



Urinary retention following lower limb arthroplasty : Analysis of predictive factors and review of literature

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Acute urinary retention is a common complication after lower limb arthroplasty. The aim of our study was to assess whether the International Prostate Symptom Score (IPSS) and other patient related factors could predict the likelihood of patients developing urinary retention after lower limb arthroplasty. We have also reviewed the literature on this subject.

This is a prospective study of 102 male patients undergoing hip or knee arthroplasty. Data collected included age, IPSS, type of operation, type of anaesthesia and development of acute urinary retention in the immediate postoperative period.

Thirty-one patients (30.4%) developed acute urinary retention. Of all the parameters studied, age was the only factor that correlated significantly with development of urinary retention.

The risk factors for progression of benign prostatic hyperplasia could all be considered as factors for the development of this complication. However, apart from age more than 70 years, it is not practical to use the other parameters.

Keywords : urinary retention ; lower limb arthroplasty ; predictive factors.

INTRODUCTION

Acute postoperative urinary retention is a common non-surgical complication following lower limb arthroplasty. The reported incidence is between 10.7% and 77.8% (9,23). This complication is managed by urinary tract catheterisation which

involves instrumentation of the urinary tract. This has a number of identified consequences such as added patient discomfort and anxiety, the risk of urinary sepsis and moreover a potential source of implant infection (3,4). Some surgeons administer a prophylactic dose of parenteral antibiotic such as Gentamycin before catheterisation to reduce the risk of implant infection. However, this does not completely negate the risk of infection. An ideal method would be to be able to identify patients at risk of developing postoperative urinary retention and to prevent the complication from developing in this group of patients. It would therefore be of significant benefit if the operating surgeon could identify which patients are likely to develop postoperative urinary retention.

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Many previous studies have analysed various factors in predicting the development of postoperative urinary retention in patients undergoing lower limb arthroplasty. To date, however, no study has convincingly demonstrated a method for predicting patients likely to develop this complication. International Prostate Symptom Score (IPSS) has been recently proposed as a simple and reliable test to predict the possibility of developing acute urinary retention (6). However, the study by Sarasin *et al* (19) revealed that the IPSS was not useful in predicting retention.

The aim of our study was to assess whether the IPSS and other patient related factors could predict the likelihood of patients developing urinary retention following lower limb arthroplasty. We have also reviewed the literature on this subject.

METHODS AND MATERIALS

The study was carried out at the Department of Orthopaedics at Llandough Hospital, Cardiff between January and May 2006. Data was collected prospectively for 110 consecutive male patients undergoing total hip or knee arthroplasty under spinal or general anaesthesia. Patients taking medication such as alpha-blockers for urinary tract symptoms and those requiring catheterisation preoperatively were excluded from the study. Informed consent was obtained from all the patients prior to their inclusion in the study. The patients were asked to fill an IPSS in the pre-admission clinic. A mid stream urine sample was collected in the pre-assessment clinic and those patients with a positive urine culture for infection were also excluded from the final study group. Data collected for each patient included age, IPSS, type of operation, type of anaesthesia and whether the patients developed acute urinary retention with the need for catheterisation in the immediate postoperative period.

Postoperatively the nursing staff observed the patients at regular intervals for development of acute urinary retention. Acute urinary retention was defined as the development of abdominal discomfort with inability to void and with clinical evidence of a distended bladder. Patients with urinary retention were catheterised by the on-call doctor or by a trained member of the nursing staff using a transurethral Foley catheter. Gentamycin (80 mg) was given intravenously before catheterisation as prophylaxis to prevent urinary infection. The catheter was removed 48 hours later when the patients were mobile. If

urinary retention persisted after a trial without catheter, the patients were re-catheterised and a Urology review was arranged.

RESULTS

One hundred and two patients were recruited for the study. Median patient age was 68 years (range : 34 to 89). Sixty-two patients underwent total hip arthroplasty, 40 underwent total knee arthroplasty. General anaesthesia was used for 50 patients and spinal anaesthesia for the remaining 52 patients. All the patients received opiate analgesia postoperatively (intravenous morphine as patient controlled analgesia). The mean IPSS of the entire group was 6.46 (range 0 to 30). Thirty-one patients (30.4%) developed acute urinary retention and required catheterisation postoperatively. Table I summarises the results for the four parameters studied. Urinary retention occurred in 27.4% of patients undergoing total hip arthroplasty and in 35% of patients undergoing total knee arthroplasty. Applying the Chi-Square test, the type of surgery was found not to be a significant risk factor for developing urinary retention ($p = 0.502$). Urinary retention occurred in 38% of patients receiving spinal anaesthesia and in 22% of those receiving general anaesthesia ($p = 0.143$). The mean IPSS for the catheterised patients was 7.41 (SE 1.245). The mean IPSS for the 71 patients not requiring catheterisation was 6.04 (SE 0.8). The percentage of patients catheterised within the same IPSS group is shown in table II. A t-test for Equality of Means was found to be non significant at the 5% level ($p = 0.349$). The mean age of the catheterised patients was 72.10 years (SE 1.67), versus 66.73 years (SE 1.12) for those not catheterised. A t-test for Equality of Means was found to be significant at the 5% level ($p = 0.009$).

