

COMPARISON OF HAND-ASSISTED LAPAROSCOPIC NEPHROURETERECTOMY WITH OPEN SURGERY FOR UPPER URINARY TRACT TUMOR

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Herein we report on our initial experience in performing nephroureterectomy by hand--assisted laparoscopic surgery, and compare the results with those performed by traditional open methods. From December 2000 to September 2001, 10 patients with upper urinary tract tumors underwent hand--assisted laparoscopic nephroureterectomy. Except for one patient who required elective conversion to open surgery due to renal vein injury, this cohort of 9 patients was compared to a group of 35 patients who had received traditional open nephroureterectomy over the last 2 years. Demographic, intraoperative and postoperative data were compared retrospectively. These two groups were similar in age, body mass index, operation time and time to postoperative oral intake. However, the hand-assisted laparoscopy group was found to have significantly less blood loss, less need for parenteral narcotic and a shorter length of time needed for postoperative hospitalization than the open group. Thus, in this report we have demonstrated hand-assisted laparoscopic nephroureterectomy to be a safe and efficacious treatment of malignant urinary collecting tumors. We believe the benefits of this minimally invasive surgery make it a viable alternative technique for management of upper urinary tract tumor.

Key words: laparoscopy, nephroureterectomy, transitional cell carcinoma

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The standard method used to treat transitional cell carcinoma in renal pelvis or ureter is open nephroureterectomy with bladder cuff removal. Although highly effective in reducing cancer related deaths, the open surgery requires a single midline or thoracoabdominal incision or two incisions including the flank and lower abdomen. The morbidity of these open incisions is significant and can lead to prolonged hospitalization and delayed convalescence.

The first laparoscopic nephrectomy for renal tumor was accomplished in 1990[1]. Since then, the use of laparoscopic surgery for urological disease has become an accepted mode of management.

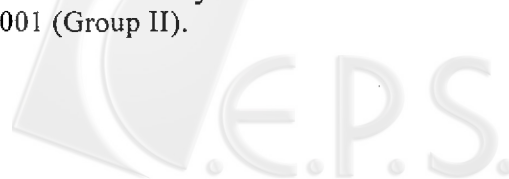
Furthermore, laparoscopic surgery with hand assistance has been developed to aid in such complex laparoscopic procedures as nephroureterectomy. Herein we present our initial experience with hand-assisted laparoscopic nephroureterectomy and compare our results in patients who underwent this procedure with the results of those who underwent traditional open methods.

MATERIALS AND METHODS

From December 2000 to September 2001, 10 patients who had received transperitoneal laparoscopic nephroureterectomy for upper urinary tract transitional cell carcinoma were collected and categorized into one group (Group I) and were compared with another group of 35 patients who had received open nephroureterectomy from October 1999 to September 2001 (Group II).

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In Group I, the laparoscopic procedure was performed transperitoneally. The techniques of hand-assisted laparoscopic nephrectomy have been described in previous series[2-4]. The patient is placed in a partial lateral position. Although the 7cm length hand device incision could be placed in various positions, including supraumbilical, infraumbilical and subcostal position, in order to perform ureterectomy and bladder cuff removal, we chose to place the hand port in a right or left lower abdominal position, much like a Gibson incision wound. The camera trocar was placed in the supraumbilicus. One 12mm trocar placed in the mid clavicular line just below the subcostal was used as the surgeon's working instrument. The other 10mm trocar was placed in the anterior axillary line below the subcostal. Pneumosleeve was placed on the hand port. The abdomen was insufflated with CO₂ until a pressure of 14-15 mmHg was reached. A 10mm 0-degree laparoscope was introduced through the camera port (Fig. 1). Once the line of Toldt had been incised and the hepato-renal or spleno-renal ligament was divided, the intestine could be mobilized medially by gravity. The peri-renal and periureteral tissues were separated by endo-shear or blunt dissection by hand. The renal artery and other vessels were divided with clips and the renal vein was divided by endo-GIA. Excision of the distal ureter could be accomplished either by resecting the hemitrigone and intramural ureter transurethrally before the laparoscopic procedure or by resecting the distal ureter and hemitrigone extravesically via the hand port incision wound. Finally, the specimen was removed without morcellation from the hand port.

In Group II, the open surgical procedures used an extraperitoneal flank approach to remove the kidney and upper ureter. The lower ureter and bladder cuff was resected either by using a lower mid-line incision or a Gibson incision.

Charts were retrospectively reviewed to obtain and record clinical data, including demographic, operative and postoperative data. Statistical analysis for comparison between the two groups was performed using a Mann-Whitney test.

