

Acute urinary retention: how useful is an ambulatory care protocol?

不住院的急性尿瀦留護理方案效用如何？

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Introduction: Acute urinary retention (AUR) is a common urological presentation to emergency departments (ED). An ambulatory care protocol had been developed allowing trial without catheterization (TWOC) instead of admission to hospital after catheterization in the ED. This study aimed to evaluate the efficacy of the ambulatory care protocol for patients with AUR. The secondary aim was to identify any independent predictor(s) for successful weaning of urinary catheter in a short duration. **Methods:** This was a prospective cohort study. A total of 143 male patients presenting with an episode of AUR underwent urinary catheterization once. Those who were unable to pass urine afterwards were catheterized again and discharged home with a urinary catheter in-situ (Day 0). On Day 3, ability of spontaneous urination was assessed. If failed, spontaneous urination was assessed again on Day 6. **Results:** Successful TWOC was recorded in 50.3% of the 143 patients after first catheterization. The cumulative successful rates for first (Day 3) and second (Day 6) follow-ups were 76.9% and 79.0%, respectively. Among the associated predictors, only the urine retention volume on first catheterization was found to be independently associated with successful TWOC, using binary logistic regression ($p=0.001$). **Conclusion:** The ambulatory care protocol was successful in weaning off urinary catheter for 50.3% of patients with AUR after first catheterization and a further 26.6% on Day 3, making a cumulative success rate of 76.9%. Those who failed TWOC on Day 3 would get little benefit on further trials. The first catheterization volume was independently associated with the chance of successful TWOC. (*Hong Kong j.emerg.med.* 2009;16:134-140)

導言：急性尿瀦留是急症室常見的泌尿科求診原因。本急症室制訂了一個不住院的護理方案，容許病人嘗試不插導管，以替代在急症室插導管後留醫。這研究旨在評估這急性尿瀦留病人不住院護理方案的功效。其次的目的是去識別在短時間內成功戒除尿管的獨立預報因子。**方法：**這是一個前瞻性組列研究。共有143名男病人因急性尿瀦留求診而插尿管放了一次尿。其後不能排尿的病人再次插尿管，帶著插入的尿管回家（零天）。在第三天，評估自行排尿的成功率。如不成功，在第六天再評估自行排尿。**結果：**143名首次插尿管的病人中，記錄了50.3%成功嘗試不用尿管。第一次（第三天）及第二次（第六天）覆診的累積成功率分別為76.9%及79.0%。使用二邏輯斯諦回歸分析，在有關預報因子中，只有首次插尿管時的尿瀦留容量被發現與成功嘗試不用尿管獨立地有關聯（ $p=0.001$ ）。**結論：**這不住院護理方案成功戒除因尿瀦留首次插尿管後的50.3%病人的尿管，及在第三天額外的

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26.6% , 累積成功率為 76.9% 。在第三天嘗試不用導管失敗的病人再進一步嘗試是沒有益處的。首次插導管的容量獨立地與嘗試不用導管的成功機會是有關聯的。

Keywords: Hospital emergency service, prostatic hyperplasia, urinary catheterization, urinary retention

關鍵詞: 醫院緊急服務、前列腺增生、插尿管、尿瀰留

Introduction

Acute urinary retention (AUR) is a common urological presentation to the emergency department (ED). Over 1 in 10 men in their 70s would experience AUR within the next 5 year.¹ It is defined as the sudden and painful inability to void voluntarily with the relief of symptoms following catheterization. More than half of the cases are associated with benign prostatic hyperplasia (BPH).² It has measurable impact on patients' health-related quality of life and is associated with a substantial economic burden.³ Treatment of those related to BPH may involve an early prostatectomy. However, prostatectomy on patients with AUR was found to be associated with increased morbidity and an increased risk of death during and after surgery.⁴ Urinary catheterization is another commonly employed treatment. A successful trial without catheterization (TWOC) may lead to the avoidance of prostatectomy in 23% of patients presenting with AUR.² In Hong Kong, patients suffering from AUR are usually admitted with the trial of spontaneous urination a few days after catheterization. The ED of Princess Margaret Hospital was one of the first ED in Hong Kong that introduced an ambulatory care protocol for AUR patients. The protocol was jointly developed by consultant emergency physicians and consultant urologists of the hospital and had been put into practice for more than five years. This study aimed at evaluating the efficacy of this protocol in order to improve the standard of care for patients with AUR.

