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IATROGENIC URETERIC INJURIES IN A NIGERIAN TEACHING HOSPITAL- EXPERIENCE IN THE LAST DECADE

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ABSTRACT

Background: Ureteric injury is one of the most serious complications of any abdominal or pelvic surgery with significant morbidity. The medico-legal consequences are also becoming areas of concern in our environment. Traditionally abdominal hysterectomy was responsible for most cases. While recent reports from the west have however indicated a change in the pattern of these iatrogenic injuries with urological endoscopy being the major source, recent literature from the sub-Saharan Africa is relatively sparse, with the few ones available also indicating a change in pattern however of a different variety with a high incidence of injuries arising from gynaecological, non-hysterectomy causes.

Objectives: To determine the incidence, pattern of presentation and outcome managements of iatrogenic ureteric injuries in our centre.

Design: A retrospective descriptive study.

Setting: Lagos University Teaching Hospital, Lagos, Nigeria.

Subjects: Twenty patients managed for iatrogenic ureteric injuries between January 2000 and June 2010.

Results: A total of 20 patients were managed for 24 iatrogenic injuries. Total abdominal hysterectomy was responsible for 15 (75%) of the patients. Six patients had the injury from the referring hospital in four of whom the gynaecological operations were performed by general practitioners (GP). Twelve patients developed injury after operation in our centre. Excessive intra-operative bleeding and emergency surgery in critically ill patients referred by the GP or traditional birth attendants were the most common predisposing factors. All but one patient had open surgical intervention. All patients with delayed diagnosis were operated immediately they were fit for anaesthesia irrespective of the time of injury. Outcome was satisfactory in all patients who had surgical intervention. There was one mortality which occurred in one patient who presented late and died before surgical intervention.

Conclusion: Total abdominal hysterectomy still accounts for most cases of iatrogenic ureteric injuries in our environment. Open surgical intervention gives satisfactory results in all cases. Early surgical intervention is necessary to prevent morbidity and mortality.

INTRODUCTION

Injury to the ureter is one of the most serious complications of any abdominal or pelvic procedure whether from gynaecological, urological or general surgical disease and the medico-legal implication has always been a major area of concern (1). The incidence

varies between 0.5 and 10% in most series (2-4).

Traditionally, gynaecological procedures have been reported to account for between 50 and 75% of iatrogenic ureteric injuries (IUI) since the ureter lies very near the female reproductive organs throughout its course from the pelvic brim to the bladder. Gynaecological or pelvic disease can involve the

ureter directly or can cause the course of the ureter to deviate. The normal anatomic relations of the ureter in the pelvis can also vary, thereby making it vulnerable to injury (5-8).

In sub-Saharan Africa, with an endemic scarcity of gynaecologists, the practice of major gynaecological surgical procedures is not limited to the specialists alone (4,9). Ureteric injury may result from such practices and if not properly managed could lead to increase in morbidity and mortality (4,9). Injuries may however be almost unavoidable in some situations, even in the hands of the most skilled and experienced gynaecologists.

Over the last two decades, many reports especially from the more developed nations have reported a reduction in the proportion of open gynaecological ureteral injuries mainly because of the increasing incidence of ureteral injuries from the urological endoscopes and laparoscopes and also from improvements in the quality of gynaecological care (2,10-12). However, the true incidence iatrogenic injuries is difficult to ascertain from the literature because most studies reviewed only patients who became symptomatic and subsequently required intervention (2,4,13-15). If the injury to the ureter is recognised during the surgery, it can be repaired immediately without significant morbidity. Unfortunately, many iatrogenic injuries to the ureter only become apparent when an otherwise uneventful convalescence is interrupted with symptoms arising from the injury (2,4,13-15).

Recent literature on UII in sub-Saharan African is relatively sparse (2,9,14,16,17). In this retrospective study we report a single-centre experience with these injuries over a period of ten years.

MATERIALS AND METHODS

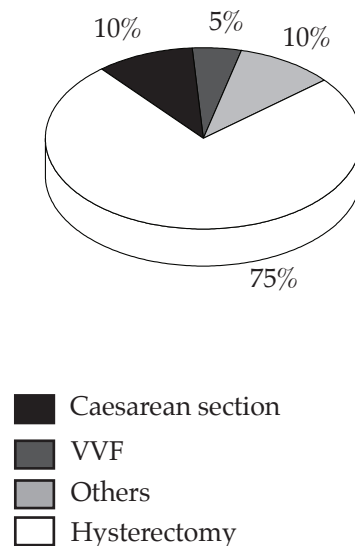
This was a retrospective descriptive study covering a period of ten years from January 2000 to June 2010. The cases were traced by using the theatre and ward records. Iatrogenic ureteric injury was defined as any inadvertent injury to the ureter which necessitates additional period of observation or intervention. The clinical and operative record of all patients who were managed for iatrogenic ureteric injuries by the urology unit during the period under review were retrieved and analysed. The information extracted from the notes included patients' age, mode of injury, mode of presentation, place of primary surgery leading to the injury, cadre of surgeon, methods of confirming the diagnosis where applicable, treatment and the outcome of treatment. Data were analysed using simple proportion.

