The Royal College of Surgeons of England

UROLOGY

Ann R Coll Surg Engl 2006; **88**: 210–213
doi 10.1308/003588406X95101

The surgical risk of suprapubic catheter insertion and long-term sequelae

RS AHLUWALIA[1], N JOHAL[1], C KOURIEFS[1], G KOOIMAN[2], BRUCE SI MONTGOMERY[2], RO PLAIL[1]

[1]Department of Urology, Hastings and Eastbourne NHS Trust, UK
[2]Department of Urology, Frimley Park Hospital, UK

ABSTRACT

INTRODUCTION Suprapubic catheter (SPC) insertion is a common urological procedure, which is often referred to as safe and simple even in inexperienced hands. There is, however, very little published evidence on the safety of this procedure. Our study aimed to provide evidence on the associated morbidity and mortality and provide guidance for practising clinicians.

PATIENTS AND METHODS A total of 219 patients who underwent SPC insertion under cystoscopic guidance at two urology institutions between 1994 and 2002 were identified and their case notes reviewed.

RESULTS The intra-operative complication rate was 10% and the 30-day complications rate was 19%. Mortality rate was 1.8%. Long-term complications included recurrent UTIs (21%), catheter blockage (25%) resulting in multiple accident and emergency attendance (43%). Despite this, the satisfaction rate was high (72%) and most patients (89%) prefer the SPC over the urethral catheter.

CONCLUSIONS SPC bladder drainage results in a high patient satisfaction rate. Patients and clinicians should be aware of the potential complications associated with SPC insertion.

KEYWORDS
Suprapubic catheter insertion – Complications

CORRESPONDENCE TO
Mr C Kouriefs, Department of Urology, Medway Maritime Hospital, Mount Ephraim Road, Gillingham, Kent ME5 7NY, London SE1 4LB, UK
M: +44 (0)7985 141197; E: c.kouriefs@btinternet.com

Suprapubic catheter (SPC) insertion is a very common urological procedure. It is practised widely by a variety of specialities and is a standard requirement that appears in the basic surgical trainees logbook. It has been suggested as a procedure suitable for clinical nurse specialist practice. The majority of such procedures are performed without any complications. However, some are difficult and anecdotal evidence suggests that they carry a significant morbidity and mortality. There is a lack of published evidence on postoperative morbidity and mortality.

In the current era of clinical governance, comparative clinical audits and guidelines for best practice are becoming increasingly important. We, therefore, conducted an audit of all SPC insertions performed in the operating theatres at three urology institutions (Frimley Park, Eastbourne and Hastings NHS Trusts). Our intention was to provide comparative morbidity and mortality figures and produce comprehensive guidelines on SPC insertion.

Patients and Material

A total of 232 patients who had SPC insertion in the operating theatre under cystoscopic guidance, between 1994 and 2002, were identified. Data were collected retrospectively as well as prospectively with the aid of a suitably designed proforma. Collected data included patient's demographics, co-morbidity (ASA score), indication for SPC insertion, intra-operative difficulties and complications, technical details of the procedure as well as 30-day morbidity and mortality. Follow-up data were collected from case-note review, accident and emergency attendance cards and telephone conversations. Mann-Whitney rank sum, Chi-square and one-way ANOVA tests were used for statistical comparison (Sigma-Stat v2.0 software).

Complete data were collected from 219 cases (94%). The mean age was 73 years (range, 25–95 years). There was a slight male preponderance with a male:female ratio of 1.2:1.