The ambulatory care protocol

The protocol is applicable to male patients presenting with uncomplicated AUR to the emergency department. Complicated cases are those with gross haematuria, known carcinoma of

prostate, urethral stricture, bladder stone and impaired mobility.

All patients, after history taking and physical examination, will be catheterized once to relieve the retention. These patients are then observed in the ED for fluid intake and trial of spontaneous urination. The trial is defined as successful if the patient can pass urine with a smooth stream for several times and physical examination does not reveal a palpable bladder. If the trial is successful, the patient will then be discharged. If the patient fails to urinate smoothly or develops retention again, he will be treated with a second catheterization and will be discharged with the urinary catheter in-situ. The patients will be followed 3 days later with the urinary catheter taken off and observed for successful spontaneous urination. Those patients who failed TWOC will be catheterized again and followed up on Day 6. Patients who failed TWOC on Day 6 will be catheterized and referred with early appointment to the urology specialist clinic. Community Nursing Service is also notified for Foley care after discharge at this point.

Methods

Study design

This was a prospective cohort study to evaluate the efficacy of the ambulatory care protocol for AUR patients. All patients presenting with AUR were catheterized to relieve the symptoms. Eligible patients will then follow the ambulatory care protocol described above and data collection was carried out (Figure 1).

Inclusion criteria and exclusion criteria

Consecutive male patients 40 years or above presenting with AUR between July 2005 and April 2006 were eligible, subject to exclusion criteria. Exclusion criteria

were: presence of gross haematuria; known or suspected carcinoma of prostate; presence of urethral stricture or bladder stone; bed-ridden or wheel-chair bound patients; failure of insertion of urinary catheter; any co-morbidity that necessitate hospitalisation of the patient.

Data collection and statistical analysis

The following data were collected:-

1. Age;
2. History of BPH;
3. Past experience of AUR;
4. Presence of lower urinary tract symptoms;
5. Recent intake of medications that may precipitate the retention of urine, which are mainly medications with anti-muscarinic effects e.g. cough syrup, antispasmodic, antihistamine, antiemetic, narcotic analgesic, anti-psychotic, tricyclic anti-depressant, and drug for Parkinsonism;

6. Presence of faecal impaction on physical examination;
7. Urine volume on first catheterization;
8. Catheterized urine microscopy and culture; and
9. Alpha-blocker (α -blocker) initiation in the ED.

The primary outcome was successful trial without catheterization, defined as satisfactory micturition without re-catheterization within 24 hours following the removal of catheter.^{5,6} The cumulative rates of successful TWOC at different stages (i.e. Day 0, 3, 6) were recorded. The rate of re-attendance for AUR within one week and one month were recorded for those with successful TWOC. Re-attendance to all hospitals under the Hospital Authority was retrieved from the ePR computer system. The secondary outcome was the identification of independent predictor factor(s) for successful TWOC, using binary logistical regression and chi-squared test at

