

Managing Ureterovaginal Fistulas following Obstetric and Gynecological Surgeries

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ABSTRACT

Background: Iatrogenic ureteric injuries leading to fistula are rare but devastating complications of obstetric and gynecological surgeries. The aim of the study was to review the demography of ureterovaginal fistula (UVF) and its surgical outcome in Kathmandu Model Hospital.

Methods: This is a review of 15 patients of ureterovaginal fistula who were referred to department of Obstetrics and Gynaecology of Kathmandu Model Hospital from Feb 2014 to Sept 2017. We reviewed the demography, causes and surgical outcome of ureterovaginal fistula (UVF). Ten patients who had complete blind end at the distal ureter, underwent Lich-Gregoir extravesical ureteroneocystostomy. In other five patients, guide wire was successfully negotiated beyond the fistula site, however retrograde double J stenting could be done in only four patients.

Results: All the patients had distal ureteric injury close to vesicoureteric junction leading to ureterovaginal fistula. Among them, majority were due to post-hysterectomy in 60% (n=9) followed by obstetrical procedures in 40% (n=6). Fourteen patients (93%) had successful closure of the fistula with complete preservation of renal function. Retrograde double J stenting was possible in patients who were referred earlier within two weeks of the onset of injury.

Conclusions: Iatrogenic injury to the distal ureter during surgery was the leading cause for the ureterovaginal fistula. Endoscopic management with ureteric stents was still possible if the patients were referred earlier following primary surgery.

Keywords: Double J stent; iatrogenic ureteric injury; ureterovaginal fistula; ureteroneocystostomy.

INTRODUCTION

Iatrogenic ureteric injuries leading to fistula are rare but devastating complications of obstetric and gynecological surgeries. The morbidity associated with ureterovaginal fistula are increased hospital stay, requiring secondary surgical intervention, potential damage to kidney and deterioration of the woman's quality of life.¹

Ureteral injuries can occur during genitourinary endoscopic procedures, gynaecological and obstetric surgeries, colorectal and vascular surgeries. However, approximately two thirds of all ureteral injuries occur during gynecologic surgery.² The overall calculated incidence of ureteral injury during major gynecologic surgery is 0.5% to 2.5% in which abdominal hysterectomy accounts for over half of the total.^{3,4} Cesarean section is clearly the most common cause for ureteric injury among the obstetric procedures.⁵ Women suffering from

genital fistula likely to have illness like depression, social isolation as family abandon them.^{6,7}

The aim of the study was to review the demography of ureterovaginal fistula (UVF) and its surgical outcome in the starting phase of fistula surgery.

METHODS

This is a review of 15 patients who developed ureterovaginal fistula following obstetric and gynecological surgeries, and were referred to department of Obstetrics and Gynaecology of Kathmandu Model Hospital. Our hospital operation theater record checked and charts retrieved which was from Feb 2014 to Sept 2017. The study reviewed the demography of ureterovaginal fistula (UVF), causes and its surgical outcome. All the data were collected from the records of the patients operated for fistula surgery.

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All the patients diagnosed with ureterovaginal fistula were included in this study. The diagnosis of ureterovaginal fistula was established from history, physical examination, negative methylene blue dye pad test and with demonstration of extravasation of contrast media from the ureter in intravenous urography (IVU) or CT urogram study, (Figure 1).



Figure 1. CT urogram showing Left Ureterovaginal fistula, extravasations of dye at the left distal ureter.

The success of the treatment was evaluated in terms of cessation of leakage of urine per vagina and getting continent after the removal of Foley's catheter following surgery with restoration of satisfactory renal function in follow up. Two patients had concomitant vesicovaginal fistula, which were repaired in the same setting.

All these patients were evaluated with cystoscopy followed by diagnostic ureterorenoscopy (URS) and retrograde pyelogram (RPG) before the definitive procedure. Ten patients who had complete blind end at the distal ureter with inability to negotiate 0.035" guide wire and with no visible contrast proximal to injury site were undergone Lich-Gregoir extravascular ureteroneocystostomy with double J (DJ) stenting (Figure 2).



Figure 2. Modified Lich-Grgoir extravascular ureteroneocystostomy.

In the other 5 patients, guide wire was successfully negotiated beyond the fistula site (Figure 3) with flow of contrast into the ureter and collecting system, however retrograde double J stenting (6F) could be done in only four patients. Remaining one patient was advised for ureteroneocystostomy after few weeks' time but lost to follow up. In both the groups, double J stent were removed three months following the surgery.

