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"Close-loop" urethral obstruction: Clinico-radiological features and management consideration in a resource-constraint environment

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Abstract
Objective: To document our observation of "close-loop" obstruction among patients with dual urethral obstruction from BPH and urethral stricture disease.
Materials and Methods: The hospital records of all patients that presented to our centres with evidences of urethral stricture co-existing with BPH were retrospectively reviewed from January 2007 to December 2011. Among other things, the salient features in the contrast radiograph of those with "close-loop" obstruction and their treatment were documented and analysed.
Results: Forty three patients were managed for radiological evidence of urethral stricture and elevated bladder base (dual obstruction). Thirty (69.7%) of these patients had open prostatectomy with easy dilatation of the urethral stricture. Twelve (27.9%) of the patients had urethroplasty for urethral stricture diseases; of these twelve, five patients presented with persistent LUTS ("close loop" obstruction). These five (11.6%) patients were aged between 50 to 80 years; they all had suprapubic cystostomy. In addition to delineating the anatomy of the urethral stricture and elevated bladder base, other salient features on the contrast

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radiographies included dilated prostatic urethral, visualization of the seminal vesicles and closed bladder neck on voiding cystogram. The initial treatment was urethroplasty but two each had combination therapy (with alpha adrenergic blocker and 5-alpha reductase inhibitor) and open prostatectomy respectively as further treatment while the last patient had perineal urethrostomy as first-stage redo-urethroplasty.
Conclusion: "Close-loop" urethral obstruction appears to be an entity that needs further evaluation.

Introduction

Bladder outflow obstruction, which included urethral obstruction among others, constitutes a significant proportion of the urological work load in the world; this is even more so in the resource-poor developing nations [1,2].

Urethral obstruction can involve the anterior urethra, posterior urethra or both the anterior and posterior urethra concurrently. The coexistent of both the posterior urethral obstruction (from benign prostate enlargement [BPH]) and anterior urethral obstruction (from urethral stricture disease [USD]) have been reported to occur in 1-15% of patients managed for BPH [3,4]. It has been speculated that it was the slowly developing mild urethral stricture that are often associated with BPH; they are characteristically a short segment, incomplete USD on retrograde urethrogram and are thus amenable to urethral dilatation or internal urethrotomy [3]. To further support the above proposition, a rapidly developing USD was believed to become symptomatic early enough and thus the patient present for treatment before the age of occurrence of BPH [3].

When there is dual obstruction it is usually one of the pathologies that contribute more to the symptoms. However, it is often difficult, clinically and even with the adjunctive aid of urodynamic evaluation, to ascertain which of these two pathologies (BPH or USD) may be responsible for or predominates the cause of the patient's symptoms. As a rule of thumb, bothersome lower urinary tract symptoms (LUTS) in the presence of a clinically and radiologically enlarged prostate gland and an incomplete dilatable urethral stricture can be attributable to the BPH; thus the patient often do well if offered prostatectomy for the BPH and dilatation of the stricture; this treatment suffices at most times (personal observation). The reverse of the above scenario may not always be true; where the presence of tight or complete USD and BPH does not always attribute the LUTS to the USD only, as the enlarged prostate may also be obstructive and thus present challenges in the management of such patients.

When both parts of the urethra are involved with each of them contributing equally or, at least, significantly to the symptoms of the patient this can be referred to as "close-loop" urethral obstruction. We present our experience with significant dual obstructive lesions ("close-loop" urethral obstruction) from both BPH and USD along with the salient radiological features, clinical implications, and management challenges. We equally proposed a management protocol.

Subjects and methods

The hospital records of all patients that presented to our centres with clinico-radiological evidences of USD co-existing with elevated bladder base, suggesting BPH, from January 2007 to December 2011 were retrospectively reviewed. None of our patients who presented with urine retention and who had successful urethral catheterization, which clinically excluded USD, were included in the study or further had contrast studies. However, few patients were occasionally encountered who had 'failed' urethral catheterization but the retrograde urethrogram (RUG) study was normal; these were also excluded from our study.

The age, occupation, mode of presentation, radiological evaluation results, initial management, follow up and subsequent management were documented. The data was analyzed with SPSS version 15 statistical software package.

