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Evaluation of Ureteric Fistula with Ultrasonography and Dye Test in a Low-resource Setting

M. E. Isikhuemen[1*], K. C. Ekwedigwe[2], I. Sunday-Adeoye[2], A. B. C. Daniyan[2], M. O. Eliboh[2] and D. A. Onwe[2]

[1]Department of Obstetrics and Gynaecology, University of Benin Teaching Hospital, Benin City, Edo State, Nigeria.
[2]National Obstetric Fistula Centre, Abakaliki, Nigeria.

Authors' contributions

This work was carried out in collaboration between all authors. Authors MEI, KCE and ISA designed the study, performed the statistical analysis, wrote the protocol, and wrote the first draft of the manuscript. Authors ABCD, MOE and DAO managed the analyses and literature searches. All authors read and approved the final manuscript.

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Original Research Article

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ABSTRACT

Introduction: Ureteric injury is a possible complication of pelvic surgery. Ultrasonography, when combined with dye test is relatively inexpensive for evaluation of patients with ureteric fistula. The aim of this paper was to determine the role of ultrasonography and dye test in the evaluation of patients with ureteric fistula in a low-resource setting.
Methods: This was a retrospective study conducted at the National Obstetric Fistula Centre, Abakaliki, South-East Nigeria between January 2014 and December 2016. Thirty-two patients had repair of ureteric fistula during the study period, but fourteen met the inclusion criteria. Patients that had preoperative evaluation with pelvic ultrasonography and dye test were included in this study.
Results: Their mean age was 37.6±6 years. Eleven (78.57%) of the patients had ureteric fistula from emergency caesarean section, while 3(21.43%) had fistula from abdominal hysterectomy.

**Corresponding author: E-mail: maradona4real2002@yahoo.com;*

Eleven patients (78.57%) had hydronephrosis during ultrasonography. Out of the 11 patients with hydronephrosis, it was bilateral in 5 (45.45%). Out of the 14 patients, 6 (42.86%) had hydroureter during ultrasonography. In all eleven patients, dye test was negative despite presence of urine in the vagina which was strongly suggestive of ureteric fistula.

Conclusion: Common features of ultrasonography in patients with ureteric fistula are hydronephrosis and hydroureter. However, these features are not pathognomonic for ureteric fistula. Combinations of ultrasonography and dye test are useful and cheap methods for evaluating patients with ureteric fistula.

Keywords: Ureteric injury; ureteric fistula; ultrasonography; hydronephrosis; hydroureter; dye test.

1. INTRODUCTION

Urine leakage during pelvic surgery is a serious complication following injury to the ureter [1]. Ureteric fistula can occur between the affected ureter and the vagina, uterus or skin [2]. Ureteric fistula usually results when there is ureteric injury which is not usually seen at the time of surgery. Obstetric events are the most common causes of ureteric fistula in less developed countries unlike developed countries where gynaecological surgery account for most cases of ureterovaginal fistula [1,3-5]. Caesarean sections (38%) and caesarean hysterectomies(25%) are the leading causes of ureteric injuries and ureterovaginal fistula in Nigeria [5]. The liability of the ureters to injury during pelvic operations result from its closeness to the female reproductive system and its course in the pelvis [6]. The incidence of ureteric injuries following pelvic surgeries have been reported to be between 0.3 and 0.41% [6,7]. Other less common causes of ureteric injuries include vaginal surgeries and colonic/pelvic vascular surgeries [8]. During abdominopelvic surgery, ureteric injury may result from crush injury, diathermy injury, suture ligation, transection, resection of a segment of the ureter and devascularisation of a segment of the ureter due to dissection which is made close to the ureter [9].

Ultrasonography is the main technique for primary imaging of the upper urinary tract due to its low cost, availability and lack of exposure to radiation [10]. Utilization of modern diagnostic techniques such as ultrasonography might be useful in the evaluation of the upper urinary tract and in developing strategies for long-term follow-up of fistula patients [10]. Previously reported ultrasound findings in patients with ureteric fistula includes hydronephrosis and hydroureter [11,12]. There are however other sophisticated techniques for evaluating patients with ureteric fistula but they are usually expensive and may not always be available. These features on ultrasonography are not pathognomonic for ureteric fistula and may even be present following a normal pregnancy.

