Radiol* 2015;26:950-957.
19. Richstone L, Reggio E, Ost MC, et al. First Prize (tie): Hemorrhage following percutaneous renal surgery: characterization of angiographic findings. *J Endourol* 2008; 22:1129-1136.
20. Tinto H, Di Primio M, Tselikas L, et al. Selective arterial embolization of life-threatening renal hemorrhage in four patients after partial nephrectomy. *Diagn Interv Imaging* 2014;95:601-609.
21. Baumann C, Westphalen K, Fuchs H, et al. Interventional management of renal bleeding after partial nephrectomy. *Cardiovasc Intervent Radiol* 2007;30: 828-832.
22. Inci K, Cil B, Yazici S, et al. Renal artery pseudoaneurysm: complication of minimally invasive kidney surgery. *J Endourol* 2010;24:149-154.
23. Lazarov R, de Kort G, van Moorselaar R. Persistent renal bleeding treated with selective vascular embolisation with preservation of renal function. *Nederl Tijdschr Geneesk* 2002;146:994-999.
24. Nadu A, Kleinmann N, Laufer M, et al. Laparoscopic partial nephrectomy for central tumors: analysis of perioperative outcomes and complications. *J Urol* 2009;181: 42-47.
25. Spana G, Haber G-P, Dulabon LM, et al. Complications after robotic partial nephrectomy at centers of excellence: multi-institutional analysis of 450 cases. *J Urol* 2011;186: 417-422.
26. Shapiro EY, Hakimi AA, Hyams ES, et al. Renal artery pseudoaneurysm following laparoscopic partial nephrectomy. *Urology* 2009;74:819-823.

ORIGINAL ARTICLE

Large Adrenal lesions - Management at a tertiary centre in Greece

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Abstract

Introduction and Objective: "Large adrenal lesions" are considered tumours with a size varying between 5cm to 10 cm, with a general consensus measuring approximately 6 cm. Adrenal lesions are common with adrenalectomy being the third commonest endocrine procedure. However, large adrenal lesions are rare with an incidence ranging from 8.6% to 38.6% of adrenal tumours. There is evidence that the risk of malignancy increases with a tumour size of more than 4cm. With advances in modern imaging and rapidly aging population, the presentation of an incidentally found adrenal mass has become an increasingly common scenario for endocrine surgeons and Urologists. Resection of large adrenal lesions could be challenging, especially when it is performed laparoscopically. Our aim is to present the surgical outcomes of our patients operated for large adrenal lesions measuring more than 6cm in size and to validate the role of laparoscopic surgery in the management of these tumours.

Key words

large adrenal lesions,
pheochromocytoma,
adrenocortical
carcinoma, malignant,
benign, laparoscopic
surgery

Methods: This is a retrospective study of patients operated for an adrenal lesion, measuring more than 6cm, in Aretaieio university hospital, between July 2008 and April 2018. Patients underwent open or laparoscopic procedure. The preoperative diagnosis, operative details, complications, length of hospital stay, morbidity and follow-up were recorded and tabulated.

Results: 45 patients had lesions over 6cm (47 lesions) with mean size 8.38cm. Out of these 45 patients 25 were female patients, and 20 males, with mean age of 58.2 years. 31.9% of the lesions were found to be malignant with an average size of 11.33cm and the rest were benign with an average size of 7.65cm (pvalue=0.01). Most of the cases operated for an adrenal mass were for Pheochromocytoma (27.7%) that had mean size of 7.5cm, followed by Adrenocortical carcinomas (23.4%) and Adrenocortical adenomas (21.3%) with mean size of 12.5cm and 6.78cm respectively. 28 out of 47 cas-

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es (59.6%) had open surgery, while the rest underwent laparoscopic approach; 13 (25.7%) transabdominal and 6 (12.8%) posterior retroperitoneal approach. The majority of the malignant cases (94%) had open surgery. Although no differences were noticed in the complication rates between open and laparoscopic surgery, there was a statistical significant reduction in the duration of the hospital

stay, in the patients treated laparoscopically (mean stay 3.7d over 9.5d, p value<0.01).

Conclusion: Laparoscopic resection of large adrenal lesions could be challenging but if expertise is available could be effectively performed. Risks and complications are reduced when the surgical approach is tailored for each patient.

Introduction

With advances in modern imaging and rapidly aging population, the presentation of an incidentally found adrenal mass has become an increasingly common scenario for endocrine surgeons and Urologists. The prevalence of incidental adrenal lesions has been reported as high as 8% in autopsy series and 4% in radiologic series [1, 2]. Adrenal masses between 3 and 9mm are being discovered on a routine basis and usually represent myelolipomas or simple cysts [3]. The usual size of adenomas varies between 3-3.5cm and evidence has revealed that the risk of malignancy increases with a tumour size of more than 4cm [4-6].

In a rapidly aging society, the diagnosis and management of incidental adrenal lesions will become a more frequent task. Resection of large adrenal lesions could be challenging, especially when is performed laparoscopically.

The goals of initial workup for adrenal lesions are to distinguish benign from malignant processes, as well as non-functioning from hyper-functioning tumours. A complete evaluation allows the clinician to distinguish adrenocortical carcinoma, pheochromocytoma, primary aldosteronism, and Cushing's syndrome (which require surgical removal) from benign adenomas (which can be followed clinically).

The latest NIH state-of-the-science report recommended surgical excision of all incidental adrenal lesions greater than 6 cm and to use clinical judgment, based on the results of the initial or follow-up evaluations, when assessing masses between 4 and 6 cm for surgery [3]. Current literature suggests lowering this absolute cut-off to 4 cm because most adrenocortical carcinomas (ACC) are >4 cm in size [5, 7, 8].

Laparoscopic adrenalectomy should be the gold standard for surgical removal of adrenal masses [9-11]. In the hands of skilled surgeons, laparoscopic approach shows equal efficacy to open surgery with regards to long term outcomes [9, 11, 12]. However, open surgery should be considered for large or invasive masses and it depends on the skill set of the surgeon as to which procedure should be employed.

Specifically, for large pheochromocytomas, laparoscopic resection could be technically more challenging due to bigger size, increased tumour vascularity and intraoperative haemodynamic instability. Improvement of image investigations, pre-operative optimisation with medication and advances in anaesthesia as well as technology of laparoscopic surgery has gradually established laparoscopic resection for pheochromocytomas as a safe and efficient practise [13].

