

## Ureterovaginal fistula - etiological factors and outcome

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### Abstract

**Objective:** To assess the etiological factors and the outcome of ureterovaginal fistula in an urban setting.

**Methods:** The observational study was conducted at the Armed Forces Institute of Urology, Military Hospital, Rawalpindi, from January 2009 to January 2011. All the patients of uretero-vaginal fistula at the centre were included on the basis of non-probability purposive sampling. The etiology, clinical presentation and the investigative procedures were recorded. The operative modality contemplated was noted and post-operative results were evaluated. The data was entered in a structured proforma and analysed for descriptive statistics using SPSS version 14.0.

**Results:** Seventeen cases of ureterovaginal fistula were recorded. Amongst these 10 (58.8%) were post-hysterectomy, while 7 (41.1%) cases post-caesarean section. The emergency procedures performed by the residents/junior registrars contributed 12 (70.2%) of the cases. All these patients were treated surgically; 14 (82.3%) were managed with ureteroneocystostomy, 2 (11.7%) required Boari Flap reconstruction, and in psoas hitch was performed in 1 (5.8%) case. The time of intervention was 4 - 12 weeks ( $9.76 \pm 2.223$ ). Post-operatively, only 1 (5.8%) case had superficial wound infection and 1 (5.8%) urinary tract infection. All the patients remained dry with a follow-up period of 3 - 24 months (mean  $12.24 \pm 6.879$ ).

**Conclusion:** Ureterovaginal fistula is one of the complications of emergency procedures, especially in the hands of inexperienced surgeons. Prompt diagnosis and surgical intervention produce excellent results. Intervention can be done safely as early as 4 weeks after the initiation of the condition.

**Keywords:** Ureteric injury, Incontinence, Ureteroneocystostomy. (JPMA 62: 999; 2012)

### Introduction

Urinary leakage following gynaecological or obstetric surgery is a dreaded complication due to the formation of urogenital fistula. It has significant morbidity, with social and psychological aspects aggravating the clinical situation. The commonest urogenital is the vesicovaginal fistula. Ureteral fistulas to the genital tract in the female may connect with the vagina or much less commonly with the fallopian tube or the uterus.<sup>1</sup> The incidence of iatrogenic ureteral injury during major gynaecological surgery is around 0.5% to 2.5%.<sup>2,3</sup> Risk factors for the development of ureteral fistulas also include endometriosis, obesity, pelvic inflammatory disease, radiation therapy and pelvic malignant disease.<sup>4</sup>

As far as urogenital fistulas are concerned, significant amount of work has been done on vesicovaginal fistula, locally as well as internationally. However, local studies available on ureterovaginal fistula are limited, reflected by the extent of literature available on it. This study was conducted to assess the etiological factors of ureterovaginal fistula and to

evaluate the outcome of the operative intervention performed.

### Patients and Methods

The descriptive case series (observational) study was conducted at the Armed Forces Institute of Urology (AFIU), Military Hospital, Rawalpindi, from January 2009 to January 2011. Permission from the hospital's Ethical Committee was obtained prior to the study, and informed written consent was obtained from the patients before their enrollment in the study. The patients were selected by non-probability purposive sampling. All the patients with ureterovaginal fistula diagnosed and treated at the AFIU were included. Other cases of urogenital fistulas were excluded. Their clinical presentation and the investigative modalities were recorded. The operative procedure contemplated was noted and the post-operative results were evaluated.

The diagnosis was made on the basis of the history of surgical intervention followed by urinary incontinence. The classical history of continuous urinary incontinence along with the normal act of micturition