Table 1 The primary causes of neuropathic bladder and bladder outflow obstruction in this series

Neuropathic bladder	No.	Bladder outflow obstruction	No.
Multiple sclerosis	42	Urethral strictures	61
CVA	38	BPH	15
Parkinsonism	12	Pelvic organ prolapse	4
Spinal trauma	9	Post-vulvectomy	2
Others	22	Post-incontinence surgery	2
Total	123		84

The mean follow-up was 50 months (range, 2–72 months). Overall, 98% of cases had multiple significant co-morbidities as indicated by a mean ASA score of 3.6. Of these, 155 patients (71%) had previous long-term urethral catheters with unsatisfactory outcomes and opted for SPC insertion. In all, 152 patients (69%) had general ($n = 151$) or regional ($n = 1$) anaesthesia and 66 (30%) had local anaesthesia. Mode of anaesthesia was not available in one case. Indications for SPC insertion included neuropathic bladder (56.1%; $n = 123$), bladder outflow obstruction (38.4%; $n = 84$) and incontinence (5.5%; $n = 12$). The primary cause for neuropathic bladder included multiple sclerosis (MS) in 34%, cerebrovascular accident (CVA) in 32%, Parkinson's disease in 11% and spinal trauma in 7%. Other causes included cerebellar degeneration, dementia, spinal tumours, motor neuron disease, diabetes and multiple system atrophy (Table 1). Amongst the bladder outflow obstruction group of patients, urethral stricture was the commonest primary pathology (72.6%).

Results

In the study group, 103 cases (47%) were performed by a consultant urologist, 110 (50%) by middle grades and 6 (3%) by senior house officers (SHOs; Table 2). Amongst the cases performed by middle grades, 24% had consultant supervision, as did all the cases performed by junior staff (SHOs). Overall, 61.6% of cases were performed in the presence of a consultant urologist. Consultants performed high-risk cases with a mean ASA score of 3.9 compared to ASA scores of 3.4 and 3.3 for middle grade and junior staff ($P > 0.05$). The postoperative complication and mortality rates were comparable for cases performed by consultant and middle grades ($P = 0.533$ and $P = 0.596$, respectively).

Intra-operative difficulties were commonly reported in the operating notes, notably a small contracted bladder, a spatulous urethra that made bladder filling difficult and surgical scarring of the lower abdominal wall. Of patients with

Table 2 Breakdown of cases according to the operator's grade and their associated complication and mortality rates

Operator	No.	Supervised (%)	Mean ASA score	Postoperative complications (%)	Mortality (%)
Consultant	103	n/a	3.9	18 (18%)	2 (2%)
Middle grade	110	26 (24%)	3.4	24 (22%)	2 (1.8%)
SHO	6	6 (100%)	3.3	0	0
Total	219	32		42 (19%)	4 (1.8%)

Table 3 Intra-operative and postoperative (30-day) complication rates amongst the neuropathic bladder and bladder outflow obstruction

Patient group	Neuropathic bladder ($n = 123$)	Bladder outflow obstruction ($n = 84$)	*P*-value	Total
Intra-operative complications/difficulties (%)	14 (11%)	6 (7%)	0.459	20 (10%)
30-day postoperative complications (%)	28 (23%)	12 (14%)	0.145	40 (19%)
Total	42 (34%)	18 (21%)	0.057	60 (29%)

The incontinence cohort is excluded from this table.

Table 4 Intra-operative and postoperative complications of suprapubic catheter insertion

Intra-operative complications/difficulties	**20 (10%)**
Anaesthetic-related complications	4
Unable to position patients in lithotomy position	5
Bowel injury/perforation	5
Catheter malpositioning/expulsion	6
30-day postoperative complications	**40 (19%)**
Septicaemia secondary to UTI[a]	10
SPC exit site infection[a]	8
SPC exit site bleeding[a]	4
Blocked SPC[a]	5
Congestive cardiac failure[b]	1
Acute coronary syndrome[b]	1
Chest infection[b]	3
Acute confusional state[b]	2
General deterioration[b]	4
Cholecystitis[b]	1
Total	**60 (29%)**

[a]Complications directly related to SPC insertion (67%).
[b]Complications related to exacerbation of premorbid conditions (33%).

previous pelvic surgery, 31% had intra-operative complications compared to 5% amongst patients without previous pelvic surgery ($P < 0.001$). Musculoskeletal co-morbidity (*e.g.* contractures and fused joints) made on-table positioning difficult for endoscopic access. Overall, the intra-operative complication/difficulty rate was 10% (Table 3). Intra-operative complications were commoner in the neuropathic group (11%) compared to the BOO group (7%; $P = 0.459$; Table 3) Bowel injury occurred in 5 cases (2.4%). The intra-operative complications and difficulties are shown in Table 4.

