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Ureteroscopy as an out-patient procedure: the Singapore General Hospital Urology Centre experience

把輸尿管鏡檢查作為門診的程序：新加坡中央醫院泌尿中心的經驗

Objective. To study the safety and efficacy of ureteroscopy as an out-patient procedure.

Design. Retrospective study.

Setting. Teaching hospital, Singapore.

Subjects and methods. Operating facilities for out-patient ureteroscopy were introduced in late 1998. A retrospective review of all patients undergoing ureteroscopy from March 1999 to December 2000 was conducted. Clinical records were reviewed for operating time, surgical outcome and complications, and length of hospital stay and re-admissions.

Results. Two hundred and ten patients underwent ureteroscopy for a variety of indications—115 patients were admitted to hospital as in-patients and 95 patients were treated as out-patients. Ureteroscopy and laser lithotripsy were performed using general or regional anaesthesia. Patients assessed to be American Society of Anesthesiology class I or II were eligible for an out-patient procedure. American Society of Anesthesiology class was found to be lower for those treated as out-patients compared with those undergoing in-patient procedures—63% versus 28% for class I and 36% versus 69% for class II. Mean operating time was 37 minutes for out-patient procedures and 57 minutes for in-patient procedures ($P<0.01$). Complications were low for out-patients, with six unplanned re-admissions, mostly for minor complications. All patients were discharged the following day.

Conclusion. Ureteroscopy can be offered selectively as an out-patient procedure to patients with low surgical risk, especially American Society of Anesthesiology class I patients, and others expected to have an uncomplicated surgical procedure.

目的：研究把輸尿管鏡檢查作為門診程序是否安全及有效。

設計：回顧性研究。

安排：教學醫院，新加坡。

患者與方法：院方在1998年引進門診輸尿管鏡檢查設備。對所有在1999年3月至2000年12月期間，接受輸尿管鏡檢查的病人作回顧性總結。回顧的臨床紀錄包括手術時間、結果和併發症，以及留院時間和再入院的情況。

結果：210名因各種病徵而接受輸尿管鏡檢查的病人；其中115名留院，另95名作門診處理。在全身或局部麻醉後，為病人進行了輸尿管鏡檢查及激光碎石手術。按 American Society of Anesthesiology 評級，被評為一級或二級的病人，可接受門診程序。結果發現，接受門診程序的病人，其 American Society of Anesthesiology 評級較住院病人為低——一級為63%比28%，二級為36%比69%。門診病人的平均手術時間為37分鐘，而住院病人的平均手術時間則為57分鐘($P<0.01$)。門診病人的併發症不多，其中有6名需再度入院，多數是因輕微的併發症。所有病人都在手術後第二天出院。

結論：把輸尿管鏡檢查作為門診的程序，可以選擇性地應用於手術風險較低的病人，尤其是按 American Society of Anesthesiology 評級，被評為一級的病人，以及其他預計會進行不複雜的外科手術的病人。

Key words:

Lithotripsy, laser;

Outpatients;

Ureteroscopy

關鍵詞：

激光碎石；

門診；

輸尿管鏡檢查

Hong Kong Med J 2003;9:175-8

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Introduction

Over time, there have been many advances in ureteroscope design, including reduction of scope size, better optical visualisation, and improved durability. There have also been improvements in calculus fragmentation devices, and retrieval instruments. These developments have made ureteroscopy (URS) a safer and more efficacious procedure. Ureteroscopy is a suitable procedure for an out-patient setting.¹ However, in Singapore, as in many other Asian centres, this practice has not been widely adopted.^{2,3} One of the reasons is the logistical problem of having the equipment readily available in an out-patient centre. The infrastructure of the service and staffing required are also major limitations. Also, the physician or the patient may be reluctant to undertake the procedure on an out-patient basis. With the establishment of the Urology Centre as an independent service centre at the Singapore General Hospital, URS has been offered as an out-patient procedure since late 1998. This paper reports the experience of out-patient URS, and compares this with URS offered as an in-patient procedure.

Subjects and methods

From March 1999 to December 2000, 210 patients underwent URS in the Singapore General Hospital. These patients were assigned admission status, with out-patient URS undertaken whenever possible, with patient agreement. The following considerations were taken into account:

- (1) Patient factors—only patients younger than 70 years were eligible for out-patient surgery requiring anaesthesia. In addition, patient status needed to be classified as American Society of Anesthesiology (ASA) class I or II, with the presence of co-morbidity prompting an in-patient procedure. Major co-morbidities included ischaemic heart disease, chronic obstructive airway disease, and coagulopathy;
- (2) Disease factors—for patients for whom pre-morbid intervention, including nephrostomy drainage, had been instituted, the URS would proceed as an in-patient procedure. Anticipated additional procedures, including percutaneous nephrolithotripsy or open surgery in the event of failed URS, were also indications for an in-patient operation; and
- (3) Social and cost factors—these included social aspects of case management, patient preference and, occasionally, insurance reimbursements. For example, a caretaker needed to be available for at least 48 hours after a scheduled out-patient procedure, and the patient needed to have easy access to medical facilities. In terms of cost considerations, the procedure fee was largely the same irrespective of admission status. However, the facilities cost could differ tremendously and was an important consideration, especially for full fee-paying (private) and non-resident patients. These patients were offered out-patient surgery where possible.

