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ORIGINAL ARTICLE

Urological Injuries during Cesarean Section: Retrospective Cohort Study

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ABSTRACT

Background: Urinary tract injuries during cesarean sections are one of the most common complications. Bladder injuries are more frequent than ureteric injuries. Of all the ureteric injuries, only one-third are discovered during cesarean sections, and the majority of urinary tract injuries are discovered during surgery. The study aims to determine the prevalence of urinary tract injuries during cesarean section and identify the risk factors causing these complications, their management, and their outcomes.

Methods: This retrospective cohort study was conducted on 73 patients who underwent cesarean section complicated with urological injuries in Zagazig University hospitals in the last five years. We reviewed all medical records of deliveries from the Obstetrics and Gynecology Department Faculty of Medicine, Zagazig University Hospital, Egypt between January 2017 and December 2021.

Results: The incidence of urological injuries during CS was 0.3%. Forty-five (61.6%) patients had only a surgical history of previous CS and 20 (27.4%) patients had other surgical histories rather than CS (appendectomy, cholecystectomy, or hernia repair). There were 12 (16.4%) patients who had grade 3 bladder injuries, 54 (74%) patients who had grade 4 bladder injuries, and 7 (9.6%) patients who had grade 5 bladder injuries.

Conclusion: Despite the significant increase in the prevalence of CS, the incidence of urologic injury at the surgery (0.3%) was comparable to earlier literature studies. Our research indicates that patients with a history of CS have an increased risk of bladder injury.

Keywords: Urological Injuries, Cesarean Section, Bladder.

INTRODUCTION

The anatomical relationship between the female genital and urinary tract is such that operating on one always carries the risk of harm to the other. Of all gynecologic surgeries and cesarean sections, around 1% are complicated by urinary tract damage [1].

It is estimated that a significantly higher number of urinary tract injuries occur after pelvic surgery if the cases of unclear origin are taken into account. It has been shown that gynecologic surgery accounts for 75% of urinary tract injuries and that pelvic surgery causes 82% of ureteric injuries [2].

The two types of urinary tract injuries resulting from obstetrical and gynecologic surgery are typically as follows: acute complications, which include ureteric and bladder lacerations, can be detected immediately during the procedure; and chronic complications, which include vesicovaginal fistulas, ureterovaginal fistulas, and ureteric stenosis, can develop later on. A cystoscope and an injection of methylene blue can be used to detect acute problems during surgery. Radiological scans can identify persistent problems when urinary tract injury is suspected [3].

The obstetrician must have a thorough understanding of pelvic anatomy, employ a methodical and meticulous surgical technique, and maintain a constant state of alertness to prevent urinary tract injury. Any urinary tract injury that occurs should be repaired during the procedure [2].

This is particularly true when it comes to ureteric injuries, which can result in a decline in ipsilateral renal function, making them more serious than bladder or urethral injuries. According to Morey et al. [4], prompt detection and treatment of ureteric damage can stop renal function from declining and result in a favorable outcome.

METHODS

This retrospective cohort study was conducted on 73 patients who underwent cesarean section complicated with urological injuries in Zagazig University hospitals in the last five years we reviewed all medical records of deliveries from the Obstetrics and Gynecology Department Faculty of Medicine, Zagazig University Hospital, Egypt between January 2017 and December 2021.

Written informed consent was obtained from all participants, the study was approved by the research ethical committee of the Faculty of Medicine, Zagazig University (IRB number 9643). The study was done according to the Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

Inclusion criteria included women who had urological injuries during cesarean sections with ages between 20 – 40 years. Exclusion criteria included cases missed during follow-up and pregnant Ladies less than 20 weeks gestation.

We reviewed the number of cases of cesarean sections among all cases. The operating room record sheet and delivery room register were used to identify the urinary tract injury cases associated with these procedures.

The following clinical and demographic information was gathered: age, parity, type of CS (Elective, Urgent), Adhesions (Mild, Moderate, Severe), fetal birth weight; an indication of CS; number of previous pelvic surgeries and cesarean deliveries; history of vaginal birth following CS; number of previous CS; type of uterine incision and pre-existing maternal health conditions; previous surgery with or without known perioperative adhesions; the term "intra-abdominal adhesions" refers to post-procedural or post-infective adhesions of the abdominal wall, bladder, and intestine to the uterus, omentum, and adhesive bands, without intestinal obstruction. The surgeon's seniority, the kind of anesthetic (general or spinal), the type of uterine incision made, any related uterine rupture, and the frequency of urological injuries were additional clinical factors.