RESULTS

Available data showed that a total of 20 patients were

managed for 24 iatrogenic ureteric injuries during the ten year study period. Obstetrics and Gynaecological surgery was responsible for 18 patients, while colorectal surgery and exploration for a pelvic mass were responsible for the two male patients in the study (Figure 1).

Figure 1
Operations associated with ureteric injuries



The post-gynaecological cases were analysed further. Fourteen patients sustained unilateral injuries while it was bilateral in four. Abdominal hysterectomy was responsible for 15 cases, while Caesarean section (C/S) and vesico-vaginal fistula (VVF) repair were responsible for two and one cases respectively (Figure 1).

Six patients with UII were referred to the centre having had their initial surgeries performed at other hospitals. Four of these injuries occurred during abdominal hysterectomy, one during a Caesarean section and one during an attempt at a VVF repair. Four of these patients were referred by general practitioners to the hospital gynaecological section who subsequently invited the urologists. Twelve patients sustained ureteric injuries during gynaecological surgery at the centre. Abdominal hysterectomy accounted for 11 while emergency Caesarean section accounted for only one. The total number of hysterectomies performed in the centre during the same period was 563. Thus, the incidence of ureteric injury from hysterectomy at our center during the study period was approximately 1.96%. The total number of Caesarean performed during the same period was 11,204 giving an incidence of approximately 0.01%. A total of 121 VVF repairs were done in the same period giving an incidence of 0.8%.

Unplanned or emergency hysterectomy and

Caesarean section was responsible for seven (47%) and two (12%) of cases respectively. Elective hysterectomy was responsible for eight (37.5%) while an attempt at repair of a vesico-vaginal fistula was responsible for one. Uterine fibromyoma was the most common indication for elective hysterectomy while excessive bleeding complicating a myomectomy was the most common indication for emergency hysterectomy (Table1).

Table 2
Sites of injury

Site/location	Frequency	Per cent (%)
At uterine artery area	11	50
Vesico-ureteric region	6	27.2
At infundibulo-pelvic ligament	4	18.2
Unknown	1	4.5
Total	22	100%

Table 1
Indications for hysterectomy leading to ureteric injury

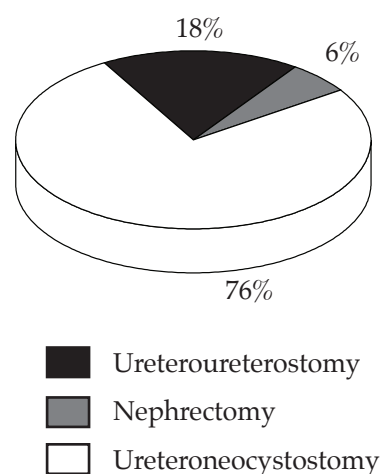
Nature of surgery	Indication	Frequency	Per cent (%)
Elective	Massive uterine fibroid	4	26.6
	Ovarian tumour	3	20.0
	Uterine malignant disease	1	6.7
Emergency	Complicated myomectomy	3	20.0
	Uterine rupture	2	13.3
	Caesarean Hysterectomy	1	6.7
	Uncontrollable PPH	1	6.7
Total		15	100

Mode of presentation: In six patients (7 injuries) the diagnosis was made at the time of surgery and was characterised by urinary extravasations into the peritoneal cavity. One of these patients had bilateral injuries. The clinical diagnosis was made within 36 hours of the post-operative period in six patients (9 injuries). Two of these patients with bilateral injuries presented with anuria, while the other four patients presented with urinary peritonitis and leakage of urine through the surgical wound. The diagnosis in five patients was made between the 7th and 28th post-operative day. They presented with uretero-vaginal fistula with or without flank pain or tenderness. One patient presented about 72 months after hysterectomy with vague abdominal symptoms and a palpable left renal mass .

