

## Ureteric Injuries Arising from Obstetric and Gynaecological Operations at the University College Hospital Ibadan: a 20-year Review

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### Abstract

**Context:** Iatrogenic ureteric injuries occur as a result of inadvertent ligation, transection or crushing of the ureters. A clinical condition with potential significant morbidity and mortality such as this should be a subject of regular reviews.

**Objective:** The objective of the study is to determine the aetiology, the types and the various mode of management of ureteric associated with obstetric and gynaecological surgeries within the study period.

**Methods:** This is a descriptive study of 20 years duration from January 1981 to December 2000, carried out at the University College Hospital, Ibadan Nigeria. The clinical and operative records of all patients who had ureteric injuries during the period under review were retrospectively analysed.

**Results:** The incidence of ureteric injuries during the period of review was 0.4%. The mean age of the patients was 39.4 years and the injury occurs mostly in grandmultiparous women. The commonest surgery leading to ureteric injuries in this study was total abdominal hysterectomy whereby ligation of the ureter was the commonest mode of injury.

**Conclusion:** The incidence of ureteric injury during the study period is fewer than in that of previous review. This is probably so because less radical pelvic surgeries are performed now than during the period covered by the previous review which was about three decades ago. Also improved surgical skill among gynaecologists coupled with better obstetric care might have contributed to the fewer number of ureters that were injured.

**Key Words:** Ureter, Iatrogenic, Injury, Fistula, Urinary Bladder. [Trop J Obstet Gynaecol, 2003, 20: 32-36]

### Introduction

Avoidance of iatrogenic ureteric injury during the course of pelvic surgery is a concern of every gynaecologist<sup>1</sup>. The anatomical proximity of the female reproductive organs to the pelvic portion of the ureter makes it vulnerable to injury during the course of some obstetric and gynaecological procedures<sup>2,3</sup>.

In developing countries such as Nigeria, the practice of obstetrics and gynaecology is not limited to specialists alone. General practitioners also perform caesarean sections, myomectomies, hysterectomies and laparotomies for benign and malignant pelvic conditions. Ureteric injuries may result from such practice and, if not promptly managed, could lead to increase in morbidity and mortality<sup>4</sup>.

The reported incidence of iatrogenic ureteric injuries varies between 0.5% and 2.0% of all gynaecological and pelvic operations<sup>2,5,6,7</sup>. However, the true incidence is difficult to ascertain from the literature because most studies reviewed only patients who became symptomatic and subsequently required operative intervention<sup>2,5,6,8</sup>. Iatrogenic ureteric injuries occur as a result of its inadvertent ligation,

transection or crushing of the ureters<sup>3,6</sup>. The risks of damage increase when the normal course of the ureter is altered by the primary pelvic pathology or when the ureter is not clearly identified due to intra-operative complications such as bleeding, pelvic adhesions, and/or incompetence of the surgeon. If the injury to the ureter is recognized during the surgery, it can be repaired immediately without significant morbidity. Unfortunately, however, most injuries to the ureter only become apparent when an otherwise uneventful convalescence is interrupted with symptoms arising from the injury<sup>3,9</sup>.

There is a paucity of information on ureteric injuries in Nigeria<sup>4,7,10,11,12</sup> and a study on ureteric injuries in obstetric and gynaecology was last carried out at the University College Hospital Ibadan in 1967<sup>10</sup>. A clinical condition with such significant potential for morbidity and mortality should be a subject of regular audit, which is the aim of this report.

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## Materials and Methods

This is a descriptive study covering a period of 20 years from January 1981 to December 2000, carried out at the University College Hospital, Ibadan Nigeria. The clinical and operative records of all patients who had ureteric injuries during the period under review were retrieved and analysed. The information extracted from the notes included the patients' age, parity, mode of injury, mode of presentation, methods of confirming the diagnosis, types of reconstruction done and the post-operative recovery of the patients.

### Surgical Technique

All patients were explored via a midline infra-umbilical incision on the abdominal wall. The ureter was approached through either an extra-peritoneal or trans-peritoneal route. The ureter was often isolated on an umbilical tape and traced down to the bladder as much as possible while preserving the blood supply. It was then transected. The bladder was then mobilized as much as possible, particularly on the side that corresponds to that of the ureteric injury. A cystotomy was performed between stay sutures and the lower end of the ureter was guided to the bladder through a tunnel made in the bladder wall, as close to the ipsilateral ureteric orifice as possible.

