# Adrenal cysts – optimal laparoscopic treatment

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**Abstract**

***Introduction:*** *Adrenal cysts develop in up to about 0.2% of the overall population. They may account for up to 11% of all pathologies of adrenal glands.*
***Aim:*** *Is laparoscopic resection of adrenal cysts a method for the treatment of these pathologies?*
***Material and methods:*** *In the years 2010–2017, a total of 27 patients underwent surgery due to adrenal cysts; those included 18 (66.7%) women and 9 (33.3%) men aged 29 to 84 years (mean age: 42.7). Cyst diameter ranged from 55 to 130 mm. After exclusion of hormonal hyperactivity, parasitic cysts, or, to the best possible extent, cancer lesions, patients were qualified for adrenal-sparing laparoscopic surgery.*
***Results:*** *All patients were subjected to laparoscopic surgery. Cystic wall resection was performed in 15 (55.6%) patients while adrenalectomy was performed in the remaining 12 (44.4%) patients. The decision regarding the extent of the surgery was made intraoperatively. Histopathological assessment revealed pathological adrenal lesions in as few as 3 (11.1%) patients, with the rest of the study population, i.e. 24 (88.9%), presenting with normal adrenal tissue.*
***Conclusions:*** *Laparoscopic resection of adrenal cysts appears to be recommendable as a method for the treatment of these pathologies. It is simpler than adrenalectomy and associated with low risk of any pathological lesion remaining within the adrenal gland following careful intraoperative assessment by an experienced surgeon.*

***Key words:*** *adrenal cysts, adrenalectomy, laparoscopic adrenalectomy, adrenal cyst resection.*

## Introduction

The incidence of adrenal cysts in the overall population is very low (below 0.2%). In abdominal or thoracic imaging scans performed for various indications, this incidence rises to ca. 5% of patients. Cysts comprise 5.4% to 8.2% of all adrenal pathologies [1–3]. They may accompany hormonal hyperactivity of the adrenal cortex and medulla in about 15% of cases as well as primary or metastatic tumors in about 7% of cases. Parasitic cysts are relatively rare; their incidence is estimated at below 0.5% [4]. The remaining percentage of endothelial cysts, epithelial cysts, pseudocysts and unclassified cysts is autonomous in character. Assuming that nearly 80% of adrenal cysts are not accompanied by hormonal hyperactivity of the adrenal cortex and medulla, adrenal-sparing procedures are attempted, consisting in resection of the cystic wall with conservation of adrenal tissue. Of course, there exist numerous situations in which special care must be taken when qualifying patients for adrenal-sparing surgery. A special population consists of patients with post-hemor-

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rhagic pseudocysts having developed in the course of chromaffin cell tumors, hypercortisolemia, or mixed solid and cystic adrenocortical adenoma [5].

## Aim

According to our research and the resulting fact that most of adrenal cysts constitute autonomic forms, the most appropriate procedure seems to be gland saving cyst excision.

## Material and methods

In the years 2010–2017, a total of 27 patients underwent surgery due to adrenal cysts at the study site. Of these, 18 (66.7%) were women and 9 (33.3%) were men aged 29 to 84 years (mean age: 42.7). Adrenal cysts were diagnosed by accident in 11 (40.7%) patients during an abdominal ultrasonography (US) scan or an abdominal or thoracic computed tomography (CT) scan being performed for other reasons. In the remaining 16 (59.3%) patients, diagnostic examinations, most commonly abdominal US scans, were due to non-specific complaints manifesting as epigastric fullness, postprandial abdominal pain, and enlarged circumference of the abdomen, particularly in lean and young individuals. In 13 cases, the lesions were located within the right adrenal gland as compared to 14 cases in which the lesions were located within the left adrenal gland. The size of the cysts ranged from 55 to 130 mm, with the mean size of 66.7 mm. Hormonal hyperactivity of the adrenal cortex and medulla was ruled out in preoperative diagnostic examinations in all cases. Thus, patients with pseudocysts (post-hemorrhagic cysts) which accompanied chromaffin cell tumors or patients with hormonally active adrenal adenoma were excluded from the study. ELISA or Western blot assays were performed in all cases to rule out the parasitic nature of cysts (unexpected interruption of the parasitic cyst may result in anaphylactic shock). Virtually all patients were preoperatively qualified for adrenal-sparing surgery, with the final decision about resection of the cyst or adrenalectomy, regarding the extent of the surgery, determined by the actual condition observed intraoperatively.