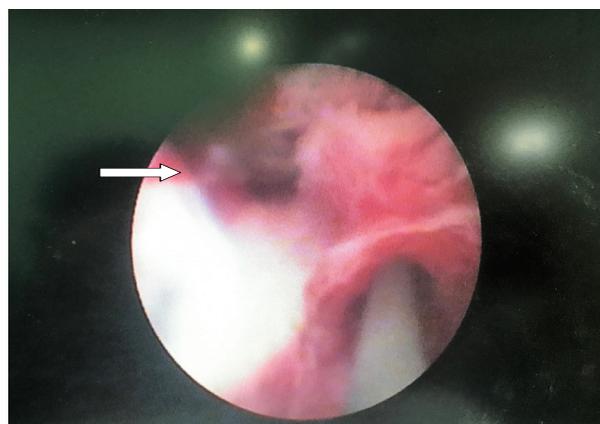


Figure 3. Endoview of ureterovaginal fistula. Arrow showing fistula on the right side and guide wire in the ureteric lumen.

All the patients were followed up with ultrasonogram at three months and contrast study at six months period and yearly ultrasonogram study following the removal of DJ stent. Follow up period ranged from 3 to 37 months.

RESULTS

Age of the patient varied from 19 to 52 years with mean age of 36 years. Among fifteen patients, four patients were para 1, six patients were para 2, three patients were para 3 and four patients were para 4. All the patients had leakage of urine per vagina following the previous surgery. Onset of urine leakage varied from 1 day to 30 days following the previous surgery with mean of 16.8 days. Referral was done to our center from the date of previous surgery ranged from 2 to 180 days. Postoperative period was uneventful in all the patients with two patients had postoperative complication Clavien Dindo grade I and one patient had grade II. The hospital stay of the patient ranged from three to eighteen days with average of 10.7 days.

All the patients had distal ureteric injury close to vesicoureteric junction leading to ureterovaginal fistula. Among them, majorities were due to post hysterectomy 60% (n=9) and remaining were due to obstetrics procedures (caesarean section) 40% (n=6), (Table 1). Nine patients (60%) had injury in the left distal ureter

whereas 6 patients (40%) had injury on right distal ureter. Ten patients had undergone modified Lich-Gregoir extravesical ureteroneocystostomy, whereas four patients underwent retrograde DJ stenting under C-arm guidance (Table 2). Two patients had concomitant vesicovaginal fistula which were repaired in the same setting.

Table 1. Causative factors for ureterovaginal fistula.

| Previous Surgery | No. of Patients | Percentage (%) |
|---------------------------|-----------------|----------------|
| Gynaecological Procedures | 9 | 60% |
| TAH with BSO | 7 | |
| TLH | 1 | |
| VH | 1 | |
| Obstetric surgeries | 6 | 40% |
| LSCS for fetal distress | 3 | |
| LSCS in obstructed labor | 2 | |
| LSCS for IUFD | 1 | |

Table 2. Operative procedures for ureterovaginal fistula.

| Operative procedures | No. of patients | Percentage (%) |
|---|-----------------|----------------|
| Ureteroneocystostomy (Lich-Gregoir) | 10 | 66.6% |
| Diagnostic URS and retrograde DJ stenting | 4 | 26.6% |
| Failed retrograde DJ stenting | 1 | 6.6% |



Figure 4. Post operative contrast study following left ureteroneocystostomy.

Fourteen patients (93%) had successful closure of the fistula with complete preservation of renal function till date. Retrograde DJ stenting was possible in patients who were referred earlier within two weeks of the

onset of injury. All the operated patients underwent ultrasonogram of abdomen and pelvis after three months following the removal of ureteric stent, which showed normal kidney without hydronephrosis on the fistula site. Postoperative contrast study IVU was performed after 6 months in both the groups, which showed patent ureter in all the patients (Figure 4).

DISCUSSION

Iatrogenic injury to ureter may lead to ureterovaginal fistula, which are most common during gynaecological procedures. The intimate relation of pelvic ureter to the female genital tract throughout its course in the pelvis makes ureter more vulnerable to injury during various gynaecological procedures. Pelvic ureter passes lateral to uterosacral ligament, cervix and fornix of vagina. Because of this anatomical proximity lower ureter is the most common site of injury during various gynaecological procedures.¹

Gynecological surgery like total abdominal hysterectomy has been found the most common cause for ureteric injury leading to ureterovaginal fistula. During major gynaecological or obstetric surgeries, the frequent encountered sites of ureteric injury leading to UVF are lateral to the uterine vessels, base of the infundibulopelvic ligament, area of the ureterovesical junction close to the cardinal ligaments, point where ureters cross the pelvic brim at the ovarian fossa and at the level of the uterosacral ligament.¹

