Comparison of Postoperative Analgesic Requirements in Living Donors and Patients Undergoing Similar Surgical Procedures

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ABSTRACT

Background. More factors affect pain perception of donors than patients. We prospectively evaluated postoperative pain intensity and analgesic requirements in living kidney donors and patients with renal cell carcinoma undergoing laparoscopic nephrectomy with similar surgical procedures.

Material and Methods. The study included 30 living kidney donors and 30 patients with renal cell carcinoma undergoing laparoscopic nephrectomy from March 2013 to August 2014. All of the participants underwent similar surgical procedures under general anesthesia. Data including participants' demographics, surgical data, postoperative analgesic requirements, visual analog scale scores at rest and during coughing at postoperative 0.5, 2, 4, 8, 12, 24, and 48 hours, side effects, and overall satisfaction degree were compared between the 2 groups.

Results. Time to the first tramadol request was significantly shorter in the donors. The donors received more intravenous doses of tramadol than the patients. Visual analog scale scores at 2 and 4 hours at rest and at 2, 4, and 8 hours during coughing after extubation were significantly higher in the donors. There were no significant differences between the groups according to the number of participants given pethidine, time to pethidine rescue, and adverse effects. The overall satisfaction degree was comparable between the 2 groups.

Conclusions. There were significant differences with respect to postoperative pain intensity and analgesic requirements in living kidney donors and patients undergoing retroperitoneal laparoscopic nephrectomy with similar surgical procedures.

SUCCESSFUL transplantations improve both the lifespan and life quality of patients with end-stage kidney disease. Renal grafts from living donors provide better chances of survival than cadaveric grafts and can relieve the graft shortage to some extent. A choice of an appropriate surgical technique and adequate pain relief during and after living donor nephrectomy are likely to make the procedure more appealing to kidney donors [1]. Laparoscopic living donor nephrectomy, which is now the preferred method and gold standard operation for kidney donation, reduces postoperative pain and morphine consumption [2]. Nonetheless, some patients undergoing laparoscopic living donor nephrectomy still suffer significant postoperative pain, to the point where opioids are necessary. In our country, most urologists perform laparoscopic nephrectomies through a retroperitoneal approach different from a transperitoneal laparoscopic approach, which is widely used and reported in other countries [3]. More factors affect donors' pain perception than patients' in certain social environments and cultural backgrounds. Thus, we need to reassess postoperative pain management for this unique donor population.

In this prospective clinical trial, we tested the hypothesis that living renal donors and patients undergoing retroperitoneal laparoscopic nephrectomy had different postoperative pain experiences and analgesic requirements.

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Table 1. Demographic Data and Surgical Characteristics of Patients and Donors

	Group D	Group P	*P*
Left/right nephrectomy (n)	25/5	21/9	.329
M/F (n)	13/17	14/16	.795
Age (y)	48.6 ± 9.6	45.7 ± 11.4	.290
Weight (kg)	60.4 ± 5.2	62.3 ± 4.4	.132
Duration of surgery (min)	106.7 ± 24.1	112.9 ± 22.2	.304
Duration of anesthesia (min)	142.7 ± 36.4	145.9 ± 45.3	.764
Intraoperative blood loss (mL)	132.5 ± 45.2	144.3 ± 36.6	.271
Intraoperative fluid administration (mL)*	1072.7 ± 243.6	2122.9 ± 614.3	<.005
Intraoperative urinary output (mL)*	323.3 ± 56.6	1012.1 ± 263.7	<.005

Note. Values are presented as mean ± SD and no. of patients (%).
Abbreviations: M, male; F, female.
*$P < .05$ compared with the counterpart of the Group P.

MATERIALS AND METHODS

After approval of the institutional Ethics Committee and written informed consent from the participants, this study enrolled 30 kidney donors (Group D) and 30 patients (Group P) with renal cell carcinoma staged II or below. All participants underwent retroperitoneal laparoscopic nephrectomy with similar surgical procedures. Donors and patients with histories of substance abuse and mental illness, who have allergic reactions to study drugs, with liver or renal dysfunctions, and American Society of Anesthesiologists (ASA) physical status III or above were excluded from the study. Donors or patients in whom the laparoscopic procedure had to be converted to open nephrectomy were not included in this study for further assessment.