Methylene blue dye testing of the bladder revealed intra-abdominal leaking. Foley's lightbulb emerged into the working field. If there was any uncertainty about an injury, it was verified by inserting sterile milk or a dye (methylene blue, trypan blue, etc.) through a transurethral catheter into the bladder and watching for a colored leak. [5].

Timing of bladder injuries (during repair of lateral extension, during adhesiolysis, during breech extraction, during repair of ruptured uterus), type of injury, Anatomical site of injury (at the anterior wall of the bladder, the dome of the bladder, at the lateral wall of the bladder, lateral to the dome of the bladder, the whole anterior wall was damaged) were recorded. The following categories apply to iatrogenic bladder injury [6]: Grade 1: partial thickness laceration, intramural hematoma, or contusion Extraperitoneal bladder wall laceration less than 2 cm is graded as Grade 2, intraperitoneal laceration less than 2 cm is graded as Grade 3, extraperitoneal > 2 cm or intraperitoneal < 2 cm laceration is graded as Grade 4, and intra- or extraperitoneal bladder wall laceration involving the trigone or bladder neck is graded as Grade 5.

Trigonal and ureteral involvement may be suspected if the posterior portion of the bladder is affected. Injuries of grade five should be reported to urologists or urogynecologists.

Estimated blood loss during operation and presence of adhesions, any associated intraoperative genital tract injury was recorded.

Every cesarean birth was attended by an obstetrician. Prophylactic antibiotics were administered to all women either 30 minutes before an elective cesarean delivery or as soon as possible before an emergency cesarean. A senior urologist was consulted at the time of diagnosis in all cases with suspected bladder injury at or after CD, and bladder repair was carried out right away using two or three layers of 2.0-Vicryl suture (polyglactin 910). Following surgical repair, all women had to have an in situ Foley catheter for a minimum of 5-7 days [7].

All patients received intravenous antibiotics (Cefuroxime, Ofloxacin, or Cefamizin) up until the Foley catheter was removed. Vital signs were recorded three times a day regularly, and broad-spectrum antibiotics were used to treat febrile sickness, which was defined as two fever readings 38 obtained at least six hours apart from the day following surgery. Per the attending urologist's recommendation, a follow-up cystography was carried out before the mother was released from the hospital. The ambulatory urologist service recommended continued follow-up in the clinics based on each individual situation. The university

hospital's Urology Clinic, where women got additional care for urologic injuries, provided ambulatory outpatient data that were also consulted. A month following the procedure, a pyelogram and laboratory tests (creatinine, urea) were used to evaluate kidney functioning.

Every patient underwent physical examination, gynecological examination, radiological imaging modalities (cystography, intravenous urography, IVP, urinary computerized tomography, CT), and cystoscopy to determine the diagnosis of bladder injury.

Hospital stay (days), number of days with a catheter, the need for additional surgery, and average time to survey (months) were recorded.

Only one reviewer called any number of numbers. Based on the overall number of cesarean births at our facility, the incidence of urinary tract injuries as well as the particular incidence of bladder and ureteral injuries were determined. The demographic data was used to calculate the mean and confidence intervals for each group (ureteral and bladder injuries).

We recorded the data about the intraoperative urological injury according to the following: the site of injury, the size of the injury, the time of diagnosis of injury, the method of diagnosis, the time of repair of this injury, associated intraoperative injury, complications following the repair of injury, associated ureteric injury either vesicovaginal or fistula or incontinence of urine were recorded). If the associated bladder injury is immediately recognized and repaired during CS or accidentally discovered by the postoperative follow-up. The postoperative follow-up at the outpatient clinic for those patients from 2 to 6 weeks postpartum was recorded.

STATISTICAL ANALYSIS

IBM Inc., Armonk, NY, USA used SPSS version 26 for statistical analysis. To assess if the data distribution was normally distributed, the Shapiro-Wilks test and histograms were employed. Standard deviation (SD) and mean were used to depict quantitative parametric data. The interquartile range and median (IQR) were used to display quantitative non-parametric data. Presentations of qualitative data included frequency and percentage (%).