In cases where the ureter was considered too short for direct re-implantation, a Boari flap was fashioned from the bladder wall and the open end of the ureter was anastomosed to this (Boari) flap.

## Results

A total number of twenty patients sustained ureteric injuries during the 20 years study period. Thirteen case notes (65 %) were found suitable for retrieval of information. The total numbers of gynaecological operations performed during the same period were 3,240. Thus the incidence of ureteric injury during the study period was 0.4%.

**Table 1**

### Age Distribution of the Patients

Age Group (years)	Number (%)
21-30	3 (23.0)
31-40	4 (30.8)
41-50	4 (30.8)
51 & above	2 (15.4)
<b>Total</b>	<b>13 (100)</b>

Age Range: 25-52 years; Mean: 39.4 years

Table 1 shows the age distribution of the patients. Ureteric injury occurred mostly in grandmultiparous women with an incidence of 38.5% of patients. Only one of the patients was nulliparous, in whom the ureteric injury was sustained at myomectomy to treat uterine fibroids.

Total abdominal hysterectomy was the leading cause of ureteric injury in this study followed by repair of vesicovaginal fistula, leading to ureteric injuries in 6 (46.1%) and 4 (30.8%) patients respectively. Emergency caesarean section, repair of ruptured uterus and myomectomy contributed one case each. The injury was sustained at the UCH in 7 (53.8%) patients while the remaining 6 (46.2%) patients sustained ureteric injury at other private, general and teaching hospitals and were subsequently referred to the UCH.

**Table 2**

### Symptomatology in the Patients

Symptoms & Signs	Number (%)
<b>Urinary Incontinence</b>	10 (76.9)
*Retains Urge to Urinate	6 (46.1)
<b>Loin Pain and Tenderness</b>	5 (38.5)
<b>Abdominal Pain &amp; Distension</b>	4 (30.8)
<b>Oliguria/Anuria</b>	4 (30.8)
<b>Post Operative Pyrexia</b>	3 (23.0)
<b>Facial Swelling</b>	1 (7.7)
<b>Bilateral Leg Swelling</b>	1 (7.7)
<b>Dyspnoea</b>	1 (7.7)

Table 2 shows the clinical presentation of patients with ureteric injury. Urinary incontinence and urinary incontinence, while still retaining the urge or ability to micturate, were the leading presenting symptoms noted, especially in those presenting a long time after the event that led to the injury. The commonest symptoms and signs in those presenting shortly after the precipitating procedures were loin pain and tenderness, abdominal pain and distension, oliguria and/or anuria with pyrexia.

Intravenous urography (IVU) was the commonest investigative procedure done to confirm ureteric injury followed by ultrasonography of the kidneys, ureters and bladder. The two other investigative modalities used were examination under anaesthesia and dye test, and cystoscopy. The 4 aforementioned procedures were done in 10 (76.9%), 4 (30.8%), 5 (38.5%) and 4 (30.8%) of the patients respectively.

In the 10 patients who had IVU, 4 showed right hydroureters and 6 showed left hydroureters. There was associated hydronephrosis in three cases. Abdominal ultrasonography, done in 4 patients, showed hydrocalycosis of the left ureter in two and right hydrocalycosis in three patients. In addition, ultrasonography in patients with bilateral ureteric injuries demonstrated loss of cortico-medullary differentiation.

Examination under anaesthesia and dye test in all 5 patients, for whom it was done, showed egress of clear fluid per vaginam, witness of the uppermost swab in the vaginal fornix and no leakage of methylene blue. No vesicovaginal fistula (VVF) was demonstrable in any of the 4 patients who had cystoscopy. However, minimal ecchymosis and irregular bladder mucosa were noticed around the ureteric orifices of the affected ureter in 2 patients.

The left ureter was injured in 6 patients (46.1%) the right ureter in 5 patients (38.5%) while the injury was bilateral in 2 patients (15.4%). Ligation of ureter was responsible for ureteric injury in 5 (38.5%) patients while another 5 patients (38.5%) had their ureters obstructed by dense fibrous scar tissue. The injury to one other ureter resulted from transection. In the two patients who sustained bilateral ureteric injuries, ligation/ligation and ligation/transection were the cause of the injuries, respectively.