was seen in all the cases. The surgical procedure performed was evaluated in detail, considering it to be the main etiological factor behind fistula formation. Preliminary baseline investigations, including complete blood count, urinalysis, blood sugar random, serum urea/creatinine/electrolytes, electrocardiograph and chest radiograph, were carried out in all the cases. For diagnostic purposes, kidney, ureter, bladder (KUB) ultrasound and intravenous urography were performed. The ultrasonographic findings of hydronephrosis accompanied by the intravenous findings of hydronephroureter upto the lower end of the ureter were suggestive of the diagnosis. This was followed by vaginal speculum examination with cystoscopy. The vagina was examined to localise any leaking point, as easily seen in the vesicovaginal fistula. Cystoscopically the bladder was evaluated for evidence of vesicovaginal fistula or other bladder pathology. The cystoscopy was accompanied by ureteric catheterisation, to confirm the ureteric blockade and assess its level, as seen in the ureterovaginal fistula. Under the same general anaesthesia, the patients diagnosed with ureterovaginal fistula were placed in a supine position and exploration was conducted through the lower oblique (Gibson's incision/muscle cutting incision) approach. The 17 cases considered in our study showed an indurated/fibrotic area in the lower part of the ureter. The ureter proximal to it was separated and ureteroneocystostomy alone or with Boari flap/psoas hitch was performed over a double J stent. The stent was placed for 6 weeks in all the cases and subsequently removed under local anaesthesia. The patients were reviewed 2 weeks after surgery. Later, the followup was maintained with an interval of 3 and 6 months.

The data was entered in a structured proforma. It was analysed on using SPSS 14.0. All data were expressed as mean, standard deviation, frequency and percentages. Frequency and percentage were calculated for categorical variables like side predilection, causative factors and treatment modalities. Mean and standard deviations were calculated for quantitative data like age of the patient, level of obstruction, time of intervention and followup.

## Results

The age of the 17 cases ranged from 22 - 70 years (mean 35.18 + 13.907). Ureterovaginal fistula was noted on the left side in 15 (88.2%) cases, while only two (11.7%) cases were found involving the right ureter.

The majority of the cases (n=12; 70.2%) were noted after emergency procedures, performed by the residents/junior registrars. Besides, 10 (58.8%) cases

**Table: Etiological factors of ureterovaginal fistulas.**

S/No	Causative Factors	n 17 (%)
1	Post-hysterectomy	10 (58.8%)
	i. Abdominal hysterectomy for fibroids	3
	ii. Abdominal hysterectomy for malignancy	2
	iii. Cesarean hysterectomy	4
	iv. Rupture uterus with SVD	1
2	Post-caesarean Section	7 (41.1%)

SVD: Spontaneous vaginal delivery.

were seen after emergency hysterectomy, and 7 (41.1%) were post-emergency caesarean section (Table). All were subjected to preliminary cystoscopy with ureteric catheterisation/assessment followed by definitive procedure. On ureteric catheterisation the level of blockade was seen 3 - 6 cm ( $3.82 \pm 0.951$ ) from the ureterovesical junction. In terms of treatment, 14 (82.3%) cases were managed with simple ureteroneocystostomy, using the extravesical Modified Lich-Gregoir technique, while 2 (11.7%) cases required Boari Flap reconstruction, and in one (5.8%) case psoas hitch was added to the ureteroneocystostomy. A double J stent was retained in all the cases. It was removed after 6 weeks under local anaesthesia. The time of intervention ranged from 4-12 weeks (mean  $9.76 \pm 2.223$ ) after the primary surgery. Post operatively, all the patients remained dry, with no urinary incontinence. One (5.8%) case had superficial wound infection, which was treated by local wound management with antibiotics. One (5.8%) case had urinary tract infection, which responded to antibiotics. The patients were followed up regularly over a period of 3 - 24 months (mean  $12.24 \pm 6.879$ ).

## Discussion

Ureterovaginal fistula predominantly occurs as a result of ureteral injury during gynaecological/obstetric surgery like abdominal/vaginal/radical hysterectomy, caesarean section or anterior colporrhaphy and other pelvic surgical procedures like vascular surgery, urological surgery, including retropubic bladder neck suspensions or colon surgery. This fistula can also result from locally advanced malignant disease, radiation therapy, pelvic trauma or chronic inflammatory diseases like actinomycosis.<sup>4</sup> Laparoscopically-assisted vaginal hysterectomy<sup>5</sup> and rarely transvaginal oocyte retrieval<sup>6</sup> have also been considered in the etiology. In cases of iatrogenic post-operative ureterovaginal fistula, ureteral injury usually occurs in the form of laceration, transaction, crushing, avulsion, suture ligation (partial/complete) or ischaemia due to the devitalisation of the ureteral blood supply. Pelvic adhesions due to