RESULTS

Table 1 shows the distribution of all cases of cesarean section complicated with urological injuries in Zagazig University hospitals in the last five years from 2017 to 2021. There was a 25–40 age range, with a mean ± SD of 32.4 ± 4.42 years. Parity ranged from 1 to 4 with a mean ± SD of 2.15 ± 0.83. 11 (15.07%) patients received general anesthesia while 62 (84.93%) patients received spinal anesthesia. CS surgery was elective in 43 (58.9%) patients and urgent in 30 (41.1%) patients. 19 (26.03%) patients had mild adhesions, and 38 (52.1%) patients had severe adhesions. Fetal birth weight ranged from 2713 to 4200 gm with a mean ± SD of 3412.04 ± 425.34 gm (**Table 2**).

All 73 (100%) patients had traumatic bladder injuries and intra-abdominal leakage was found in all patients. 43 (58.9%) patients were injured during the repair of lateral extension, 30 (41.1%) patients were injured during adhesiolysis, 16 (21.92%) patients were injured during breech extraction, 12 (16.4%) patients were injured during the repair of the ruptured uterus and 7 (9.6%) patients were injured during delivery of placenta accreta cases. 12 (16.44%) patients were injured at the anterior wall of the bladder, 25 (34.25%) patients were injured at the dome of the bladder, 7 (9.59%) patients were injured at the lateral wall of the bladder, 22 (30.14%) patients were injured lateral to the dome of the bladder, and 7 (9.59%) patients had the whole anterior wall damaged (**Table 3**).

There were 8 (11%) patients who had primary CS, and 65 (89%) patients had repeated CS. There were 7 (9.6%) patients with midline sub-umbilical incisions and 66 (90.4%) patients with Pfannenstiel incisions (**Table 4**).

The surgical history of the studied patients revealed that 8 cases (11%) had no previous abdominal surgery, 45 (61.6%) patients had only a surgical history of previous CS, and 20 (27.4%) patients had another surgical history rather than CS (appendectomy, cholecystectomy or hernia repair) (**Table 5**).

Regarding the seniority of surgeons, there were 35 (47.9%) first or second-year residents, 21 (28.8%) third-year resident, 10 (13.7%) specialist and 7 (9.6%) consultant (**Table 6**).

N.B: The American Association for the Surgery of Trauma provided a classification system for the grades of bladder injuries. Scale of Bladder Organ Injury [8].

There were 12 (16.4%) patients who had grade 3 bladder injuries, 54 (74%) patients who had grade 4 bladder injuries, and 7 (9.6%) patients who had grade 5 bladder injuries. The duration of hospital stay varied from 5 to 15 days, with an average of 10.05 ± 3.14 days. The average length of time spent with a catheter was 14.89 ± 3.42 days, with a range of 10 to 20 days. For re-examination, no patients are required. The mean follow-up time at the outpatient clinic was found to be between one and two months,

with a standard deviation of 1.37 ± 0.49 months (**Table 7**).

Table 1: Distribution of the studied patients

Year	Total number of deliveries	Number of CS	Number of cases with bladder injuries after CS
2017	7462	4974	15
2018	7839	5262	16
2019	7766	5177	16
2020	6311	4207	12
2021	6912	4608	14

CS: cesarean section

Table 2: Demographic and clinical characteristics of the studied patients with bladder injury.

		n=73
Age (years)	**Mean ± SD**	32.4 ± 4.42
	Range	25 - 40
Parity	**Mean ± SD**	2.15 ± 0.83
	Range	1 - 4
Anesthesia	**General**	11 (15.07%)
	Spinal	62 (84.93%)
CS	**Elective**	43 (58.9%)
	Urgent	30 (41.1%)
Adhesions	**No**	16 (21.92%)
	Mild	19 (26.03%)
	Severe	38 (52.1%)
Fetal birth weight (gm)	**Mean ± SD**	3412.04 ± 425.34
	Range	2713 - 4200