The aim of our study is to present the surgical outcomes of our patients operated for large adrenal lesions measuring more than 6cm in size and to validate the role of laparoscopic surgery in the management of these tumours.

Materials and Methods

This is a retrospective study of patients operated for large adrenal lesions (> 6cm) in Aretaieio University hospital. A structural and comprehensive workup, including thorough clinical, radiologic and hormonal evaluations took place prior to surgical intervention.

With regards to pheochromocytoma the diagnosis was established biochemically using urine metanephrines in combination with VMA in order to prove functionality of the tumour. Preoperative localiza-

TABLE 1 Demographics of patients NA: not applicable, SD: standard deviation Q: quartile	
Patients' characteristics	For lesions over 6cm (45 patients, 47 lesions)
Age	
Mean ± SD	58.2 ± 12.3 years
Median (Q1-Q3)	59 (52-64)
Range	28-81
Gender, n (%)	
Male	20 (44.4%)
Female	25 (55.6%)
Side	
L	20/45 (44.4%)
R	15/45 (33.3%)
NA	8/45 (17.8%)
Bilateral	2/45 (4.4%)
Procedure	
Open	28/47 (59.6%)
Laparoscopic trans-abdominal	13/47 (27.7%)
Laparoscopic retroperitoneal	6/47 (12.8%)
Size of Tumor (larger diameter)	
Mean ± SD	8.8cm ± 3.7
Median (Q1-Q3)	7.5cm (6.5-9.5)
Range	6-23cm
Weight of Tumor	
Mean ± SD	188.6gr ± 399.7
Median (Q1-Q3)	66gr (40-150)
Range	11-2205gr
Hospital Stay	
Mean ± SD	7.3days ± 8.2
Median (Q1-Q3)	5 (3-9)
Range	1-47
Follow-up	
Alive	28/45 (62.2%)
Deceased	8/45 (17.8%)
Lost in Follow Up	9/45 (20%)

tion was established using computerized tomography (CT) or magnetic resonance imaging (MRI). Iodine-123 metaiodobenzylguanidine (MIBG) scan was performed in order to diagnose paragangliomas or possible metastatic disease. All our patients underwent standard basal adrenal hormonal investigation such as serum cortisol, ACTH, renin and aldosterone levels, and the aldosterone/renin ratio. The evaluation of cortisol hypersecretion included 24-h urinary free cortisol and measurement of serum cortisol and ACTH levels after an overnight dexamethasone suppression test (1mg of dexamethasone administered at midnight, before the morning blood sample). In all patients with pheochromocytoma, an α -adrenergic blockade with a titration dose of phenoxybenzamine was initiated 14 days prior to surgery and the dose was increased 48 hours preoperatively after the patient was admitted in the hospital in order to receive intravenous fluids in order to achieve volume expansion and counteract the orthostatic effect associated with α -adrenergic blockade. Fine-needle aspiration biopsy (FNB) is currently not recommended for the routine workup of adrenal lesions since its results rarely alter treatment, except in patients with potential metastases or infectious processes [14]. Often, clinical, hormonal and radiologic findings can effectively direct treatment. FNA is also associated with relatively rare, but significant, complications; pheochromocytoma must always be ruled out before biopsy is undertaken to avoid potentially life-threatening haemorrhage and hypertensive crisis.

Surgical technique

The operations performed were either open adrenalectomy or minimally invasive procedures (laparoscopic intraperitoneal approach and posterior retroperitoneal approach) based on tumour characteristics and patient's habitus. For the open adrenalectomy the anterior transabdominal approach is our preferred method of choice for any tumours that are too large to be removed laparoscopically and for all invasive adrenal malignancies. The incision we most commonly use is an extended unilateral or bilateral subcostal incision. The extended subcostal incision yields exposure of both adrenal glands, as well as

TABLE 2 *Number of benign and malignant cases based on the mean size*

Histopathology	No of lesions over 6cm (%)	Average Size for lesions over 6cm
Benign	32 (68.1%)	7.65
Malignant	15 (31.9%)	11.33
Grand Total	47	8.83
		Pvalue: 0.01

the rest of the peritoneal cavity. If necessary, it may be extended superiorly in the midline to the xiphoid to provide better upper abdominal exposure for full mobilization of the liver and access to the hepatic veins and the vena cava.

For the posterior retroperitoneal approach, we adjust the patient on the Jack-knife position, and we prefer to operate using a 20mm - 35mm CO₂ pressure and 30 – degree angle laparoscope with the use of harmonic scissors throughout the procedure for laparoscopic intraperitoneal approach. The patient is positioned on the left or right lateral decubitus position accordingly.

Results

From the total number of patients that had a surgical procedure for adrenal lesions 45 had lesions over 6cm in size (47 lesions as 2 patients had bilateral lesions). The mean age of the 45 patients operated for a large adrenal mass measuring more than 6 cm was 58.2 and the majority of these patients were females (55.6%) (**Table 1**).

The mean size of these large tumours was 8.8cm with a mean weight 188.6gr (**Table 1**).

The majority of all lesions were benign independently the size (above or below 6 cm size) (**Table 2**). However, the mean size of malignant lesions was larger than the benign (11.33 vs 7.64cm) and that difference was statistical significant (pvalue=0.01)

The commonest histopathological diagnosis was the Pheochromocytoma (27.7%) with an average size of 7.46cm followed by the adrenocortical Carcinoma (23.4%) with an average size of 12.54cm and adrenocortical adenoma (21.3%) with an average size of 6.78cm (**Table 3**).

For the malignant lesions open surgery was per-

formed in 93.8% of the cases (**Table 4**). In the benign cases where both the adrenal glands were removed, a laparoscopic approach was decided, one transabdominally and one retroperitoneal.

6 out of 28 patients (21.4%) that had open surgery developed a type of complication, that corresponded in only 2 out of 17 patients with laparoscopic surgery. Although there were differences regarding post-operative complication rates between open and laparoscopic approach that was not proven to be statistically significant (p=0.4). On the other hand, the hospital stays of patients that underwent laparoscopic resection had a mean duration of 3.7 days when compared with those who had an open procedure who required a mean of 9.5 days of hospitalisation and this was statistically significant (p<0.01) (**Table 5**).