repeated caesarean section, markedly enlarged uterus at the time of hysterectomy and massive bleeding obscuring the operative field could be considered as the main causes of ureteral injury.<sup>7-10</sup> The lower third of the ureter is usually affected, resulting in a fistulous communication with the vagina. The damage to the ureter occurs unintentionally, in an attempt by the operating surgeon to control active bleeding or in the process of clamping large segments of the tissues. The vulnerable sites of injury to the lower third of the ureter include the lateral edge of the uterosacral ligament, ventral to the uterine artery and then just lateral to the cervix and fornix of the vagina. Injury to the ureter can result in extravasation of urine, formation of a urinoma, followed by extension along the non-anatomic planes and eventual drainage through the vaginal incision or an ischaemic area of the vaginal cuff.<sup>4</sup>

Although gynaecological surgery is considered to be the commonest cause of ureterovaginal fistula in the developed countries, the situation in the developing countries is quite different. The obstetric causes are usually considered to be the predominant ones.<sup>7,9,10</sup> A Nigerian study<sup>9</sup> reported caesarean sections (38%) and caesarean hysterectomies (25%) as the leading cause of ureterovaginal fistula, collectively reaching upto 63%, which was similar to our study where we had 70.5% cases due to the caesarean section/caesarean hysterectomies/Spontaneous vaginal delivery(SVD) induced uterine rupture followed by hysterectomy. Interestingly, the cases in our study had been performed by the residents and the junior registrars as emergency cases in odd hours, where inadvertent injury occurred due to various manoeuvres conducted in controlling the haemorrhage during the surgery. An earlier study<sup>11</sup> reported 26 cases of ureterovaginal fistula, which were mainly due to unrecognized ureteral injuries during gynaecological procedures.

The main presentation of the ureterovaginal fistula is urinary incontinence despite the normal act of micturition. The incontinence is usually constant developing 1 to 4 weeks after surgery.<sup>12</sup> Initially, the patient may experience flank pain, fever and nausea probably due to the urinoma or obstructed kidney, followed by incontinence.<sup>4</sup>

A study<sup>12</sup> considered intravenous urography, retrograde pyelography and cystography essential for the diagnosis of ureterovaginal fistula. Another study<sup>7</sup> diagnosed UVF on the basis of simple procedures like ultrasonography with three swab test. In our study, the role of detailed history and examination followed by ultrasonography, intravenous urography and ureteric

catheterisation were emphasised. We did not perform three swab test or retrograde pyelography. Evidence of hydronephroureter with obstructed lower ureter on intravenous urography and the presence of constant urinary incontinence along with the normal act of micturition strongly suggested the ureterovaginal fistula. The presence of periureteral flare due to the urinary extravasation may be seen occasionally on intravenous urography as well. However, the debate lies in the probability of upper tract appearing normal on intravenous urography in cases of large-sized fistulas, but in such cases the urine could be seen spilling into the vagina on the lateral films, before the post-void image. The retrograde pyelogram may be useful to localise the level of obstruction and the fistula as well. A study<sup>1</sup> considered the retrograde pyelography as the single best test for diagnosis of the ureteral injury. Another study<sup>13</sup> emphasised on the role of vaginogram in the detection of ureterovaginal fistula. However, we performed simple ureteric catheterisation, to assess the level of obstruction followed by the exploration during the same anaesthesia. The cystogram may be useful to exclude a coexistent vesicovaginal fistula. Computed tomography urography also has a definitive role in the diagnosis of ureterovaginal fistula. Differentiating a ureterovaginal fistula from a ureterouterine fistula may become difficult occasionally. The history of paradoxical incontinence seen in the latter condition along with the findings of computed tomography intravenous urography,<sup>14</sup> may prove helpful in reaching a diagnosis. However, the rarity of ureterouterine fistula poses a diagnostic and therapeutic dilemma.<sup>15</sup>

Intra-operatively, the ureteric involvement was confirmed by noting extensive fibrous adhesions surrounding the distal portion of the ureter and extending into the perivesicular space as well. In our study we noted left ureteral fistula in 88.2% as compared to 11.7% on the right side. An earlier study<sup>16</sup> also reported left-sided predominance. This is probably due to the fact that the operating gynaecologist usually stands on the right side of the patient; the left-sided bleeding is controlled by the clamps under obscured vision.