RESULTS

Of the ten patients who received laparoscopic nephroureterectomy, one required elective conversion to open surgery due to renal vein injury and bleeding which was difficult to control. We com-

pared the remaining 9 cases of laparoscopic surgery with 35 cases of open surgery. Table 2 lists demographic, intraoperative and postoperative parameters. Demographic data on the 2 groups were similar in terms of patient age (mean 64.9 vs. 65.0) and body mass index (mean 23.7 vs. 23.8). Average operative time in the hand-assisted laparoscopy group was 266.7 minutes compared with 273.4 minutes in the open group ($p > 0.05$). Average estimated blood loss for laparoscopy and open surgery was 146.1 ml and 564.1 ml, respectively ($p < 0.0001$). Average time that a patient took to re-start oral intake was 2.6 days after laparoscopic surgery and 2.1 days after open surgery ($p > 0.05$). Patients who underwent hand-assisted laparoscopy required significantly fewer parenteral analgesics (68.9 mg vs. 158.1 mg meperidine, $p < 0.05$). Postoperative hospitalization was also shorter for those in the laparoscopy group (7.6 days vs. 10.8 days, $p < 0.01$). Except for the patient who was converted to open surgery, only one patient in 9 experienced a delay in return of bowel function, which was due to paralytic ileus. The bowel activity of that patient returned to normal 6 days later under conservative treatment. There was no mortality in our laparoscopic and open groups.

DISCUSSION

Upper urinary tract transitional cell carcinoma

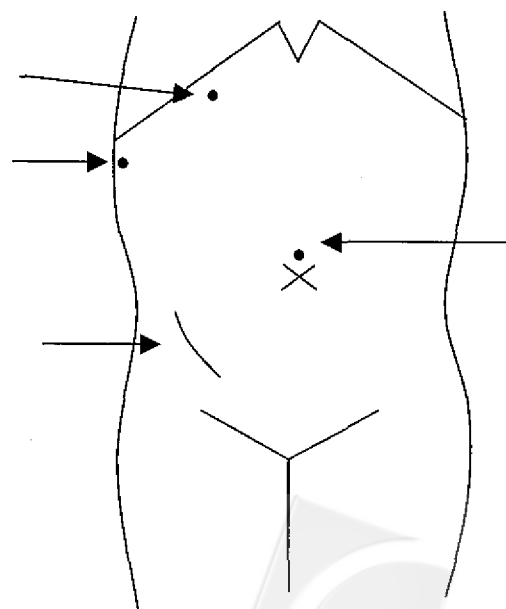


Fig. 1. Placement of all ports

is an aggressive tumor with a tendency toward high-grade disease, multifocality, local recurrences and distant metastases[5]. Because a 30% to 60% local recurrence rate can be expected in any downstream remnant ureteral urothelium, complete distal ureterectomy with bladder cuff must be performed for transitional cell carcinoma of the renal pelvis or ureter [6]. When done with traditional open surgery, this procedure requires either 2 separate muscle cutting incisions or a single long incision. The open techniques cause significant postoperative pain and prolong the hospital stay.

Since it was first described by Clayman *et al.* [1], laparoscopic surgery has made tremendous progress in urology. In 1996, Bannenberg *et al.* first detailed hand-assisted laparoscopic techniques for nephrectomy in pigs[7]. According to their report, hand-assisted laparoscopic nephrectomy was easy to perform and, compared with conventional laparoscopic nephrectomy, the operative time was much shorter. In 1997, Nakada *et al.* performed the first hand-assisted laparoscopic nephrectomy in a human for chronic infection caused by renal stones [8]. Since that time, the hand-assisted laparoscopic procedures have been successfully performed in many urological surgeries. Hand-assisted laparoscopic surgery has two advantages. One advantage is that it provides the laparoscopist with the tactile sensation to perform blunt dissection by a hand. The other advantage is that specimens can be removed intact by the operator via hand port for pathological staging.

