



Outcomes of Laparoscopic Radical Nephrectomy and Factors Predicting Successful Outcomes

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ABSTRACT

Purpose: For renal malignancies, laparoscopic radical nephrectomy is the current standard of care. However, we have observed that a radical nephrectomy is often more challenging than expected even in the most experienced hands. Here, we assess the outcomes that determine a successful radical nephrectomy. **Methods:** In this retrospective analysis of a prospectively maintained database, between January 2019 and July 2022, patients who had laparoscopic radical nephrectomy were assessed. Total surgical time, intra-operative blood loss postoperative complications, and length of hospital stay were analyzed. **Results:** Analysis was done on 106 patients. The mean age was 55.33 years \pm 12.17 years. Mean operative time 166.79 mins \pm 40.11 mins, Blood loss of more than 400 ml was seen in 2 patients (1.8%) and twenty-seven patients required blood transfusions (25%). **Conclusion:** The term “Simple nephrectomy” is perhaps a misnomer. In a centre of excellence in laparoscopic surgery such as ours, these simple nephrectomies carry longer operative times, comparable rates of surgical complications, and similar hospital stays. Our findings suggest that pre-procedure planning to determine who would benefit most from it is essential while factors such as stone disease or pre-procedure DJ stenting/PCN would perhaps make the procedure more challenging.

Keywords: Complications, Radical nephrectomy, Simple nephrectomy, Terminology

INTRODUCTION

Nephrectomy is a common intervention in urology practice. “Simple Nephrectomy” (SN), purely by definition, involves kidney removal within the Gerota’s fascia without removing the adrenal or surrounding lymph nodes. Common indications include benign renal conditions associated with inflammation and infection.

As literature suggests, “Radical Nephrectomy” (RN) involves the completely excising the kidney, the ipsilateral Gerota’s fascia and adrenal gland (when indicated) [1]. Laparoscopic Simple Nephrectomy (LSN) is now the procedure of choice when surgically managing benign renal diseases that merit kidney removal. Approaches described for laparoscopic simple nephrectomy include the trans-peritoneal, retroperitoneal, and hand-assisted procedures. Traditionalists have stated that laparoscopy may not be the first choice in inflammatory conditions like tuberculosis, Xantho Granulomatous Pyelonephritis (XGPN) and pyonephrosis. Laparoscopic simple nephrectomy may also become more challenging in patients with severe

vertebral deformities and in those with renal anomalies, such as crossed fused ectopia.

The appropriate use of terms is essential when communicating with patients and their relatives. The word "simple" is defined as "easy," "not complicated," "readily understood or performed," and "presenting minimal or no difficulty" in the majority of English dictionaries [2]. According to these definitions, a "simple nephrectomy" is a less challenging procedure when compared with its more radical counterpart. However, simple nephrectomies may provide a challenge in that, these procedures usually pose difficulties with regards to significant inflammation, fibrosis, and may have an infectious component too. This, almost always makes surgical dissection more difficult. In such scenarios, the complication rates of LSN's are known to be greater than those in whom nephrectomy are performed for renal tumours [3]. In clinical practice, we, more often than not, encounter challenging SN's. Assessing and anticipating the possibility of surgical problems can help in appropriately terming procedures.

Literature on the preoperative factors which predict intraoperative difficulty during a laparoscopic "simple" nephrectomy is scarce. In this study, we aimed to compare the various factors and postoperative outcomes between LSN and Laparoscopic Radical Nephrectomy (LRN) and, to also the identify factors that predict adverse outcomes in the laparoscopic simple nephrectomy. We hereby tried to find out if "simple nephrectomy" is actually "simple to perform".

METHODS

In this retrospective analysis of a prospectively maintained database, we analysed the records those who underwent LRN by the intraperitoneal approach, between January 2019 and July 2022 at our institute. An institutional ethical committee clearance was obtained. Patients whose medical records were not complete, patients with T3 or higher tumour stage, donor or partial nephrectomies, patients with bleeding disorders or on anti-platelet therapy and a past history of renal surgery to the same kidney were excluded. Lymphadenectomy was not routinely performed.

Demographic details of the patient, Operative Time (OT), blood loss, conversion to an open procedure, need for blood transfusions, Length of Hospital stay (LOH) and postoperative complications, were analysed. Operative time was measured from the first skin incision to the final skin closure. The amount of blood loss was taken from the intra-operative procedure record of the patient. The entire number of days from the day of surgery until discharge was used to define postoperative LOH. Statistical Package for Social Science (SPSS) v22.0 (IBM) was used for statistical analysis.

RESULTS

Analysis was done in a total of 106 patients. Mean age of the patients was 55.33 years \pm 12.17 years, (Table 1).

Table 1 Demographic details

	Radical Nephrectomy Mean \pm SD
Age	55.33 \pm 12.17
Male	79 (75%)
Female	27 (25%)
Total	106

The mean operative time was 166.79 min \pm 40.11 min. Blood loss of more than 400 ml was observed in 2 patients (1.8%) (Table 2). Blood transfusion was required 27 patients (25%) (Table 3). Intraoperative complications (bleeding from the Adrenal vein; Injury to left renal artery arising from aorta due to abnormal course; diffuse unidentified; diaphragm injury; extensive adhesions to the IVC; dense adhesions to liver) were seen in 6 patients (6%) (Table 4). Mean Length of hospital stay was 5.77 days \pm 1.56 days.