Results

Forty three patients were managed within the study period for radiological evidence of urethral stricture and elevated bladder base (dual obstruction). All the patients had suprapubic cystostomy; they all had retrograde urethrogram (RUG) except for one of them who had combined RUG and micturating cysto-urethrogram (MCUG). Thirty (69.7%) of these patients had open prostatectomy with easy dilatation of the urethral stricture, no further treatment was required in them thus far (Fig. 1A). One patient, who had gone into acute urinary retention following ophthalmic procedure and relieved by urethral catheterization, had open prostatectomy, about two months later; attempt at urethral catheterization failed at surgery. Urethrogram later showed complete proximal bulbar urethral stricture. He developed iatrogenic rectal injury during urethroplasty.

Twelve (27.9%) of the patients had urethroplasty for varying degree and extents of USD that were considered to be responsible for the LUTS and amenable to surgical options of treatment (Fig. 1B); of these twelve, five patients presented with persistent bothersome LUTS (as quantified by international prostate symptom score [IPSS]) despite satisfactory post operation urethrogram ("close loop" obstruction) and formed the basis of further analysis.

Five (11.6%) patients aged between 50 to 80 years were managed for "close-loop" urethral obstruction in our centres within the study period; the clinico-radiological characteristics were summarized in Tables 1 and 2 (and the corresponding figures). All the patients had suprapubic cystostomy following failed urethral catheterization to relieve urine retention and, in addition, one of them presented with recurrent episodes of epididymo-orchitis. In addition to delineating the anatomy of the urethral stricture and elevated bladder base, other salient features on the contrast radiographies included dilated prostatic urethral with or without post-stenostic urethral dilatation, visualization of the seminal vesicles and closed bladder neck on voiding cystogram (Figs. 2–5). All the five patients had urethroplasty as initial surgical treatment and two each had combination therapy (with alpha adrenergic blocker and 5-alpha reductase inhibitor) and

Table 1 Showing the summary of the diagnosis, findings on RUG and MCUG, and treatments offered for all the patients.

Initial Diagnosis	No. of patient	RUG and/or MCUG findings		Treatment offered		Outcome
		Urethral component	Prostatic component	Initial	later	
BPH + USD	30	dilatable USD	elevated bladder base	OP + dilation		Good
BPH	1	tight USD	-	OP	urethroplasty	fistula
USD	7	tight USD	elevated bladder base	urethroplasty	Good	
	5	tight USD	elevated bladder base, Dilated prostatic urethra, Outlined seminal vesicle, Failed bladder neck opening.	urethroplasty	therapy for BPH	

RUG: retrograde urethrography; MCUG: micturating cysto-urethrography; BPH: benign prostatic hyperplasia; USD: urethral stricture disease; OP: open prostatectomy.

