

CASE SERIES AND REVIEW OF THE LITERATURE

IATROGENIC INJURY OF THE LOW URINARY TRACT IN WOMEN UNDERGOING PELVIC SURGICAL INTERVENTIONS

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ABSTRACT

Introduction. Iatrogenic injury of the urinary tract in women undergoing pelvic surgeries is one of the most feared complications and an important source of significant morbidity. Moreover, they cause a lot of anxiety to both patient and surgeon and they also create many legal concerns. The most commonly affected organs are the ureter, bladder and urethra. Urologic injury during obstetrics and gynecologic surgery should always be a matter of prevention, but there are situations in which prevention fails. With this article we intend to raise the awareness on potential situations leading to iatrogenic urinary tract lesions during obstetrics and gynecology surgery.

RÉSUMÉ

La lésion iatrogène des voies urinaires chez les femmes soumises à la chirurgie pelvienne

Introduction. La lésion iatrogène des voies urinaires chez les femmes subissant des interventions pelviennes est l'une des complications les plus redoutées et une source importante de morbidité significative. En outre, elles provoquent beaucoup d'anxiété en égale mesure pour le patient et le chirurgien et elles créent également de nombreuses préoccupations juridiques. Les organes les plus fréquemment touchés sont l'uretère, la vessie et l'urètre. Les lésions urologiques en obstétrique et en chirurgie gynécologique devraient toujours être une question de prévention, mais il y a des situations où la

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Cases presentation. Three different cases of iatrogenic injuries at various sites of the urinary tract during pelvic surgeries are presented and preventive and treatment measures are discussed.

Conclusions. Most iatrogenic urinary tract lesions are prone to occur during difficult surgeries, but a significant number of iatrogenic injuries are made during routine interventions, even by the most trained surgeons. Therefore, preventing and recognizing iatrogenic urinary tract injuries is of highest importance for all surgeons performing interventions in the pelvic area.

Keywords: iatrogenic injury, ureter, bladder.

INTRODUCTION

The proximity of the lower urinary tract organs and the reproductive organs predispose them to iatrogenic trauma during various obstetric and gynecological surgical interventions. Bladder is the most frequent urologic organ injured during surgery, closely followed by the ureter. The incidence of the ureteral injuries varies according to the type of surgery, but it is estimated to be between 52%-82% in gynecologic procedures, with a higher prevalence in oncologic procedures¹⁻⁴. However, most studies report that a large number of iatrogenic injuries occurs during interventions for benign tumors, especially in women with dystocic pelvises, in women with large tumors which distort normal anatomy and predispose to severe hemorrhage or in severe endometriosis. The incidence of ureteral lesions is almost similar in abdominal and vaginal hysterectomy, but only one third of them are recognized intraoperatively⁵. Renal damage occurs in 25% of cases, requiring more specialized care. In obstetrical interventions, bladder can be injured during cesarean section in patients with certain risk factors, such as multiple previous cesarean sections, failure to empty the bladder preoperatively, ascended bladder flap, adhesions, difficult extraction of the fetal head⁶. Recognizing the risk factors and preventing iatrogenic injuries of ureter and bladder are essential to any surgery involving the pelvic area. Therefore, we discuss on three cases of urologic injuries and their particularities.

Case 1. A 62-year-old obese parous woman presented with vaginal bleeding, abdominal pain, frequent micturition. At an ultrasound examination

prévention échoue. Avec cet article, nous avons l'intention d'attirer l'attention sur les situations potentielles menant à des lésions des voies urinaires iatrogènes au cours de la chirurgie obstétrique et gynécologique.

Présentation des cas. Trois cas différents de lésions iatrogènes à divers sites de l'appareil urinaire lors de chirurgies pelviennes sont présentés et des mesures préventives et thérapeutiques sont discutées.

Conclusions. La plupart des lésions des voies urinaires iatrogènes sont susceptibles de survenir lors de chirurgies difficiles, mais un nombre important de lésions iatrogènes sont faites au cours d'interventions de routine, même par les chirurgiens les plus habiles. Par conséquent, la prévention et le dépistage des lésions des voies urinaires iatrogènes sont de la plus haute importance pour tous les chirurgiens effectuant des interventions dans la région pelvienne.

Mots-clés: lésion iatrogène, uretère, vessie urinaire.

she was diagnosed with a large uterine leiomyoma (120x90x70 mm), with increased vascularization. A total abdominal hysterectomy was performed. During surgery, the anatomy was distorted by the uterine tumor, with a highly vascular uterus, leading to severe hemorrhage. Blind clamping of pedicles was performed in order to stop the bleeding. After hysterectomy, cystoscopy was performed, and it revealed that the right ureter was accidentally ligated. Ureter stenting and repair were required.

Case 2. A 37-year-old nulliparous woman presented with chronic pelvic pain due to severe dysmenorrhea, infertility and a suggestive ultrasound for ovarian endometriomas. She was subjected to laparoscopy in order to remove the endometrial cysts. During laparoscopy, a 6.5 cm endometrioma was found on the left ovary, compressing the rectal wall and also many other endometrial foci were noted on the uterosacral ligaments. The endometrioma was resected, adhesiolysis was also performed with difficulty and the removal of multiple endometrial lesions was attempted. The insertion of a ureteral catheter was needed in order to avoid ureteral injury.