Patients who were scheduled to have out-patient surgery were counselled about the procedure by the listing room nurse, and instructed to fast the night before surgery. They attended the Urology Centre early on the operative day, with the procedures listed for the morning. The operation was performed using general anaesthesia and patients were monitored postoperatively in the recovery area. They were reviewed by the surgeon-in-charge before discharge in the afternoon. The criteria for discharge included stable parameters, tolerance of diet, ability to void spontaneously, and satisfactory control of pain. Oral analgesia was prescribed, and the patients were advised to return to the Urology Centre or the Accident and Emergency Department should they experience severe pain or persistent haematuria.

Patients who had the operation as an in-patient procedure were admitted the afternoon prior to the procedure for preparation and assessment by the anaesthetist. The majority of patients were discharged the day after the procedure.

Ureteroscopy using fluoroscopic control was performed for all patients. On identification of pathology, therapeutic procedures were conducted as appropriate. The Olympus semi-rigid ureteroscope (Olympus Co Ltd, Hamburg, Germany) was most commonly used. Flexible ureteroscopes were available where indicated. Both pulsed-dye laser (Candela Corporation, Wayland, US) and Holmium laser (Coherent, Inc, California, US) were available for stone fragmentation. Double J stents (Cook/Boston Scientific, Bloomington, US) were inserted where indicated. Temporary external stents (Cook, Bloomington, US) were limited to in-patient use.

Clinical notes, operative charts, and radiographs were retrospectively reviewed. Data gathered included information on age, sex, ASA score, indications for the procedure, operating time, surgical outcome, and complications arising from the procedure, including unplanned re-admission and conversion to open surgery.

Results

Two hundred and ten patients underwent URS—115 (55%) as in-patients and 95 (45%) as out-patients. The sex ratio was similar in both groups, with a male preponderance of approximately 70%. The mean age was higher in the in-patient group (53 versus 46 years; $P < 0.05$). The ASA class was lower for those treated as out-patients (Fig). The mean operating time was also lower for the out-patient group (Table 1).

The majority of both in-patient and out-patient procedures were performed for urolithiasis. The second most common indication was for diagnostic evaluation, including evaluation of filling defects on intravenous urography and investigation of macroscopic haematuria. Other indications included dilatation of ureteric strictures, removal of

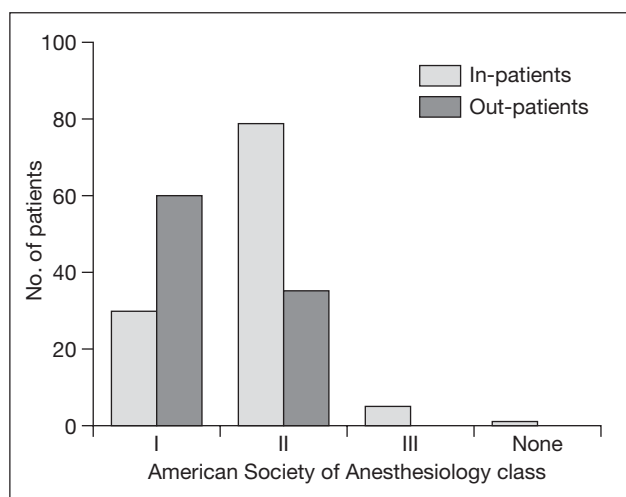


Fig. Comparison of American Society of Anesthesiology class

Table 1. Comparison of patients undergoing ureteroscopy as an out-patient or in-patient procedure

	Out-patients	In-patients	P value
Sex			
Male	70	80	-
Female	25	35	-
Mean age (range) [years]	46 (17-69)	53 (20-80)	<0.01
Mean operating time (range) [minutes]	37 (10-100)	57 (10-210)	<0.01

Table 2. Indications for ureteroscopy

Indication	Out-patients	In-patients
Stones	54	80
Diagnostic	26	16
Stricture	11	13
Tumour	1	4
Other	3*	2†

* Treatment of ureteroceles (n=1), removal of encrusted double J stent (n=1), and check scope post-intrarenal surgery (n=1)

† Removal of encrusted double J stent (n=2)

encrusted double J stents, and diagnosis of ureteroceles (Table 2).

All patients who underwent the procedure as out-patients were given general anaesthesia. In the in-patient group, the majority were given general anaesthesia (84%). A further 14% were given regional anaesthesia, and one patient had the procedure performed using local anaesthesia as he had had a recent myocardial infarction.

Complications were low in both groups. In the out-patient group, 6 (6.3%) patients required re-admission after the procedure—three for lower urinary tract symptoms, two for acute retention of urine, and one as requested for insurance reimbursement purposes. There were no major surgical complications.