CS: cesarean section

Table 3: Urological injuries occurring during CS of the studied patients

		n=73
Incidence of urological injuries	**Bladder injury**	73 (100%)
Intraoperative consultation of the urological team		73 (100%)
Timing of bladder injuries	**During the repair of the lateral extension**	43 (58.9%)
	During adhesiolysis	30 (41.1%)
	During breech extraction	16 (21.92%)
	During repair of ruptured uterus	12 (16.4%)
	During delivery of placenta accreta cases	7 (9.6%)
Type of injury	**Traumatic**	73 (100%)
Anatomical site of injury	**At the anterior wall of the bladder**	12 (16.44%)
	At the dome of the bladder	25 (34.25%)
	At the lateral wall of the bladder	7 (9.59%)
	Lateral to the dome of the bladder	22 (30.14%)
	The whole anterior wall was damaged	7 (9.59%)

CS: cesarean section

Table 4: Types of CS and uterine incision among the studied patients

		n=73
Types of CS	**Primary CS**	8 (11%)
	Repeated CS	65 (89%)
Incision type	**Midline sub-umbilical incision**	7 (9.6%)
	Pfannenstiel incision	66 (90.4%)

Table 5: surgical history of the studied patients

CS only	Other previous surgery	No previous abdominal surgery
45 (61.6%)	20 (27.4%)	8 (11%)

Table 1: Seniority of the surgeon among the studied patients

		n=73
Seniority of surgeon	**First or second-year resident**	35 (47.9%)
	Third-year resident	21 (28.8%)
	Specialist	10 (13.7%)
	Consultant	7 (9.6%)

Table 7: Grades of bladder injuries and surgery outcomes among the studied patients

		n=73
Graded of bladder injuries	**Grade 1**	0
	Grade 2	0
	Grade 3	12 (16.4%)
	Grade 4	54 (74%)
	Grade 5	7 (9.6%)
Hospital stay (days)	Mean ± SD	**10.05 ± 3.14**
	Range	5 - 15
Number of days with catheter	**Mean ± SD**	14.89 ± 3.42
	Range	10 - 20
Need of re-exploration	**Yes**	0 (0%)
	No	73 (100%)
Average time for follow-up at the outpatient clinic (months)	**Mean ± SD**	1.37 ± 0.49
	Range	1 - 2

DISCUSSION

We found that age ranged from 25 to 40 years with a mean ± SD of 32.4 ± 4.42 years. Parity ranged from 1 to 4 with a mean ± SD of 2.15 ± 0.83. 11 (15.07%) patients received general anesthesia while 62 (84.93%) patients received spinal anesthesia. CS was elective in 43 (58.9%) patients and urgent in 30 (41.1%) patients. 19 (26.03%) patients had mild adhesions, 21 (28.77%) patients had moderate adhesions, and 17 (23.29%) patients had severe adhesions. Fetal birth weight ranged from 2713 to 4200 gm with a mean ± SD of 3412.04 ± 425.34 gm. Consistent with our research, in line with our results, Lo et al. conducted a retrospective case study on 5619 cases between January 2007 and September 2014 that were treated by cesarean section. Of these, 6 (0.107%; 95% CI, 0.1069%–0.1071%) suffered ureteral injuries associated with the procedure. During that time, 36.7% of all cases were delivered by cesarean section, while 9695 patients were

managed vaginally. The patient's age range, they discovered, was 28 to 37 years old. Their parity was 0 to 2, their BMI was between 25.2 and 31.2, and their surgical and medical histories were unremarkable. In all cases, an emergency cesarean section was performed following a failed labor attempt on term deliveries (gestational age, 38–39 weeks). According to Lo et al. [9], every patient underwent a conventional cesarean section with a lower uterine segment incision and a low transverse Pfannenstiel.

Furthermore, Rahman et al. [10] conducted a retrospective study on 7,708 patients who had CS deliveries out of 67,618 deliveries at the King Fahad Hospital of the University in Al-Khobar, Saudi Arabia, between January 1983 and December 2007. This study yielded an 11.4% CS rate. The patients' ages ranged from 22 to 48 years old, with an average age of 29.4 ± 6.2 years. The range of parity was 1 to 12 (mean 5.6). Twenty-six patients had more than five paras, and eight patients fell between paras 1 and 4 ($P < 0.001$). In 27 patients (79.4%), the pregnancy was full term; in 4 patients (11.8%), it was preterm; and in 3 patients (8.8%), it was post-term. 32 patients underwent lower-segment cesarean sections, whereas 2 underwent traditional cesarean sections. 21 (61.7%) patients who had undergone multiple CS (2–8) previously underwent elective CS; of them, 16 had placenta previa, 3 had macrosomic babies, and 2 had macrosomic babies. The mean fetal birth weight (3.2 kg) was found in 29 (85.3%) instances and 5 (14.7%) newborns.