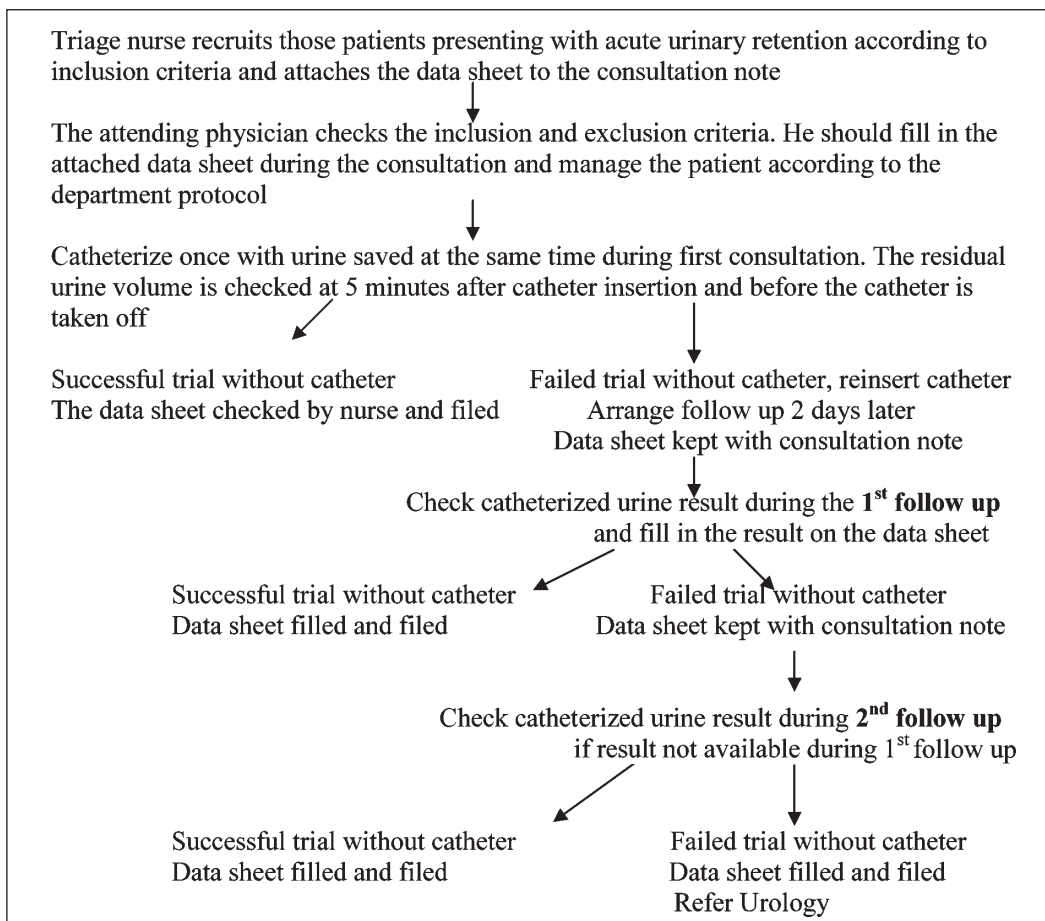


Figure 1. Schematic diagram on the acute urinary retention study.

a significance level of $p < 0.05$. The potential predictors were those listed in the data collection section above. All statistical analyses were performed with SPSS 13.0.

Results

There were totally 143 male patients enrolled over the 10-month study period. The age on presentation ranged from 43 to 88 years with a mean of 69.8 (SD ± 8.13). There were 109 patients (76.2%) with a past history of BPH, 86 of the 143 patients (60.1%) were taking α -blocker before presentation, and α -blocker was newly initiated in 24 patients (16.8%) on presentation at the ED.

The successful rate of TWOC after catheterized once at Day 0 was 50.3% without re-attendance within the first 24 hours. The cumulative successful rates of

TWOC at Day 3 (first follow up) and Day 6 (second follow up) were found to be 76.9% and 79.0% respectively (Table 1). From the cumulative success rate, we can see a remarkable increase (26.6%) in TWOC at first follow up (Day 3) but only a small (2.1%) further contribution from the second follow up (Day 6).

We also studied the re-attendance rate within one week and one month for those who successfully weaned off the Foley catheter. The one week and one month re-attendance rate for recurrent AUR were 8.8% and 16.0% respectively.