The mechanism of injury which results in iatrogenic ureterovaginal fistulae are as follows: laceration or transection of ureter, crush injury, partial or complete suture ligation and ischemia caused by operative injury to the ureteral vascular supply. Urinary extravasation which later follows the distorted anatomical planes created during the course of surgery may lead to formation of ureterovaginal fistula.¹

The overall estimated incidence of ureteral injury during major gynecologic surgery is 0.5% to 2.5% in which abdominal hysterectomy accounts for over half of the total.^{3,4} Cesarean section is by far the most common cause for ureteric injury among the obstetric procedures.⁵ In cases of radical hysterectomy, incidence of immediate and delayed ureteral injury were found to be 1.3% and 2.4% respectively.⁸ In our study also, the major cause of ureteric injury leading to UVF has been found to be trans abdominal hysterectomy.

During surgeries, ureter might be injured in one of the several ways. Intraoperatively, kinking of the ureter

by a ligature or complete ligation, complete or partial transection, crushing by a clamp, devascularisation or diathermy-related injuries are most frequently encountered. The estimated incidence of different forms of injury are as follows: complete transection, 61%; excision, 29%; ligation, 7% and partial transection, 3%.⁹

The successful management of UV fistula depends on time of diagnosis of the disease following the previous surgery, site of injury, degree of injury to the ureter and time of referral to the Urologists. In our study, fourteen patients (93%) had successful closure of the fistula with complete preservation of renal function till date. Ten patients, who were referred late than 6 weeks following the previous surgery, all had blind end in the distal ureter in ureteroscopy and needed modified Lich-Gregoir extravesical ureteroneocystostomy. However in five patients who were referred within two weeks following previous surgery, retrograde DJ stenting was possible and they did not require any ancillary procedure.

In a study conducted in India, Arasu et al¹⁰ reviewed 30 patients of UVF following hysterectomy. All patients underwent retrograde ureterogram and ureteroscopy with double-J stenting. Twenty nine (96.6%) out of 30 patients were treated successfully with retrograde double-J stenting. Ureteroscopy and placement of double-J stent though technically very challenging but is still a feasible option if detected and intervened earlier, causing minimal morbidity and discomfort. In our study also, four out of five patients who were referred earlier from the onset of injury, ureteroscopy and placement of double J stent was possible.

Choudhury et al¹¹ did a retrospective analysis of management of ureterovaginal fistula and they concluded that undiagnosed ureteric injuries during various gynecologic and other pelvic surgeries may lead to ureterovaginal fistula. In experienced hands and with proper instruments endoscopic ureteric stenting can be regarded as one of the most effective minimally invasive approach to manage ureterovaginal fistula.

In a study conducted in Nigeria, Chalya et al¹² retrospectively analyzed 164 patients with iatrogenic ureteric injuries following abdomino-pelvic operations. Total abdominal hysterectomy was found to be the most common cause for iatrogenic ureteric injury, occurring approximately in 69.2% of the cases. Distal ureteric injury was observed in majority of cases (75.6%). 116 patients (70.7%) had delayed diagnosis.

Murtaza et al¹³ performed a study about etiology and

outcome of Ureterovaginal fistula in Pakistan. Seventeen cases of ureterovaginal fistula were evaluated. All these patients were treated surgically; 14 were managed with ureteroneocystostomy, two required Boari Flap reconstruction, and one required psoas hitch. The study concluded by saying ureterovaginal fistula is one of the major complications usually seen after emergency procedures, especially when surgery is carried out by inexperienced surgeons. Prompt diagnosis and timely surgical intervention produce excellent results. Surgical intervention can be safely done as early as four weeks from the onset of injury to the ureter.

In a single paper published in Nepal about UVF on 2010, Shrestha et al¹⁴ performed a review of 3 cases presented with UVF following gynecologic and obstetric procedures. The conclusion of the study was early diagnosis and management of uretero-vaginal fistulas results in high operative success rate with preservation of renal function with few postoperative complications and high patient's quality of life.

In our series the commonest cause of ureteric injury was injury to the distal ureter during abdominal hysterectomy. All our cases that required open surgery, modified Lich Gregoir extravesical ureteroneocystostomy were performed. None of the patients who underwent open surgery required Psoas hitch or Boari flap procedure.