In follow up, 62.2% of these patients are still alive, 17.8% deceased, and 20% were lost in follow-up (**Table 1**).

Discussion

“Large adrenal lesions” are considered tumours with a size varying between 5cm to 10 cm with a general consensus measuring approximately 6 cm [15].

Adrenal lesions are common with adrenalectomy being the 3rd commonest endocrine procedure [16]. However, large adrenal lesions are rare with an incidence ranging from 8.6% to 38.6% of adrenal tumours [17]. In our series of cases we identified 45 cases with tumours over 6cm, and this is because our department is a tertiary referral centre for retroperitoneal lesions. There is evidence that the risk of malignancy increases with a tumour size of more than 4cm [4-6] and we have seen that in our series as almost 25% of our patients had adrenocortical carcinoma with lesions measuring > 6cm and the size of malignant tumours was larger than the benign.

The reported incidence adrenal malignancy in patients with Large adrenal masses is approximately 25% but it varies in literature between 10% to 50% and this is in concordance with our study [17, 18].

Management remains controversial but introduction of functional imaging studies such as PET scan in combination with biological work up has improved the diagnosis and pre-operative optimisa-

Histopathology	No of lesions over 6cm (%)	Average Size for lesions over 6cm
Pheochromocytoma	13 (27.7%)	7.46
Adrenocortical Carcinoma	11 (23.4%)	12.54
Adrenocortical Adenoma	10 (21.3%)	6.78
Metastatic	3 (6.4%)	8.17
Nodular adrenal hyperplasia	3 (6.4%)	10.50
Diffuse adrenal hyperplasia	2 (4.3%)	8.75
Cavernous Haemangioma	2 (4.3%)	8.00
Aldosteronoma	1 (2.1%)	6.00
Myelolipoma	1 (2.1%)	9.00
Retroperitoneal Tumor Involving Adrenal gland	1 (2.1%)	7.50
Grand Total	47	8.83

Type of Surgery	Open	Laparoscopic transabdominal	Laparoscopic retroperitoneal	Total
Lesions Over 6cm				
Benign	14 (43.8%)	12 (37.5%)	6 (18.8%)	32
Malignant	14 (93.3%)	1 (6.7%)	0 (0%)	15
Grand Total	28	13	6	47

tion [19]. With regards to patients diagnosed with pheochromocytoma, administration of α - with or without β -blockers and intravenous expansion with crystalloids is considered as standard practice [20, 21].

Treatment of these large adrenal lesions could be challenging due to the size and the laparoscopic approach. Ideally, the diagnostic and treatment approach should involve a multidisciplinary team by endocrinologists, surgeons and radiologists and this is the standard practise in our centre.

When surgery is indicated there is a range of surgical techniques based on the underlying pathology and surgeons experience such as cortical sparing technique to extensive resection and laparoscop-

ic to open approach. Laparoscopic adrenalectomy should be the gold standard for surgical removal of adrenal masses [9-11]. In the hands of skilled surgeons, laparoscopic approach show equal efficacy to open surgery with regards to long term outcomes [9, 11, 12]. However, open surgery should be considered for large or invasive masses and it depends on the skill set of the surgeon as to which procedure should be employed. In our series, an open approach was decided for the majority of the malignant cases but for the benign ones measuring over 6cm, a laparoscopic approach was performed in the majority of the cases without difference in the complication rates and with decrease of the duration of the hospital stay.

TABLE 5 Lesions over 6cm: Hospital Stay and Complication Rates

Type of Surgery	Mean Hospital Days	Complications
Open	9.5	6/28 (21.4%)
Laparoscopic	3.7	2/17 (11.8%)
Total	7.3	8/45 (17.8%)
	Pvalue<0.01	Pvalue 0.4

Laparoscopic resection of pheochromocytomas may decrease the intraoperative release of catecholamines, compared with open surgery, thus reducing the risk of a hypertensive crisis [22] and this may be a result of less intra-operative manipulations.

Conclusion

Adrenal lesions are becoming more common due to advances in modern imaging and rapidly aging population. Surgical resection of large adrenal lesions could be managed laparoscopically in a safe and effective way based on the skills and experience of the operating surgeon. Risks and complications are reduced when the surgical approach is tailored for each patient. 

Conflict of interest

There are no potential or actual, personal, political or financial interests by any of the authors in the material, information or techniques described. All authors have seen and approved the manuscript and are fully conversant with its contents.

Περίληψη

Εισαγωγή και Στόχος: Οι «μεγάλες αλλοιώσεις των επινεφριδίων» θεωρούνται όγκοι με μέγεθος που κυμαίνεται μεταξύ 5cm και 10cm, κατά ομοφωνία περίπου τα 6 cm. Οι επινεφριδιακές βλάβες είναι κοινές, με την επινεφριδεκτομή να είναι η τρίτη συχνότερη επέμβαση χειρουργικής ενδοκρινών. Ωστόσο, οι μεγάλες επινεφριδιακές αλλοιώσεις είναι σπάνιες με συχνότητα που κυμαίνεται από 8,6% έως 38,6% των όγκων των επινεφριδίων. Υπάρχουν ενδείξεις ότι ο κίνδυνος κακοήθειας αυξάνεται με μέγεθος όγκου μεγαλύτερο από 4 εκατοστά. Με την πρόοδο της σύγχρονης απεικόνισης και τον ταχέως γηράσκοντα πληθυσμό, η παρουσίαση μιας περιστασιακά διαπιστωμένης επινεφριδιακής μάζας έχει γίνει όλο και πιο συνηθισμένο σενάριο για τους ενδοκρινούς χειρουργούς και τους ουρολόγους. Η χειρουργική αφαίρεση μεγάλων επινεφριδιακών όγκων μπορεί να έχει δυσκολίες, ειδικά όταν γίνεται λαπαροσκοπικά. Στόχος μας είναι να παρουσιάσουμε τα χειρουργικά αποτελέσματα των ασθενών μας που χειρουργήθηκαν για μεγάλες επινεφριδιώδεις αλλοιώσεις μεγέθους μεγαλύτερου από 6 εκατοστά και να εκτιμήσουν το ρόλο της λαπαροσκοπικής χειρουργικής στη διαχείριση αυτών των όγκων.

