Original Article

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Surgery Section

Evaluation of Outcomes between the Right and Left-Sided Transperitoneal Laparoscopic Adrenalectomy in a Tertiary Care Center: A Retrospective Study

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ABSTRACT

Introduction: Several studies have corroborated the feasibility and safety of Transperitoneal Laparoscopic Adrenalectomy (TLA) for the removal of adrenal tumours however, there is very limited clinical evidence comparing right and left TLAs. This comparison enables surgeons in preoperative counseling of patients regarding postoperative outcomes.

Aim: To evaluate the outcomes between the right and left-sided laparoscopic adrenalectomy in patients admitted to a tertiary care centre.

Materials and Methods: The present retrospective study considered data from patients, who underwent TLA between December 2013-December 2019 admitted to the Vydehi Institute of Medical Sciences and Research Centre, based in Bengaluru, India. All the selected subjects with adrenal tumours were operated on by a single surgeon through a standardised transperitoneal laparoscopic approach for right and left-side adrenalectomies. The data collected were age, gender, symptoms, size of the tumour, duration of surgery, intraoperative blood loss, complications, duration of stay and histopathology of tumours. Both sides were compared for age, gender, size of tumour, operative time, blood loss, duration of hospital stay, histopathological diagnosis, benign and malignant lesions. The Student's t-test was used for the evaluation of continuous data and the Chi-square test and Fisher's-exact test for categorical variables.

Results: The study considered the data of 42 patients. The corresponding number of subjects who had undergone right and left adrenalectomies for various adrenal pathologies were 18 (42.85%, 9 each of both genders) and 24 (17 males, 7 females). The mean age for right-sided adrenalectomy was 44.17 and the left-side was 46.83. The mean tumour size (in cm) was significantly larger in the right-side group as opposed to the left-side (7.97±2.77 vs 5.62±2.38, p-value <0.01). The duration of surgery (136.22±25.53 vs112.92±27.21 min, p-value <0.01) and average intraoperative blood loss were also more in the right-side group (431.67±259.73 vs 277.08±193.92 mL, p-value=0.02). There was no significant difference in the mean duration of hospital stay between the groups (3.94±1.06 vs 3.71±1.16, p=0.25). The most common tumour was adenoma in both groups. No major complications were noted in either group.

Conclusion: Outcomes were comparable between right and left-side adrenalectomies. However, longer mean operative time and larger tumour size were noted for right-side laparoscopic adrenalectomy.

Keywords: Adenoma, Adrenal, Intraoperative blood loss, Laparoscopy

INTRODUCTION

Laparoscopic adrenalectomy, first described by Gagner M et al., is considered as the gold standard for removing adrenal lesions (≤6 cm), except for large or malignant tumours with suspected infiltration [1]. Literature has corroborated the advantages of the technique over open intervention such as reduced perioperative morbidity, operative blood loss, and postoperative pain, lower complication rates, shorter hospital stay, and speedy recovery [2-3]. Significantly higher success rates have been reported for laparoscopic transperitoneal and retroperitoneal approaches for managing various adrenal pathologies. The evolution of laparoscopic techniques and increased experience have contributed to this higher success rate. The procedure is comparable to the open surgical approach with dissection of the adrenal and early identification and control of the adrenal vein [4].

Right-sided adrenalectomy is speculated to be more challenging because of the anatomical differences such as the position of the adrenal vein with regards to the Inferior Vena Cava (IVC) and retrocaval location of the right adrenal gland [5]. However, there are very limited studies comparing the results of right and left TLAs [5,6]. Certain researchers have pointed out that since the right-sided procedure is more challenging the anterior approach is not justifiable [5]. Literature review shows that there is no Indian data investigating the differences in right and left-sided laparoscopic adrenalectomies. The present study has evaluated the differences between the right and left-sided laparoscopic approaches with regard to objective outcomes in Indian patients admitted to a specialty care centre.

MATERIALS AND METHODS

The present retrospective study considered data from patients, who underwent TLA from December 2013 to December 2019, and data analysis was performed in January 2022 at Vydehi institute of Medical Sciences and Research Centre based in Bengaluru, India. Case records of all the patients were reviewed and the data collected were age, gender, size of the tumour, side of surgery i.e., whether right-sided adrenalectomy or left-sided adrenalectomy, duration of surgery, intraoperative blood loss, complications, duration of stay and histopathology of tumours.

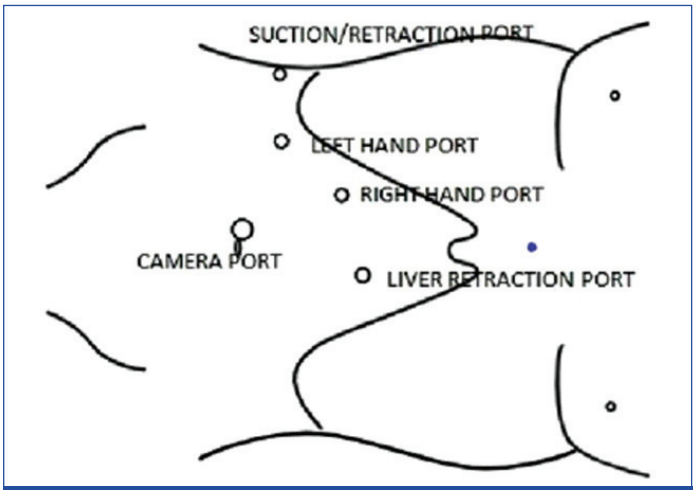
Inclusion criteria: Patients with adrenal tumours who were operated by a single surgeon through a standardised transperitoneal laparoscopic approach were included in the study.

