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Peak Urine Flow as a Predictor of Urine Infection and Retention After Coronary Artery Bypass Grafting

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Summary. Peak urine flow rates were measured in 83 men before coronary artery bypass grafting. The patients were grouped according to the method of Drach et al. [1] into those with normal, equivocal or abnormal flow rates. No cases of urine infection occurred in any of the 3 groups and only 2 patients in the group with abnormal peak flow developed urine retention. This was not statistically significant. Peak urine flow did not appear to be useful in predicting urine retention after coronary artery bypass grafting.

Key words: Peak urine flow, Urine infection and retention, Cardiac surgery.

Introduction

A significantly higher incidence of post-cardiac surgery urine infection has been reported in men with abnormal peak urine flow rates [2]. Our experience with peak urine flow rate as a predictor of post-operative urine infection and retention in 83 men undergoing coronary artery bypass grafting (CABG) is reported.

Patients and Methods

Eighty-three men (mean age 53.6 years, range 37 to 73 years) undergoing elective CABG had a pre-operative urological history taken and a mid-stream sample of urine (MSSU) for microscopy and culture. All pre-operative MSSUs were sterile. Peak urine flow was measured using a DISA 21F01 mictiograph. After induction of general anaesthetic, urethral catheterisation was performed with a sterile technique. Only patients undergoing elective CABG were studied, those having additional or emergency procedures (e.g. valve replacement) were excluded. After the placement of a central venous line, all patients received 1 g Cefamandole intravenously which was continued 8 hourly for 48 h after operation. A catheter sample of urine was obtained by a sterile technique on the first post-operative day. Urethral catheters were usually removed on the first post-operative day (the mean period of catheterisation was 1.3 days) and a further mid-stream urine sample obtained prior to discharge.

Results

Using the method of Drach et al. [1], voided volume between 150 ml and 600 ml, age and peak urine flow were charted and patients classified into normal, equivocal or abnormal groups.

In 6 patients flow studies were technically unsatisfactory. A voided volume of less than 150 ml was obtained in 12 patients and of more than 600 ml in 5 patients. These 23 patients were therefore excluded from further analysis. Table 1 indicates the numbers of patients in the 3 groups: normal, equivocal or abnormal on the basis of peak urine flow rates. As indicated in Table 2, no cases of post-operative urine infection occurred in any of the 3 groups. Table 3 shows patients developing post-operative urine retention in each of the 3 groups according to peak flow rate. There was

Table 1. Results of pre-operative peak flow measurements in 60 men undergoing CABG

Normal peak flow	Equivocal peak flow	Abnormal peak flow
7	31	22

Table 2. Numbers of male patients developing urinary tract infection after CABG

Normal peak flow group	Equivocal peak flow group	Abnormal peak flow group
0	0	0

Table 3. Numbers of male patients developing urine retention after CABG

Normal peak flow group	Equivocal peak flow group	Abnormal peak flow group
0	0	2

no significant difference between the normal and abnormal groups and between the equivocal and abnormal groups as regards the incidence of post-operative urine retention (Yates' modification of χ^2).

Discussion

Peak urine flow is useful in screening for male urinary tract dysfunction [1] and it has been suggested that it is more accurate than other flow parameters in the determination of lower urinary tract dysfunction [4]. The method of Drach et al. [1] has been used in this study as it takes account of patient age as well as urine volume voided. However, 23 patients were excluded from analysis (27.7% of the original group) either because the flow studies were technically unsatisfactory (in 6 patients) or because the voided volumes were less than 150 ml (in 12 patients) or greater than 600 ml (in 5 patients), for which the charts devised by Drach et al. [1] are unsuitable. In addition, 31 patients (37.3%) had equivocal flow results. If repeat flows had been possible, then perhaps less patients would have been in this group.

In a series of men undergoing cardiac surgery [2] almost 10% developed post-operative urine infection. Of those with abnormal peak urine flows, 24% developed urine infection against 3% of those with normal flow rates. No cases of urine infection were recorded in our series in any of the 3 groups. All the patients in our series received prophylactic antibiotics before surgery, while this was not routine in the other series [2]. If antibiotic administration is routine in such patients, there is possibly such a low incidence of urine infection and peak urine flow rates may be unnecessary in predicting subsequent infection.

The urinary tract was the origin for 30% of cases of septicaemia occurring after open-heart surgery [2] and as all patients undergoing open-heart surgery require catheterisation, there exists the possibility of infection originating in the urinary tract, which could be a lethal situation particularly in patients with prosthetic heart valves.

The urinary tract has also been implicated as a source of infection in patients undergoing hip joint replacement [3] and a higher incidence of deep hip infection has been reported in patients undergoing hip replacement who developed post-operative urine retention [8]. Peak flow rates have been used in the urological assessment of men undergoing hip joint replacement [6], where obstructed patients underwent trans-urethral resection of prostate before hip surgery, resulting in a much lower retention rate than the same authors reported previously [5]. By contrast, others have reported that accurate prediction of post-operative urine retention could not be made on a single abnormal peak flow in 100 men undergoing hip joint replacement [7]. This is similar to the results in our cardiac surgical patients as only 2 patients in the abnormal flow group developed post-operative retention. If repeat flow studies had been possible in the limited time available before surgery, the number of equivocal flow results and patients excluded because of voided volumes less than 150 ml or more than 600 ml might have been less.

There is no doubt that peak urine flow measurement is simple and a non-invasive screening test, but our conclusion is that it is of limited value in predicting those at risk of post-operative retention. Urine infection was absent in our series.

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