In our study, we noted left sided ureterovaginal fistula in 60% (n=9) as compared to 40% (n=6) on the right side. An earlier study also reported left-sided predominance.¹⁵ The hypothesis for this finding is probably that the operating surgeons usually stand on the right side of the patient and whenever there is bleeding on the left side of pelvic cavity, it is not very clear and attempts are done to control bleeding by the clamps under obscured vision.

The commonest presenting symptom of UVF is the onset of constant leakage of urine per vagina few days or few weeks following previous surgery along with normal micturition.¹⁵ Majority of them also have moderate to severe flank and loin pain prior to leakage of urine. Good history, physical examination and appropriate radiological studies when combined together, most of the UVF can be diagnosed earlier. Common imaging modalities include IVU, CT urography, retrograde pyelography.¹⁶

Cystoscopic evaluation of urinary bladder and upper tract evaluation should be mandatory in all cases of genitourinary fistula before considering any surgical intervention. It is found that in approximately 12% of

diagnosed cases of VVF, concomitant ureteral injury or ureterovaginal fistula are also present.^{17,18} In our small series of 15 cases, two cases were found to have concomitant VVF along with UVF. Radiologic imaging such as IVU or CT scan usually demonstrates some degree of ureteral obstruction with proximal ureteral dilation along with extravasation of contrast material in the pelvis or in the vagina.¹⁹

Ureteroscopic and C arm guided ureteric stenting should be attempted as early as possible after diagnosis of ureterovaginal fistula. Successful ureteric stenting may prevent other unnecessary surgeries and associated morbidities. Success of closure of fistula after stenting increases when there is maintained ureteral continuity along with normal appearing ureteric lumen distal to fistula site. According to various literatures success rate of these procedures vary from 6% to 100%, although the overall success rate in most of the studies is around 50%.^{20,21} In our study, the success rate in fistula closure when ureteroscopic stenting was successful was found to be 100%, but these patients need to be followed up for longer duration.

Primary treatment of ureterovaginal fistula with percutaneous nephrostomy has also been reported in the literature. However it proved to be less effective in the treatment of UVF. Schmeller et al²² reviewed a series of 11 patients with ureterovaginal fistulas treated only by percutaneous nephrostomy. Six patients (55%) had persistent fistulas, while 2 patients (18%) developed strictures.

Complications following ureterovaginal fistula surgical intervention include urinary extravasation and urinoma formation in early stage and ureteral stricture in late stage. Persistent post-operative urinary leak can be treated with placement of percutaneous nephrostomy catheter. For short ureteral strictures, ureteroscopy and C arm guided ureteric stents can be applied. In our study we only encountered two case of post-operative wound infection and one of urinary tract infection, which responded well to the treatment. All the patients remained dry and continent with no evidence of ureteric strictures in the follow up period.

Ureteroneocystostomy has been the procedure of choice for the treatment of UVF for last many years. Ureteroneocystostomy either laparoscopic or by open method has excellent results with minimal complications. Open surgical procedures include ureteroneocystotomy which may require Psoas hitch or rarely Boari flap. Transvaginal repair of UVF is also possible when abdominal access is problematic.²³ In our study, ten patients who

underwent ureteroneocystostomy, all had injury in the distal ureter close to insertion into bladder so none of them required Psoas hitch or Boari flap reconstruction.

CONCLUSIONS

Iatrogenic injury to the distal ureter during Obstetrical/ Gynaecologic surgery was the leading cause for the formation of ureterovaginal fistula. Proper history, physical examination and appropriate radiological studies when used in combination, most of the UVF can be diagnosed earlier. Endoscopic management with ureteric stents was still possible if the patients were referred earlier following primary surgery thus avoiding further invasive surgery. Ureteroneocystostomy with anti-reflux technique was preferred for the fistulae close to vesicoureteric junction. Lich-Gregoir ureteroneocystostomy is simple and technically easier to perform for the fistulas close to the vesicoureteric junction.