Μέθοδοι: Πρόκειται για μια αναδρομική μελέτη ασθενών που χειρουργήθηκαν για επινεφριδιακό όγκο, μεγέθους περισσότερο από 6cm, στο πανεπιστημιακό νοσοκομείο του Αρεταιείου, μεταξύ Ιουλίου 2008 και Απριλίου 2018. Οι ασθενείς υποβλήθηκαν σε ανοικτή ή λαπαροσκοπική επέμβαση. Η προεγχειρητική διάγνωση, οι επιπλοκές, η διάρκεια της παραμονής στο νοσοκομείο, η νοσηρότητα και η παρακολούθηση καταγράφηκαν στην εργασία μας.

Αποτελέσματα: 45 ασθενείς είχαν αλλοιώσεις άνω των 6cm (47 αλλοιώσεις) με μέσο μέγεθος 8,38cm. Από αυτούς τους 45 ασθενείς, 25 ήταν γυναίκες ασθενείς και 20 άρρενες, με μέση ηλικία 58,2 ετών. Το 31,9% των βλαβών βρέθηκε να είναι κακοήθες με μέσο μέγεθος 11,33 εκατοστά και τα υπόλοιπα ήταν καλοήθη με μέσο μέγεθος 7,65 εκατοστά (pvalue = 0,01). Οι περισσότερες από τις περιπτώσεις που χειρουργήθηκαν για επινεφριδιακή μάζα αφορούσαν το φαιοχρωμοκύτωμα (27,7%) που είχε μέσο μέγεθος 7,5 εκ, ακολουθούμενο από αδρενοκορτικά καρκινώματα (23,4%) και αδρενοκορτικά αδενώματα (21,3%) με μέσο μέγεθος 12,5 εκ και 6,78 εκ αντίστοιχα. 28 από τις 47 περιπτώσεις (59,6%) είχαν ανοικτή χει-

Λέξεις ευρητηριασμού

μεγάλες επινεφριδιακές βλάβες, φαιοχρωμοκύτωμα, αδρενοκορτικοειδές καρκίνωμα, κακοήθεια, καλοήθεια, λαπαροσκοπική χειρουργική

ρουργική επέμβαση, ενώ οι υπόλοιποι υποβλήθηκαν σε λαπαροσκοπική προσέγγιση. 13 (25,7%) διακοιλιακή και 6 (12,8%) οπισθοπεριτοναϊκή προσέγγιση. Η πλειονότητα των κακοήθων περιπτώσεων (94%) είχε ανοικτή χειρουργική επέμβαση. Παρόλο που δεν παρατηρήθηκαν διαφορές στα ποσοστά επιπλοκών μεταξύ ανοικτής και λαπαροσκοπικής χειρουργικής, παρατηρήθηκε αισθητή μείωση της διάρκειας της νοσηλείας, στους ασθενείς που χειρουργήθηκαν λαπαροσκοπικά. **Συμπέρασμα:** Η λαπαροσκοπική εκτομή μεγάλων επινεφριδιακών βλαβών μπορεί να αποτελεί χειρουργική πρόκληση, αλλά εάν υπάρξει εμπειρία μπορεί να πραγματοποιηθεί αποτελεσματικά. Οι κίνδυνοι και οι επιπλοκές μειώνονται όταν η χειρουργική προσέγγιση είναι προσαρμοσμένη για κάθε ασθενή.

References

1. Bovio S, Cataldi A, Reimondo G, Sperone P, Novello S, Berruti A, et al. Prevalence of adrenal incidentaloma in a contemporary computerized tomography series. *Journal of endocrinological investigation*. 2006;29(4):298-302.
2. Joris JL, Hamoir EE, Hartstein GM, Meurisse MR, Hubert BM, Charlier CJ, et al. Hemodynamic changes and catecholamine release during laparoscopic adrenalectomy for pheochromocytoma. *Anesthesia and analgesia*. 1999;88(1):16-21.
3. NIH state-of-the-science statement on management of the clinically inapparent adrenal mass ("incidentaloma"). *NIH consensus and state-of-the-science statements*. 2002;19(2):1-25.
4. Denzinger S, Burger M, Hartmann A, Hofstaedter F, Wieland WF, Ganzer R. Spontaneous rupture of a benign giant adrenal adenoma. *APMIS: acta pathologica, microbiologica, et immunologica Scandinavica*. 2007;115(4):381-4.
5. Mantero F, Arnaldi G. Management approaches to adrenal incidentalomas. A view from Ancona, Italy. *Endocrinology and metabolism clinics of North America*. 2000;29(1):107-25, ix.
6. Medeiros LJ, Weiss LM. New developments in the pathologic diagnosis of adrenal cortical neoplasms. A review. *American journal of clinical pathology*. 1992;97(1):73-83.
7. Angeli A, Osella G, Ali A, Terzolo M. Adrenal incidentaloma: an overview of clinical and epidemiological data from the National Italian Study Group. *Hormone research*. 1997;47(4-6):279-83.
8. Terzolo M, Ali A, Osella G, Mazza E. Prevalence of adrenal carcinoma among incidentally discovered adrenal masses. A retrospective study from 1989 to 1994. Gruppo Piemontese Incidentalomi Surrenalici. *Archives of surgery (Chicago, Ill : 1960)*. 1997;132(8):914-9.
9. Imai T, Kikumori T, Ohiwa M, Mase T, Funahashi H. A case-controlled study of laparoscopic compared with open lateral adrenalectomy. *American journal of surgery*. 1999;178(1):50-3; discussion 4.
10. Smith CD, Weber CJ, Amerson JR. Laparoscopic adrenalectomy: new gold standard. *World journal of surgery*. 1999;23(4):389-96.
11. Tanaka M, Ono Y, Matsuda T, Terachi T, Suzuki K, Baba S, et al. Guidelines for urological laparoscopic surgery. *International journal of urology : official journal of the Japanese Urological Association*. 2009;16(2):115-25.
12. Conzo G, Tricarico A, Belli G, Candela S, Corcione F, Del Genio G, et al. Adrenal incidentalomas in the laparoscopic era and the role of correct surgical indications: observations from 255 consecutive adrenalectomies in an Italian series. *Canadian journal of surgery Journal canadien de chirurgie*. 2009;52(6):E281-5.
13. Brunaud L, Nguyen-Thi PL, Mirallie E, Raffaelli M, Vriens M, Theveniaud PE, et al. Predictive factors for postoperative morbidity after laparoscopic adrenalectomy for pheochromocytoma: a multicenter retrospective analysis in 225 patients. *Surgical endoscopy*. 2016;30(3):1051-9.
14. Quayle FJ, Spittler JA, Pierce RA, Lairmore TC, Moley JF, Brunt LM. Needle biopsy of incidentally discovered adrenal masses is rarely informative and potentially hazardous. *Surgery*. 2007;142(4):497-502; discussion -4.
15. Liao CH, Chueh SC, Lai MK, Hsiao PJ, Chen J. Laparoscopic adrenalectomy for potentially malignant adrenal tumors greater than 5 centimeters. *The Journal of clinical endocrinology and metabolism*. 2006;91(8):3080-3.
16. Germain A, Klein M, Brunaud L. Surgical management of adre-