Vaginal speculum examination and dye test is also another way of assessing ureteric fistula [12]. This involves the use of dye which is instilled into the bladder via a urethral catheter. A negative dye test in a woman that is leaking urine usually indicates ureteric fistula. It is easily performed and does not require the attention of a specialist. It is cheap and readily available. The nature of the upper urinary tract is however not determined by the use of dye test.

In resource-poor settings like Sub-Saharan Africa including Nigeria, a combination of ultrasonography and examination in theatre, including dye test may be an affordable means of investigating patients with ureteric fistula. The aim of this paper was to document the role of ultrasonography and dye test in the preoperative assessment of patients with ureteric fistula.

2. MATERIALS AND METHODS

This was a retrospective study conducted at the National Obstetric Fistula Centre, Abakaliki, South-East Nigeria between January 2014 and December 2016. The centre is primarily for the management of women with genital fistula. It is also a research centre. The centre has facilities for other gynaecological procedures such as cervical cancer screening and treatment, family planning services and management of patients with infertility. A total of 32 patients had repair of ureteric fistula during the study period. All patients were referred to our centre. Eleven patients were excluded because they were not evaluated with pelvic ultrasonography before surgery. Five patients with congenital ureteric fistula were also excluded from the study. The case folders of two patients could not be retrieved. Hence, a total of 14 case folders were reviewed. Vaginal speculum examination and

dye test were done for each patient. The presence of clear urine in the vagina without dye stain was adjudged to be ureteric fistula. Abdominopelvic ultrasound scan was done in the Radiology Department of the National Obstetric Fistula Centre, Abakaliki to assess for hydronephrosis, hydroureter or any other pathology. All patients had ureteroneocystostomy. Ethical approval for the study was obtained from Ethics and Research committee of the National Obstetric Fistula Centre, Abakaliki.

3. RESULTS

All patients were females. Their ages were between 28 and 46 years with a mean age of 37.6±6 years. Their parity ranged from 2 to 8 with a mean parity of 4±2. The majority (71.43%) of patients were Igbo (Table 1). Four (28.57%) of the patients had primary level of education, while 6 (42.86%) had no formal education. All were Christians.

Table 1. Sociodemographic characteristics of patients

	Variable	Frequency (%)
Age	20 – 29	2 (14.29)
	30 – 39	7 (50)
	40 – 49	5 (35.71)
Marital status	Married	13 (92.86)
	Single	1 (7.14)
Tribe	Igbo	10 (71.43)
	Yoruba	1 (7.14)
	Urhobo	2 (14.29)
	Ishan	1 (7.14)
Level of education	Primary	4 (28.57)
	Secondary	4 (28.57)
	No formal education	6 (42.86)

Table 2. Cause of fistula

Cause of fistula	Frequency (%)
Emergency caesarean section	11 (78.57)
Abdominal hysterectomy	3 (21.43)

All 14 patients were assessed using pelvic ultrasonography and dye test. Duration of urine leakage at first presentation ranged from half a month to 168 months. Eleven patients (78.57%) had ureteric fistula following emergency caesarean section, while the other three (21.43%) had fistula following abdominal hysterectomy (Table 2). Eleven patients (78.57%) had hydronephrosis. Out of the 11 patients with hydronephrosis, it was bilateral in 5 (45.45%). Out of the 14 patients, 6 (42.86%) had hydroureter on ultrasonography. One patient (7.14%) had left nephromegaly while three (21.43%) had normal findings on ultrasound scan. In all eleven patients, dye test was negative despite leakage of urine per vagina.

During intraoperative evaluation, nine (64.29%) of the patients had right ureteric fistula while 5 (35.71%) had left ureteric fistula. Five of the patients that had hydroureter during ultrasonography were corroborated intraoperatively. Result of findings in theatre and ultrasonography are shown in Table 3. All 14 patients had ureteroneocystostomy. It was successful in all the patients. The postoperative period was uneventful. They were followed up for six months and remained dry.

4. DISCUSSION

Ureteric injury and ureteric fistula is a possible complication of abdominopelvic surgery [6,7]. It may be obstetric related [13-15]. Vaginal speculum examination and dye test is relatively cheap and may predict the diagnosis of ureteric fistula when present [12]. Evaluation with ultrasonography is an inexpensive method of assessing the urinary tract.