Table 3 shows the method of treatment for these patients. Ureteroneocystostomy was the leading reconstructive surgery performed to repair injured ureters during the period covered by this study, being done for 8 (61.5 %) of the patients with unilateral ureteric injury and the 2 (15.4%) patients with bilateral ureteric injuries. Only one patient was managed conservatively with a favourable outcome. The conservative management consisted of close monitoring of input and output and other vital signs, administration of analgesics and antibiotics. The condition of the patient improved gradually over the period of 5 days after the operation with the patient gradually regaining the ability to pass urine through the urethra and the abdominal discomfort gradually subsiding. She was well enough for discharge after two weeks.

Urologists performed most of the reconstructive surgeries; having performed 10 (83.3%) out of 12 cases while gynaecologists performed the remaining 2 (16.7%) procedures. The time spent in the hospital post-operatively ranged from 14 to 20 days, with an average of 16 days. The follow-up period ranged from 2 weeks to 5 months. Investigations carried out

during the follow-up period include abdominal ultrasonography and intravenous urography.

**Table 3**  
**Types of Reconstructive Surgery Performed**

Procedure	Right Side	Left Side
<b>Unilateral Lesions</b>		
Ureteroneocystostomy	3	5
Ureterostomy	1	-
Ureteric Re-implantation into a Boari Flap	-	1
Uretero-ureterostomy	1	-
Expectant Management	1	-
<b>Bilateral Lesions</b>		
Bilateral Ureteroneocystostomy	2	2

**Discussion**

The ureter is vulnerable to injury in obstetric and gynaecological operations because of its close proximity to the pelvic organs.<sup>2, 3, 5</sup> The pelvic portion of the ureter is not only embryologically related to the female genital organs but it is also involved in diseases affecting them.<sup>9</sup> Injury to the ureter is a serious postoperative complication and is usually iatrogenic.<sup>7, 9</sup> It is often detected when an otherwise uneventful convalescence is expected.<sup>8</sup> The injury can cause severe morbidity if not promptly and properly managed, with occasional associated mortality that further underlines the seriousness of the complication.<sup>4</sup>

The incidence of ureteric injury during the study period was 0.4%, which is lower than in those of previous reviews.<sup>4, 10</sup> The number of cases of ureteric injuries in this study is fewer probably because fewer radical pelvic surgical operations are performed now than during the period covered by the previous review of 1967. Also there is improved surgical skill among obstetricians and gynaecologists coupled with better obstetric care. Furthermore more tertiary care centres where experts could manage ureteric injuries have been opened in the South Western part of Nigeria, where the UCH Ibadan is located, since the last review. Some cases that would have been treated exclusively at the UCH in the past are probably being treated elsewhere.

Most of the patents in this study, 8 (61.6%) were aged between 31 and 50 years, a similar pattern to what had been reported before, indicating that this

calamity often befalls women during the productive periods of their lives.<sup>4, 5, 7, 9</sup> Most of these patients had total abdominal hysterectomy for the treatment of uterine fibroids and premalignant lesions of the cervix. The pelvic part of the ureter is very close to the uterine artery, the vaginal fornices, the broad ligaments as well as the cardinal and uterosacral ligaments, thereby increasing the risk of injury to the ureter during total abdominal hysterectomy. That total abdominal hysterectomy was the commonest antecedent procedure causing ureteric injury in this study is consistent with what had been observed in other studies<sup>3, 5, 7, 11, 12</sup>. However in a study carried out at UNTH Enugu<sup>4</sup>, emergency caesarean sections were the commonest antecedent operation leading to ureteric injury. In addition a previous review from our institution showed that 50% of ureteric injuries occurred during the repair of high VVF or juxtacervical fistula<sup>10</sup>. It is significant to note that vaginal hysterectomy, which is frequently listed as a cause of ureteric injury in gynaecological practice<sup>4, 13, 14, 15</sup>, did not contribute to any ureteric injury in this study despite the fact that a total of 264 vaginal hysterectomies were performed in the hospital during the period under review.

