

ORIGINAL RESEARCH

A retrospective evaluation of risk of ureteric injury associated with hysterectomy

¹Dr. Sweta Gupta, ²Dr. Rupesh Gupta, ³Dr. Kaushik Balkrushna Kadiya

¹Assistant Professor, Department of Obstetrics and Gynaecology Banas Medical College and Research Institute, Palanpur, Gujarat, India

²Assistant Professor, Department of General Surgery Banas Medical College and Research Institute, Palanpur, Gujarat, India

³Associate Professor, Department of General Surgery GMERS Medical College, Dharpur, Gujarat, India

Corresponding author

Dr. Kaushik Balkrushna Kadiya

Associate Professor, Department of General Surgery GMERS Medical College, Dharpur, Gujarat, India

Email: viralkaushik77@gmail.com

Received: 19 Sep, 2023 Acceptance: 15 Oct, 2023

ABSTRACT

Background: A uncommon but dangerous iatrogenic side effect of a hysterectomy is ureteric damage. The rationale for operation, preexisting risk factors, and postoperative circumstances all affect the risk.

Objective: To assess the risk of ureteric damage, taking into account the potential long-term effects of injury related to hysterectomy, and to ascertain if the type of hysterectomy or the surgical indication had an impact on the risk of ureteric injury.

Methods: Data for the women who underwent hysterectomy in last four years were collected from hospital registry. Unadjusted rates of ureteric injury within a year following a hysterectomy are assessed, taking into account the kind of operation, indication, and outcome of the injury.

Results: Total 170 hysterectomies were performed in hospitals for the designated circumstances (105 for benign and 65 for malignant diseases). In the benign group, number of hysterectomies performed for prolapse was more and for fibroids was lower. Within a year following their hysterectomy, 21 (12,7%) of the 165 women in the research had a ureteric damage documented. The injury rates for benign illnesses did not significantly differ based on the kind of surgery. Vaginal hysterectomy generally had a lower risk of injury. There was no indication that the relative risks of ureteric injury had altered as people aged.

Conclusion: For both benign and malignant diseases, the likelihood of ureteric damage within a year following hysterectomy differed depending on the kind of surgery.

Keywords: Hysterectomy; Surgical injuries; Ureteric injury; Signs and consequences, Bening and Malignant condition

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-Non Commercial-Share Alike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

INTRODUCTION

One of the most common gynecological surgeries is hysterectomy for benign gynecological illness, which mostly involves abnormal uterine bleeding, prolapse, or uterine fibroids (30% of women by the age of 60; 590,000 procedures yearly in the USA) [1]. Both benign and malignant reasons are treated with hysterectomy, and laparotomy, laparoscopy, or vaginal surgery are possible surgical approaches. During an abdominal hysterectomy, the uterus is removed via a lower abdominal incision. With a vaginal hysterectomy, the uterus is removed through the vagina without the need for an abdominal incision. 'Keyhole surgery' is performed during a laparoscopic hysterectomy using tiny abdominal incisions. Peroperative bleeding, damage to the bowel, urinary tract, or nerves, and postoperative infection or

thromboembolism are the most frequent problems after a hysterectomy [2]. Ninety percent of hysterectomies are done to treat benign diseases such fibroids that cause irregular uterine bleeding [3]. Peroperative bleeding, damage to the bowel, urinary tract, or nerves, and postoperative infection or thromboembolism are the most frequent problems after a hysterectomy [1]. Predisposing risk factors, surgical circumstances, and hysterectomy indications all affect the probability of ureteric injury [4]. The female internal genital organs, the gut, the urinary system, nerves, and arteries are all located in close proximity to one other in the complicated pelvic anatomy. It has been determined that there is an average of 2.3 cm between the ureters and the cervical edge [5]. Adhesions, severe endometriosis, large uterus, prior pelvic surgery, significant blood loss

during the procedure, and extended surgical times are all factors that might raise the risk of ureteric damage after a hysterectomy [6]. The most significant prognostic factor in preventing irreversible damage is early identification of the injury, ideally during surgery [7]. A rare but dangerous side effect of gynecological surgery is ureteric damage [8]. The most frequent cause of ureteric damage is iatrogenic trauma. Up to 6% of patients after gynecological and colorectal surgery may result in ureteric damage [9]. The lower portion of the ureter is most commonly injured after a hysterectomy. The most frequent causes for this injury are ligation, kinking by suture, transection/avulsion, partial transection, crush, and devascularization, listed in decreasing order of occurrence [8]. These processes may account for the 65–80% of instances where the identification of iatrogenic ureteric damage is delayed, occurring after the initial surgery. Renal unit loss is one of the more frequent and dangerous consequences of delayed diagnosis [8].