REFERENCES

1. Jha S, Coomarasamy A, Chan KK. Ureteric injury in obstetric and gynaecological surgery. *The Obstetrician & Gynaecologist*. 2004; 6:203-8. [\[FullText\]](#)
2. Payne CK. Ureteral injuries in females: Fistulas and obstruction. In: Raz S, editor. *Female Urology*. WB Saunders; Philadelphia: 1996. pp. 507-20.
3. Symmonds RE. Ureteral injuries associated with gynecologic surgery: prevention and management. *Clin Obstet Gynecol*. 1976;19:623-4. [\[PubMed\]](#)
4. Mattingly RE, Borkowf HI. Acute operative injury to the lower tract. *Clin Obstet Gynecol*. 1978; 5(1) [\[PubMed\]](#)
5. Eisenhop SM, Richman R, Platt LD, Paul RH. Urinary tract injury during cesarean section. *Obstet Gynecol*. 1982;60:591 [\[FullText\]](#)
6. Lewis G, de Bernis L, editors. *Obstetric fistula: guiding principles for clinical management and programme development*. Geneva: World Health Organization; 2006.
7. Miller S, Lister F, Webster M, Cowan B. Obstetric fistula: a preventable tragedy. *J Midwifery Womens Health*. 2005;50(4):286-294. [\[PubMed\]](#)
8. Likic IS, Kadija S, Ladjovic NG, Stefanovic A, Jeremic K, Petkovic S, et al. Analysis of urologic complications after radical hysterectomy. *Am J Obstet Gynecol*. 2008 644.e1-644.e3. [\[DOI\]](#)
9. Berkmen F, Peker AE, Alagol H, Ayyildiz A, Arik AI, Basay S. Treatment of iatrogenic ureteral injuries during various operations for malignant conditions. *J Exp Clin Cancer*

- Res. 2000;19:441-5 e1. [\[FullText\]](#)
10. Arasu C, Ramasamy N, Kumaresan N. Early Endoscopic Management of Ureterovaginal Fistula: A Prospective Study. *Int J Sci Stud*. 2016;4(2):191-3. [\[FullText\]](#)
 11. Chodhary S, Jain P, Pal DK. Retrospective analysis of management of ureterovaginal fistula. *Sch J App Med Sci*. 2017;5(4F):1674-8. [\[FullText\]](#)
 12. Chalya PL, Massinde AN, Kihunrwa A, Simbila S. Iatrogenic ureteric injuries following abdomino-pelvic operations: a 10-year tertiary care hospital experience in Tanzania. *World J Emerg Surg*. 2015;10(1):17. [\[FullText\]](#)
 13. Murtaza B, Mahmood A, Niaz WA, Akmal M, Ahmad H, Saeed S. Ureterovaginal fistula-etiological factors and outcome. *J Pak Med Assoc*. 2012;62(10):999-1003. [\[FullText\]](#)
 14. Shrestha PM, Vaidhya A, Joshi BR. Ureteric injury during hysterectomy and caesarean birth and repair. *PMJN*. 2010;10(2):75-78. [\[FullText\]](#)
 15. Hanif MS, Saeed K, Sheikh MA. Surgical management of genitourinary fistula. *J Pak Med Assoc*. 2005;55:280-4. [\[FullText\]](#)
 16. Mandal AK, Sharma SK, Vaidyanathan S, Goswami AK. Ureterovaginal fistula: summary of 18 years' experience. *BJU International*. 1990;65(5):453-6. [\[FullText\]](#)
 17. Lee RA, Symmonds RE, Williams TJ. Current status of genitourinary fistula. *Obstet Gynecol*. 1988;72(3):313-9. [\[FullText\]](#)
 18. Fichtner J, Voges G, Steinbach F, Hohenfellner R. Ureterovesicovaginal fistulas. *Surgery, Obstetrics & Gynecology*. 1993;176(6):571-4. [\[FullText\]](#)
 19. Selzman AA, Spirnak JP, Kursh ED. The changing management of ureterovaginal fistulas. *J Urol*. 1995;153(3):626-8. [\[Link\]](#)
 20. Badlani GH, Ridder JMK, Mettu JR, Rovner ES. Urinary tract fistulae. In: Wein JA, editor. *Campbell Walsh Urology*. 11th ed. Philadelphia: Saunders Elsevier; 2016:2119-22.
 21. Narang V, Sinha T, Karan SC, Sandhu AS, Sethi GS, Srivastava A, et al. Ureteroscopy: Savior to the gynecologist?—Ureteroscopic management of post laparoscopic assisted vaginal hysterectomy ureterovaginal fistulas. *Journal of Minimally Invasive Gynaecology*. 2007;14(3):345-7. [\[FullText\]](#)
 22. Schmeller NT, Göttinger H, Schüller J, Marx FJ. Percutaneous nephrostomy as primary therapy of ureterovaginal fistula. *Der Urologe Ausg A*. 1983;22(2):108-12. [\[FullText\]](#)
 23. Chen SS, Yang SH, Yang JM, Huang WC. Transvaginal repair of ureterovaginal fistula by Latzko technique. *International Urogynaecol J*. 2007;18(11):1381-3. [\[Link\]](#)