The main aim of the treatment of ureterovaginal fistula is the resolution of the urinary leakage, prevention of urosepsis and preservation of renal function. In our study, we performed extravesical Modified Lich-Gregoir ureteroneocystostomy in majority of cases (82.3%). However, a few required adjuvant procedures (17.6%) like psoas hitch or Boari flap. The procedure was performed as early as 4 weeks. There was no recurrence in any of the cases. In fact,

prompt diagnosis and appropriate surgical intervention had excellent results. The intervention need not be delayed as it used to be recommended previously. More recent literature suggests that early repair is preferred and is not associated with an increase in morbidity or higher failure rates.<sup>2</sup> One study<sup>16</sup> reported open surgical repair performed safely and as early as 12 days. Another study<sup>17</sup> also considered modified Lich-Gregoir surgical procedure as a simple, successful and quick method of treatment with no recurrence and minimal complications. It also recommended bilateral ureteral catheterisation prior to difficult female pelvic and gynaecological surgery to prevent such a disaster. Others have recommended<sup>10</sup> psoas hitch as the procedure of choice in ureterovaginal fistula cure and considered prevention to be the most efficient treatment, while still others<sup>8</sup> considered ureteroneocystostomy alone as the most effective method. Like our study, others have reported ureterovaginal fistulas successfully treated with ureteroneocystostomy alone in majority of cases.<sup>16</sup> They performed adjuvant procedures in 37.5% of cases. In cases of combined fistulas of ureterovaginal and vesicovaginal fistula, the management may require bladder reconstruction.<sup>18</sup> Bilateral ureterovaginal fistulas have been reported as well.<sup>19</sup> In cases of recurrent vesicovaginal fistula with bilateral ureterovaginal fistulas at times urinary diversion is recommended. We did not encounter either of these cases in our study.

Early drainage of the affected upper urinary tract is essential,<sup>20</sup> as the partial ureteral obstruction is almost always present. Even recommendations have been made that, provided the open surgical procedure is not being considered immediately, an attempt should be made for ureteral stenting or percutaneous nephrostomy.<sup>21</sup> Spontaneous resolution<sup>22</sup> has been seen in patients with ureteral continuity and a normal appearing ureter beyond the fistula. Endoscopic management with ureteral stenting can promote closure of the fistula in some cases which are detected early. Percutaneous antegrade double J stenting with or without balloon dilatation has also been considered useful.<sup>23</sup>

Complications associated with ureterovaginal fistula repair include urinary extravasation and ureteral stricture formation. Persistent urinary leak can be treated with percutaneous nephrostomy drainage, ureteral stent(s), and/or Foley catheter drainage. For short ureteral strictures, minimally invasive endoscopic treatments can be used. In our study we had only one case of wound infection and one of urinary tract infection, which responded to the treatment. All the patients remained dry with no recurrence.

## Conclusion

Ureterovaginal fistula commonly occurs in emergency procedures conducted by the residents/junior registrars, including the emergency caesarean section and emergency hysterectomies. At least 3-6 months rotation in urology should be mandatory for residents in gynaecology and obstetrics. Planned hysterectomy for benign and malignant uterine pathologies are relatively less common. Definitive surgical procedure has excellent results for ureterovaginal fistula with no recurrence and minimal complications. The operative intervention can be done safely as early as 4 weeks. In planned cases of abdominal hysterectomy for complex pelvic/ uterine-ovarian masses, pre-operative bilateral double J ureteric stenting can be useful in avoiding the ureteric injury.

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