

## Short Communication



# Posterior Retroperitoneoscopic Adrenalectomy in a Renal Agenesis Patient

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No potential conflict of interest relevant to this article was reported.

## ABSTRACT

Nowadays, laparoscopic adrenalectomy has been the gold standard treatment for benign surgical adrenal disease. Traditionally, the transperitoneal approach was most widely used for laparoscopic adrenalectomy. Recently, the posterior retroperitoneoscopic adrenalectomy (PRA) was introduced and it showed several benefits over the traditional approach, such as less complications and pain, and a shorter operative time and hospitalization. The number of surgeons capable of performing PRA is steadily increasing world-wide. The initial surgical step in this procedure is the identification and exposure of the upper part of kidney, which is the only visible landmark in the fat-abundant retroperitoneal space. Therefore, PRA in a renal agenesis (RA) patient is challenging for the surgeon due to the absence of surgical landmarks. In this article, we describe our experience of performing a PRA on the RA patient. The patient was a 62-year-old female, who had hypertension for 20 years. Blood examination revealed a high renin-aldosterone ratio, and computed tomography scan and adrenal venous sampling confirmed a 2.4 cm left adrenal aldosterone-producing adenoma. PRA was safely performed using three trochars. The total operation time was 55 minutes, and there were no complications.

**Keywords:** Posterior retroperitoneoscopic adrenalectomy; Renal agenesis; Hyperaldosteronism

## INTRODUCTION

Laparoscopic adrenalectomy has been the gold standard for treatment of benign adrenal tumors since it was introduced by Michael Gagner in 1992 (1). For this minimally invasive surgery, the transperitoneal approach (TA) has been most widely used. However, the less common posterior retroperitoneoscopic approach has various advantages compared to TA, such as less pain, faster recovery, shorter operating time, quick and direct access to the gland, and avoidance of traumatic damage to other intra-peritoneal organs (2-4). Accordingly, in recent years, many surgeons have started posterior retroperitoneoscopic adrenalectomy (PRA) and are increasing the scope of its application (5).

In PRA, exposing and identifying the upper part of the kidney in the retroperitoneal space where the fat layer is thick is an important landmark of the surgery. Performing PRA in

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patients with renal agenesis (RA), where none of the typical landmarks are present, can be a challenging operation for surgeons.

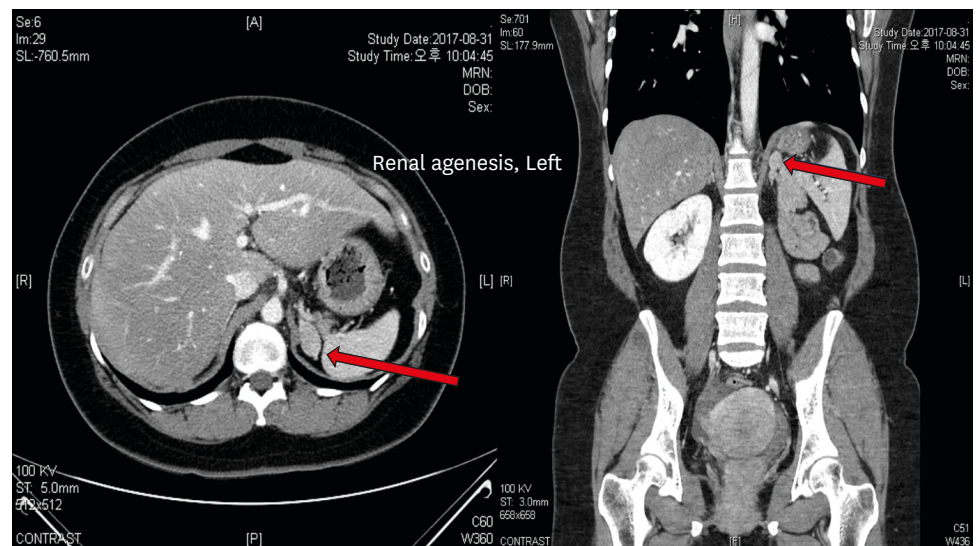
In this study, we report a successful case of PRA in a patient with RA, without surgical problems or postoperative complications.