DISCUSSION AND CONCLUSION

Acute postoperative urinary retention following lower limb arthroplasty, although a common complication, has the potential to significantly increase patient morbidity and hence affect the outcome of the surgery. Even with the use of prophylactic antibiotics and aseptic techniques, urinary

Table I. — Results of the four different parameters studied

	Catheter	No Catheter
Mean Age (years)	72.10	66.73
Mean IPSS	7.42	6.04
Operation, n (%)		
THR	17 (27%)	45 (73%)
TKR	14 (35%)	26 (65%)
Anaesthesia, n (%)		
Spinal	20 (38%)	32 (62%)
General	11 (22%)	39 (78%)

infections were eight times more frequent in catheterised patients (5), and bacteriuria has been reported in 10-27% of catheterised patients (24). In the study by Wroblewski and del Sel (25) on urethral instrumentation and deep sepsis in total hip replacement, the overall deep sepsis rate of the implant was 6.2% and they advocated that male patients with urinary tract symptoms should be investigated and treated before being accepted for total hip replacement.

The IPSS is a validated score developed by the American Urological Association (1). It is used for the quantification of lower urinary tract symptoms and consists of seven categories. Each category gives a score of 0 to 5, with a score of 5 equating to the highest level of symptoms. Therefore, a maximum score of 35 and a minimum score of 0 can be obtained. The final score can be interpreted as representing mild (0-7), moderate (8-18) and severe symptoms (18-35). This score is one of the parameters used by urologists in the diagnosis and treatment of conditions such as Benign Prostatic Hyperplasia (BPH).

We studied four different variables and have shown that the IPSS, type of operation and type of anaesthesia cannot be used as reliable indicators for predicting post-operative urinary retention. Age on the other hand may be a better predictor. Previous studies (15,19) have also suggested age as a significant risk factor for post-operative urinary retention and our study has supported this. Although age beyond 70 years seems to be a likely parameter, it is difficult to quote an exact age after which this risk becomes great enough to accurately predict the possibility of developing retention.

Table II. — Different IPSS groups and percentage of patients catheterised in each group (IPSS = International Prostate Symptom Score)

IPSS	Catheterised patients (% of patients same score)	Patients not catheterised	Total
MILD (0-7)	22 (28.5%)	50	77
MODERATE (8-18)	6 (27.2%)	16	22
SEVERE (> 18)	3 (37.5%)	5	8

A review of literature of the various factors likely to predict postoperative urinary retention in this group of patients showed little consensus amongst different investigators. Regarding the type of anaesthesia used, although the studies by Chu *et al* (2) and Izard *et al* (10) did not show any statistically significant difference between general anaesthesia (GA) and regional anaesthesia with regards to urinary retention, the study by McQueen *et al* (14) showed that epidural patients had a significantly increased incidence of urinary retention when compared with non-epidural anaesthesia patients.

On comparing different methods of postoperative analgesia, Walts *et al* (22) concluded that urinary retention increased from 24% to 62% with the use of epidural morphine and Gedney and Liu (7) showed that epidural morphine was associated with a significantly greater incidence of urinary retention than pethidine and methadone. Macdowell *et al* (13) demonstrated that the rate of catheterisation does not increase when GA is supplemented by epidural using fentanyl and bupivaccaine, and Singelyn *et al* (20) demonstrated that continuous femoral nerve sheath block has fewer side effects than intravenous patient controlled analgesia with morphine and continuous epidural analgesia.

Other factors likely to predict the development of urinary retention were past medical history of retention (12), patients undergoing single stage bilateral total knee arthroplasty (8), patients with hypertension (10), use of patient controlled analgesia (15), peak urinary flow rate less than 17 ml/s (18), inability to pass urine in a bottle while lying down in bed and previous bladder outflow problems (23).

Regarding the prevention of this complication, again there is no consensus amongst the investigators. Petersen *et al* (17) have suggested the use of Prazosin, an alpha antagonist, whereas Tammela *et al* (21) have suggested using Phenoxybenzamine in the peri operative period to reduce retention. These drugs relax the smooth musculature of the posterior urethra and prostate, and have been successfully used to treat urinary obstruction secondary to benign prostatic hypertrophy. Reports of potential carcinogenicity of phenoxybenzamine as well as dizziness and hypotension with Prazosin have limited their routine use in practice. It may be prudent to consider newer alpha antagonists such as Tamsulosin in clinical trials to test their efficacy and safety in this group of patients. The only other option suggested has been to catheterise at risk patients preoperatively (11,19) but again as mentioned above, it carries with it the potential risk of urinary infection, bacteraemia and prosthetic infection.

We feel that the risk factors for progression of BPH such as age more than 70 years, prostate volume more than 30 ml, concentration of prostate specific antigen more than 1.4 ng/ml, peak urinary flow rate less than 12 ml/s and post void residual urine volume more than 100 ml (16) could be used as useful parameters to identify at risk patients. However, considering the logistics and costs involved to analyse all these parameters, apart from age more than 70 years, it is not practical to use the other parameters.

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