MATERIALS AND METHODS

For the previous four years, we used hospital data that was extracted. Each medical record includes information on the patient's demographics, hospital administration, diagnosis data using the International Classification of Diseases (ICD), 10th revision, and surgical procedures. The records are from patients who have been admitted to the hospitals.

PATIENT SELECTION

Adult women with certain benign and malignant indications who underwent elective hysterectomy during the previous four years made up the research population. Women with benign diseases and women with malignant conditions were included in distinct groups for the study. Menstrual problems, genital prolapse, endometriosis, and uterine fibroids were among the benign illnesses in the sample. Only cervical carcinoma-in-situ, cervical cancer, uterine

cancer, and ovarian cancer were included in the category of malignant conditions. Assuming that older women were likely postmenopausal, women with a main diagnosis of endometriosis or menstrual problems were limited to being under 55 years old; women in other diagnostic categories were not subject to this age limitation. The study made a distinction between four categories of open procedures: vaginal, radical, subtotal, and complete abdominal hysterectomy. If ureteric damage, hydronephrosis with ureteric stricture, or another urinary-genital tract fistula was present in the diagnostic fields of the index procedure episode or a later episode that occurred within a year of the index procedure, the woman was considered injured. If surgical therapies for ureteric fistula or blockage were discovered within the same period, ureteric damage was also detected. These procedures included ureteroscopic dilatation, ureteric repair, closure of the ureteric fistula, stent implantation, nephrostomy tube insertion, ureteric dilatation, suture removal from the ureter, and ureter reimplantation.

RESULTS

Over the previous four years, 170 hysterectomies were performed in hospitals for the designated circumstances. A total of 105 and 65 surgeries were performed for benign and malignant diseases, respectively.

Number of hysterectomy procedures by indication:

There were 105 hysterectomies in the benign group. Across all circumstances, the number of hysterectomies varied by year. The number of hysterectomies performed for endometriosis and fibroids is lower and higher, respectively, among women with menstrual disorders and prolapse (Table 1). The most significant differences in the malignant group were found in instances of uterine cancer and a reduced incidence of cervical cancer.

Table 1: Number of hysterectomy procedures by indication

| Benign condition | Total = 105 |
|---------------------|-------------|
| Prolapse | 34 |
| Menstrual disorder | 30 |
| Endometriosis | 21 |
| Fibroids | 20 |
| Malignant condition | Total = 65 |
| Cervix CIS | 16 |
| Uterine cancer | 26 |
| Cervical cancer | 9 |
| Ovarian cancer | 14 |

Rates of ureteric injuries by indication and procedure: Within a year following their hysterectomy, 21 (12,7%) of the 165 women in the research had a ureteric damage documented. The 21 women who were diagnosed with ureteric injury were divided into three groups: 14.3% (n=3) were

identified by both surgical treatment and diagnostic code; 57.1% (n=12) were identified by surgical treatment alone (i.e., they had no related surgical code in any treatment episode); and 28.6% (n=6) were identified by diagnostic code alone. Within two months of the index surgery, all ureteric injuries were

documented; 38% of those identified by a surgical code and 33% of those identified by a diagnostic code were discovered during the same hospital stay as the index procedure. The rates of ureteric damage for benign and malignant disorders associated with different forms of hysterectomy are shown in Table 2. The injury rates for benign illnesses did not significantly differ based on the kind of surgery, with the exception of women with endometriosis, where 6 out of 21 women had injuries. Compared to

alternative hysterectomy techniques, vaginal hysterectomy generally had a lower risk of injury: four times lower than entire abdominal surgeries for prolapse and almost half as high as abdominal hysterectomy for fibroids. In cases of malignancy, the pattern was more variable. Among women with cervical cancer, the type of hysterectomy had no bearing on the injury rate. Women with uterine cancer had the most variance by kind of surgery (11.54%).