Postoperative complications (30-days) occurred in 40 cases (19%; Table 3). Table 4 shows the complications in the neuropathic and bladder outflow obstruction groups. The 30-day postoperative complication rate was higher in the neuropathic group of patients (23%) compared to the BOO group (14%; $P = 0.145$). Postoperative complications were divided into those directly related to SPC insertion (67%) and those related to exacerbation of pre-existing co-morbidities (33%). The latter tended to relate to significantly longer hospitalisation. The overall mean hospitalisation was 4.6 days and it correlated with ASA score. The overall complication rate in the neuropathic group was 34% compared to 21% in the BOO group ($P = 0.057$).

Peri-operative prophylactic antibiotics were administered in 53% of cases. The need for, and choice of, antimicrobial prophylaxis was surgeon-dependent. No reasons for omitting antibiotic prophylaxis were reported in the operating notes. The most commonly used antibiotic was a single dose of intravenous gentamicin. Postoperative clinical urinary sepsis was defined as pyrexia with a positive CSU microscopy. Ten patients (9%) who received prophylactic antibiotics experienced postoperative urinary sepsis compared to 42 (41%) patients who did not receive any intra-operative prophylactic antibiotics ($P = 0.001$).

One of the markers we surveyed was multiple accident and emergency department attendance (Table 5). Overall, 43.5% of patients had multiple accident and emergency attendance. The repeated attendance rate was significantly higher (57%) in the neuropathic group than the BOO group (27%; $P < 0.001$). The commonest reasons for accident and emergency attendance were change of catheter (25%) and recurrent symptomatic UTI (21%). Other reasons included SPC exit site infection/granulation/bleeding, bladder spasms and catheter technical difficulties. No correlation was found between peri-operative antibiotics and long-term recurrent urinary tract sepsis. There was no significant difference in the incidence of UTI between the neuropathic and BOO groups of patients.

Telephone consultation and out-patient review revealed a 72% patient satisfaction. Of patients who had previous urethral catheter, 89% reported a preference for SPC. Reasons for preference included easier catheter management,

Table 5 Reasons for accident and emergency attendance by patients with SPC

	Multiple A&E	Reasons for multiple A&E attendance		
Patient group	attendances	Catheter changes	Urinary infection	SPC exit site infection
Neuropathic bladder	56.9%	42.8%	32.7%	28.6%
BOO	26.6%	28.9%	23.7%	15.6%
Incontinence	0	5.0%	6.8%	2.0%
Total	43.5%	25.6%	21.1%	15.4%

less discomfort, less frequent symptomatic urinary infections (38% of patients reported a lower incidence of symptomatic UTI) and improved sexual activity with a SPC compared to a urethral catheter.

Discussion

SPC insertion is a popular method of long-term bladder drainage in voiding dysfunction. Insertion of the SPC is often thought of, and referred to, as a simple procedure but little is published on the associated complications and mortality. Sheriff *et al.*[2] published the largest, to date, retrospective series of 157 patients with neuropathic bladder who had SPC inserted under controlled conditions in the operating theatre under cystoscopic guidance. They reported a 10% complication rate with a 2.7% incidence of bowel injury. In our series, the overall complication rate was 29%. Sheriff *et al.*[2] referred to a 10% complication rate related specifically to SPC, whereas we included postoperative complications related to co-morbid conditions. The latter accounted for 33% of the overall postoperative complications. Taking this into account, the complication rates like-for-like are comparable in the two series and signify their common occurrence in relation to SPC insertion. The incidence of bowel injury in our series was 2.4% compared to 2.7% in the series from the National Orthopaedic Hospital.[2] Of our cases, 57% were neuropaths compared to 100% of the cases from the National Orthopaedic Hospital series.[2] It is particularly difficult to insert a SPC catheter in this group of patients. We demonstrated that intra-operative and postoperative complications were higher in the neuropathic group compared to patients with other lower urinary tract dysfunction. This should be taken into account in case selection. Such high-risk cases should be performed in a controlled environment with a senior surgeon and a senior anaesthetist present.