Routine monitoring (electrocardiogram, noninvasive blood pressure, and pulse oxymeter) was performed for participants taken to the operation theater without premedication. With a 16-gauge intravenous canula sited, all participants received total intravenous anesthesia and mechanical ventilation. Anesthesia induction was performed with 2 $mg \cdot kg^{-1}$ propofol, 3 $\mu g \cdot kg^{-1}$ fentanyl, and 0.15 $mg \cdot kg^{-1}$ cisatracurium. Anesthesia was maintained with continuous infusions of propofol and remifentanil at the rates of 6 to 8 $mg \cdot kg^{-1} \cdot h^{-1}$ and 0.012 $mg \cdot kg^{-1} \cdot h^{-1}$, respectively; cisatracurium was administrated intermittently as needed. Lactated Ringer's solution was given at the rate of 8 $mL \cdot kg^{-1} \cdot h^{-1}$ in Group P and 16 $mL \cdot kg^{-1} \cdot h^{-1}$ in Group D. Furosemide 40 mg in 100 mL normal saline was administrated intravenously for 20 minutes just before the clamping of the renal artery. Pneumoperitoneum was established by CO_2 insufflation with limiting pressure from 12 to 14 mm Hg. Thirty minutes before the approximated end of surgery, the participants received intravenous 100 $\mu g \cdot kg^{-1}$ ondansetron and intravenous 3 mg morphine in both groups. All of the participants were extubated on meeting the standard criteria for extubation in the operating theater and shifted to the postanesthesia care unit.

An independent anesthesia registrar who was unaware of the grouping situation recorded pain intensity evaluated by a linear 10-cm visual analog scale (VAS; 0, no pain; 10, worst imaginable pain). Pain assessment was done at rest (supine) and during coughing at 0.5, 2, 4, 8, 12, 24, and 48 hours after extubation of the participants. In addition, the overall satisfaction degree was also measured at the end of the study. The overall satisfaction degree was divided as follows: poor, moderate, good, and excellent.

The first rescue analgesia (intravenous injection of tramadol 1.5 $mg \cdot kg^{-1}$) was given if the VAS score was more than 4. If the pain persisted even after 30 minutes of intravenous tramadol administration, a single dose of intramuscular pethidine 1 $mg \cdot kg^{-1}$ was given (the second rescue analgesic agent). No other mode of analgesia was used in this study, except for 3 mg morphine administered 30 minutes before the end of surgery, postoperative tramadol, and pethidine. The time from extubation of the participant to administration of the first dose of rescue analgesic was recorded. The number of participants to whom tramadol or/and pethidine was administrated during the postoperative period was noted. Side effects were specifically observed and recorded for a total period of 48 hours, including nausea, vomiting, hypotension, bradycardia, allergic reactions, drowsiness, paresthesia, and respiratory depression.

The incidence of adverse effects was evaluated with "yes" or "no". Nausea was defined as a subjective unpleasant sensation associated with the awareness of the urge to vomit. Vomiting was defined as the forceful expulsion of liquid gastric contents.

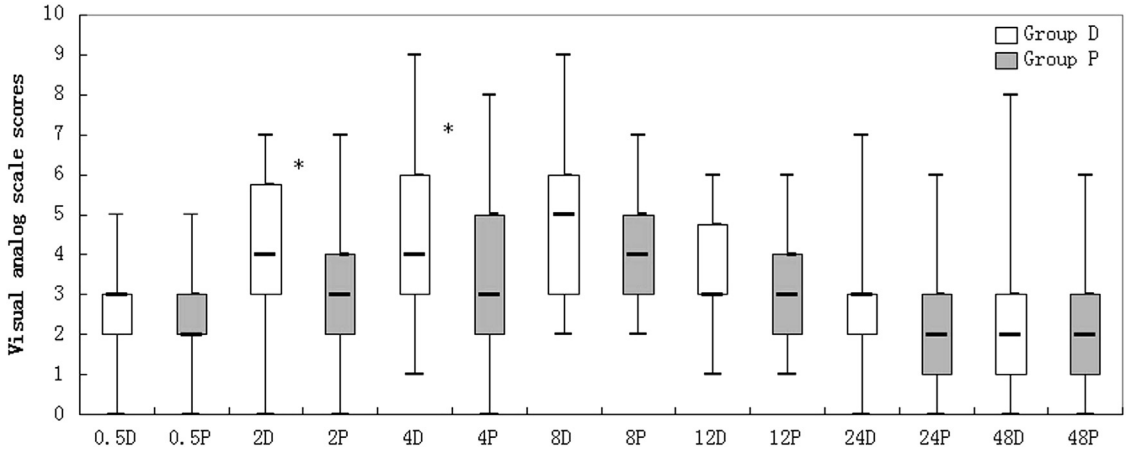

Fig 1. VAS scores at rest at various time points (in hours) postoperatively. Box plots of postoperative VAS scores at rest and during coughing. Results are expressed in median. The top and bottom of each box indicate 75th and 25th percentiles and the error bars 10th and 90th percentiles. *$P < .05$ compared with the counterpart of Group P.