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Ahmed Solyman
Department of Urology, Faculty of Medicine, Al-Azhar University, Cairo, ahmedsolyman2022@gmail.com

Aly Gomaa
Department of Urology, Faculty of Medicine, Al-Azhar University, Cairo, Egypt, alygomaa68@yahoo.com

Abdullah Zaki
Department of Urology, Faculty of Medicine, Al-Azhar University, Cairo, Egypt, zakizaki10@yahoo.com

Mahmoud Ali
Department of Urology, Faculty of Medicine, Al-Azhar University, Cairo, Egypt,
dr_mahmoud72@hotmail.com

Hasan Ismail
Department of Urology, Faculty of Medicine, Al-Azhar University, Cairo, Egypt, hasan.ismail60@yahoo.com

See next page for additional authors

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Authors

Ahmed Solyman, Aly Gomaa, Abdullah Zaki, Mahmoud Ali, Hasan Ismail, Mohammed Hindawy, Mohammed El-feky, Hasan Abdelazim, Hani Abdelaal, and Ahmed Abdelraouf

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Urinary Tract Injuries during Obstetric and Gynecologic Surgeries: Rates and Management Outcome at Two High-Volume Centers in a Developing Country

Ahmed Solyman [1]*MD; Aly Gomaa [1]MD; Abdullah Zaki [1]MD; Mahmoud Ali [1]MD; Hasan Ismail [1]MD; Mohammed Hindawy [1]MD; Mohammed El-feky [1]MD; Hassan Abdelazim [1]MD; Hani Abdelaal [1]MD; Ahmed Abdelraouf [2]MD

Corresponding Author:
Ahmed Solyman
Ahmedsolyman2022@gmail.com

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[1]Urology Department,Faculty of Medicine, Al-Azhar University, Cairo , Egypt.

[2]Obstetrics and Gynecology Department, Faculty of Medicine, Al-Azhar University, Cairo , Egypt.

ABSTRACT

Background: Iatrogenic genitourinary trauma can result from various obstetric (Obst) and Gynecologic (Gyn) surgeries.
Aim of The Work: To evaluate the rate and management outcome of urinary tract (UT) injuries caused by Obst/Gyn surgeries at two tertiary care centers in a developing country.
Patients and Methods: In this study, we reviewed the files of all patients with UT injuries due to Obst/Gyn surgeries managed in the past 6 years at two tertiary care centers in Egypt. Types of Obst/Gyn surgeries and UT injuries, time at diagnosis, associated factors, and management outcome were evaluated.
Results: The study included 103 patients. The UT injuries were in the form of urinary bladder injury in 38 (36.9%), ureteral injury in 11 (10.7%), and genitourinary fistula in 54 (52.4%). The fistula was vesicouterine in 13, vesicovaginal in 36, and ureterovaginal in 5 cases. Most bladder injuries (76.3%) occurred during cesarean section, and all were reported and successfully repaired intraoperatively. The ureteral injuries were reported intraoperatively in 7 (63.6%) and postoperatively in 4 (36.4%) cases. Most ureteral injuries (90.9%) occurred during abdominal hysterectomy, and all were successfully managed except for one patient who needed reoperation. Most genitourinary fistulae (74.1%) were diagnosed after abdominal hysterectomy, and all were managed successfully by surgical intervention, except 3. The factor associated with bladder injury and genitourinary fistula formation was the history of previous pelvic surgery.
Conclusion: Most UT injuries induced during Obst/Gyn surgeries were managed successfully. The reported associated factor could aid in reducing the risk of this type of injury.

Keywords: *Injury; Gynecology; Obstetrics; Urinary tract.*

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INTRODUCTION

The female genital and urinary systems are closely related embryologically and anatomically. The surgeon should know the anatomy of this area to avoid urinary tract (UT) injuries during obstetric (Obst) and gynecologic (Gyn) surgeries [1]. UT injuries during Obst/Gyn surgeries are rare but have a significant psychological impact on both patient and surgeon, and their medico-legal aspects are very bothering .[2,3]

UT injuries during Obst/Gyn operations range from 0.3 to 1% [4, 5]. Most cases are bladder injury, approximately three times more than ureteral injury .[4,6]