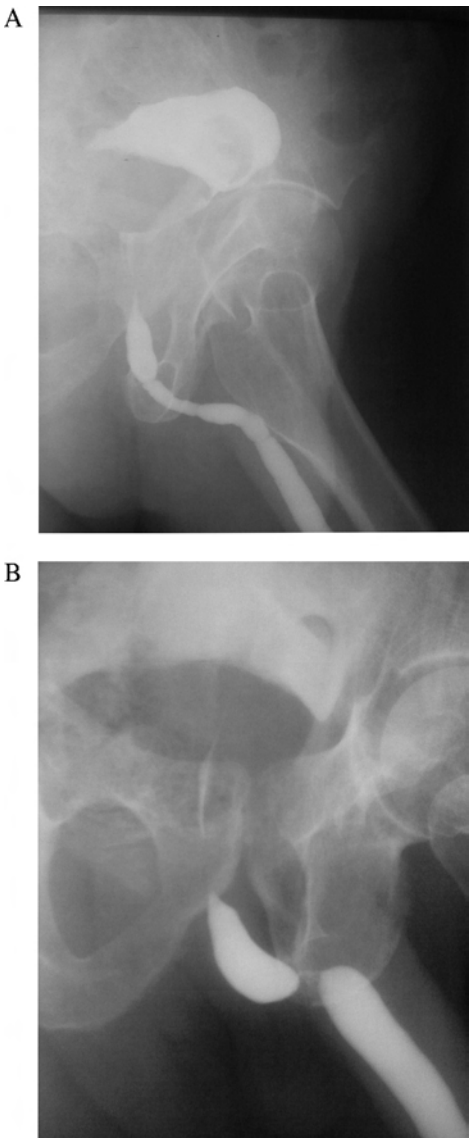

Figure 1 (A) Retrograde urethrogram showing ripple of incomplete bulbar urethral stricture. Note the stretched prostatic urethra and elevated bladder base pathognomonic of enlarged prostate radiologically. (B) Retrograde urethrogram showing tight, short segment bulbar urethral stricture. Note the stretched, non-dilated prostatic urethra and elevated bladder base. (This patient had anastomotic urethroplasty and was voiding adequately post-operation).

open prostatectomy respectively while the last patient had perineal urethrostomy as first-stage redo-urethroplasty.

Discussion

All of our patients presented in urine retention that necessitated suprapubic cystostomy (SPC), following failed urethral catheterization. Although, urethral catheterization can be said to have failed after an appropriate size and type of catheter, adequate urethral anaesthesia and lubrication, in an adequately relaxed patient, failed to negotiate through the urethra into the bladder; SPC is often the

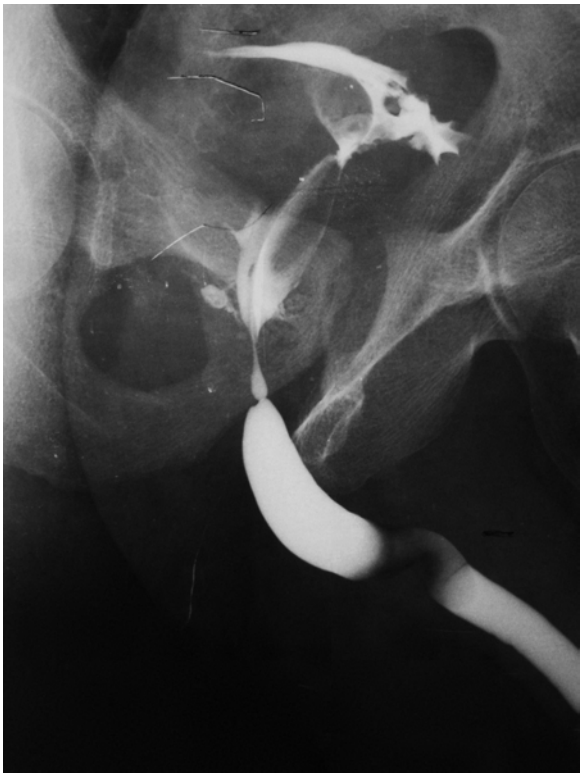

Figure 2 Retrograde urethrogram showing a tight proximal bulbar urethral stricture with dilated prostatic urethra and elevated bladder base, "close-loop" obstruction. (The patient had anastomotic urethroplasty but required months of 5-alpha reductase inhibitor and alpha blocker before he was able to void).

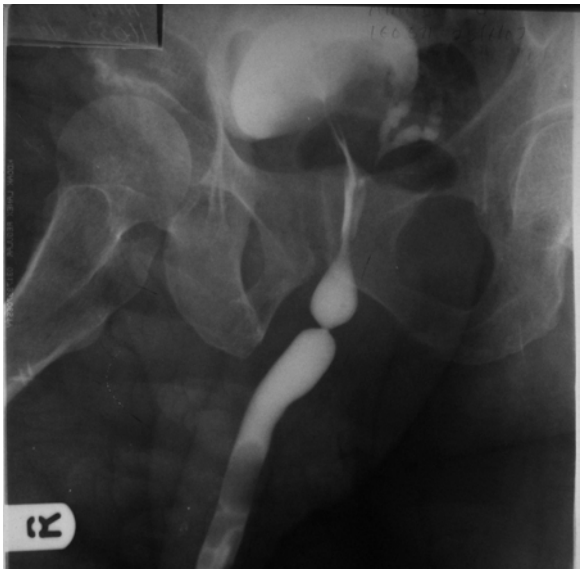

Figure 3 Retrograde urethrogram showing a tight proximal bulbar urethral stricture with elevated bladder base. Dilatation of the posterior urethra was not marked because the build-up pressure within it has been transmitted to the seminal vesicle which is outlined, "close-loop" obstruction. (The patient had anastomotic urethroplasty but required open prostatectomy afterwards).