The secondary outcome of this study was to identify any predictor(s) of successful TWOC. The descriptive analyses of the potential predictors are listed in Table 2 and Table 3. The independent predictor(s) for successful TWOC was identified with binary logistic regression with the significance level set at $p < 0.05$. The

Table 1. Cumulative rate of successful TWOC (n=143)

	Number of success	Percentage	Cumulative percentage
Day 0	72	50.3%	50.3%
Day 3	38	26.6%	76.9%
Day 6	3	2.1%	79.0%

Table 2. Frequency of potential predictors (dichotomous variables) for successful TWOC

	Valid Sample	Frequency	Percentage
Presence of BPH	143	109	76.2%
BPH on α -blocker	143	86	60.1%
History of AUR	143	82	57.3%
Presence of LUTS	143	50	35.0%
Precipitating drugs	143	39	27.3%
α -blocker initiation	143	24	16.8%
Faecal impaction	143	14	9.8%
Positive culture	128	7	5.5%

AUR=acute urinary retention; BPH=benign prostatic hyperplasia; LUTS=lower urinary tract symptoms

Table 3. Range of measurement of potential predictors (continuous variables) for successful TWOC

	Number	Minimum	Maximum	Mean	SD (\pm)
Age	143	43	88	69.8	8.13
Volume (ml) on first catheterization	141	20	1400	580.53	226.31

results are listed in Table 4. Only the urine volume on first catheterization was found to independently predict the success of TWOC ($p=0.001$).

The mean urine volume on first catheterization for those successful and failed TWOC were 547 ml and 706 ml respectively and it was statistically significant ($p=0.02$). In addition, we tried to identify the cut-off volume associated with failed TWOC by using the chi-squared test. It was found that a cut-off volume of less than 700 ml was associated with a higher success of TWOC ($p=0.001$).

Since the frequency of BPH and positive urine culture were overwhelmingly large (76.2%) or small (5.5%) respectively, they were unlikely to independently associate with the success of TWOC. We tried to exclude them from the logistic regression and found the same result that only the urine volume on first catheterization was significantly associated with success ($p=0.009$).

Discussion

There are high variations within and among countries in the management of AUR in terms of type and duration of catheterization, hospital admission, TWOC, emergency or delayed surgery.⁷ There is growing evidence that delayed elective prostatectomy is a better way to manage patients with AUR. It was shown in a large cohort study in the United Kingdom

that urgent prostatic surgery after AUR is associated with higher morbidity and mortality than in men with elective prostatectomy for lower urinary tract symptoms alone.⁴ They found that men who had prostatectomy after AUR were at higher risk of intraoperative complications (RR 1.8, 95%CI 1.3 to 2.5), bleeding requiring transfusion (RR 2.5, 95%CI 1.8 to 3.3), postoperative complications (RR 1.6, 95%CI 1.2 to 2) and hospital death (RR 3.3, 95%CI 1.2 to 93). Therefore, appropriate protocols that allow TWOC and subsequent elective surgical intervention without the presence of a urinary catheter are essential. Our ambulatory care protocol can serve this purpose of TWOC.

Our ambulatory care protocol was successful in weaning off the urinary catheter in the majority of AUR patients. The success rate after first catheterization was 50.3%, which was much higher than the 27.8% success rate reported by Taube & Gajraj⁶ and the 27% successful rate reported by Hastie et al⁸ but similar to the 44% successful rate reported by Djavan et al.⁹ For those who needed a second catheterization, more than half could wean off the catheter on Day 3, making a cumulative success rate of 76.9%. The ambulatory care protocol can therefore effectively reduce hospital admission for a traditionally fully hospitalized condition.

However, those who failed the Day 3 trial were unlikely to resume spontaneous urination (successful in only an additional 2.1%). The timing of catheter removal

Table 4. Analysis of predictors of successful TWOC using binary logistic regression

Potential predictor	Significance level (p)
Age	0.611
Benign prostatic hyperplasia	0.727
Acute urinary retention	0.358
Lower urinary tract symptoms	0.797
Precipitating drugs	0.584
Faecal impaction	0.065
Urine volume on first catheterization	0.001
Benign prostatic hyperplasia on α -blocker	0.929
α -blocker initiation	0.747
Positive catheterized urine culture result	0.721

was shown by Taube & Gajraj to be unimportant in predicting successful TWOC.⁶ Therefore, those patients who failed the Day 3 trial were unlikely to be benefited by further trial. These patients should be referred for early urologist assessment and treatment.