We started procedures for hand-assisted laparoscopic nephroureterectomy in December 2000, and since that time 9 patients have been success-

fully treated by this procedure. We compared the results of this procedure with the results in those who had received the traditional open method. The time it took to operate using the laparoscopic procedure was about the same as it was for the open procedures, though we believe that, with more experience, the laparoscopic procedure will take much less time. Patients in the hand-assisted laparoscopic group had significantly less blood loss, fewer parenteral narcotic requirements and shorter postoperative stays than those in the open groups, results that were similar to those in previous literature[9-11]. The above advantages can be derived from the fact that the laparoscopic procedures do not require as much skin wounding and muscle cutting as open procedures. Hand-assisted laparoscopic nephroureterectomy involves a main wound 7cm long, while traditional open surgery involves incisions more than 25cm long in total. According to a report by Brian *et al.* [11], there is no significant difference for the time to oral intake postoperatively between the laparoscopic and the open nephroureterectomy. While our study agreed with their finding, some other series have concluded that the laparoscopic groups need less time to restart oral intake than the open groups[9,12]. Our explanation for this difference is that the traditional open surgeries are extraperitoneal procedures without intestine involvement, but the transperitoneal laparoscopic procedures would involve the intraperitoneal organs, especially the bowels.

In our study, we have demonstrated the advantages of the laparoscopic procedure to be a significant decrease in operative blood loss, postoperative analgesic use and hospital stay. There are, however,

Table 1. Comparative data on laparoscopic vs. open nephroureterectomy

	Laparoscopic	Open surgery	P value
No. of pts.	9	35	-
Time period (mm/yy)	12/2000 ~ 9/2001	10/1999 ~ 9/2001	-
Age	64.9 ± 10.1	65.0 ± 9.9	0.96
Body mass index (kg/m ²)	23.7 ± 3.5	23.8 ± 3.5	0.87
Op time (min)	266.7 ± 126.8	273.4 ± 68.8	0.51
Blood loss (ml)	146.1 ± 66.7	564.1 ± 327.8	< 0.0001
Time to oral intake (day)	2.6 ± 1.5	2.1 ± 0.7	0.24
Meperidine (mg)	68.9 ± 30.0	158.1 ± 113.7	< 0.05
Postoperative stay (day)	7.6 ± 1.9	10.8 ± 2.3	< 0.01

two disadvantages associated with laparoscopic surgery: time is needed to learn how to perform this procedure skillfully and the cost of this surgery is relatively high. Nevertheless, the increased operative costs may be offset by a decreased length of stay, resulting in a similar total hospital cost.

Laparoscopic nephroureterectomy could be performed either by the transperitoneal route or by the retroperitoneal route, both of which afford less postoperative pain, a more rapid convalescence, and an optimal cosmetic result compared with the traditional open surgery[13,14]. The transperitoneal approach is associated with a larger working space and familiar anatomical landmarks. Advantages of the retroperitoneal approach include early control of the renal artery and vein, no manipulation of the bowel leading to minimal paralytic ileus and possibly a shorter hospital stay. The complication and conversion rate of transperitoneal approach is similar to the retroperitoneal approach[15-17]. We selected transperitoneal route because there was not sufficient space to place the hand port for the retroperitoneal approach. Because laparoscopic nephroureterectomy has been developed and used in our institution for only one year, we do not have access to the kind of data that would allow us to make a long-term-comparison between the two groups. Additional follow-up is necessary to confirm the long-term role of laparoscopic nephroureterectomy for the treatment of upper urinary tract tumor.

In conclusion, we have found hand-assisted laparoscopic nephroureterectomy to be a safe, efficacious, reproducible technique for treating patients with malignant urinary collecting tumors. Because it is minimally invasive, and it is significantly better than open surgery in reducing blood loss, parenteral analgesic use and post operative hospitalization, we believe that this procedure can be considered a viable alternative for managing upper urinary tract tumor and that it will be widespread acceptance in the near future.

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手洞輔助之腹腔鏡手術施行 腎臟輸尿管全切除與傳統手術的比較

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我們報告本科以手洞輔助之腹腔鏡手術施行腎臟輸尿管全切除的初步經驗，並和傳統開刀方式做比較。從2000年12月起至2001年9月止，有10位上段尿路惡性腫瘤的病人以此方式完成腎臟輸尿管全切除。除了一位病人因腎靜脈出血而必須改為傳統手術之外，我們將其餘9位病人和過去二年中接受傳統手術的35位病人做個統計。比較的項目包括人口統計學上、手術過程中及手術後的一些重要參數。這兩組在年

齡、身高體重指數、手術時間及術後恢復進食時間均沒有明顯差異。然而在失血量、止痛劑的用量及手術後的住院天數，接受腹腔鏡的病人明顯比傳統手術要少很多，因此我們認為手洞輔助之腹腔鏡腎臟輸尿管全切除手術是一種安全、有效的手術方式，正因為它有著侵入性較傳統手術少的優點，我們相信對於治療腎臟或輸尿管惡性腫瘤，它將成爲一種可以代替傳統手術的方式。

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