**CASE REPORT**

A 62-year-old woman was referred to an endocrinologist for hypertension, hypokalemia, and an adrenal mass. The patient was asymptomatic with no evidence of weight gain and edema. The patient was diagnosed with hypertension 20 years prior and was taking Telmisartan 40 mg, hydrochlorothiazide 12.5 mg, and amlodipine 5 mg at the time of visit. Her past medical and family medical history were unremarkable.

Her height was 154 cm, the weight was 64 kg, and the body mass index was 27.03 kg/m<sup>2</sup>. Blood pressure was 160/94 mmHg and pulse rate was 60 bpm. Abdominal examination showed no organomegaly, palpable mass, or bruits. Routine laboratory examination showed nonspecific results except for hypokalemia (2.7 mmol/L). The following studies were done to confirm the clinical impression of primary hyperaldosteronism: plasma renin activity was 0.04 ng/mL/hr, and plasma aldosterone concentration was 36.3 ng/ dL. Through adrenal venous sampling and computed tomography (CT) scan, a left aldosterone-producing adenoma was confirmed (**Fig. 1**), and surgical operation was decided.

In general PRA, the trocar is inserted, and the psoas muscle and ipsilateral renal position are checked. The upper pole of the kidney is then checked, the surrounding fat tissue is peeled off, and the adrenal gland superior is identified and removed. In patients with RA, cannot be located because of the absence of the kidney, therefore the gland tissue is identified by dissecting the adipose tissue layer by layer. The adrenal gland is found using the site as a landmark in a relatively safe direction of the psoas muscle. After locating the gland tissue, the surrounding adipose tissue is removed, and the central vein is revealed.



**Fig. 1.** Preoperative computed tomography scan (red arrow: left adrenal adenoma).

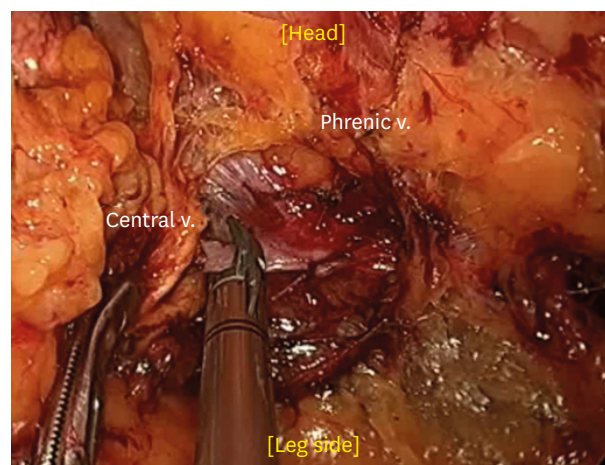
Left PRA was performed using three trochars. After the trochars were inserted, the adrenal gland was identified as the adipose tissue was exfoliated (**Fig. 2**). The specimen was removed after ligation of the central vein originating from the phrenic vein (**Figs. 3 and 4**). No bleeding or other complications occurred during the entire operation, and the total operation time was 55 minutes. Two days after surgery, the patient was discharged without complications, and the outpatient examination showed stable biochemical findings.

### 1. Ethical statement

The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All information in cases were obtained through retrospective literature review, and informed consent was not required as it did not contain information that could identify the patients. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013).



**Fig. 2.** Intraoperative photo showing Lt. adrenal gland. Lt., left.



**Fig. 3.** Intraoperative photo showing venous anatomy. v = vein.

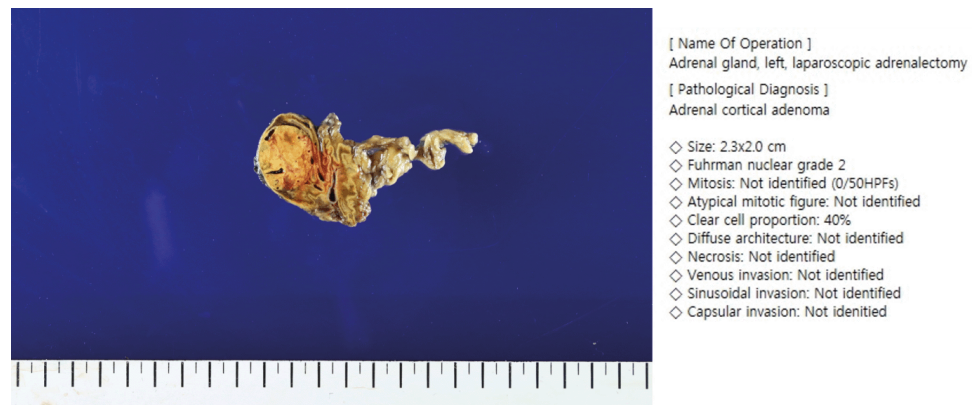


Fig. 4. Pathology results showing the gross findings and final result.