Furthermore, Alanwar et al. [11] study is discovered that women's mean ages were 31.04 years, 34.93 years for gestation, and 2.77 for parity.

According to a study on placenta accrete by Konijeti et al. [12] any ailment that threatens the nearby uterine structure may be affected by placenta accrete. The secret to successful therapy when it comes to the urinary bladder is a multidisciplinary strategy that incorporates a team of doctors and surgeons from radiology, obstetrics/gynecology, and urology. According to Konijeti et al. [12], every effort should be taken to obtain the diagnosis prior to delivery, reduce blood loss, and protect the bladder.

In our present study, the prevalence of urological injuries during CS was 0.3%, all 73 (100%) patients had traumatic bladder injuries, and all were confirmed by the urological team as bladder test by methylene blue dye was done and intra-abdominal leakage was found in all patients. 43 (58.9%) patients were injured during the repair of lateral extension, 30 (41.1%) patients were injured during adhesiolysis, 16 (21.92%) patients were injured during breech extraction, and 19 (26.03%) patients were injured during repair of ruptured uterus. 12 (16.44%) patients were injured at the anterior wall of the bladder, 25 (34.25%) patients were injured at the dome of the bladder, 7 (9.59%) patients were injured at the lateral wall of the bladder, 22 (30.14%) patients were injured lateral to the dome of the bladder, and 7 (9.59%) patients had the whole anterior wall damaged.

Carley et al. [13] discovered that the incidence of bladder and ureter injuries were, for abdominal hysterectomy, 0.58% and 0.36%, vaginal hysterectomy, 1.86% and 0%, and 5.13% and 1.71% for obstetric hysterectomy with placenta accreta, respectively. These findings are consistent with our research.

Radu et al. [14] conducted their investigation on 14,340 women who were delivered by CS throughout 4 years, from January 2016 to December 2019. 36 women were found to have urinary tract injuries among the women who had CS deliveries during the study period, amounting to an overall incidence of 0.25% from all CS procedures. The huge volume of obstetrics at our institution, the rarity of these events, the surgical risk assessment, and the assignment of repeat CS with higher risk to more experienced obstetricians (specialists or consultants) all contributed to this, they noted. Similar incidences between 0.28% and 0.30% are reported by other research; however, the former study exclusively included bladder injuries [15].

Hammad et al. [16] retrospectively reviewed 13,010 procedures, and cases between January 2000 and December 2005. With an incidence of 0.46%, CS accounted for the bulk of urological injuries (31 patients, 76%) compared to 0.19% for other procedures.

A retrospective case series of pregnancies complicated by bladder injury following cesarean deliveries was created by Salman et al. [7]. According to reports, the risk of bladder damage following a cesarean birth (CD) ranges from 0.0016% to 0.96% [17]. However, they discovered an expected difference in incidence: 0.07% versus 1.03%, respectively, when bladder injury incidence was stratified by first CD versus recurring CD. Previous CD and adhesions were shown to be linked to a higher risk of bladder damage [18]. 90.1% of patients in the Salman et al. case series had at least one prior CD, and 67.9% of them had documented adhesions, including primary CD [7].

27 cases were examined retrospectively by Chaudhari et al. [19] yielding an overall incidence of 0.23% for LUT injuries related to pregnancy. With a mean age of 29.8 years (range: 20–39 years), 92.6% of the population was multiparous. The majority of LUT injuries (incidence of 0.05%) happened during CS. In just 10.5% of cases, vaginal births took place. Chaudhari et al. [19] reported the identification of 20 bladder injuries (occurrence of 0.05%), 3 urethral injuries (11.1%), and 2 ureteric injuries (incidence of 0.003%). This incidence was less than that of earlier research [15], which were 0.3%, 0.3%, and 0.08%, respectively.