The re-attendance rates within one week and one month were also found to be low in this study, which further supports the efficacy of the ambulatory protocol.

Predicting who will successfully void is not easy. In the second part of this study, we tried to identify the independent factors that could predict successful TWOC. Only the urine volume on first catheterization was found to be associated with successful TWOC. Smaller volume predicted a higher likelihood of successful TWOC. It was also found that a cut-off volume of 700 ml predicted success of TWOC. This complied with the trend detected in previous studies which found a cut-off volume at 900 ml to 1000 ml.^{6,8,9} Larger volumes of retained urine cause over-distension of the bladder and loss of detrusor tone.¹⁰ Age was not found to be an independent predictor for success. Two previous studies also concluded against the relationship of age and successful TWOC.^{6,8} We tried to divide the patients into two age groups (above and below 70 years old) but the regression analysis still showed no statistical association ($p=0.164$). Previous studies also concluded the lack of association between urinary tract infection and success, as noted in this study.^{6,8} However, a limitation of this study was that the rate of positive culture was too low (5.5%) to be analysed as a significant predictor. A detrusor pressure of <35 cmH₂O is another factor shown to be associated with failure of TWOC in a study but its measurement is not readily available.¹¹

In the emergency department, α -blocker was initiated in 24 patients (16.8%) who presented with AUR, and 60.1% of the patients had already been put on α -blocker before the presentation since most of them had known benign prostatic hyperplasia. Either prazosin or terazosin would be prescribed in our department. However, α -blocker initiation was not shown to be an independent predictor of successful

TWOC in this study. The rationale for the use of α -blocker is based on the fact that sudden stimulation of α 1-adrenergic receptors may have a role in the development of AUR.¹² α 1-blockers have been shown to decrease bladder outlet resistance and post-void residual urine volume by decreasing the high sympathetic tone at the level of the urethra and bladder neck.¹³ There are several small studies suggesting that α -blockers including terazosin may facilitate the return to normal voiding after catheterization of short duration.¹⁴⁻¹⁶ However, alfuzosin is the only α 1-blocker currently having confirmed benefit in men undergoing TWOC in an adequately powered placebo-controlled study.⁵ In the study, 360 patients with the first episode of AUR related to BPH were enrolled, and alfuzosin 10 mg once daily significantly increased the rate of success of TWOC compared with placebo (62% vs. 48% of patients, $p=0.012$).

There are several limitations of this study. Firstly, we did not study about the complications of this ambulatory care protocol. It was found that the presence of a urethral catheter resulted in bacterial colonisation of the bladder at a rate of 4% per day and might increase the risk of sepsis.¹⁷ However, no increased risk of major infective complications was demonstrated in another study.⁴ Other known complications included urethral stricture, urethral trauma, and paraphimosis.

Secondly, patient's satisfaction was not studied. Patients may think that it is inconvenient for them and it prevents them from sexual activities. On the other hand, this ambulatory protocol can satisfy those who do not prefer operation or hospitalisation.

Thirdly, the success rate of TWOC might be overestimated and the one week re-attendance rate of 8.8% and the one month re-attendance rate of 16.0% of those successful TWOC might be underestimated because some patients might have sought consultation in private hospitals or private practitioner clinics which could not be traced by our hospital computer systems. Phone follow-up would be a better method to estimate the attendance for recurrent AUR.

Conclusions

The ambulatory care protocol developed by our department was successful in weaning off urinary catheter for 50.3% of the patients with AUR after first catheterization and a further 26.6% on Day 3, making a cumulative success rate of 76.9%. Those who failed TWOC on Day 3 would probably get limited benefit on further trials. They should be referred to the urologist for early operative treatment. The urine volume of first catheterization was independently associated with the chance of success of TWOC. A urine volume of less than 700 ml on first catheterization was associated with a higher success of TWOC.

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