Difficulties during VVF-repair led to ureteric injury in 30.8% of the patients. Incidentally, difficulties during repair of VVF was the commonest cause of ureteric injury in a previous review from our institution.<sup>10</sup> Urinary fistulae around the area of the trigone expose the ureters to the risk of injury during repair due to a combination of factors such as poor access, excessive scarring, difficulties in locating the ureteric orifices and difficulties with the control of haemorrhage at the vaginal vault<sup>10</sup>. Insertion of blind sutures at the supero-lateral angles of the vagina could lead to ureteric injury<sup>10</sup>

One patient each sustained ureteric injuries during emergency caesarean section and at the repair of a ruptured uterus respectively. These two patients were however operated upon outside UCH. Previous reviews had also shown that ureteric injury could be sustained during these emergency obstetric procedures.<sup>4, 7, 11, 12</sup>

At disimpaction of the baby's head from the pelvis in prolonged obstructed labour, there may be an extensive lateral tear, which could extend to the broad ligaments. Such an injury could also be found in ruptured uterus seen mostly in poorly managed labour<sup>4</sup>. Desperate clumsy attempts at achieving haemostasis in these situations could lead to ureteric injury, as was probably the case in these patients. The incidence of ureteric injury is also high in repeat caesarean sections since the anatomy of the pelvic ureter tends to be distorted in the presence of

adhesions<sup>2, 4</sup> and lateral tear along the line of previous scar could jeopardize the ureter during clamping and ligation of the uterine pedicles.

The commonest presenting symptom in this series was urinary incontinence, or involuntary dribbling of urine per vagina at various times during convalescence. A large proportion of these patients still retain the normal urge to pass urine despite the urinary incontinence. This interesting clinical situation arises when the ureteric fistula is only on one side and the second normal ureter still drains into the bladder. The common immediate symptoms and signs after a patient might have sustained ureteric injury are loin pain on the affected side; post-operative oliguria or anuria in patients whose two ureters were affected, fever and abdominal distension. The presence of these conditions should arouse a suspicion of ureteric injury in susceptible patients

The importance of adequate preoperative investigations in patients with urinary incontinence cannot be over emphasized. In particular the investigations should seek to differentiate between ureterovaginal fistula (UVF) and vesicovaginal fistula (VVF). This is because the wrong suspicion of a VVF and a subsequent negative dye test may give a false sense of security that all is well. Similarly, the presumptive diagnosis of a residual VVF following fistula repair needs to be extensively investigated to exclude the possibility of a UVF before another attempt at VVF repair is embarked upon. In the current study, two patients with juxtacervical fistulae had multiple attempts at repair of a presumptive residual VVF when in fact the patients had UVF that resulted from previous attempt of VVF repair. The diagnosis of ureteric fistula was only made after 6 years when proper and adequate investigations were performed.

It is not clear whether the ureter on a particular side is more susceptible to iatrogenic injury than the other. Forty six percent of the patients in this series sustained injury to the left ureter while 38.5% of them sustained injury to the right ureter. This finding is similar to that of previous workers from this institution<sup>10</sup>. In addition, findings from a study on ureteric injuries at Enugu<sup>16</sup> suggested that the left ureter was more commonly injured than the right ureter, with frequencies of 52.1% and 47.9 % respectively.

A bilateral ureteric injury was seen in 2 patients, one each of whom had total abdominal hysterectomy for symptomatic uterine fibroids and premalignant lesions of the cervix respectively. In the previous review of ureteric injuries at the UCH, Ibadan, there

were 5 cases of bilateral ureteric injuries arising from the repair of large juxta-cervical fistulae<sup>10</sup>. There may be a changing trend in the causative factors of bilateral ureteric injuries, probably due to better supervision of labour with resultant fewer obstetric fistulae.

The objectives of the surgery for repair of iatrogenic ureteric injury include among others, the preservation of the renal function on the affected side and restoration of anatomic continuity of the urinary tract<sup>3,17</sup>. The most common reconstructive surgical procedure performed in this study was ureteroneocystostomy or ureteric re-implantation, as was reported in some other studies<sup>3,4,5,6,8,16</sup>. This is the most logical procedure to perform where the

length of the ureter remaining is adequate. However, the terminal end of the ureter should be adequately tunnelled through the bladder to prevent urinary reflux. Where the ureter is too short for ureteroneocystostomy, the Boari-Ockerblad flap method should be used, as we did in one of the patients in this series, to allow the gap between the ureter and the bladder be bridged by bladder muscle so that a satisfactory anastomosis can be achieved without tension<sup>17,18,19,20</sup>.

Finally, to use the words of Charles C. Higgins, injuries to the ureter during operation is a venial sin but the non-recognition of such is a mortal sin. It is thus recommended that the surgeon should be ureter-conscious and not ureter-confident<sup>6</sup>.

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