- nal tumors. *Journal of visceral surgery*. 2011;148(4):e250-61.
17. Zografos GN, Farfaras A, Vasiliadis G, Pappa T, Aggeli C, Vassilatou E, et al. Laparoscopic resection of large adrenal tumors. *JSL: Journal of the Society of Laparoendoscopic Surgeons*. 2010;14(3):364-8.
 18. Parnaby CN, Chong PS, Chisholm L, Farrow J, Connell JM, O'Dwyer PJ. The role of laparoscopic adrenalectomy for adrenal tumours of 6 cm or greater. *Surgical endoscopy*. 2008;22(3):617-21.
 19. Tessonnier L, Ansquer C, Bournaud C, Sebag F, Mirallie E, Lifante JC, et al. (18)F-FDG uptake at initial staging of the adrenocortical cancers: a diagnostic tool but not of prognostic value. *World journal of surgery*. 2013;37(1):107-12.
 20. Combemale F, Carnaille B, Tavernier B, Hautier MB, Thevenot A, Scherpereel P, et al. [Exclusive use of calcium channel blockers and cardioselective beta-blockers in the pre- and per-operative management of pheochromocytomas. 70 cases]. *Annales de chirurgie*. 1998;52(4):341-5.
 21. Siddiqi HK, Yang HY, Laird AM, Fox AC, Doherty GM, Miller BS, et al. Utility of oral nicardipine and magnesium sulfate infusion during preparation and resection of pheochromocytomas. *Surgery*. 2012;152(6):1027-36.
 22. Ramacciato G, Paolo M, Pietromaria A, Paolo B, Francesco D, Sergio P, et al. Ten years of laparoscopic adrenalectomy: lesson learned from 104 procedures. *The American surgeon*. 2005;71(4):321-5.

CASE REPORT

A rare presentation of Matrix Stone and a short review of the literature

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Abstract

Matrix stones are extremely rare. An unusual case of coexistence of matrix stone with a conventional, calcified stone is reported. A 63-year-old female was admitted to our department because of a sizable, radiopaque, right renal stone. Her medical history included recurrent urinary tract infections. Preoperative Computed Tomography scan demonstrat-

ed a 2 cm calculus and a radiolucent, soft tissue mass in the dilated, right renal pelvis, without enhancement after the intravenous administration of contrast agent. The patient underwent right Percutaneous Nephrolithotomy. Intraoperatively, we found that the renal pelvis was occupied by matrix stone with a centrally located core of solid calculus.

Key words

Matrix stone, percutaneous nephrolithotomy

Introduction

Matrix stones are also known as fibrinomas, fibrinous or colloid calculi and albumin calculi [1-3]. Their atypical clinical presentation and imaging features constitute a diagnostic and therapeutic challenge for the practicing urologist [2]. Our aim is to present an uncommon case of diagnosis of matrix and solid, calcified stone simultaneously, as well as to present a short review of the literature about matrix stone.

Case Report

A 63-year-old female was admitted to our department because of a sizable right renal stone. Her medical history included hypertension, hypothyroidism and recurrent urinary tract infections (UTIs) by *Escherichia Coli*. Twenty-eight days before her admission, she presented urinary tract obstruction and infection, an indwelling double-J stent was inserted in another hospital and she received cefuroxime axetil for 15 days. She did not

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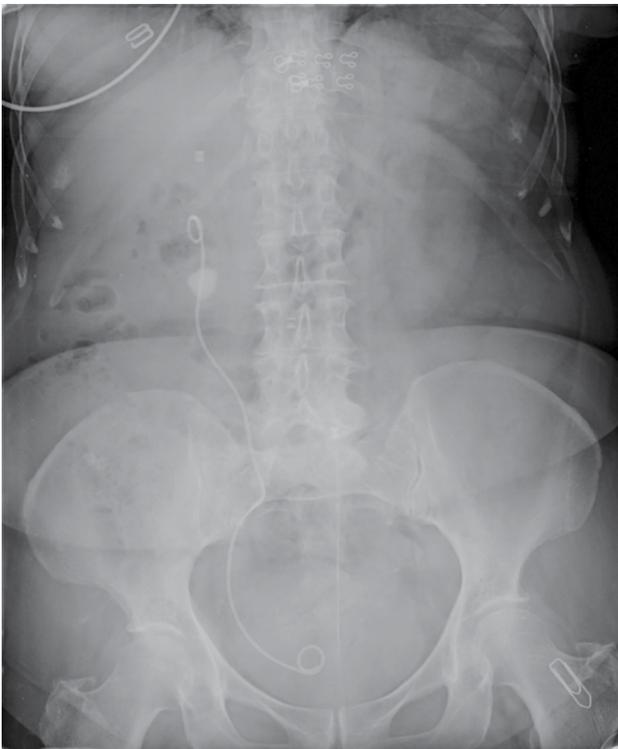


Figure 1. Preoperative plain X-ray of the kidney, ureter and bladder region demonstrating a sizable, radiopaque, right renal stone and an indwelling, right double-J stent.



Figure 2. Preoperative non-contrast CT scan demonstrating a dilated right renal pelvis, totally occupied by soft tissue mass. There is gas within soft tissue mass. We can discriminate the sizable, calcified stone of the right renal pelvis and the trace of double-J stent in front of the stone.

bring to us any past urinary culture, but her urinary culture three days before her admission was negative.