Globally, the most common mode of evaluation of the female pelvis is ultrasonography [11]. However, there is paucity of information regarding ultrasonographic features of women with ureteric fistula. Intravenous urography is appropriate for extraurethral incontinence [10]. This is quite expensive in our environment bearing in mind that many patients involved are usually of low socioeconomic status who were unable to afford quality obstetric care.

The appearances of the upper urinary tract are not pathognomonic for urinary or obstetric fistula [11]. Fistula are difficult to diagnose sonographically [11]. However there could be features on ultrasonography which can be corroborated with findings on dye test to make a diagnosis of ureteric fistula [12]. In a related study, fistula was not diagnosed in 71% of cases on ultrasonography [11]. None of our patients had a definite diagnosis of ureteric fistula from ultrasonography. However, features on ultrasosnography such as hydronephrosis and hydroureter in a patient with continuous leakage

of urine and a negative dye test is suggestive of a possible ureteric fistula. Hydronephrosis and hydroureters are also physiological occurrences in pregnancy [16]. Since most women in this study had just been delivered, the results have to be interpreted with caution and this may explain the bilateral hydronephrosis seen in some of the patients. In this situation the use of intravenous urography may be better. The experience of the sonologist may also influence ultrasound findings.

Ultrasonographic features in women with ureteric fistula are mainly evidence of urinary stasis. In a previous study, 50% of patients had dilated ureters and renal pelvis following ureteric injury [12]. In our study, 42.86% of our patients had hydroureter while 78.57% had hydronephrosis.

Dye test is also another inexpensive method of identifying ureteric fistula [12]. Speculum examination may reveal a communication between the bladder and vagina. If no vesicovaginal fistula is seen, a dye test is carried out and if it is negative despite urine leakage, it is usually indicative of ureteric fistula. As shown in our study, all our patients had a negative dye test despite leakage of urine through the vagina which was adjudged to be ureteric fistula. This was corroborated by intraoperative findings.

Several studies have shown the role of cystoscopy, vaginoscopy, intravenous pyelogram and retrograde ureterography in the evaluation of patients with ureteric fistula [2,12]. We however managed our patients without any of these techniques. We used a cheap, easy and readily available means in assessing these patients which included ultrasonography and dye test with good outcomes. This is similar to a study done in Zaria, Nigeria where ultrasonography was combined with three swab test in the preoperative evaluation of patients with ureteric fistula [12].

Ureteroneocystostomy is a recognized method of treating ureteric fistula [2,17-21]. As shown in our study, ureteroneocystostomy was done for all the patients with good outcomes. The postoperative period was essentially uneventful. None of them were leaking urine at the time of discharge. They remained dry after six months of follow-up.

Table 3. Ultrasonographic findings and findings in theatre

	Ultrasonographic findings	Findings at surgery
Patient 1	Bilateral hydronephrosis Right hydroureter	Right ureteric fistula
Patient 2	Bilateral hydronephrosis Left nephromegaly	Left ureteric fistula
Patient 3	Bilateral hydronephrosis Right hydroureter	Right ureteric fistula Right hydroureter
Patient 4	Right hydronephrosis Right hydroureter	Right ureteric fistula Right hydroureter
Patient 5	Right hydronephrosis	Right ureteric fistula Right hydroureter
Patient 6	Nil	Left ureteric fistula Left hydroureter
Patient 7	Right hydronephrosis	Right ureteric fistula Right hydroureter
Patient 8	Bilateral hydronephrosis	Right ureteric fistula
Patient 9	Left hydronephrosis	Left ureteric fistula
Patient 10	Right hydronephrosis Right hydroureter	Right ureteric fistula Right hydroureter
Patient 11	Left hydronephrosis Left hydroureter	Left ureteric fistula Left hydroureter
Patient 12	Nil	Left ureteric fistula
Patient 13	Nil	Right ureteric fistula Right hydroureter
Patient 14	Bilateral hydronephrosis Right hydroureter	Right ureteric fistula Right hydroureter

5. CONCLUSION

Common ultrasonographic features in patients with ureteric fistula are hydronephrosis and hydroureter. Where resources are inadequate ultrasonography combined with dye test is a cheap, reliable, readily available, and simple means of evaluating patients with ureteric fistula.

CONSENT

It is not applicable.