Exclusion criteria: Patients who underwent open surgery were excluded from the study.

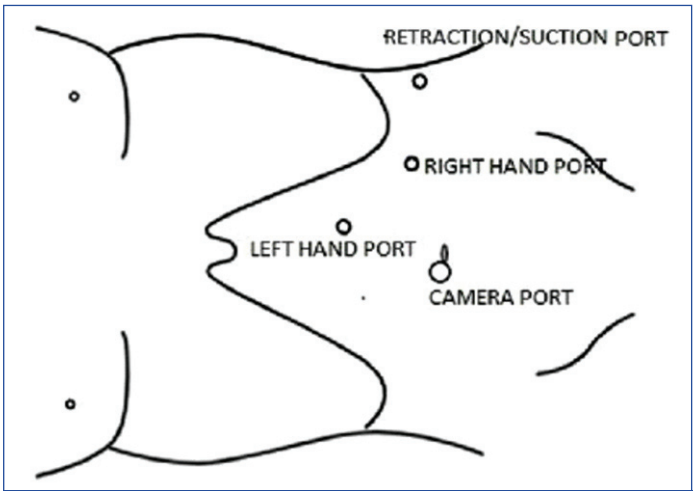
Study Procedure

The selected subjects were adequately prepared for the surgery and were operated under general anaesthesia. The patients were placed in a lateral position with the affected side-up and a slight 20° tilt was provided with bolsters and paddings. For right-sided adrenalectomy, five ports were placed as briefed below [Table/Fig-1,2]. A 10 mm port at the level of the umbilicus or just above the umbilicus, at the lateral border of rectus, three (5 mm Subcostal ports) placed at the lateral border of rectus, midclavicular line, and anterior axillary line and another port for liver retraction, placed subcostal to the left of midline. For left-sided adrenalectomy, only 4 ports were placed in the mirror image fashion on the left-side [Table/Fig-3].

[Table/Fig-1]: Port site marking for right laparoscopic adrenalectomy.



[Table/Fig-2]: Right transperitoneal laparoscopic adrenalectomy.



[Table/Fig-3]: Left transperitoneal laparoscopic adrenalectomy.

Right adrenalectomy involves division of the right triangular ligament, liver retraction, mobilisation of the second portion of the duodenum, and division of anterior renal fascia between the upper pole of the kidney and adrenal gland [Table/Fig-4]. Care was taken, not to injure the upper polar renal vessels during this step. The lateral border of IVC was exposed and dissection continued till cephalad. Upon encountering the right adrenal vein, it was divided between 5 mm Hem-o-lock clips. Multiple tiny adrenal arteries were cauterised. Upon separation of the adrenal gland from IVC, lateral and superior dissection was completed by dividing the fatty tissue. The gland was collected in an endo bag and retrieved.

[Table/Fig-4]: Image showing Right adrenal tumour. A- Adrenal tumour.

Left adrenalectomy involved reflection of left colon medially, dissection in the plane between mesocolon and Gerota's fascia, exposure of renal and adrenal vein, and division of adrenal vein between 5 mm Hem-o-lock clips. Medial dissection and inferior dissection were carried out and vessels encountered were divided between clips or cauterised. The gland was dissected and retrieved in an endo bag. The specimen was further extracted by extending the incision through a 5 mm port.

STATISTICAL ANALYSIS

Statistical test was carried out for the comparison of the parameters between right and left-side adrenalectomies namely age, tumour, duration of the procedure, blood loss, duration of hospital stays, and benign and malignant adrenalectomies. The Student's t-test was used for the evaluation of continuous data and the Chi-square test and Fisher's-exact test for categorical variables.

RESULTS

The number of subjects who had undergone right and left adrenalectomies for various adrenal pathologies were 18 and 24, respectively [Table/Fig-5]. The commonest tumour was adrenal adenoma in both the groups followed by pheochromocytoma and myelolipoma.

Histopathology diagnosis	Right adrenalectomy (n=18) n (%)	Left adrenalectomy (n=24) n (%)
Adenoma	9 (50.0)	13 (54.17)
Pheochromocytoma	3 (16.67)	3 (12.5)
Myelolipoma	2 (11.11)	3 (12.5)
Adrenocortical carcinoma	2 (11.11)	2 (8.33)
Adrenal pseudocyst	1 (5.55)	1 (4.17)
Cavernous lymphangioma	1 (5.55)	0
Metastasis	0	2 (8.33)

[Table/Fig-5]: Indication for surgery (N=42).