Figure 4 Retrograde urethrogram showing a tight mid-bulbar urethral stricture with dilated prostatic urethra and elevated bladder base, "close-loop" obstruction. (The patient had anastomotic urethroplasty but required months of 5-alpha reductase inhibitor and alpha blocker before he was able to void).

Figure 5 Combined retrograde urethrogram and voiding cystogram showing a complete bulbar urethral stricture, closed bladder neck and elevated bladder base; "close-loop" obstruction. (The patient had substitution urethroplasty but required open prostatectomy afterwards).

practise in our unit, without strict adherence to the above considerations for failed urethral catheterization, because of our limitations which included non-availability of different urethra catheter types. In addition, our practise concerning suspected USD is to do RUG in studying the anatomy of the USD except when the RUG shows a complete stricture for which an additional micturating cystourethrogram (MCUG) is usually done; all our patients had RUG but only one patient required such a combined RUG and MCUG in this present study.

Of the forty-three patients that were managed for dual urethral obstruction a little over two-third of them had benign prostatic obstruction (BPO) as the significant contributory factor to their bladder outflow obstruction (BOO). They all did well following open prostatectomy with urethral dilatation. The concomitant existence of incomplete urethral stricture (Fig. 1A) were pre-operatively assessed as not contributing significantly to the BOO and this was proven by the fact that these patients did well with urethral dilatation during prostatectomy. The follow up calibration of their urethra was adequate and there was no remarkable LUTS.

The only patient with significant USD that was encountered intraoperatively was inadvertently missed based on the history of successful urethral catheterization to relieved urine retention. He developed rectal injury at urethroplasty. This is an uncommon morbidity following urethroplasty; except probably in those patients with genitourinary malignancy or had undergone radiation therapy [5,6]. One of the explanations that can be adduced for this morbidity was the absence of the lobes of the prostate (post prostatectomy)

Table 2 showing the clinico-radiological characteristics of the patients with "close-loop" obstruction.

S/N	age	occupation	presentation	RUCG	initial treatment	further treatment
1	64	farmer	SPC	'CLO'	urethroplasty	AB + ARI
2	58	B/man	SPC	'CLO'	urethroplasty	AB + ARI
3	72	Rtd CS	SPC	'CLO'	urethroplasty	OP
4	50	CS	SPC + epid-idymo-orch	'CLO'	urethroplasty	perineal urethr-ostomy
5	80	farmer	SPC	'CLO'	urethroplasty	OP

CS = civil servant; SPC = suprapubic cystostomy; CLO = close-loop obstruction; AB = alpha adrenergic blocker; ARI = 5-alpha reductase inhibitor; OP = open prostatectomy.

that often direct the curved antegrade bougie through the prostatic urethra into membranous urethra; the bougie thus wanders around within the prostatic fossa with all the manipulation. The wandering bougie might have pushed forth the rectal tissue which was then excised as part of the stricture; thus, utmost care should be exercised during urethroplasty in patients whose prostate have been removed, especially in proximal bulbar stricture.

Twelve (27.9%) of the patients had urethroplasty for varying degree and extents of USD that were considered to be amenable to surgical