Among the in-patients, most were discharged the day after the procedure. One patient was re-admitted with a urinary tract infection when she presented with fever and dysuria. She was treated with intravenous antibiotics. One patient developed hypotension and had reduced urine

Table 3. Location of stones removed

Position	Patients No. (%)	Repeated procedure (%)
Lower ureter	73 (50.3)	7
Mid ureter	36 (24.8)	27
Upper ureter	28 (19.3)	33
Kidney	8 (5.5)	0

output. He was given intravenous dopamine and this complication reversed, allowing discharge the next day. The three patients with ureteric strictures required open surgery, as anticipated preoperatively, because attempts to dilate the strictures endoscopically failed. One patient had ureteroscopic lithotripsy converted to open surgery due to stone impaction over the distal ureteric stricture. Boari flap reconstruction was performed as the definitive procedure after open stone removal.

A total of 134 (63.8%) patients underwent URS for removal of stones. In 99 (73.9%) patients, a single stone was present. The remaining 35 (26.1%) patients had multiple stones. The location of the stones is summarised in Table 3. The majority of stones were located in the lower ureter, while some patients had both upper and lower ureteric stones. Eight patients had renal stones removed during a single procedure. There were notably more repeat procedures for stones in the upper ureter but all renal stones were cleared during a single operative visit.

Discussion

Ureteroscopy has been proven to be highly efficient for the treatment of ureteric calculi. These authors first published their experience of laser (pulsed-dye) URS in 1994, in which good fragmentation in 85% of patients was documented.¹ It is interesting to note that, at that time, despite the relative proximity of services, many centres in Singapore were predominantly undertaking URS as an in-patient procedure.²⁻⁴

Worldwide, the current trend is to perform the procedure on an out-patient basis.⁴⁻⁷ Recently, Cheung et al⁷ reported their extensive series of 329 patients who underwent out-patient URS. The same day re-admission rate was 1.5% and the overall unplanned re-admission rate was as low as 3.6%. These authors concluded that out-patient URS could be successfully performed with minimal postoperative complications. This practice is particularly suitable in places where the population is concentrated, transport and telecommunication networks are well developed, and medical services are widely available. Concerted efforts involving the establishment of appropriate infrastructure and staff training are keys to the development of a successful out-patient service.

In these authors' experience, the availability of two devices/instruments has contributed to the high success rate and low complication rate for out-patient surgery. The first of these is the Holmium laser—a powerful, yet safe

intracorporeal stone fragmentation machine. All stones, irrespective of composition, can be fragmented. Since the stones are often 'vapourised' and retrieval of fragments deemed unnecessary in most situations, trauma to the ureter arising from repeated deployment of baskets or forceps is reduced. The limited penetration of laser energy also significantly reduces the chance of ureteric perforation, providing stone fragmentation is performed using adequate vision. Studies have demonstrated a low ureter perforation rate during such treatment,⁶⁻⁸ especially when the Holmium laser is used as the energy source.⁷ Secondly, the availability of flexible ureteroscopes has made lesions in difficult locations, including the upper ureter and the pelvi-calyceal system, more accessible.⁹ Our early experience with the flexible 7.5F ureteroscope yielded good results.¹⁰ A total of 29 ureteroscopies were performed for a variety of indications, and a 100% stone-free rate was obtained for urolithiasis.

Patient selection, however, remains the most important factor contributing to successful URS. We recommend URS for distal ureteric stones, for which success rates exceeding 97.0% have been reported.¹¹ The majority of patients that we treated had stones located in the mid and distal ureter (75.1%). However, there remains some controversy about whether URS should be offered as the primary modality for upper ureteric stones, which can be treated effectively with extracorporeal shock wave lithotripsy (ESWL).¹² Thus, although we obtained good results for lesions at all levels of the ureter, URS was largely employed as a secondary procedure for upper ureteric stones that were not treated effectively with initial ESWL.

Patients who are treated on an out-patient basis may have particular concerns, especially that medical and nursing staff may not be available should they need immediate attention. Urology Centre staff make routine post-operative phone calls to patients who have undergone URS as an out-patient procedure. This ensures patients' well-being, provides an opportunity to address patient queries, and documents a full return to normal activities.¹³ The contact has proved to be effective for alleviating patient concerns and enhancing their satisfaction.⁷ The 'walk-in' service accommodates postoperative patients for any condition, without the need for an appointment. Again, this has contributed to containing complications, allowing timely intervention where necessary.

Rising medical costs have been a major concern for patients and health care providers in recent years. Extensive

studies have proven the safety, as well as the cost-saving potential of out-patient URS.^{5,11} At the Singapore General Hospital, a day-surgery procedure can reduce the hospital bill by approximately US\$250. These savings have become a major factor driving the provision of URS as an out-patient procedure where indicated.

Conclusion

With rising health care costs and the pressure on hospital beds, there is an increasing emphasis on performing surgical procedures in an out-patient setting. This study has documented low complication rates and low re-admission rates for out-patient URS. Therefore, young patients assigned a low ASA class, and anticipated to have a short and uncomplicated procedure should be offered URS in an out-patient setting. The establishment of appropriate infrastructure and dedicated staff are keys to the success of such out-patient surgery.

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