Preoperative plain X-Ray of the kidney, ureter and bladder region demonstrated a sizable, radiopaque, right renal stone and an indwelling, right double-J stent (**Fig. 1**). Computed Tomography (CT) scan revealed a 2 cm, renal pelvic calculus and a radiolucent soft tissue mass in the dilated, right renal pelvis, without enhancement after the intravenous administration of contrast agent. Hounsfield Units (HU) measurement of renal calculus and soft tissue mass was 1300-1500 and 30-50, respectively. There was gas in the right renal pelvis, possibly due to the recent surgical intervention (**Fig. 2**).

The patient underwent Percutaneous Nephrolithotomy (PCNL) in prone position, under general anesthesia. Firstly, we replaced indwelling double-J stent by a 6-Fr ureteral catheter, in lithotomy position. We started injection of contrast agent via ureteral catheter and the patient was put in prone position. A single tract at the right, posterior, lower pole calyx was created under fluoroscopy. After tract dilation with a balloon dilator,

a 30-Fr Amplatz sheath was positioned inside the calyx of puncture. Rigid nephroscope was positioned inside and we found that the renal pelvis was occupied by grayish, putty-like, matrix stone with a centrally located solid calculus (**Fig. 3**). Matrix stone was removed using grasping forceps. Afterwards, we fragmented the solid stone with a pneumatic lithotripter and the fragments were removed using grasping forceps (**Fig. 4**). An 18-Fr nephrostomy tube was inserted for postoperative drainage. The patient was stone free (**Fig. 5**). Foley and ureteral catheters were removed on the 1st postoperative day, nephrostomy tube was removed on the 2nd postoperative day and the patient was discharged. The patient received ciprofloxacin for 10 days prophylactically. We asked her to analyze chemically both types of stones, as our laboratories do not perform this procedure, but she did not do it. The patient did not develop UTI or stone during the first 10 months postoperatively.

Discussion

Matrix stones are a rare form of renal calculi, which were firstly described 100 years ago by Gage and Beal [2-4]. In contrast to the conventional stones, matrix stones are encountered more frequently in females, perhaps due to the increased incidence of UTIs in females [3-6].

Macroscopically, their colour is usually gray-white or



Figure 3. Intraoperative photo demonstrating the sizable, calcified renal stone (1) and matrix stone (2).

yellow-tan and they are soft, amorphous and putty or rubbery-like on palpation [1,3,5]. Matrix is an organic substance composing of approximately two-thirds mucoprotein and one-third mucopolysaccharide by weight [2]. Matrix is thought to promote stone's formation functioning as a foundation or inducer for the deposition of crystalline component [2,3,5]. Matrix encountered in matrix stone is similar to that encountered in calcified urinary stones [2,4-6]. However, in contrast with normal urinary stones which contain mainly crystalline salt and a small amount of matrix (approximately 2.5% of the dry weight), the organic component of matrix stones comprises approximately 65% of the stone's dry weight, while their crystalline component is minimum [1-6]. It is still unknown why some matrix stones fail to be calcified [2-6]. It was theorized that reduced urinary calcium levels are responsible for matrix stone formation, but recent studies demonstrated formation of matrix stones in patients with normal urinary calcium excretion [2].

The most common predisposing factors of the formation of matrix stones are recurrent UTI by urea-splitting bacteria, previous stone formation, previous surgery due to urolithiasis and obstructive uropathy [1-6]. Urinary cultures usually reveal *Proteus* species and *Escherichia Coli* [1-5]. Moreover, there is increased risk of matrix stone formation in chronic kidney disease patients undergoing dialysis and in patients with glomerulonephritis due to proteinuria [2-6]. Patients usually present with renal colic or symptoms of UTI [1,3]. Our patient had a history of recurrent UTIs by *Escherichia Coli*.



Figure 4. Intraoperative photo showing fragments of the renal, solid calculus mixed with matrix stone.

Imaging studies may contribute to the diagnosis of matrix stone, although the diagnosis is often made intraoperatively [3,5]. Matrix stones are radiolucent on X-Ray [1-6]. Ultrasonography reveals a solid, hypoechoic mass without acoustic shadowing, which may occupy the entire pelvicalyceal system [1-3,5,6]. CT scan demonstrates a soft tissue mass of the renal pelvis, without contrast enhancement [1,6].

CT Urography, as well as intravenous and retrograde pyelogram, demonstrates filling defects in the renal collecting system [2-4,6]. Occasionally, indistinct calcified materials may be shown within matrix stones [1,2,6]. Gas within the layers of matrix stone was also reported [2]. According to the literature, the HU measurement of matrix stones varies between 15-80 on the unenhanced CT scan, proportionally to the content of matrix stone's crystalline component [1,6]. On Magnetic Resonance Imaging, matrix stones appear hypointense signal in T1-weighted images, without enhancement after gadolinium administration, and slightly hyperintense signal in T2-weighted images [1,3,5]. In our case, HU of the matrix stone was 30-50. Furthermore, there was gas in the right renal pelvis, which was attributed to the recent surgical intervention.

The differential diagnosis includes other causes of radiolucent filling defects of the renal collecting system



Figure 5. Plain X-Ray and nephrostogram on the 2nd postoperative day demonstrating the nephrostomy tube at the right, posterior, lower pole calyx. The passage of contrast agent is easy and there are no filling defects/residual stones.

(malignant tumours, radiolucent renal stones, blood clots etc) [1-3,6]. Imaging studies and retrograde ureterorenoscopy contribute to valid diagnosis [2].

Complete stone's removal, correction of coexisting obstructive uropathy and administration of antibiotics according to the results of the urinary culture ensure treatment and prevent recurrence [1,5]. Minimally invasive surgical techniques, such as percutaneous nephrolithotomy and retrograde ureterorenoscopy, can remove matrix stones successfully and have replaced open surgery, which was the treatment of choice in the past [1,3,5]. Extracorporeal shock wave lithotripsy has no place in the treatment of matrix stone [2,3,5,6]. The choice of each surgical

technique depends on stone burden and location [3]. In our case, the renal pelvis was occupied by matrix stone and was obstructed by a sizable, calcified stone. PCNL was the treatment of choice and our patient is stone free and did not suffer any UTI during the last 10 months.