Table 2 Intraoperative Outcomes

	Radical Nephrectomy Mean \pm SD
Operative Time	166.79 \pm 40.11
Blood Loss	177.02 \pm 84.78
Hospital Length Stay	5.77 \pm 1.56
Blood Transfusion	27 (25%)

Table 3 Intra-operative complications

	Radical Nephrectomy
Yes	6 (6%)
No	100 (94%)
Total	106

Table 4 Post-operative complications

	Radical Nephrectomy
I	75 (71%)
II	31 (29%)
III	0
Total	106

DISCUSSION

Simple nephrectomies are mostly indicated in non-functioning or poorly functioning kidneys secondary to stones, infection or obstruction. Repeated bouts of infection and inflammation of a kidney leads to scarring and fibrosis, making surgery more challenging due adhesions. Typically, difficulties might arise from adhesions at the renal hilum caused by fibrosis, bulky adenopathy's, and fat infiltration. This makes the surgery more challenging. Justification is based on the intimate relationship between the right side's inferior vena cava and renal hilum [4]. This study also reported three cases of Vena caval injury during surgery for stone disease.

In this study, we analysed intra-operative and post-operative variables of laparoscopic RN. As corroborated in literature, the patients' mean age was 55.33 years \pm 12.17 years, indicating that malignancy is more common in older ages. The mean operative time and blood loss (166.79 mins \pm 40.11 mins and 177.02 ml \pm 84.78 ml) The need for blood transfusions were seen in 27 patients (25%), while postoperative complications were seen 29% of the patients.

Patients with fat stranding on their computerised tomography scans, were observed to have had a longer operative time than those who did not, suggesting that the presence of inflammation makes surgery more challenging.

In a study by Raman *et al.* summarizing physician responses with regards to open/laparoscopic simple and radical nephrectomies, it was seen that simple nephrectomies have similar complication rates and hospital stays when compared with radical nephrectomies [5]. They also suggested that the term simple nephrectomy is a misnomer and instead the term "nonradical nephrectomy" should be used. The British Association of Urological Surgeons (BAUS) database, suggested that a simple nephrectomy had significantly higher Lap to open conversion (5.9% vs. 3.3%, P=0.003), transfusion, (4.8% vs. 2.8%, P=0.01), Intraoperative (5.2% vs. 3.7%, P=0.09) and postoperative (11.9% vs. 10.0%, P=0.17) complications rates [6]. Hence, the suggestion- "a simple nephrectomy, in reality, could be more complicated than a radical nephrectomy. So, they proposed calling it a "Benign" nephrectomy. Tepeler *et al.* found higher complication rates in the stone group, when compared with patients undergoing a retroperitoneoscopic nephrectomy for other benign diseases [7].

Higher open conversion rates were observed in the laparoscopic SN group (6.7% vs. 4.9%), in a study by Hsiao and Pattaras [8]. This suggests that there is a considerable amount of difficulty associated with this procedure. Manohar *et al.* reported that a kidney size of 10 cm and its association with hilar lymphadenopathy resulted in a higher complication rate [9]. According to Duarte *et al.* inflammation that included the renal hilum or extended beyond the Gerota fascia was the primary factor in the decision to switch from laparoscopic or open surgery to hand-assisted laparoscopy [10].

These studies suggest that a simple nephrectomy can be as or more challenging/complicated than a radical nephrectomy. However, there are studies in literature that also refute this. A study by Conolly *et al.* noted that an SN is as the term suggests "simpler than a RN" and suggested that the term "simple" is accurate [11].

Olcucuoglu found that the complication rate was more in laparoscopic radical nephrectomies as compared to its simple counterpart [12]. Both of these studies did not mention the stage of the tumour in the radical nephrectomy group, and hence we would assume that all tumour stages were included. As the involvement of the renal vein, other organs, and vena cava may make surgery more difficult and complex, we did not include patients with higher T stages. By using precise inclusion criteria to compare SN and RN, we were able to standardize the intraoperative and postoperative conditions. Permpongkosol *et al.*, in their study group, reported a lesser complication rate in the LSN group (15%) when compared

with the LRN group (20%) [13].

Studies have also suggested nephrectomy to be performed outside Gerota's fascia for benign renal diseases, as a way to dissect the renal hilum in a plane furthest from where the maximum inflammation may have occurred [14]. These findings added to our result, suggest that a "simple nephrectomy" may not be the appropriate term for this surgical procedure and may have implications for both the treating physician and the patient [15]. The first line of care is given by the primary care physicians, and they are the ones who talk about the disease, the treatment protocols and the length of hospital stay to the patient. The usage of appropriate terminology will make this conversation less challenging while counselling the patient and the attenders. Hence, we believe that term simple may not be the correct term and this must be addressed worldwide. Our study had a few limitations, primarily, this being a retrospective single institution study. It is a major referral centre and so the probability operating on a higher level of difficulty in SN and could have led to bias. Lastly the sample size may need to be bigger in order to emphasize the change in proposed terminology.

CONCLUSION

The right use of language is crucial for effective communication. "Simple nephrectomy" may not accurately describe the surgery itself. These "benign nephrectomies" carry similar rates of surgical complications and perioperative challenges when compared to malignant nephrectomies. Therefore, it is necessary to change how the word "simple" nephrectomy is currently used. It could be more appropriate to use terms like "non-radical nephrectomy," "benign nephrectomy," or "nephrectomy for benign disease."

Our findings suggest that the presence of stone disease, pre-procedure DJ stenting/PCN placement and perinephric stranding due to inflammation are the most likely to predict intraoperative difficulty during laparoscopic simple nephrectomy.

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