Treatment: All patients except one had surgical intervention. Pre-operative assessment included Ultrasound scan, IVU, C-T scan, examination under anaesthesia, dye test and cystoscopy as indicated. The most common location of the injury was at the region of the uterine artery underneath the broad ligament which accounted for 11(50%) of the post gynaecological injuries.

All the injuries were repaired as soon as possible after diagnosis was made. Seventeen patients had surgical intervention. Ureteroneocystostomy was performed in 12 (76%) patients (Figure 2). One patient died before surgical intervention.

Figure 2
Treatment of ureteric injury



Follow up evaluation mainly consisted of clinical evaluation and abdomino-pelvic ultrasound scan with IVU and cystoscopy when indicated. Patients were followed up for a period ranging between two and twelve months.

Outcome of treatment: There was one mortality which occurred in a referred 40 year old woman who presented with features of urinary peritonitis and leakage of urine through the abdominal wound. She died over 72 hours after the initial injury, before she could have surgical intervention. The immediate and short term outcomes were regarded as satisfactory in the remaining 17 patients based on complete resolution of all the symptoms and non-demonstration of obstruction or extravasations on follow-up. Urologist performed all the reconstructive surgeries. The hospital stays of patients ranged on the average from 14 to 35 days.

DISCUSSION

The anatomical proximity of the female urinary and genital tracts makes injury to the ureters a constant threat during gynaecological surgery as ureteral injuries may be almost unavoidable in some situations even in the hands of the most skilled and experienced gynaecological surgeons (6).

The pelvic portion of the ureter is not only embryologically related to the female genital organs but is also involved in diseases affecting them (8). At the base of the cardinal ligament where it crosses the uterine artery, the ureter is just 12mm from the vagina and as it moves towards the bladder it becomes even closer to the vagina (8,14).

Nearly all gynaecological procedures have been reported to cause ureteric injury with an incidence of 0.4-2.5% for non-malignant conditions (1,2). Traditionally, open gynaecological procedures have been known to be responsible for more than 50% of all IUI. Even though more recent reports from the developed nations have suggested laparoscopic and urological endoscopic procedures as being responsible for a majority of cases, (1,2,11). In this study open gynaecological procedures accounted for 92% of all IUI with hysterectomy being responsible for about 83% of the gynaecological cases. This is however not surprising in view of the fact that upper tract endoscopy service is virtually non-existent in most public health institutions in Nigeria. Even though most studies have also reported TAH as the main cause of IUI during obstetric and gynaecological surgery (2,6), more recent reports from sub-Saharan Africa have reported a rather high percentage of IUI arising from hysterectomy-unrelated causes (4,9,14).

The incidence of ureteric injury during hysterectomy in this study was 1.96% which is

higher than the incidence of 0.4 – 1% for abdominal hysterectomy reported in other studies (2,17,18). There may be reasons for this. While most cases of post gynaecological IUI have been reported to occur in apparently straight forward operations, majority of the cases in this study had documentation of multiple predisposing factors. Technical difficulties were reported in all the eleven hysterectomies performed at the centre. These included excessive bleeding (9 cases) and multiple adhesions to bladder and lower ureter. In all the myomectomies, the uterus was greater than 28 weeks size. Even though over 90% of TAH in the centre were performed as elective procedures, almost half of TAH causing IUI were performed as emergencies (five in eleven) when operative conditions (including the expertise of the surgeon) were far from ideal. Indeed emergency hysterectomy and Caesarean section accounted for 50% of all post gynaecological IUI in this study. Typically, these patients presented in critical conditions either after spending days with the traditional birth attendants (TBA) or after being referred by a general practitioner (GP) and after an obstetric and gynaecology surgery gets complicated.

The left ureter was injured in one patient who had a Caesarean hysterectomy. When total abdominal hysterectomy is done at the time of Caesarean section or in the immediate post-partum period, ureteral injury can occur closer to the lower ureter, especially if dilatation and effacement of the cervix have begun (5). The left ureter is more liable to injury as it is much closer to the cervix than the right ureter (8). In this series as well as others, IUI was more common on the left.

However, unlike in the cases of hysterectomies performed in the centre where the incidence of IUI was higher than most figures quoted in literature, the incidence from Caesarean section was about 0.01% accounting for 8.3% of all cases of IUI caused by procedures in the centre and 10% of all cases of IUI overall. Even though most studies have reported similarly low incidence of IUI from the Caesarean section ranging from 0.01-0.09% (19) more recent studies from sub-Saharan Africa have reported rather high figures. Williams *et al* reported Caesarean section to be responsible for 72% (64 in 89) of IUI in AddisAbaba while it was responsible for 31.6% of IUI in a study done by Mweta *et al* in Tanzania (4,14).