We need to mention that in our case we observe the coexistence of sizable, calcified, radiopaque stone with a poorly-calcified stone in the same renal unit. We cannot explain the reason why matrix stone fail to calcify in this case and we do not know stones' chemical analysis for the reason we already mentioned. A possible hypothesis is that the solid, calcified stone is a carbonate apatite stone. Firstly, the macroscopic and radiologic

appearance of our stone is similar to carbonate apatite stone's. Secondly, our patient suffered recurrent UTIs, which favor carbonate apatite stone's formation. In such circumstances, carbonate apatite stone could be formed and grew up and secondarily could worsen UTI and urinary stasis, which favor the formation and aggregation of matrix stone.

Conclusion

Matrix stone constitute a diagnostic and therapeutic

challenge due to their rarity and atypical clinical and imaging features. A high index of suspicion is required to diagnose this uncommon clinical entity. PCNL is a well-established and effective surgical procedure to treat matrix stone and to eliminate the possibility of recurrence. 

Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

Περίληψη

Οι λίθοι matrix είναι εξαιρετικά σπάνιοι. Στο άρθρο αυτό αναφέρεται μία ασυνήθης περίπτωση συνύπαρξης λίθου matrix με συμβατικό, ασβεστοποιημένο λίθο. Μία γυναίκα 63 ετών εισήχθη στην κλινική μας λόγω ενός ευμεγέθους, ακτινοσκοπικού λίθου του δεξιού νεφρού. Το ατομικό της αναμνηστικό περιλάμβανε υποτροπιάζουσες ουρολοιμώξεις. Η προεγχειρητική Αξονική Τομογραφία κατέδειξε έναν λίθο μέγιστης διαμέτρου 2 εκατοστών και μία μη-ακτινοσκοπική μάζα μαλακού ιστού στη διατεταμένη δεξιά νεφρική πύελο, η οποία δεν παρουσίασε ενίσχυση μετά την ενδοφλέβια χορήγηση σκιαγραφικής ουσίας. Η ασθενής υπεβλήθη σε Διαδερμική Νεφρολιθοτριψία δεξιά. Διεγχειρητικά, ανακαλύψαμε ότι η νεφρική πύελος είχε καταληφθεί από λίθο matrix με έναν κεντρικά ευρισκόμενο πυρήνα από στερεό λίθο.

**Λέξεις
ευρητηριασμού**
Λίθος Matrix, διαδερμική
νεφρολιθοτριψία

References

1. Liu CC, Li CC, Shih MC, Chou YH, Huang CH. Matrix stone. *J Comput Assist Tomogr*. 2003;27(5):810-813.
2. Bani-Hani AH, Segura JW, Leroy AJ. Urinary matrix calculi: our experience at a single institution. *J Urol* 2005; 173:120-123.
3. Beltrami PA, Ruggera LB, Guttilla AA, Iannetti AA, Zattoni FA, Gigli FA, Bernich PC, Zattoni FA. The Endourological Treatment of Renal Matrix Stones. *Urol Int* 2014, 93:394-398.
4. Canales BK, Anderson L, Higgins LA, Frethem C, Ressler A, Kim IW, Monga M. Proteomic analysis of a matrix stone: a case report. *Urol Res* 2009, 37:323-329, doi: 10.1007/s00240-009-0213-5.
5. Shah HN, Kharodawala S, Sodha HS, Khandkar AA, Hegde SS, Bansal MB. The management of renal matrix calculi: a single-centre experience over 5 years. *BJU Int* 2009; 103:810-814.
6. Rowley MW, Faerber GJ, Wolf JS Jr. The University of Michigan experience with percutaneous nephrostolithotomy for urinary matrix calculi. *Urology* 2008; 72: 61-64.



CASE REPORT

Renocolic fistula following radiofrequency ablation of a renal tumor. A rare case report and review of the literature

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Abstract

Data in the literature concerning fistula formation between colon and kidney are limited in no more than 50 case reports with the majority of them representing complications of bowel surgery or disease. There are sparse and limited data concerning fistula formation after urological procedures. We report a case of fistula formation between calyx and colon after RFA for kidney tumor and we review the literature about this rare entity.



Key words

renocolic fistula;
radiofrequency ablation;
renal cell carcinoma

Introduction

Data in the literature concerning fistula formation between colon and kidney are limited in no more than 50 case reports. The majority of them are complications of bowel surgery [1,2] or bowel disease like Crohn's disease or diverticulitis [3]. Nevertheless urological diseases and surgeries can potentially result in this rare complication with kidney surgeries due to lithiasis and renal abscess account for the majority of the cases [4-9]. We report a case of a fistula formation between renal calyx and colon after radiofrequency ablation (RFA) for a kidney tumor.

Case Report

Our patient is a 44 years old female with a history of right radical nephrectomy due to renal tumor 12 years ago. She has suffered from Von-Hippel-Lindau syndrome and seven years before she was diagnosed with a new renal tumor on the left kidney this time, which was managed with ultrasound guided radiofrequency ablation (RFA). Another tumor appeared 7 months ago for which she underwent ultrasound guided RF ablation, which failed to eradicate the tumor and another try was performed, computed tomography (CT) guid-

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Figure 1. Air inside ureter, blue arrow.



Figure 2. Contrast material inside calyx, blue arrow.



Figure 3. Fistula after excision.

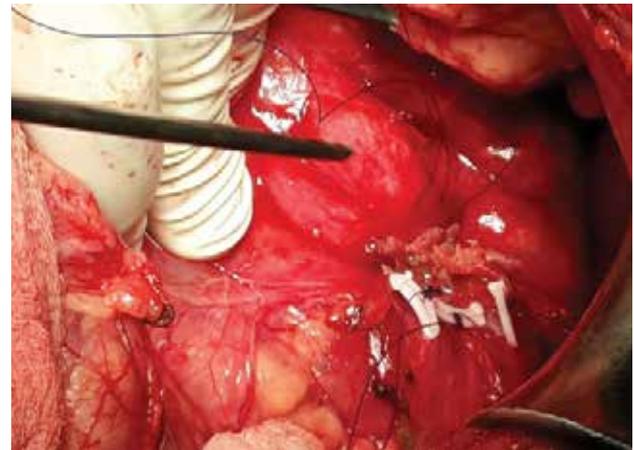


Figure 2. Calyceal system sutured.

ed this time, one month ago. One month after the last RF operation she was admitted to the emergency department due to anuria, diarrhea with urine content. The CT imaging revealed gas (**Figure 1**) inside the calyceal system and ureter and oral taken contrast material inside renal middle calyx (**Figure 2**). A fistula between colon and lower pole renal calyx was diagnosed and the patient underwent a left percutaneous nephroureteral stent placement.