In order to find guidelines for diagnostic techniques and to conduct a systematic literature search on the frequency of urinary tract lesions following cesarean sections, Lysne et al. Rarely, ureteric and bladder injuries result during cesarean sections. Bladder injuries are among the most common urinary tract injuries, with an incidence ranging from 0.05% to 0.47%. While ureter injury incidence ranges from 0% to 0.11% [20].

Traditionally, the bladder has been the organ most often harmed during gynecologic surgeries; the reported injury rate ranges from 0.14 to 3.17% [21]. Procedures involving the pelvis, abdomen, or vagina may result in bladder damage. The following are risk factors for bladder injuries: anatomic variations, ineffective exploration, adhesions, scar from prior surgery, radiation, presence of urinary infection, malignancy, endometriosis, pelvic inflammatory diseases, and incomplete bladder emptying [22]. The two most common iatrogenic injuries are vesicovaginal fistulas and bladder lacerations. According to Başaranoğlu et al. [23], the incidence of bladder injury after cesarean sections ranges from 0.08 to 0.94%, and this rate rises with the number of procedures performed.

While the majority of ureteral injuries happened in women who had an emergency cesarean birth during the second stage of labor, the majority of bladder injuries happened in women who had previously had cesarean deliveries with abdominal adhesions [24].

Of the 32 bladder injuries, 23 happened in the dome, while the remaining 9 (n = 9) happened in the posterior wall, according to Hammad et al. Only 12.5% of bladder injuries were blunt or crush injuries, with the majority (87.5%) being from unintentional cystotomies [16].

Furthermore, 74 women (21.7%) with morbid placental adhesion experienced urinary tract injuries, according to Alanwar et al. [11] study of 342 women with the condition. They found that, based on sonography criterion findings, 26.9% of cases had an invasive bladder. According to Alanwar et al. [11], among cases with morbid placental adhesion, 11.7% of cases involved bladder injuries, 4.7% involved ureter injuries, and 5.3% involved both bladder and ureter injuries. The organs most frequently affected, according to Chan et al. [25] are the distal ureters and the bladder [25].

Due to its retroperitoneal nature, with its base resting on the cervix and lower uterine segment and its trigone resting over the anterior vaginal fornix, Gomez et al. discovered that the bladder sustains injuries most frequently during obstetric procedures. Furthermore, according to Gomez et al. [26], 1.8% of placenta accreta cases during cesarean sections were documented.

However, the Mendez study showed that, out of 1000 cases recorded, 1.5% of gynecological surgery patients had urinary tract injuries [27].

A hysterectomy was used to treat 292 women with placenta accreta who were admitted by Tam KB et al. Urinary tract injuries occurred in 83 (29%) of the cases [28].

The bladder injury rate in the control group in the whole bladder study on challenging C-section cases was 18.4%. In addition, the surgeon's criterion for dense adhesions, the categorization scheme employed, and the surgeon's proficiency in adhesiolysis are other variables that could have affected the frequency of bladder damage. Additional experiments using the same criterion of thick adhesions can resolve this disparity [29].

The results of Wei et al. imply that most hysterectomy techniques and cesarean sections have low rates of bladder and ureteric damage. It is evident that the risk of ureteric and bladder injuries is higher during laparoscopic radical hysterectomy and postpartum. They concluded that the majority of hysterectomy procedures and Caesarean sections have minimal risks of urological harm [30].

Careful dissection may not always be prioritized at emergency care stations (CS), where it is believed to be a more stressful atmosphere to hasten delivery [31]. Two cases of obstetric hysterectomy for placenta percreta were described in this study, indicating that cesarean hysterectomy is a significant risk factor for suffering obstetric-associated LUT damage. According to this series, the most common signs of CS were cephalo-pelvic disproportion, failed labor trial following CS, and prior cesarean section [19].

According to the Solyman et al. [32] study, the incidence of bladder injuries was higher than that of

ureter injuries, at 36.9% and 10.7%, respectively. According to Başaranoğlu et al., there was a 39.0% incidence of bladder injury and a 43.5% incidence of ureteral injury. According to Başaranoğlu et al. [23], the majority of bladder injury instances happened during cesarean sections. Common causes of bladder damage after cesarean sections include labor difficulties, abdominal adhesions from prior surgeries, and insufficient bladder emptying during the procedure [33].

