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ORIGINAL ARTICLE

Technical modification of retroperitoneal laparoscopic adrenalectomy for primary hyperaldosteronism and clinical outcomes

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Summary *Background/Objective:* Standard laparoscopic adrenalectomy requires early control of the main adrenal vein; however, the small retroperitoneal working space is challenging for beginners to perform this maneuver. We report a technical modification of retroperitoneal laparoscopic adrenalectomy (RLA) for primary hyperaldosteronism (PHA) and the clinical outcomes.
Methods: A total of 38 RLAs were performed for the patients with PHA. The patients were placed in true lateral position with mild bending to expand the surgical field. Instead of attempting to control the main adrenal vein initially, we adopted a technical modification that manipulating and freeing the gland first before controlling the main adrenal vein.
Results: The RLAs were successfully performed in all but one case, which was converted to open surgery due to pancreatic injury. Mean operative time was 124 minutes and estimated blood loss was 74 ml. Mean maximal fluctuation of systolic blood pressure was 29 mmHg. For the right-side RLA, less operative time (113.5 vs. 137.9 minutes) and estimated blood loss (59.5 vs. 91.2 ml) were noted compared with the left-side procedure. Postoperative complications included cerebrovascular accident in one patient, one surgical site hematoma, and two patients had postoperative fever. Potassium level returned to normal in all patients and 70% of the patients reduced their antihypertensives.

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Conclusion: Technical modification RLA for PHA without initial control of the main adrenal vein is a safe and feasible procedure. No vigorous blood pressure fluctuation was intraoperatively noted. No vascular injury occurred. Moreover, the right-side procedure became easier.

1. Introduction

The first laparoscopic adrenalectomy (LA) was reported by Gagner et al [1] in 1992 for Cushing syndrome and pheochromocytoma. Since then, issues regarding the safety, feasibility, and efficacy of LA have been reported and confirmed in several series compared with open adrenalectomy.[2] In addition, LA is more preferable than open adrenalectomy because of less pain, more rapid recovery, less morbidity, and superior cosmesis.[3] With the world-wide acceptation and maturity of this technique, LA has been the standard care for benign adrenal tumors.

Recent studies in hypertensive populations have demonstrated a high prevalence of primary hyperaldosteronism (PHA) around 5%—15%.[4] Once computed tomography shows an adrenal nodule simultaneously, the aldosteronoma should be considered the cause of PHA. This disease is surgically correctable and adrenalectomy is the treatment of choice. Accumulating data regarding LA for PHA shows comparable results with the open adrenalectomy on the postoperative improvement on the potassium level and hypertension control.[5]

Retroperitoneal laparoscopic adrenalectomy (RLA) is preferred by some urologists with the advantages of avoidance of bowel manipulation, direct access to the adrenal gland, and more rapid convalescence. However, a smaller working space, poor surgical landmarks, and a steeper learning curve are concerns with the procedure.[6] Previously reported LAs have been performed with early ligation of the adrenal vein.[7] The main reason for early vascular control in LA is to prevent the fluctuation of blood pressure; this is especially true in patients with pheochromocytoma. However, beginners may fail to approach the vessels initially due to the obscure anatomy. Herein, we report our experience of a technical modification on RLA and the clinical outcomes in patients with PHA.

2. Materials and methods

A total of 38 patients with PHA were recruited and underwent RLA at our institution. We retrospectively reviewed their medical records. Hypertension with or without limb weakness was found in the initial clinic visit for all patients. The diagnosis was confirmed by elevated serum aldosterone and decreased plasma renin activity. All patients had image studies such as computed tomography or magnetic resonance imaging performed to indicate the existence of an adrenal tumor.

2.1. Surgical procedures

Under satisfactory general anesthesia, the patients were put in a true lateral position with mild bending. An incision of 1.5 cm was made on the midaxillary line three fingers' breadth above the iliac crest. After opening the dorsal-lumbar fascia, finger dissection was employed to create the retroperitoneal space according to a previous report.[8] A 0-degree telescope was introduced and the other two ports were set on the anterior and posterior axillary line at the level of 1 fingerbreadth cephalad to the first port. Using the telescope, blunt dissection proceeded between Gerota fascia and psoas muscle with care. Gerota fascia was then opened at the level around the midpole of the kidney. Different from the traditional LA, we did not intend to control the adrenal vessels at the beginning of the procedure since the pedicle is not easy to approach for the beginners. Dissection was performed along the psoas muscle to the level of diaphragm. Adrenal gland could be identified after the dissection proceeded medially. The upmost portion of the adrenal gland was dissected and the superior adrenal vessels were carefully controlled with Endoclip (Autosuture, USSC, Norwalk, CT, USA). The adrenal gland was dissected away from the peritoneum with care. A 30-degree telescope was then introduced and the dissection proceeded along the junction of kidney and adrenal gland. The adrenal gland was mobilized from the adjacent tissue except for the medial portion and could have been retracted for further dissection. For the right side (Fig. 1), the dissection was carried on carefully along the inferior vena cava. The right adrenal vein was identified and clipped with Endoclip. For the left side (Fig. 2), the dissection was undertaken along the medial side of the kidney to the left renal vein. The left adrenal vein was identified and clipped. The principle of dissection remained the same if minor anatomic variation was encountered. The specimen was put in a self-made bag (made by a surgical glove) and extracted. The bleeders were checked meticulously under the pneumo-retroperitoneum pressure of 5 mmHg.

During the operation, blood pressure was recorded from arterial line every 15 minutes and additional recording was performed when necessary. Blood pressures including pre- and postoperative systolic blood pressure (SBP) and diastolic blood pressure were collected. The maximal intraoperative fluctuation of blood pressure was defined as the difference between the highest SBP and lowest measurements during the operation. The upward and downward fluctuation of the SBP was also recorded compared with the baseline SBP taken at ward. The perioperative parameters of complications and functional outcomes were evaluated and analyzed. The pre and postperative biochemical parameters, including potassium level, serum aldosterone, and plasma renin activity, were collected and compared. The perioperative parameters were collected and compared between left and right RLA. A two-sample t-test was used for the comparisons, and $p < 0.05$ was considered to be statistically significant.