After her last treatment her condition was deteriorating and so she was referred to our department. We immediately started parental nutrition and broad spectrum antibiotics. Ten days after starting conservative treatment no improvement was observed and a colonoscopy was scheduled during which the fistula orifice has been visualized and clipped. Two weeks after the colonoscopic management of the fistula there was no satisfactory improvement on patient's condition (leakage was not re-

duced) and so surgical repair was decided. During the operation the fistula has been identified and excised (**Figure 3**), the colon was mobilized and a right colectomy with an end to end anastomosis was performed. Finally the calyceal system was sutured (**Figure 4**) and a renorrhaphy was performed. Patient's condition improved significantly and two weeks after the operation the previous stent was removed, a retrograde urography was performed with no leakage observed and a JJ stent was then placed. A CT imaging 4 weeks after the surgery didn't show any leakage and so the stent was removed uneventfully.

Discussion

Despite the fact that a reno-colic fistula formation is addressed as a possible consequence of RFA, it is not a well-known complication because of its rarity. There are three case reports in the literature concerning this kind of complication with the first one describ-

ing a fistula between duodenum and kidney after RFA for a renal tumor [10]. Most recently two case reports were published concerning participation of the colon and the kidney in the fistula formation [11-12]. Even though all these cases were managed surgically there are data in the literature that imply that conservative treatment is feasible especially when sepsis or other

major complication exist [13-15]. In our case conservative and endoscopic treatment failed to manage patient's condition and so surgical repair was utilized with excellent results. 

Conflicts of interest

The author declared no conflict of interest.

Περίληψη

Τα δεδομένα στην βιβλιογραφία για συρίγγια μεταξύ νεφρού και εντέρου είναι πολύ περιορισμένα. Συνήθως τα συρίγγια αυτά οφείλονται σε φλεγμονώδης νόσους του εντέρου ή σε επιπλοκές επεμβάσεων στο έντερο. Παρόλα αυτά υπάρχουν πολύ λίγες αναφορές για δημιουργία παθολογικής επικοινωνίας μεταξύ νεφρού και εντέρου ως αποτέλεσμα ουρολογικών επεμβάσεων ή παθήσεων. Ο σκοπός της παρούσας μελέτης είναι να αναφέρουμε την διάγνωση συριγγίου μεταξύ νεφρικού κάλυκα και του εντέρου μετά από θερμοπηξία μέσω ραδιοσυχνότητας όγκου του νεφρού και η επισκόπηση της βιβλιογραφίας για την αντιμετώπισή τους.



Λέξεις ευρητηριασμού

νεφροκολικό συρίγγιο,
θερμοπηξία με ραδιοκύματα,
καρκίνος νεφρού

References

- Melvin WS, Burak WE, Flowers JL et al Reno-colic fistula following primary repair of the colon: case report. *J Trauma*. 1993 Dec;35(6):956-7.
- Brust RW Jr, Morgan AL. Renocolic fistula secondary to carcinoma of the colon. *J Urol*. 1974 Apr;111(4):439-40.
- Ciocco WC, Priolo SR, Golub RW. Spontaneous ureterocolic fistula: A rare complication of colonic diverticular disease. *Am Surg* 1994;60(11):832-5
- Mooreville M, Elkouss GC, Schuster A et al. Spontaneous renocolic fistula secondary to calculous pyonephrosis. *Urology*. 1988 Feb;31(2):147-50.
- Yildiz M, Atan A, Aydoğanlı et al Renocolic fistula secondary to chronic pyelonephritis. *Int Urol Nephrol*. 1993;25(3):229-33.
- Karamchandani MC, Riether R, Sheets J et al Nephrocolic fistula. *Dis Colon Rectum*. 1986 Nov;29(11):747-9.
- Neustein P, Barbaric ZL, Kaufman JJ. Nephrocolic fistula: a complication of percutaneous nephrostolithotomy. *J Urol*. 1986 Mar;135(3):571-3.
- Alster C, Zantut LF, Lorenzi F et al An unusual case of pneumoperitoneum: nephrocolic fistula due to a giant renal staghorn calculus. *Br J Radiol*. 2007 Jan;80(949):e1-3.
- Henaó DE, Vásquez A. Spontaneous nephrocolic fistula secondary to a staghorn calculus. *Urol Res*. 2012 Oct;40(5):617.
- de Arruda HO, Goldman S, Andreoni C et al Renoduodenal fistula after renal tumor ablation with radiofrequency Surg Laparosc Endosc Percutan Tech. 2006 Oct;16(5):342-3.
- Sáenz Medina J, Redondo González E, Hernández-Atance JM et al Renocolic fistula as a complication of radiofrequency in the treatment of renal cell carcinoma. *Arch Esp Urol*. 2010 Jan-Feb;63(1):74-7.
- Patel BJ, Mathur AK2, Puri N1, Jackson CS3. A Rare Case of Nephrocolic Fistula Resulting from Radio Frequency Ablation (RFA) of Renal Cell Carcinoma. *ACG Case Rep J*. 2014 Jan 10;1(2):93-5.
- Herbert FB, Goodacre B, Neal DE Jr. Successful conservative management of nephrocolic fistula. *J Endourol*. 2001;15(3):281-3.
- Vanderbrink BA, Rastinehad A, Caplin D, et al. Successful conservative management of colorenal fistula after percutaneous cryoablation of renal-cell carcinoma. *J Endourol*. 2007;21(7):726-9.
- Morgan AI, Doble A, Davies RJ. Successful conservative management of a colorenal fistula complicating percutaneous cryoablation of renal tumors: a case report. *J Med Case Rep*. 2012 Oct 26;6:365.

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