Attempt at transvaginal VVF repair was responsible for only one IUI (5.6%) patient. This however contrasts with reports by Shittu in Ibadan where VVF repair was responsible for 30.8% of cases of IUI and by Mweta in Tanzania who reported an incidence of 10.5% (9,14). The patient in question had a VVF involving the trigone. The repair of fistula in the area of the trigone exposes the patient to IUI due to the close proximity of the ureteric orifices. The relatively difficult access to ureteric manipulation through the

vaginal route may also be contributory.

Unrecognised ureteral injury is often associated with high morbidity, uretero-vaginal fistula and the potential loss of kidney function or even mortality. The risk of impairment or loss of kidney function is increased when ureteral injury is not recognised until the post-operative period when ureteral obstruction or urinary leakage is diagnosed in an expected uneventful convalescent period. The only mortality in this study occurred due to a delay in the recognition, referral and the subsequent management of a patient with unilateral injury. She had presented with features of urinary peritonitis and leakage of urine through the abdominal wound. She died before surgical intervention. Her injury was assumed to be unilateral because urine was still found in the bladder.

Ligation injury was the most common form of IUI reported in the operation notes by accounting for about 41% of cases. This is consistent with the findings of Chinakwana *et al* and most other reports in literature (2,16) but contrasts with the findings of Oboro *et al* who reported transection injury as the most common (17).

The true incidence of ligation injury may never be known because a unilateral ureteric ligation can easily be missed as the affected kidney may undergo silent atrophy in the presence of a normal contralateral kidney. An incidental clinical or radiological diagnosis of hydronephrosis usually brings attention to such cases. One patient presented almost six years after hysterectomy with vague abdominal discomfort and hypertension. An abdominal USS revealed hydronephrosis with severe loss of cortical tissue. She had a left nephrectomy with resolution of both the symptoms and the hypertension. All the other patients with unilateral ligation injuries presented 7-28 days after surgery with urinary fistula with or without loin pains and tenderness. These patients had straightforward ureteroneocystostomy with successful outcome.

Most of the patients in this study were aged between 31 – 50 years; a similar pattern to what had been reported previously indicating that this often befalls women during the reproductive periods (14,15,17).

The objectives of the surgery for repair of iatrogenic ureteric injuries include amongst others preservation of renal function on the affected side and restoration of anatomic continuity of the urinary tract. There is a general agreement that when inadvertent injury to the ureter is detected during surgery, immediate repair is the treatment of choice (2,20). However, when diagnosis is delayed the optimal time for definitive treatment is subject to some controversies. Some have advocated for immediate repair while many others still prefer a delayed repair usually preceded by a period of upper tract drainage (2,15). However, the definitions of

'early' and 'delayed' are not clear-cut even though the classic delayed treatment was to repair months after the initial injury. In our environment, these patients who quite often are illiterates, poor and completely responsible for the cost of their healthcare are more often likely to default in their treatment. In addition, like most public hospitals in Nigeria, facilities for percutaneous upper tract drainage are not available. As a result, all the patients with delayed diagnosis in this study were repaired as early as possible (once they were fit to undergo anaesthesia) with satisfactory outcome, with the interval between initial injury and the repair ranging between 36 hours and six weeks.

The most common reconstructive surgical procedure performed in this study was ureteroneocystostomy. This is consistent with other studies (2,9,15). This is not surprising in view of the precarious blood supply of the pelvic ureter and the relative ease of bringing the proximal ureter and the bladder together after adequate mobilisation.

Operations close to the ureters will continue to result in occasional iatrogenic injury. Though it may be unavoidable in some situations great care should be exercised when defining pelvic anatomy during pelvic surgery. Some surgeons have suggested pre-operative ureteral stenting as an effective way of preventing IUI (2,21). Although an intra-operative diagnosis is most preferred this may not be possible in some situations. It is therefore important that the clinician has a high index of suspicion during the post-operative period in order to reduce the morbidity and even mortality.

In conclusion, contrary to more recent reports from both the developed and developing world very little has changed in the pattern of iatrogenic ureteric injuries in our environment with total abdominal hysterectomy still responsible for 75% of all cases. Operative difficulties due to excessive bleeding, bulky uterus and emergency surgery in critically ill patients were the major predisposing factors. Early open surgical intervention usually yields excellent result and is crucial in preventing morbidity and even mortality.