Table 2: Rates of ureteric injuries by indication and procedure

| Benign condition | Total = 105 | No. of ureteric injuries | % |
|---------------------|------------------------------|--------------------------|-------|
| Prolapse | Abdominal: 21 Vaginal: 13 | 3 | 8.8 |
| Menstrual disorder | Abdominal: 17 Vaginal: 13 | 2 | 6.7 |
| Endometriosis | Abdominal: 16 Vaginal: 5 | 6 | 28.6 |
| Fibroids | Abdominal: 14 Vaginal: 6 | 3 | 15.0 |
| Malignant condition | Total = 65 | | |
| Cervix CIS | Abdominal: 11 Vaginal: 5 | 2 | 12.5 |
| Uterine cancer | Abdominal: 15 Vaginal: 11 | 3 | 11.54 |
| Cervical cancer | Abdominal: 5 Vaginal: 4 | 0 | 0 |
| Ovarian cancer | Abdominal: 8 Vaginal: 6 | 2 | 14.3 |

EFFECT OF AGE AND PERIOD OF SURGERY

The age distribution of women among the patient groups examined in this research varies depending on the ailment. Therefore, it seemed plausible that the various age structures contributed to part of the difference seen in the rates amongst the circumstances and techniques. Regression analysis confirmed the varying relative risks by condition and across time for complete abdominal hysterectomies in the benign group, but did not discover a relationship between age and injury risk. There was no indication that the relative risks had altered as people aged. There was a slight correlation between age and risk for malignant diseases, with women under 40 having the highest risk. Once more, we investigated whether the relative hazards among the conditions varied over time and discovered that there was no discernible interaction between time and condition. The regression model for vaginal hysterectomies in the benign group showed a possible correlation between age and injury risk.

Laparoscopic hysterectomies: 4.7% (n=5) of the 105 hysterectomies performed in the benign group were

laparoscopic. Compared to other kinds of hysterectomy, women receiving laparoscopic hysterectomies experienced a greater prevalence of ureteric damage (7.1%/1/14). Out of all the signs, endometriosis-afflicted women had the greatest rate. 9.2% (n=5) of the 65 hysterectomies performed on the malignant group were laparoscopic. The risk of ureteric damage among women undergoing laparoscopic hysterectomies was 14.29% (1/7), a lower percentage than that of open operations.

Signs and consequences of ureteric injury: For women with unrecognized injuries, increased postoperative pain, was documented in 85.7% women. Other symptoms and signs were fever, urinary leakage, anuria, and abnormal biochemical test results (Table 3). The two most common and serious consequences of injuries were reoperation (47.6%) and loss of a kidney (10%). Information about the cases resulting in loss of a kidney is reproduced in Table 6. Permanent damage after repair of the ureteric injury was seen in 17%. No women died as a result of the ureteric injury

Table 3: Signs and consequences of ureteric injury

| Symptoms and signs of unrecognized ureteric injury | | % |
|----------------------------------------------------|----|------|
| Pain | 11 | 52.4 |
| Fever | 7 | 33.3 |

| | | |
|---------------------------------|----|------|
| Urinary leakage | 8 | 38.1 |
| Anuria | 5 | 23.8 |
| Abnormal biochemistry tests | 13 | 61.9 |
| No symptoms | 3 | 14.3 |
| Consequences of ureteric injury | | |
| Reoperation | 10 | 47. |
| Loss of a kidney | 2 | 9.5 |
| Renal failure | 3 | 14.3 |
| Chronic urinary infections | 4 | 19.0 |
| Fistula | 2 | 9.5 |
| Chronic pain | 4 | 19.0 |
| Urinary incontinence | 1 | 4.8 |
| Death | 0 | 0.0 |
| Other | 2 | 9.5 |

DISCUSSION

Seven of the eight diseases that were chosen showed higher injury rates, and this rise was linked to more women undergoing ureteric injury surgery. Our findings demonstrate a continuation of the previously documented trend of fewer hysterectomy being used to treat heavy menstrual bleeding (HMB) [10]. On the other hand, a growing tendency in POP surgery has also been noted [11], and our research has demonstrated a correlation between this and a rise in the use of hysterectomy for POP. The necessity for uterine-preserving surgery for prolapse may have increased in some locations, but its applicability to date may have been limited by the lack of information on long-term results and the requirement for a subsequent hysterectomy. However, the risk of ureteric damage following a vaginal hysterectomy for postpartum polyps appears to be minimal and remained constant throughout our research period. While the chances of ureteric damage have risen in this group throughout our research period, the hazards associated with hysterectomy for other benign causes, most notably endometriosis, are much lower than for HMB and POP. This might be due to decreased application. This contrasts with our previous findings, which showed no variation in risk for various benign reasons in lower urinary tract fistula following abdominal hysterectomy. The discovery of a rising incidence of ureteric damage during hysterectomy under cancerous circumstances is in opposition to past research on vesicovaginal fistula, which showed no variation in risk over time [12]. Over the previous forty years, uterine cancer has become more common, especially since the 1990s. Our data also show that the number of hysterectomies performed as a result of this diagnosis has been steadily rising. Because more people are using oral contraceptives, the incidence of ovarian cancer may be down in some age groups, but the number of hysterectomies performed to treat the disease is still rising. During the course of our analysis, the number of hysterectomies performed for ovarian and uterine malignancies increased, but so did the risk of ureteric damage. During vaginal hysterectomy, ureteric injuries were significantly reduced. This is consistent with earlier research [13].