## DISCUSSION

During the fifth week of gestation, the mesoderm of the dorsal body wall gives rise to the primitive nephric structures, namely the pronephros, mesonephros, and metanephros, which later develop into the kidneys (6,7). RA occurs due to the absence of metanephric tissue and failure of the ureteral bud. However, it has also been hypothesized that it occurs as a result of multicystic dysplastic kidney degeneration during gestation (8). The adrenal cortex originates from mesodermal tissue derived from the coelomic epithelium at the lower thoracic level, whereas the adrenal medulla develops from the neural crest cells migrating to the adrenal glands. Venous anomalies concern left subcardinal and intersubcardinal veins, derived from longitudinal connecting channels and becoming the veins of the gonads and of suprarenal glands (9).

RA could be an isolated congenital anomaly or be associated with various chromosomal syndromes such as Potter, Turner, VATER, Mayer-Rokitansky-Küster-Hausler, and Fanconi syndrome (10). It has also been associated with genital malformations in women, such as hypoplastic urinary bladders, ureteric agenesis, müllerian agenesis, uterus didelphys with imperforate vagina, and bicornuate and unicornuate uteri (11,12). In men, it has been frequently associated with the absence or obstruction of the seminal vesicles, vas deferens, and epididymis (13).

Since 1992, when Gagner first introduced laparoscopic adrenalectomy, various studies have supported its feasibility (1,14-16). Compared to open adrenalectomy, laparoscopic adrenalectomy has become the gold standard for the treatment of benign adrenal tumors or small malignant tumors because of its advantages such as less postoperative pain, better cosmesis, and faster postoperative recovery (17). A variety of laparoscopic approaches exist, such as transperitoneal, lateral retroperitoneal, posterior retroperitoneal, and transthoracic approaches (18,19). Among them, TA and PRA are the most common methods, with PRA having the advantage of being able to directly and quickly access the adrenal gland without bowel mobilization despite having a narrower surgical space. In addition, there are advantages such as a shorter operative time, less pain, faster recovery, and avoidance of visceral damage in the abdominal cavity. Our institution has been continuously practicing PRA since 2009, and has recently reported 10-year outcomes in comparison to TA (20).

When performing PRA, the patient is placed in jack-knife position and 3 trochars are inserted below the lower edge of the 12th rib. After the working space is created by CO<sub>2</sub> gas



insufflation, the Gerota's fascia is opened, and the upper end of the ipsilateral kidney is identified to expose the adrenal gland. The retroperitoneal space is rich in adipose tissue, and in order to accurately expose the adrenal glands, it is safe to start dissection with the kidney's upper pole as a landmark. However, in the case of RA, because of the absence of the kidney as a landmark, it is necessary to identify the adrenal gland tissue while exfoliating the adipose tissue layer by layer. After confirming the tissue and location of the adrenal gland, the adrenal vein is checked while assessing the accompanying vascular malformations. According to a series of studies, even when RA is diagnosed on a preoperative CT scan, intraoperative bleeding that may require conversion to open surgery may occur in 5%–10% of cases (21,22). Despite the challenges, the operation in our case was successfully completed without major problems, such as bleeding, and the patient was discharged on the second postoperative day without complications. Understanding the various anomalies that may exist in relation to RA, accurate evaluation before surgery, and a careful surgical approach are important. Hence, if all potential pitfalls are properly taken into consideration, successful PRA in RA is possible without complications.

In conclusion, PRA is a surgical approach that has advantages over TA. PRA may be successfully performed in patients with RA if careful preoperative preparation and surgical dissection are implemented.

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