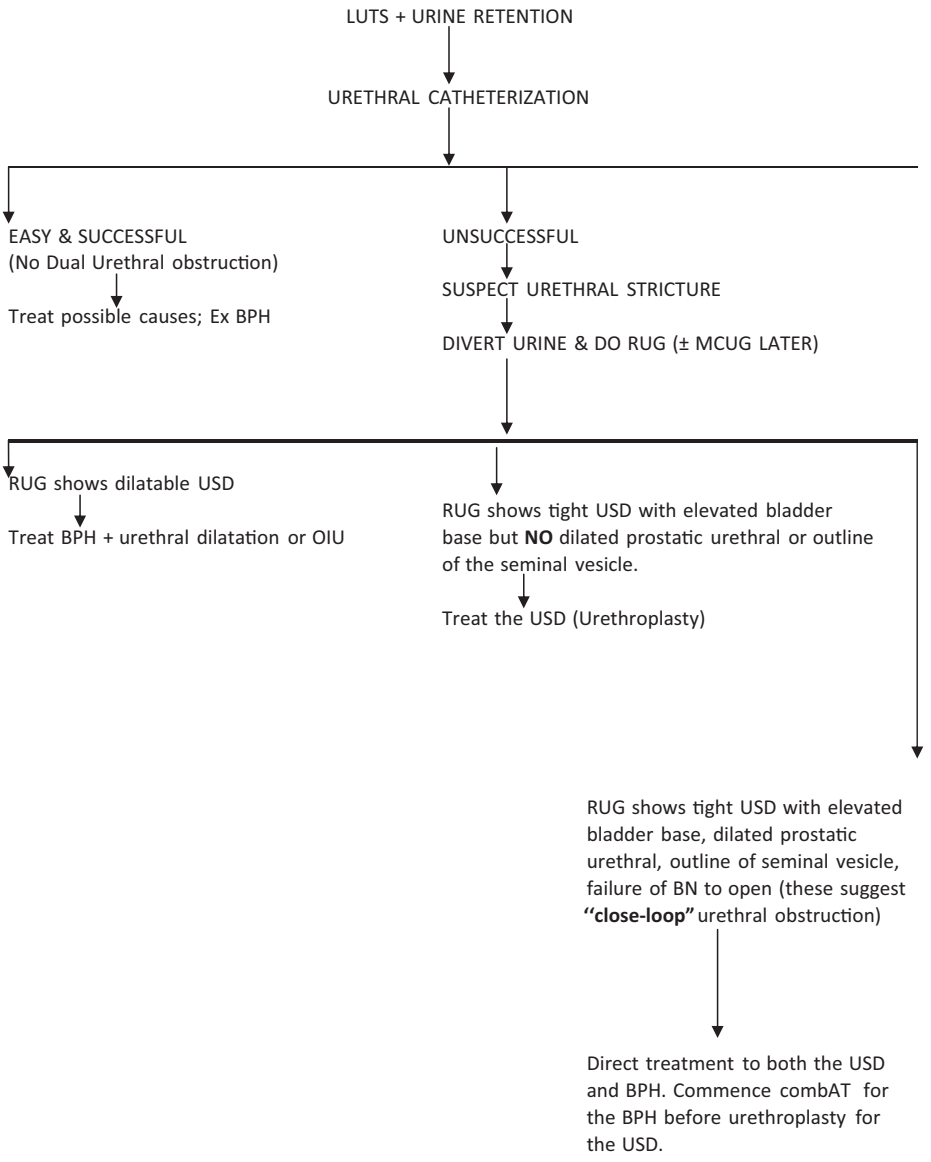

Figure 6 showing suggested flow algorithm for the diagnosis and treatment of dual urethral obstruction and "Close-loop" urethral obstruction. RUG: retrograde urethrography; MCUG: micturating cysto-urethrography; BPH: benign prostatic hyperplasia; USD: urethral stricture disease; OP: open prostatectomy; combAT: combination of Avodart and Tamsulosin.

options of treatment. Among them seven patients had satisfactory voiding, this implied that USD was solely responsible for the BOO in them. However, five patients presented with persistent bothersome LUTS despite satisfactory post operation urethrogram ("Close-loop" obstruction). Except for its non-availability urodynamics assessment wound have been useful in further evaluation of these patients. The deduction from previous reports [3,4] and our finding was that 10 to 15% of patients with BPH have dual obstruction and one per cent of them would have a "Close-loop" obstruction.