A plausible rationale might be that fewer complex cases are selected for vaginal hysterectomy. Because the justification for surgery and the difficulty of the treatment are unclear, caution must be used when comparing surgical techniques and ureteric injuries in a retrospective analysis such as ours. One reason for the low number of complaints might be that most injuries were fixed without causing long-term harm. Others have similarly described pain as the primary sign of an undetected ureteric injury [14]. Differentiating between pain from complications and typical postoperative pain can be challenging. Extensive or intensifying discomfort, as well as pain in conjunction with additional indications and symptoms including fever, anuria, or urine leaking, may prompt more research. Medical professionals deemed it a violation of the standard of care if the ureteric damage was not identified while the aforementioned postoperative symptoms were present. A uncommon but dangerous iatrogenic injury that frequently goes unnoticed after surgery is ureteric damage sustained during a hysterectomy. When pain is the most common postoperative symptom, it is advised to identify the ureters during a hysterectomy and to be on the lookout for ureteric damage. Before having a hysterectomy, all women should be informed about the risks associated with the procedure.

REFERENCES

1. Clarke-Pearson DL, Geller EJ. Complications of Hysterectomy. *Obstet Gynecol.* 2013;121:654-673.
2. Aarts JW, Nieboer TE, Johnson N, Tavender E, Garry R, Mol BW, Kluivers KB. Surgical approach to hysterectomy for benign gynaecological disease. *Cochrane Database Syst Rev.* 2015 Aug 12;2015(8):CD003677.
3. Flory N, Bissonnette F, Binik YM. Psychosocial effects of hysterectomy: literature review. *Journal of Psychosomatic Research* 2005;59(3):117-29.
4. Kiran A, Hilton P, Cromwell D. The risk of ureteric injury associated with hysterectomy: a 10-year retrospective cohort study. *BJOG.* 2016;123:1184-1191.
5. Knight S, Aggarwal R, Agostini A, Loundou A, Berdah S, Crochet P. Crochet P development of an objective assessment tool for total laparoscopic hysterectomy: a

- Delphi method among experts and evaluation on a virtual reality simulator. *PLoS One*. 2018;13:e0190580.
6. Janssen PF, Brölmann HAM, Huirne JAF. Recommendations to prevent urinary tract injuries during laparoscopic hysterectomy: a systematic Delphi procedure among experts. *J Minim Invasive Gynecol*. 2011;18:314-321.
 7. Blackwell RH, Kirshenbaum EJ, Shah AS, Kuo PC, Gupta GN, Turk TMT. Complications of recognized and unrecognized iatrogenic ureteral injury at time of hysterectomy: a population based analysis. *J Urol*. 2018;199:1540-1545.
 8. Brandes S, Coburn M, Armenakas N, McAninch J. Diagnosis and management of ureteric injury: an evidence-based analysis. *BJU Int* 2004; 94: 277–89.
 9. Summerton DJ, Kitrey ND, Lumen N, Serafetinidis E, Djakovic N. EAU guidelines on iatrogenic trauma. *Eur Urol* 2012; 62: 628–39.
 10. Reid PC, Mukri F. Trends in number of hysterectomies performed in England for menorrhagia: examination of health episode statistics, 1989 to 2002–3. *BMJ* 2005; 330: 938–9.
 11. Hilton P. Long-term follow up studies in pelvic floor dysfunction: the Holy Grail or a realistic aim? *BJOG* 2008; 115: 135–43.
 12. Hilton P, Cromwell D. The risk of vesicovaginal and urethrovaginal fistula after hysterectomy performed in the English National Health Service – a retrospective cohort study examining patterns of care between 2000 and 2008. *BJOG* 2012; 119: 1447–54.
 13. Brummer THI, Jalkanen J, Fraser J, et al. FINHYST, a prospective study of 5279 hysterectomies: complications and their risk factors. *Hum Reprod*. 2011;26:1741-1751.
 14. Jacob GP, Vilos GA, Al Turki F, et al. Ureteric injury during gynaecological surgery—lessons from 20 cases in Canada. *Facts Views vis Obgyn*. 2020;12:31-42.