



Urological complications after radical hysterectomy: incidence rates and predisposing factors

Urološke komplikacije posle radikalne histerektomije: incidencija i predisponirajući faktori

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Abstract

Background/Aim. Radical hysterectomy is a surgical approach for stage Ib and IIa of cervical cancer. The incidence of intraoperative injuries of the bladder during radical hysterectomy ranges from 0.4–3.7%. The ureter can be crushed, caught in sutures, transected, obstructed by angulation, or ischemic by the stippling or periureteric fascia. Vesicovaginal and ureterovaginal fistulas are reported to develop in 0.9–2% of patients after radical abdominal hysterectomy. Fistulas usually become manifested or visible at speculum examination within 14 days following the surgery. The aim of this study was to establish the incidence and predisposing factor of urological complications after radical hysterectomy. **Methods.** The study included a total of 536 patients with invasive stage Ib to IIb cancer of the *cervix uteri* who had underwent radical hysterectomy. The special elements considered were: the patient's age; the International Federation of Gynecology and Obstetrics (FIGO) stage after pathohistology; duration of operation; the result of preoperative laboratory tests for diabetes, anemia, hypoproteinemia, or disorders of liver or kidney function; ASA status; postoperative surgical infection. **Results.** The average age of the patients with complications was 48.68 years. All patients with intraoperative ureteric and bladder injuries had statistically significant higher stage of disease and operation lasted more than in others without injury. We noticed 1.3% ureteral injuries and 1.49% bladder injuries, more than 50% of the patients with a previously mentioned injuries were operated on more than 3 hours. We found 2.61% vesicovaginal and 2.43% ureterovaginal fistulas. A total of 50% of the patients with bladder injury and vesicovaginal fistulas and 70% of the patients with ureterovaginal fistulas had *diabetes mellitus*. Postoperative infection of surgical site is a very important factor for the development of fistulae. Half of the patients with vesicovaginal fistulas had abscess of vaginal cuff. **Conclusion.** The stage of the disease seem to be the most significant factor in the development of intraoperative ureter and bladder injuries. The stage of the disease, intraoperative bladder injury, diabetes mellitus and postoperative infection of surgical site are the most significant factors in the development of postoperative fistulas.

Key words:

hysterectomy; bladder; wounds and injuries; risk factors; incidence.

Apstrakt

Uvod/Cilj. U hirurškom lečenju stadijuma Ib i IIa karcinoma cerviksa koristi se radikalna histerektomija. Incidencija intraoperativnih povreda mokraćne bešike tokom radikalne histerektomije kreće se od 0,4 do 3,7%. Ureter može biti nagnječen, podvezan, presečen, može doći do angulacije sa sekundarnom opstrukcijom ili ishemije. Vezikovaginalne i ureterovaginalne fistule javljaju se kod 0,9–2% bolesnica posle radikalne abdominalne histerektomije. Fistule najčešće otkrivamo pri pregledu sa spekulom unutar 14 dana posle hirurške intervencije. Cilj rada bio je da se ustanove incidencija i predisponirajući faktori uroloških komplikacija posle radikalne histerektomije. **Metode.** Ispitivanjem je bilo obuhvaćeno 536 bolesnice sa invazivnim karcinomom grlića materice stadijuma Ib i IIa koje su podvrgnute radikalnoj histerektomiji. Beleženi su sledeći podaci: starost bolesnica, FIGO (*International Federation of Gynecology and Obstetrics*) stadijum posle patohistološkog nalaza, trajanje operacije, laboratorijski nalazi koji ukazuju na dijabetes, anemiju, hipoproteinemiju i funkcijski testovi za bubrež i jetru, ASA status i postoperativna hirurška infekcija. **Rezultati.** Prosečna starost bolesnica sa komplikacijama bila je 48,68 godina. Sve bolesnice sa intraoperativnim povredama uretera i bešike imale su statistički značajno veći stadijum bolesti i operacija je trajala duže. Mi smo zabeležili 1,3% povreda uretera i 1,49% povreda mokraćne bešike i kod tih bolesnica operacija je u više od 50% slučajeva trajala više od tri sata, što je u skladu sa nalazima iz literature. Zabeležili smo 2,61% vezikovaginalnih i 2,43% ureterovaginalnih fistula. Oko 50% bolesnica sa povredom uretera i vezikovaginalnom fistulom i 70% bolesnica sa ureterovaginalnom fistulom imalo je dijabetes. Postoperativna infekcija hirurške rane veoma je važan faktor za razvoj fistula. Polovina bolesnica sa vezikovaginalnom fistulom imala je apsces vaginalnog kafa. **Zaključak.** Stadijum bolesti je najvažniji faktor za razvoj intraoperativnih povreda uretera i mokraćne bešike. Stadijum bolesti, intraoperativna povreda mokraćne bešike, dijabetes melitus i postoperativna infekcija hirurškog mesta su najvažniji faktori za razvoj postoperativnih fistula.