ETHICAL APPROVAL

As per international standard written approval of Ethics committee of National Obstetric Fistula Centre, Abakaliki has been obtained for this study and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Farouk K, Najeeb R, Mohibullah, Mohsin B, Riaz H. Ureteroneocystostomy versus ureteric stenting for the management of ureterovaginal fistula. Journal of Rawalpindi Medical College (JRMC). 2014;18(2):226-229.
2. Meirow D, Moriel EZ, Zilberman M, Farkas. Evaluation and treatment of iatrogenic ureteral injuries during obstetric and gynecologic operations for nonmalignant conditions. A J Am Coll Surg. 1994;178(2):144-8.
3. Tahzib F. Epidemiological determinants of vesicovaginal fistula. Brit. J Gynecol Obstet. 1983;90:387-91.
4. Daniyan B, Sunday-Adeoye I, Ekwedigwe K, Dantani D, Lengman S. Experience in the management of ureterovaginal fistula in South-East Nigeria. Sylwan. 2016;160: 331-352.
5. Ozumba BC, Attah CA. Ureteral injury in obstetric and gynecologic operations in Nigeria. Int J Gynecol Obstet. 1991; 36(2):131-5.
6. Oboro VO, Dare FO, Fadiora SO, Aderounmu AOA. Ureteral injuries following pelvic operations. East African Medical Journal. 2012;91(11):604-606.
7. Yeong CT, Lim TLW, Tan KH. Ureteral injuries in an obstetric and gynaecology teaching hospital. Med J Malaysia. 1998;55(1):51-58.
8. Gilmour DT, Dwyer PL, Carey MP. Lower urinary tract injury during gynecologic surgery and its detection by intraoperative stoscopy. Obst. Gynecol. 1999;94(5):883-89.
9. Chalya P, Massinde AN, Kihunrwa A, Simbila S. Iatrogenic ureteric injuries following abdominopelvic operations: A 10-year tertiary care hospital experience in Tanzania. World Journal of Emergency Surgery. 2015;10:17.
10. Tubaro A. Imaging and other investigations. Committee 7B.
11. Adetiloye VA, Dare FO. Obstetric fistula: evaluation with ultrasonography. J Ultrasound in Med. 2000;19:243-249.
12. Randawa AJ, Khalid L and Abbas A. Diagnosis and management of ureterovaginal fistula in a resource constrained setting: Experience at a district hospital in Northern Nigeria. Libyan J Med. 2009;4(1):41–43.
    DOI: 10.4176/081101.
13. Ozumba BC, Attah CA. Ureteral injury in obstetric and gynecologic operations in Nigeria. Int J Gynecol Obstet. 1991; 36(2):131-5.
14. N. Gabi, A.K Hemal, M. Kumar, M.S Ansari, L.N.D Dorairajan. Diagnosis and Management of Post-ceasarean ureterouterine fistula. Int J Urogynecol 2000;11(6):389-91.
15. Iqbal S, Nabi S, Hemal A.K. Endourologic management of obstetrical ureterouterine fistula: Case report and review of literature. J Endourol. 2001;15(10):985-88.
16. Rasmussen PE, Nielsen FR. Hydronephrosis during pregnancy: A literature survey. Eur J Obstet Gynecol Reprod Biol. 1988;27(3):249–59.
17. Tijani KH, Onwuzurigbo KI, Ojewola RW, Afolabi BB, Akanmu NO. Iatrogenic ureteric injuries in a Nigerian teaching hospital-experience in the last decade. East African Medical Journal. 2011;88(9): 304-309.
18. Lanary KA, Hashim H, Iacovou J. Ureterouterine fistula post ceaserean section: A case report. Cases Journal. 2008;1:253.

19. Sahar S, Sarkar MK, Das KP, Aktar N. Iatrogenic genitourinary fistulae: A survey in Khulna Medical College. J Bangladesh Coll Phys Surg. 2005;23(2):68-71.
20. Goodwin WE, Scardino PT. Vesicovaginal and ureterovaginal fistulas: A summary of 25 years of experience. J Urol. 1980;123:370-74.
21. Akman RY, Sargin S, Ozdemir G. Vesicovaginal and ureterovaginal fistulas: A review of 39 cases. Int Urol Nephrol. 1999;31(3):321-6.

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