Salient contrast radiological findings, that were retrospectively observed in those five patients with "Close-loop" obstruction, can be explain based on Bernoulli's principle of fluid dynamics. These findings include dilated prostatic urethra on retrograde urethrogram (Fig. 2 compare Fig. 1B); the pressure zone that is created within the prostatic urethra (due to the obstruction at bladder neck proximally and the urethral stricture distally) can be transmitted retrogradely into the seminal vesicle and vas deferens, especially if these are inflamed from infection; thus the seminal vesicle may be outline in the radiography (Fig. 3). This could also explain the outline of epididymis that has been found in some patients with posterior urethral valve and will probably explain the recurrent epididymo-orchitis that was reported in them [7,8], as was found in one of our patients (Table 1). Allowing for our limitations, which include non availability of dynamic study with fluoroscope, static voiding cystourethrogram (VCUG) with closed bladder neck in the presence of USD may indicate "Close-loop" obstruction (Fig. 5).

The coexistent of BPO in those patients with significantly obstructing USD has resulted in an unmet expectation of such patients after successive urethroplasty, the hope of being wean off catheter was dashed and they had to contained with months of combination of alpha adrenergic blocker and 5-alpha reductase inhibitor to manage the BPH in two of them while another two of them had open prostatectomy for the BPH. The last of them had complex USD that failed initial urethroplasty; he later had perineal urethrostomy as first-stage of a planned stage redo urethroplasty but still failed to void despite patent urethrostomy.

Contemporary reports have lent credence to the long waiting list of operation in our environment and the long duration of indwelling catheter, with their effects on the quality of life, before operation in our patients due to several reasons that have been alluded to [9,10]. In view of the aforementioned circumstance and the fact that the pharmacology of the alpha reductase inhibitors require several months before it shrink the prostate and thus affecting the static component of BOO from BPH, we believe that early commencement of such patients on 5-alpha reductase inhibitors, while waiting for their turn for urethroplasty, will treat the BPO and reduce the incidence of failure to urinate or significant LUTS post urethroplasty in patients with "Close-loop" obstruction.

A suggested flow algorithm for the evaluation and management of patients LUTS presenting in urinary retention with suspected dual urethral obstruction is shown in Fig. 6.

Conclusion

The "close-loop" urethral obstruction appears to be a specific clinical entity and their existences among our patients with dual obstruction may not be uncommon and requires further characterization. High index of suspicion with meticulous interpretation of urethrogram may give away the diagnosis. Induction therapy with 5-alpha reductase inhibitor, before urethroplasty, may be beneficial.

Conflict of interest

None declared.

References

[1] Mbibu NH, Nwofor AME, Khalid L. Spectrum of Urologic disease in the West African sub-region. Ann Afr Med 2002;1:44–52.
[2] Chokkalingam AP, Yeboah ED, DeMarzo A, et al. Prevalence of BPH and lower urinary tract symptoms in West Africans. Prost Cancer Prost Dis 2012;15:170–6.
[3] Ntia IO, Dikko AA. The Pattern of Association of Urethral Stricture with Benign Prostatic Hyperplasia in Nigerians. Sahel Med J 2002;5:190–4.
[4] Yeboah ED. The Prostate Gland. In: Badoe EA, Archampong EQ, da Rocha-Afodu JT, editors. Principle and Practice of Surgery including Pathology in the tropics. Third edition Accra, Ghana: Ghana Publishing Corporation; 2000. p. 850–84.
[5] Joshi HM, Vimalachandran D, Heath RM, Rooney PS. Management of iatrogenic recto-urethral fistula by transanal rectal flap advancement. Colorectal Dis 2011;13:918–20.
[6] Shakespeare D, Mitchell DM, Carey BM, Finan P, Henry AM, Ash D, et al. Recto-urethral fistula following brachytherapy for localized prostate cancer. Colorectal Disease 2007;9:328–31.
[7] Springer A, Hojreh A. Epididymal reflux in posterior urethral valve. Urology 2011;78:60.
[8] Shiraishi K, Takihara H. Recurrent epididymo-orchitis caused by posterior urethral valve associated with imperforate anus. Int J Urol 2004;11:58–60.
[9] Okeke LI, Aisuiodione-Shadrack OI. Self-reported QoL measures of patients with benign prostatic hyperplasia on indwelling urethral catheter. Afr J Urol 2006;12:287–95.
[10] Ikuerowo SO, Ogunade AA, Ogunlowo TO, Uzodimma CC, Esho JO. The burden of prolonged indwelling catheter after acute urinary retention in Ikeja-Lagos, Nigeria. BMC Urol 2007;7:16–9.