Case 3. A 30-year-old multipara, with a previous cesarean section and obesity presented with a 37 weeks pregnancy with gestational diabetes mellitus and a large baby. A cesarean section was performed. During surgery, multiple adhesions were noted, and the bladder was gently dissected from the anterior uterine wall. The extraction of the fetal head was made with difficulty. After the baby was extracted, the uterine inferior segment and the bladder were inspected. A 20 mm tear on the bladder fundus was

noted. Cystorrhaphy was performed and the patient had a continuous bladder drainage for 14 days.

DISCUSSION

The incidence of iatrogenic urinary tract injuries depends on the type of surgery. Ureteral injuries are more frequent during abdominal hysterectomy (1.3-2.2%) than during laparoscopic (1.3%) or vaginal hysterectomy⁷. Most urological associations divide the ureter into an upper segment, a middle segment and a lower segment. More than half of the iatrogenic injuries occur in the lower segment, while 30% occur in the upper segment and 19% in the middle segment. Anatomists also divide it into three segments: abdominal, pelvic and intraparietal⁸. Most ureteral injuries during gynecological surgeries occur in the pelvic segment. Risk factors such as: multiple prior interventions, adhesions, large uterine tumors, ovarian neoplasms, a distorted pelvic anatomy, massive intraoperative hemorrhage, endometriosis, inflammatory pelvic disease and coexistent bladder injury increase the risk of iatrogenic ureteral injuries^{9,10}.

The main mechanisms through which the ureter can be injured intraoperatively are: crushing by clamping, ligation or kinking by ligature, suture, transection and resection. Diathermy is also dangerous, especially in laparoscopic interventions, causing necrosis. Avascular necrosis also occurs postoperatively, due to electrocoagulation or extensive dissection of the periureteric tissue which impairs the anastomotic blood supply. The most frequent complication occurring postoperatively is ureteral angulation and obstruction. Hematoma can also cause subsequent obstruction¹¹.

Preventive strategies to reduce the risk of ureteric injuries include both preoperative and intraoperative measures. Appropriate preoperative investigations, such as ultrasound or CT scan can indicate a suspected pathology of the urinary tract. Intraoperative measures include adequate exposure, appropriate operative approach, avoidance of blind blood vessels clamping, ureteric direct visualization, short diathermy applications and mobilization of the bladder away from the operative site. A full examination of the disease in the pelvis and seeking for early specialized urological assistance where appropriate are mandatory. Preventive measures and postoperative measures are of utmost importance because only one third of iatrogenic injuries are recognized intraoperatively and 25% of unrecognized cases develop kidney failure if urine flow is not properly restored¹², leading to a high mortality^{13,14}. Urologic injury should be suspected in the

postoperative period if the patient presents: flank pain, fever, hematuria, anuria, abdominal distension, secondary hypertension, urine leakage from different sites other than urethra, retroperitoneal urinoma, peritonitis, sepsis. However, typical symptoms do not occur in half of the patients. In suspected cases, investigations are needed to establish renal function and to evaluate ureteral and bladder continuity. The most common investigations are: abdominal and renal ultrasound, cystoscopy, abdominal and pelvic CT-scan with iv contrast, and specialized urologic tests¹⁵. A full blood count and an electrolyte profile are also required to evaluate the patient, but laboratory investigations tend to be unspecific¹⁶. Management of ureteral injury depends on the type and segment of the injury, but all transected ureters need stenting (mostly a double-J stent is used) with different types of surgical repair. The bladder needs to be decompressed with a catheter (a Foley is mostly used). Whenever the trigone of the bladder is injured, prophylactic ureteral stenting must be used to prevent fistula formation¹⁷.

Iatrogenic bladder injuries tend to be more frequent during cesarean sections, with the concomitant number of these interventions rising worldwide. The most common causes for this type of injury are: failure to empty the bladder preoperatively (mostly catheter-related problems), inadequate bladder flap reflection, extension of the incision into the lower segment, previous cesarean sections, multiple adhesions, stage of labor and station of fetal head. Bladder should always be checked for integrity¹⁸. A bladder injury repair is shown in figure 1.



Figure 1. Iatrogenic bladder injury repair in cesarean section.

CONCLUSIONS

In the first two cases, one can identify the most prominent risk factors such as large tumor, severe hemorrhage that required blind vessel clamping, distorted pelvic anatomy, severe endometriosis. Rapid urologic intervention with cystoscopy, CT scan and ureteral stenting prevented renal deterioration. In the third case, early recognition of bladder injury and cystorrhaphy (double layer with absorbable suture) were essential for the patients' evolution. In every intervention involving the pelvic area, all surgeons must be aware of the possibility of iatrogenic urologic injuries in order to prevent, recognize and repair them as early as possible to avoid further complications and loss of renal function.

Compliance with Ethics Requirements:

„The authors declare no conflict of interest regarding this article“

„The authors declare that all the procedures and experiments of this study respect the ethical standards in the Helsinki Declaration of 1975, as revised in 2008(5), as well as the national law. Informed consent was obtained from all the patients included in the study“

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