The primary goal of the Obst/Gyn surgeon is to avoid UT injuries during his procedure. Still, in some situations, this will be difficult as in patients with abnormal anatomy, difficult operations as in the presence of severe bleeding or pelvic adhesions, and with surgeons with low experience. Immediate intraoperative repair of these injuries is optimal. In some cases, diagnosis and management are delayed postoperatively .[7]

UT injuries during Obst/Gyn operations are either acute injuries such as bladder and ureteral laceration, and ureteral ligation identified immediately intra-operatively or chronic injuries as fistula formation and stricture ureter, which are discovered later on .[8]

The objective of this study was to report the types and management outcomes of UT injuries resulting from Obst/Gyn procedures at our institution in the past 6 years. Also, the clinical and surgical characteristics of included patients will be evaluated.

PATIENTS AND METHODS

We retrospectively reviewed the records of all patients with UT injuries related to Obst/Gyn operations and were managed at Al-Azhar University Hospitals from 2015 to 2021. Only patients with complete medical records were included. The local institutional review board approved the study

protocol.

The following parameters were evaluated and recorded: Patients' demographics and clinical characteristics, types of Gyn/Obst surgery, types and time of diagnosis of UT injuries, surgeons' experience, and methods of injury management and its outcome.

Patients were stratified according to the type of injury, either urinary bladder injury, ureteral injury, or genitourinary fistula. Patients with incomplete follow-up after management were invited for clinical and imaging reevaluation. All prospectively enrolled patients signed informed consent before inclusion.

UT injuries due to Obst/Gyn surgeries were defined as laceration, transection, rupture, or ligation of the UT found during surgery or postoperative surgery-related hydronephrosis or leakage of urine or contrast media out of the UT required intervention.

Statistical analysis

The recorded data were analyzed using the statistical package for social sciences, version 25.0 (SPSS Inc., Chicago, Illinois, USA). Quantitative data were expressed as mean±standard deviation (SD) or median and range. Qualitative data were expressed as frequency and percentage. Chi-square (x2) test was used to compare proportions between qualitative variables. P-value≤0.05 was considered significant.

RESULTS

Overall, 131 cases with UT injuries related to Obst/Gyn surgeries were managed at our institution during the study period. Only 103 patients had complete medical records and follow-up data and were included in data analysis. The mean age of patients was 39.73 ±8.53 years, and the median follow-up period was 32 months (range: 7 to 58 months).

The urinary bladder injury was reported in 38 (36.9%) cases. All cases were discovered intraoperatively. It was in the form of a domal tear in 28 (73.7%) cases and posterior wall and domal tear in 10 (26.3%). Most bladder injuries (76.3%) occurred during cesarean section. All cases were managed by two-layer bladder closure using absorbable sutures and urinary bladder drainage for 5 to 14 days (median: 7 days). All patients passed the postoperative period smoothly without complications.

The ureteral injury was reported in 11 (10.7%) cases and discovered intraoperatively in 7 (63.6%) and postoperatively in 4 (36.4%) cases. Most ureteral injury cases (90.9%) were related to abdominal hysterectomy. Of those diagnosed intraoperatively, 5 (71.4%) were managed by ureteral stent insertion, and 2 (28.6%) underwent simple ureterovesical implantation. Only one case developed late ureteral stricture that required reimplantation. Regarding postoperatively diagnosed cases, one was managed by endoscopic ureteral dilation and 3 with ureterovesical implantation. Only one case with mid-ureteral injury needed a Boari flap.

The genitourinary fistula cases due to Obst/Gyn surgeries were reported in 54 (52.4%) cases. It was vesicouterine in 13 (24.1%), vesicovaginal in 36 (66.7%), and ureterovaginal in 5 (9.2%) cases. Most genitourinary fistula cases (74.1%) were related to abdominal hysterectomy. All cases were discovered postoperatively and managed surgically at least 3 months after Obst/Gyn surgery. All vesicovaginal and vesicouterine fistula cases were managed by open fistula closure with omental interposition. All ureterovaginal fistula cases were managed by open fistula closure and ureterovesical implantation. Three cases needed reoperation, 2 with a vesicovaginal fistula and one with a ureterovaginal fistula. No data was available about the outcome of reoperations.

The history of previous pelvic surgery was found to be an associated factor with urinary bladder injury and genitourinary fistula formation (Table 1).