Ključne reči:

histerektomija; mokraćna bešika; povrede; faktori rizika; incidenca.

Introduction

The standard surgical approach for stage Ib and IIa of cervical cancer is radical hysterectomy, with lower periaortic and bilateral pelvic lymphadenectomy. A five-year-survival ranges from 75–90%^{1,2}. Modern surgical techniques and anesthesia have reduced the mortality rate from radical hysterectomy to 0.5%, while the incidence of postoperative complications has also fallen to around 25%^{3,4}.

Injuries of the ureter are the most serious complications in gynecological surgery. About 75% of all ureteral injuries are due to gynecological surgery, 75% of them arising during abdominal surgery⁵. The incidence of complications in radical operations for invasive carcinoma of the *cervix uteri* is 1–2%; in abdominal hysterectomy 0.5–1%; in vaginal hysterectomy 0.1% and in adnexal operations or procedures it is below 0.1%⁶. The ureter can be crushed, caught in sutures, transected, obstructed by angulation, or ischemic by the stippling or periureteric fascia. Most authors consider the lowest 3 cm of the ureter (between uterine arteries and the bladder) as being most at risk⁴. Injuries of the bladder arose in around 1.8% of abdominal and in 0.4% of vaginal hysterectomies⁷. The incidence of intraoperative injuries of the bladder during radical hysterectomy ranges from 0.4–3.7%⁸.

Unrecognized ureteral injury leads to extraperitoneal or intraperitoneal accumulation of urine followed by the vaginal leakage thereof. It may take 7–14 days for the fistula to become visible.

Most vesicovaginal fistulas are of obstetric origin, but some are due to abdominal or vaginal hysterectomy, cancer or radiation. The base of the bladder is the commonest site of injury resulting in a fistula⁹. Torres¹⁰ found 2% of vesico-

Methods

Our research was conducted in the Institute of Obstetrics and Gynecology of the Clinical Center of Serbia, Belgrade, over a period of 5 years (2000–2005). During that time 536 patients with invasive stage Ib to IIb cancer of the *cervix uteri* who had undergone radical hysterectomy were included in the study. Preoperatively all patients were in stage up to IIa but some of them shifted in stage IIb after histopathology examination.

The special elements considered were: the patient's age, the International Federation of Gynecology and Obstetrics (FIGO) stage after histopathology; duration of operation; the result of preoperative laboratory tests for diabetes, anemia, hypoproteinemia, or disorders of liver or kidney function; ASA status; postoperative surgical infection.

The studied ureterovaginal and vesicovaginal fistulas developed in the first 14 postoperative days.

Results

A total of 536 women were operated on for invasive carcinoma of the *cervix uteri*. The average age of the patients was 48.68 years: 3.2% were 20–29 years old; 19% were between 30–39 years old; 36.6% were aged 40–49; 28% were between 50–59, while 13.2% were over 60 years old. Most patients (n = 264, 49.3%) had stage Ib disease; 21.8% (n = 117) had stage Ib2 disease; 86 (16%) were stage IIa and 69 (12.9%) were stage IIb.

Ureteral injuries

The ureteral injuries are shown in Table 1.

Table 1

Ureteral injuries		
	Number of patients	Percentage
No injury	529	98.68
Crushing	1	0.19
Unilateral involvement in stitch	1	0.19
Bilateral involvement in stitch	0	0
Partial transection (unilateral)	1	0.19
Complete transection (bilateral)	3	0.56
Angulation with secondary obstruction	0	0
Ischemic lesion	0	0
Resection of portion of ureter	1	0.19
Total	536	100.00

vaginal fistulas in 145 patients with radical hysterectomy¹⁰. Vesicovaginal and ureterovaginal fistulas are reported to develop in 0.9–2% of patients after radical abdominal hysterectomy^{11,12}. A fistula can be located at any place along the anterior vaginal wall and can include any part of the bladder base or the urethra⁴. Fistulas usually become manifested or visible at speculum examination within 14 days following the surgery. Useful diagnostic procedures in these circumstances are: cystoscopy, i.e. pyelography, urethroscopy and biopsy of the fistula margin. Spontaneous closure of a vesicovaginal fistula occurs in 15–20% of patients^{13,14}.

Seven patients (1.32%) had ureteral injuries. The patients with intraoperative discovered lesion had statistically significantly higher stage of disease (χ^2 test; $p < 0.01$). All of them were in histologically determined FIGO stage IIa and IIb.

The duration of surgery was statistically significantly different between patients with and without intraoperative lesions of the ureter (χ^2 test; $p < 0.01$). In patients without intraoperative injury of the ureter the operation took between three and four hours in 66% of the cases; between two and three hours in 33.1% and over four hours in 0.9% of cases. In

all patients with intraoperative injury of the ureter the operation lasted more than three hours.

ASA status was also statistically significant in difference between the patients with and without intraoperative injuries of the ureter (χ^2 test; $p < 0.01$). The frequency of *diabetes mellitus* was statistically significant in the case of the group with ureteral injuries (χ^2 test; $p < 0.01$).