The 30-day mortality rate, in our series, was 1.8%; Sheriff *et al.*[2] reported a 0.8% mortality rate. These two studies indicate the significant mortality rate associated with SPC insertion in difficult cases. Such a mortality rate is comparable to that reported by large published series on radical prostatectomy (1%) and radical cystectomy (3%), emphasising the need for careful pre-operative optimisation, appropriate grade of clinical personnel and optimal postoperative care.

Of our cohort, 71% had previous urethral catheters. This, in addition to the underlying voiding dysfunction, would predispose such patients to urinary bacterial contamination and postoperative urinary sepsis. Of our patients, 53% received intra-operative intravenous antimicrobial prophylaxis. Amongst these patients, there was a significantly lower rate of clinically significant urinary sepsis ($P \leq 0.001$). We would, therefore, strongly recommend the routine administration of intra-operative intravenous prophylactic antibiotics. Urosepsis was not only an early postoperative problem but also one of the commonest complaints of patients with long-term SPC treatment. In our series, 21% of cases suffered recurrent urinary tract infections. The risk of recurrent UTI was higher amongst cases of neuropathic bladder. Of interest, the recurrent clinical UTI rate in the Sheriff *et al.*[2] series was lower at 4%.

Sheriff *et al.*[2] reported on the disappointing discovery that more and more SPCs are not changed in the community and this places strain on the hospital staff. We found similar evidence. Overall, 25% of our patients had regular attendances at the accident and emergency department for SPC change. Such cases could be managed in the community with an appropriate education programme. However, current evidence suggests that there remains a relative inexperience and unfamiliarity of SPC management amongst primary care workers.

Despite 43% of patients attending the accident and emergency department regularly with SPC-related problems, the satisfaction rate for SPC is high. Sheriff *et al.*[2] reported a high satisfaction rate. Of their patients, 99% and 70% reported a 7/10 and 9/10 satisfaction score, respectively. Also, 82% of their patients reported that SPC insertion had positively improved their quality of life and 79% would strongly recommend this type of long-term bladder drainage to other patients. The satisfaction rate in our series was 72% and 89% of the patients with previous urethral catheter reported preference for the SPC drainage.

Conclusions

SPC bladder drainage results in a high patient satisfaction rate. Patients and clinicians should be aware of the potential complications associated with SPC insertion, which have so far been under-reported. The procedure may be simple but some patients and their conditions are not. High-risk cases with neuropathic bladder, multiple associated co-morbidities, and previous pelvic surgery should be identified. Careful pre-operative optimisation is essential. The procedure should be performed by an experienced anaesthetist and surgeon. Postoperative care in a high dependency unit should be considered. We strongly recommend the use of peri-operative prophylactic antibiotics.

References

1. Gurjal S, Kirkwood L, Hinchcliffe A. Suprapubic catheterisation: a suitable procedure for clinical nurse practitioners. *Br J Urol* 1999; **83**: 954–6.
2. Sheriff MK, Foley S, McFarlane J, Nauth-Misir R, Craggs M, Shah PJ. Long-term suprapubic catheterisation: clinical outcome and satisfaction survey. *Spinal Cord* 1998; **36**: 171–6.
3. Stein JP, Skinner DG. Results with radical cystectomy for treating bladder cancer: a 'reference standard' for high-grade, invasive bladder cancer. *Br J Urol* 2003; **92**: 7–11.