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REFERENCES

1. Preston, J. M. Iatrogenic Ureteric Injury: Common Medicolegal Pitfalls, *BJU International*. 2001; **86**: 313-317.
2. Brandes, S., Micheal, C., Noel, A. and Jackmaninch:

- Diagnosis and Management of Ureteric Injury: An Evidence-Based Analysis, *BJU International*. 2001; **94**: 277-289.
3. Giberti, C., Germinale, F., Lillo, M., *et al.* Obstetric and Gynaecological Ureteric Injuries Treatment and Results. *Brit. J. Urol.* 1996; **77**: 21-26.
 4. Williams, G., Broughton, S., Worku, H., and Tekle, H. Five Years' Experience of Ureterovaginal Fistulae Following Obstetric or Gynaecological Intervention in Ethiopia. *Afric. J. Urol.* 2010, **16**: 17-19.
 5. Thompson J. D. Operative Injuries to the Ureter; Prevention, Recognition and Management. In: Thompson J. D., Rock A. J., editors *Telinde's Operative Gynaecology*. (7th Ed.) Philadelphia: JB Lippincott 1992p. 749-83.
 6. Aronson, M. P. and Bose, T. M. Urinary Tract Injury In Pelvic Surgery. *Clin. Obst. and Gynae.* 2002; **45**: 428-438
 7. Paivi, H., Jare, S. and Aila, T. Urinary Tract Injuries after Hysterectomy. *Obst. and Gynae.* 1998; **92**.
 8. Rosemarie Fröber: Surgical Atlas, Surgical Anatomy of the Ureter, 2007 *BJU International*. **100**: 949-965.
 9. Shittu, O. B., Adeyanju, O. A., Adebayo, A. S., *et al.* Ureteric Injuries Arising from Obstetric and Gynaecological Operations at University College Hospital Ibadan: A 20 Years Review. *Trop. J. Obst. and Gynae.* 1998; **92**.
 10. Selman, A. A. and Spirmak, J. P. Iatrogenic Ureteric Injury: A 20 Years treating 165 injuries. *J. Urol.* 1996; **155**: 878-881.
 11. Teija, P., Ilkka, P., Markku, S., *et al.* Increasing Numbers Ureteric Injury after the Introduction of Laparoscopic Surgery, *Scandinavian J. Urol. and Nephrol.* 2008; **42**: 422-427.
 12. Yudai, T., Hironori, Naoaki, K. *et al.* Ureteral Catheter Placement For Prevention of Ureteral Injury During Laparoscopic Hysterectomy. *J. Obst. and Gynae., Res.* 2008; **1**: 67-72.
 13. Onuora, V. C., Ariyan, R., Koko, A. H., *et al.* Major injuries to the urinary tract in association with childbirth. *East Afr. Med J.* 1997; **74**: 523-526.
 14. Mteta, K. A., Mbwambo, J. and Mvungi, M. Iatrogenic Ureteric and Bladder Injuries in Obstetric and Gynaecological Surgeries. *East Afr. Med. J.* 2006; **83**.
 15. Nasr, A., El-Tabey, B., Ali-El-Dein, *et al.* Urological Trauma after Obstetric and Gynaecological Surgeries. *Scandinavian J. Urol. and Nephrol.* 2006; **40**: 225-231.
 16. Chinakwana, G. U., Okafor, P. I. Ikechebel, J. I., *et al.* Urology Injuries Following Gynaecological Operation – our experience in a teaching hospital in Nigeria. *West Afr. J. Med.* 2006; **25**: 153-156.
 17. Oboro, V., Dare, F. O., Fadiora, S. O., *et al.* Ureteric Injury Following Pelvic Operations. *East Afr. Med. J.* 2002; **79**: 611-613.
 18. Godno, J. A., Powers, T. W. and Harris, V. D. Ureteral Injury In Gynaecological Surgery: A ten-year review in a community hospital. *Am. J. Obs. and Gynecol.* 1995; **172**: 1817-1822.
 19. Nawaz, F. H., Khan, Z. E. and Rizvi, J. Urinary tract injuries during obstetric and gynaecological surgical procedures at the Aga Khan University Hospital Karachi, Pakistan: a 20-year review. *Urologica Internationalis*. 2006; **78**: 106 – 111.
 19. Khaleel, A., Elijah, O., Kehinde, A. *et al.* Iatrogenic Ureteric Injuries: Aetiological Factors and the Effect of Early Management on Subsequent Outcome. *Intern. Urol. and Nephrol.* 2005; **37**: 235-241.
 20. Demuyder, X., Beland, G. and Audit-Lapointe, P. Ureteric Complications of Radical Hysterectomy: Role of Catheters. *J. Obst. and Gynae.* 1985; **5**: 184-186.