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3 **RETAINED URETHRAL CATHETER: NOVEL METHOD OF**
4 **REMOVAL USING TRANS-RECTAL ULTRASOUND GUIDANCE**

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6 **ABSTRACT**

7 **Background**

8 Urethral catheterization is a common procedure in medical practice. Retention
9 of urethral catheter due to inability to deflate the balloon can be a distressing
10 complication for the patient on prolonged indwelling urethral catheter. Several
11 techniques have been devised for removal of such retained urethral catheters

12 **Objective**

13 The aim of this study is to present our experience in the management of retained
14 urethral catheters using trans-rectal ultrasound-guided balloon puncture at the
15 Urology unit of Usmanu Danfodiyo University Teaching Hospital Sokoto,
16 Nigeria.

17 **Methods**

18 This was a prospective case series of five men referred to the unit with non-
19 deflatable urethral catheters between July 2013 and January, 2014.

20 **Results**

21 Five men were referred with retained urethral catheters. The mean age of the
22 patients was 46.4 years with a range of 25-80 years. Indications for
23 catheterization were benign prostatic hyperplasia, burns, and paraplegia. All
24 had successful catheter removal by ultrasound-guided balloon puncture

25 **Conclusion**

26 Retained urethral catheter can be successfully managed by trans-rectal
27 ultrasound guided balloon puncture which is minimally invasive and does not
28 require regional or general anaesthesia.

29 **Key words:** *urethral catheterization complications, retained urethral*
30 *catheter, trans-rectal ultrasound-guided removal.*

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33 **Introduction**

34 Urethral catheterization is one of the most commonly performed invasive
35 procedure on the hospitalized patient and is done for a variety of medical and
36 surgical indications ¹⁻². Though apparently a simple procedure, urethral
37 catheterization may be associated with certain complications especially when
38 the duration of indwelling is prolonged. These complications include urinary
39 tract infection, urethritis, entero-vesical fistula, urethral strictures and rarely,
40 death ³⁻⁸. However, retention of urethral catheter is a rare complication of this
41 procedure which may be a source of significant distress to the patient, relatives
42 and the physician.

43 The causes of retained and non-deflating urethral catheters include mechanical
44 obstruction of the inflation lumen, crystallization of inappropriate balloon fluids
45 such as normal saline, defective valve, obstruction of the inflation channel by
46 debris, error in deflation technique and heavy encrustation of salt deposits ⁹⁻¹⁰.
47 Other rare documented causes of retained urethral catheters include catheter
48 fracture ¹¹, and wrong and inadvertent placement in the proximal ureter ¹²

49 We describe a technique we used in the management a series of patients who
50 presented to our practice with retained urethral catheters.

51 **Patients and Methods**

52 Between July 2013 and January 2014, five male patients were referred to us
53 with retained urethral catheters. Attempts at removal by the referral medical
54 teams had been unsuccessful. All the patients were clinically assessed and the
55 indications for urethral catheterization were noted. Each was counselled and
56 informed consent was obtained. Intravenous antibiotics comprising of 1gram of
57 ceftriaxone was administered. Patient was placed in the left lateral position and
58 20 ml of lignocaine jelly was introduced rectally and allowed for a minimum of
59 five minutes in order to achieve rectal anaesthesia. 6.5Mz rectal probe coupled
60 to a needle guide and semi-automatic prostate biopsy gun after covering the
61 probe with condom containing ultrasound jelly was introduced into the rectum.
62 The urinary bladder with the non-deflating catheter balloon was imaged. Under
63 ultrasound guidance, the catheter balloon was punctured and the catheter
64 removed.

65 **Results**

66 The mean age was 46.4 years with a range of 25-80 years

67 Indications for urethral catheterizations were benign prostatic
68 hyperplasia 2, burns 1 and spinal cord injury with paraplegia 2

69 All patients had successful catheter removal by ultrasound-guided trans-
70 rectal balloon puncture . None of the patients developed signs of sepsis

71 All were promptly discharged to the referring physician

72 **Discussion**

73 Retained or non-deflating urethral catheter balloon though an uncommon
74 problem may be a source of anxiety to the patient, relatives and the attending
75 physician and this may necessitate referral to the urologist. Most of the cases
76 in this series were observed in men although there have been reports of
77 occurrence and treatment in women ^{13, 14}. The higher incidence of retained
78 urethral catheters in men is due to the anatomic differences between the sexes as
79 well as the more frequent indication for urethral catheterization in male
80 subjects. After insertion, the urethral catheter is maintained in its position by
81 inflation of the balloon with sterile water and this may be later removed by
82 deflation using a syringe attached to the balloon port.