Parameters	Urinary bladder injury (n=38)		Ureteral injury (n=11)		Genitourinary fistula (n=54)	
	n (%)	**p-value**	**n (%)**	**p-value**	**n (%)**	**p-value**
Type of Obst/Gyn surgery		<0.001		0.007		<0.001
Cesarean section	29 (76.3)		1 (9.1)		6 (11.1)	
Hysterectomy	8 (21.1)		10 (90.9)		40 (74.1)	
Uterine myomectomy	1 (2.6)		0 (0.0)		7 (13.0)	
Oophorectomy	0 (0.0)		0 (0.0)		1 (1.8)	
Surgeon experience		0.330		0.366		0.586
Low	22 (57.9)		4 (36.4)		29 (53.7)	
High	16 (42.1)		7 (63.6)		25 (46.3)	
Previous pelvic surgery		0.023		0.132		0.029
No	12 (31.6)		3 (27.3)		19 (35.2)	
Yes	26 (68.4)		8 (72.7)		35 (64.8)	

Table 1: Factors associated with urinary tract injuries during Obstetric and gynecologic surgeries.

DISCUSSION

The most frequent injuries during pelvic surgeries are the lower UT. Its rate is about 0.5-1.5%, with urinary bladder injuries being the most common [9]. Preventive measures to decrease the rate of lower UT injuries are of utmost importance. Both preoperative and intraoperative measures should be considered. Appropriate preoperative imaging (ultrasound or CT scan) can reveal the presence of any pathology of the UT. The intraoperative measures to reduce UT injuries during Obst/Gyn surgeries include good exposure, avoiding injury or blind ligation of blood

supply, urinary bladder mobilization, and direct ureteric visualization. Perioperative urological consultation or early interoperative may be mandatory to prevent or reduce the incidence of injury. [2]

In our series, we revised the records of 103 patients who underwent management of UT injuries related to Obst/Gyn operations. In this study, urological injuries were higher during gynecological procedures, especially abdominal hysterectomy. In contrast, Raut et al. (10), reported three-fold UT injuries with obstetric than gynecologic operations. However, Safrai et al. [3] stated that UT injuries are scarce during cesarean delivery, especially ureteral injuries. These variations may be due to the different study designs and prevalence of included cases with previous pelvic surgery.

In our study, bladder injury cases were more frequent than ureter injury cases, 36.9% and 10.7%, respectively. Basaranoglu et al. [4] supplied different results, who reported bladder injury in 39.0% and ureteral injury in 43.5%. The majority of cases with bladder injury occurred during cesarean sections. Bladder injury during cesarean section is commonly due to inadequate bladder emptying during surgery, abdominal adhesion from previous surgery, or difficult labor. [2]

Fistula after Obst/Gyn surgery may occur at different sites mostly because of difficulty in the dissection of the uterus from the urinary bladder leading to vesicovaginal fistula formation [9]. In our study, the frequency of all types of fistula was 52.4%. In contrast, Lee et al. [8] and Pal et al. [11] reported a higher incidence among different types of fistula. The vesicovaginal fistula was the most frequent type (66.7%), followed by ureterovaginal fistula (24.1%) and uterovaginal fistula (9.2%). Also, in Basaranoglu et al. [9] and Pal et al. [11] studies, the vesicovaginal fistula was the most common type. This may be due to their cases being after cesarean section only. Also, the present study included patients in whom Obst/Gyn surgeries were performed at other health care centers.

Several factors could predispose to UT injury during Obst/Gyn operations, such as surgeon experience, abnormal placenta position, distorted anatomy, and pelvic adhesion as in cases with previous pelvic surgery. In our series, apart from the type of surgery, the only significant associated factor with bladder injury and genitourinary fistula formation was the previous pelvic surgery.

In the present series, all bladder injury cases and most of the ureteral injuries and genitourinary fistulae were successfully managed. Despite the high success rate, the psychological impact cost burden should be taken into consideration.

CONCLUSION

Most Obst/Gyn surgery-related UT injuries were successfully managed. Despite the relatively high success rate, a comprehensive protocol for the management of these injuries is recommended. Also, studying risk factors is recommended to reduce the incidence and avoid late diagnosis and complications.

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