The benign and malignant tumours managed by right and left techniques were 16 and 2, 20 and 4, respectively. The difference was not statistically significant p=0.4852 [Table/Fig-6]. Operative time (minute) was significantly longer in the right-side group (136.22±25.53 vs 112.92±27.21, <0.01).

Adrenalectomy	Benign (n=36)	Malignant (n=6)	p-value
Right	16 (44.44%)	2 (33.33%)	0.4852$
Left	20 (55.56%)	4 (66.67%)	

[Table/Fig-6]: Benign and malignant tumours managed by adrenalectomy.
$Fisher's-exact test

The mean tumour size (in cm) was significantly larger in the right-side group as opposed to the left-side (7.97±2.77 vs. 5.63±2.38, p<0.01) [Table/Fig-7].

Variables	Right adrenalectomy (n=18)	Left adrenalectomy (n=24)	p-value
Age (in years)	44.17±11.08	46.83±14.99	0.27#
Gender {M(F)}	9 (9)	17 (7)	0.29*
Size (cm)	7.97±2.77	5.63±2.38	<0.01#
Duration of procedure (minute)	136.22±25.53	112.92±27.21	<0.01#
Blood loss (mL)	431.67±259.73	277.08±193.92	0.02#
Duration of hospital stay (days)	3.94±1.06	3.71±1.16	0.25#

[Table/Fig-7]: Comparison of objective outcomes of right and left-side laparoscopic adrenalectomies (N=42).
#Student t-test, *Chi-square test

One patient in both groups had blood loss of >400 mL. In both patients, the diagnosis was adrenocortical carcinoma, and the reason for blood loss was the development of large collateral vessels. No other major intraoperative complications were noted.

DISCUSSION

In recent years, laparoscopic interventions for large adrenal glands have become safe and patient-friendly due to the improved technical skills of the operating surgeon and focused approach. The present study noted larger tumour size and longer operative time for right-side adrenalectomy. However, no significant difference was noticed between the groups with regard to age, intraoperative blood loss, perioperative complications, and duration of stay.

Gunseran KO et al., and Wang Y et al., in their study, have reported right adrenalectomies being more difficult than the surgery on the left [7,8]. In the retrospective review of 163 laparoscopic adrenalectomies (109 on the left and 54 on the right-side) by Rieder JM et al., reported that the average operating time on the left-side was 187 minutes, which was significantly longer (by 31 min) when compared to the right-side which was 156 min [4]. The present study has noted longer operative time for right-side adrenalectomy. This could be due to the larger tumour size on the right-side. A study by Lezoche E et al., observed longer operating times for left adrenalectomy (109 vs 80 min) [9]. However, the difference was not statistically significant. Significantly more operative time was noted on the right-side in the present study, could be due to the larger tumour size on the right-side and the cautious dissection of the right adrenal vein in order to avoid inadvertent injury.

The present study showed that average blood loss was more on right-side and the difference was statistically significant p=0.02. In contrast, Chiang PH et al., found no significant difference in mean blood loss between the right and left-side [5]. The reason could be due to the larger size of the tumour seen in the present study. Similar to the current study findings, a single-centre study involving 272 cases, conducted by Gunseren KO et al., has reported that the risk of blood loss is higher on the right-side during the learning period of laparoscopic adrenalectomy [7]. Hence, extra caution and preoperative planning are warranted on the right-side even for experience surgeons, especially while operating pheochromocytoma, metastatic tumours and masses >5 cm in size [7]. A recent systematic review and meta-analysis by Wang Y et al., has corroborated that right laparoscopic adrenalectomy was associated with increased bleeding risk (weighted mean difference 13.82 mL, p=0.007) and higher conversion rate Odds Ratio (OR)=3.45, 95% p=0.03 [8]. No significant difference between the groups was noted with regard to the duration of hospital stay. A similar result was observed by Rieder JM et al., Chiang PH et al,. Kokorak L et al. These studies also noted no significant difference between the right and left-side adrenalectomies in terms of occurrence of serious intraoperative complications, operating time, and postoperative outcome [4-6].

There were two malignant lesions on right (two ACC) and four on left (two ACC and two isolated metastatic lesions each due to carcinoma of the breast and colon). However, the occurrence of malignant lesions in both approaches was not statistically significant p=0.4852. Chiang PH et al., have concluded that experienced laparoscopic surgeons can confidently adopt either of these approaches depending on their choice [10]. The present study holds significant relevance, as there is no Indian data comparing right and left-side adrenalectomies. Moreover, considering all cases operated by a single surgeon helped to avoid skill-based bias.

Limitation(s)

The major drawbacks of the study were smaller sample size, single centre design, and retrospective nature. The study did not compare the rates of open adrenalectomy conducted at the centre during the same time period, as the primary focus was to address the perceived difference in right and left laparoscopic approaches.

CONCLUSION(S)

In conclusion, comparatively similar objective outcomes were noted for both right and left-side adrenalectomies. However, the mean operative time was found to be more for right-side laparoscopic adrenalectomy. Further corroboration of the present study findings through Large, randomised, multicentric trials are warranted to develop a clear consensus on the right and left laparoscopic adrenalectomies.

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