Bladder injuries

Altogether 8 patients (1.49%) had intraoperative bladder injuries, three of them were over 50 years old.

The stage of the tumor disease was also statistically highly different between the patients with and without injuries of the bladder (χ^2 test; $p < 0.01$). Of those with an intact bladder 22% were stage Ib1, 22% stage Ib2, 12.3% stage IIb and 15.6% stage IIa. The frequency of obese patients was statistically significantly different when comparing patients with and without bladder injury (χ^2 test; $p = 0.003$). In a half of patients with bladder damage the surgery lasted more than 4 hours, and in the other half it took between 3 and 4 hours. Four patients with the injured bladder were diabetic.

As regards women with urinary tract injuries, 25% were ASA 4 as against 1.7% patients in the control.

Fistules

The types of fistulas are shown in Table 2.

Table 2

Urinary fistules		
Fistules	Number of patients	Percentage
Vesicovaginal	14	2.61
Ureterovaginal	13	2.43
None	509	94.96
Total	536	100.00

The age of patients was not significantly different with respect to the number and type of fistulas (χ^2 test; $p = 0.555$).

The stage of the tumor disease was significantly different (χ^2 test; $p < 0.01$), when comparing the women with fistulas and those without them. A half of the patients with vesicovaginal fistulas had stage IIa cervical cancer, while the other half were stage IIb. Seven patients (53.86%) with ureterovaginal fistulas had stage IIa cervical cancer, while 6 patients had stage Ib1/Ib2. In the group of patients without fistulas 72.2% had stage Ib1/Ib2 cervical cancer.

The duration of surgery was statistically significantly different in the group of patients with a certain type of fistulas, while in the group without complication (χ^2 test; $p < 0.01$) 87.71% of patients with vesicovaginal fistulas and 61.53% of the patients with ureterovaginal fistulas had surgery lasting between 3 and 4 hours.

Obesity was present in 50% of patients with vesicovaginal fistulas and in 53.85% of those with ureterovaginal fistulas. Among the patients without fistulas only 37.4% were overweight, which was not statistically significantly different (χ^2 test; $p = 0.178$).

Among the patients with vesicovaginal fistulas 50% were diabetic, the figure being 70% for those with uretero-

vaginal fistulae. Furthermore, 97.5% of women without postoperative urinary complication were normoglycemic. That difference was also highly significant.

Preoperative ASA status was significantly different (χ^2 test; $p < 0.01$) between patients with and without fistulas: for example, 92 per cent of patients with ureterovaginal fistulas were ASA 3 and 4.

The infective morbidity was significantly different between the group with urinary complication³ and the control group (χ^2 test; $p < 0.01$). A half of the patients with vesicovaginal fistulas have had abscess of vaginal cuff, 28.57% (n = 4) had late wound infection and 21.43% (n = 3) developed necrotic *fasciitis*. Also, 38.46% (n = 5) of patients with ureterovaginal fistulas had late infection of the wound, 7.7% (n = 1) abscess of vaginal cuff and 15.38% (n = 2) had necrotic *fasciitis*. As to the patients without fistulas, 85% had no infective complication. None of the patients with ureterovaginal fistulas had injured bladder.

Discussion

The average age of the patients with complications was 48.68 years, which is in agreement with the estimation of the the American Cancer Society (ACS). According to ACS the average age of those with invasive cancer of the cervix is 52.2 years¹⁴.

All patients with intraoperative ureteral and bladder injuries had statistically significant stage of the disease and operation lasted more than in others without injury.

We noticed 1.3% ureteral injuries and 1.49% bladder injuries, more than 50% of the patients with previous mentioned injuries had surgery lasting more than 3 hours, which is in agreement with the literature⁸. According to the literature, vesicovaginal and ureterovaginal fistulas have the incidence from 0.9% to 2%¹¹. In the last 10 years the incidence decreased to less than 1%⁸. We found 2.61% vesicovaginal and 2.43% ureterovaginal fistulas. We can explain that result with a high percentage of patients with high stage of malignant disease, in our trial.

Also, we noticed that 50% of the patients with bladder injury and vesicovaginal fistulas and 70% of the patients with ureterovaginal fistulas had *diabetes mellitus*. Postoperative infection of surgical site is a very important factor for development of fistula. Half of the patients with vesicovaginal fistulas had abscess of vaginal cuff. As to the patients without fistulas, 85% had no infective complication¹⁴.

Most of our patients had ASA 2 status because the patients with significant cardiopulmonary disease and high stage malignancy were not operated.

Conclusion

Intraoperative injuries of the ureter and the bladder as well as the development of fistulas in the postoperative period are important complications of radical hysterectomy in the treatment of invasive cervical cancer. The stage of the disease seems to be the most significant factor in the development of intraoperative ureter and bladder injuries. The stage of the disease, intraoperative bladder injury, *diabetes mellitus* and postoperative infection of surgical site are the most significant factors in the development of postoperative fistulas.

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