We discovered that the intraoperative blood loss had a mean ± SD of 731.34 ± 148.03 ml and ranged from 502 to 989 ml. Before and after chemotherapy, hemoglobin levels varied from 7.5 to 14 g/dl, with a mean ± SD of 11.09 ± 1.75 g/dl and 8 to 14 g/dl, respectively, with a mean ± SD of 11.33 ± 1.53 g/dl. The average length of stay in the hospital was 10.05 ± 3.14 days, with a range of 5 to 15 days. The mean ± standard deviation was 14.89 ± 3.42 days, with a range of 10 to 20 days spent with a catheter. No patients required follow-up procedures. The survey took between one and two months on average, with a mean ± SD of 1.37 ± 0.49 months.

Even with improvements in gynecologic and obstetric procedures, ureteral and bladder injuries brought on by undiagnosed conditions can result in high-morbidity complications like excessive bleeding, prolonged hospital stays, frequent blood transfusions, fever, and prolonged operation times [34].

Rahman et al. [10] found, in accordance with our findings, that the estimated average blood loss among these patients was 900 ml, above the typical loss at CS (400–600 ml). Two layers of reconstruction and healing were applied to the bladder wound at the dome. After taking antibiotics for an additional week, she recovered nicely and experienced no more problems. According to Rahman et al. [10], the patients in the series had an average hospital stay of 11.4 days.

Furthermore, Tu et al. noted that patients at higher risk experienced greater intraoperative blood loss and required a longer duration of surgery [35]. Ibeanu et al. demonstrated that the following variables, such as blood loss above 800 mL, a lower body mass index, the length of surgery, and an increase in uterine size, were also statistically associated with an increased risk of urinary tract injury [36]. The P value is not significant, despite Hsu et al.'s attempt to compare the risk of severe or minor injury [37].

According to Safrai et al., hospital stays following bladder injury lasted 7.3 ± 3.3 days, which is longer than our hospital's typical hospital stay of 4 days following a cesarean delivery. Patients with bladder damage received a urinary catheter for an average of 7.7 ± 3.3 days, as opposed to our department's practice, which calls for catheter removal after 6–12 hours for simple cesarean deliveries. After the catheter was removed, bladder function recovered in all patients who had suffered bladder injuries [24].

According to Chaudhari et al., 14.8% of the research group's cases had more than two prior CS episodes. Of the patients, 87.5% had never had any abdominal or pelvic surgery before. 20.83% of patients at CS experienced excessive bleeding (> 1-liter blood loss), and 66.7% reported adhesions. Within the study group, 2 (8.33%) cesarean hysterectomies had been carried out [19].

According to a prior study, around 28.9% of the cases in this study required ICU admission, and the majority of cases (96.5%) required a blood transfusion [11]. An estimated 90% of patients with placenta accreta require a blood transfusion, and 40% require more than 10 units of packed red blood cells; as a result, most of these cases were admitted to the intensive care unit (ICU) in 2012, according to the American Congress of Obstetricians and Gynecologists [38].

We found that all 73 (100%) patients underwent bladder sutures as a treatment regimen for bladder injuries.

According to Gungorduk et al. [17] vesicorrhaphy, an intravesical procedure utilizing a two-layer closure and absorbable suture material, can be used to repair the majority of bladder perforations. Due to their tendency to develop calculi, granulomas, and recurring urinary tract infections, permanent non-absorbable sutures should never be utilized.

In order to improve exposure and prevent ureteral injury, Oboro et al. [39] recommended removing the uterus during the procedure to avoid blind hemostatic sutures at the wound site. Over time, hematoma formation surrounding the injured ureter may grow, become infectious, or result in a fistulous connection between the ureter and uterus.

CONCLUSION

We document a urologic injury incidence (0.3%) at the CS surgery that is consistent with earlier literature data, even with the significant rise in the CS rate. According to our research, people who have had prior CS have a higher risk of bladder damage. A multidisciplinary surgical team of a gynecologist and urologist will attend and perform the surgery in these advanced-stage obstetric situations. Actively

searching for and resolving potential urological issues requires the cooperation of urologists.

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