83 A variety of techniques have been devised for the management of these patients
84 usually beginning from the simplest, less invasive to more invasive techniques.
85 However, each of these techniques may pose potential risks to the patient.
86 Hollingsworth et al ¹³, and Shapiro et al ¹⁵ have provided an algorithm for the
87 management of retained urethral catheters ranging from flushing, aspiration,
88 hyperinflation of the balloon, cutting of the balloon port proximal to the
89 inflation valve, passing of a wire through the inflation channel, passing of
90 central venous catheter over a pre-placed guide-wire, rupture of the balloon
91 using a variety of chemical solutions and balloon puncture via transurethral,
92 percutaneous and endoscopic routes. Balloon hyperinflation may result in
93 rupture and the deposition of fragments which may form nidus for calculus
94 formation. Chemical deflation techniques using ether or chloroform may result
95 in bladder irritation and chemical cystitis and in patients with vesico-ureteral
96 reflux may result in chemical reflux with subsequent renal injury.

97 Endoscopic removal of retained urethral catheters using flexible cystoscope and
98 subsequent balloon puncture using trans-bronchial aspiration needle has been
99 reported by Khan et al ¹⁶. Removal of retained urethral catheters by trans-
100 abdominal punctures may be carried out either as a blind procedure, under

101 fluoroscopy or by ultrasound guidance ¹⁷. Transabdominal balloon method,
102 although may be easy to carry out, is associated with significant risk of bowel
103 injuries especially if the urinary bladder is not fully distended. In addition to
104 this, it may be difficult in obese patients due to the thick pad of adipose tissue in
105 the anterior abdominal wall.

106 Our patients were referred to the Urology unit from other units after failed
107 attempts at removal of the urethral catheters by the referring physicians. We
108 were able to remove these by ultrasound- guided transrectal puncture of the
109 balloons. Though this method of removal of retained urethral catheters may not
110 be available in the usual Accident and Emergency room, all our patients were
111 electively referred to us. As Urologists, we are familiar with the use of
112 transrectal ultrasound in the evaluation and treatment of the diseases of the
113 prostate, urinary bladder and the seminal vesicles ^{18, 19}, thus obviating the
114 technical challenge other non-urologist physicians may encounter in the
115 application of this procedure. During this procedure, further evaluation of the
116 prostate including its volume, echotexture and targeted biopsies may be
117 undertaken in those subjects in whom the reason for initial catheterization was
118 due to an enlarged prostate. The close anatomical relationship between the
119 rectum and the urinary bladder enables direct access and thus easier puncture of
120 the retained balloon. This route almost eliminates the possibility of small bowel
121 injuries even in the presence of inadequately distended urinary bladder.

122 During the procedure, analgesia/anaesthesia was achieved by intra-rectal
123 instillation of lignocaine jelly which we found to be adequate for the procedure
124 as similarly applied during trans-rectal ultrasound-guided prostate biopsy ²⁰.
125 Reports abound in the literature of other means of achieving anesthesia during
126 transrectal ultrasound-guided prostate biopsies such as periprostatic nerve
127 block, caudal blocks each alone or combinations, each method has demonstrated
128 differing outcomes ²⁰⁻²⁴. However, our patients had transrectal ultrasound-

129 guided procedure for a different reason unlike in prostate biopsy patients in
130 whom the procedure is usually elective in nature and the associated
131 psychological and emotional complications that occur anticipatory to the
132 probable result of the investigation may influence pain perception and tolerance
133 in these subjects. The above reason may be the reason why more invasive
134 anaesthetic procedures may be needed in patients undergoing transrectal
135 prostate biopsy unlike those who underwent removal of retained catheter
136 balloons.

137 One of the complications of invasive transrectal procedure is infective episodes
138 which although not frequently encountered may occur as a result of transrectal
139 introduction of microorganisms into the general circulation and this may be a
140 reason for hospital admission with consequent morbidity and mortality ^{25, 26}.
141 Several methods have been applied to prevent occurrence of sepsis ranging
142 from use rectal enema and administration of antibiotics ^{27, 28}. All our patients
143 had intravenous peri-procedural antibiotics and there was no infective
144 complications among them.

145 **Conclusion**

146 Retained urethral catheter may be managed by the practising urologist though
147 ultrasound-guided balloon puncture. This procedure in the hands of trained
148 personnel and with administration of prophylactic antibiotics is safe and
149 effective.

150 Conflict of interest: none declared.

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236 Figure 2

237 Trans-rectal ultrasound image of the retained catheter balloon demonstrated the needle guide tract.

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241 Figure 1

242 6.5MHz rectal probe coupled to a needle guide and semi-automatic prostate
243 biopsy gun after covering the probe with condom containing ultrasound jelly
244 was introduced into the rectum

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