## Results

Laparoscopic cyst resection was performed in 15 (55.6%) patients while adrenalectomy was performed in the remaining 12 (44.4%) patients. In every case, the extent of the surgery was determined in intraoperative assessment by an experienced surgeon. All procedures were performed using the anterolateral transperitoneal approach (we explain the choice of this approach in the Discussion section) with four ports installed beneath the costal arch on the operated site. Patients were positioned so that the operated side was elevated to the angle of at least 45° relative to the horizontal plane. The intraoperative tactics consisted in the best possible separation of the cyst from the adrenal gland tissue. Next, the cyst was punctured and its contents were aspirated. Usually, a total volume of 150 to 600 ml of fluid was aspirated. In 17 cases, the fluid was clear as opposed to being turbid in another 8 cases and hemorrhagic in the remaining 2 cases. Aspiration of the cyst contents markedly improves the view of the surgical field and facilitates better assessment of the adrenal tissue, which usually constitutes a part of the cystic wall. Radial incision of the cystic wall from the apex down to the adrenal margin facilitates even better assessment of the gland itself as well as visualization of adrenal tissue margins. A harmonic scalpel was used to resect the cystic wall at its border with the coating adrenal tissue. In all cases, small fragments of adrenal tissue coating the cyst were also resected from both the cortical and medullary regions (Photo 1). This was of additional importance since it facilitated histopathological assessment of potential adrenal lesions or confirmation of the unremarkable structure of the gland. The adrenal-sparing technique consists in conservation of a properly vascularized adrenal gland.

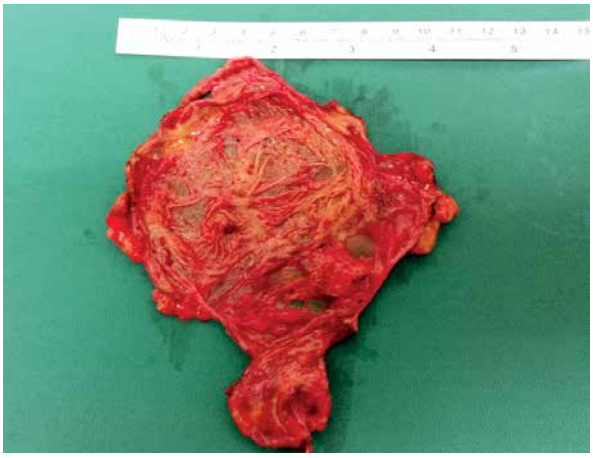

**Photo 1.** Resected wall of adrenal cyst

**Table I.** Types of adrenal cysts and other lesions diagnosed in histological examinations

| Type of cyst | Number | Percent | Other histopathological diagnosis | Number |
|---|---|---|---|---|
| Endothelial cyst | 13 | 48.2 | UAT | X |
| Epithelial cyst | 6 | 22.2 | UAT | X |
| Pseudocyst | 6 | 22.2 | NCH | 2 |
| Non-classified | 1 | 3.7 | AL | 1 |
| Bronchogenic cyst | 1 | 3.7 | CUA | X |
| Overall | 27 | 100.0 | | 3 (11.1%) |

*NCH – nodular cortical hyperplasia, UAT – unremarkable adrenal tissue, AL – atrophic lesions, CUA – cyst along with unremarkable adrenal gland.*

In cases of any contraindications for adrenal-sparing surgery, adrenalectomy is performed; the procedure requires additional clipping and transection of the adrenal vein. The surgery is completed with the removal of the resected cystic wall or the cyst and the adrenal gland in a laparoscopic tissue bag.

Table I lists the different types of cysts and other lesions diagnosed in histopathological examinations. As shown in Table I, structural abnormalities within the adrenal glands were confirmed in the histopathological assessment of as few as 3 (11.1%) specimens (Photo 2). No pathologies were observed in the remaining 9 patients in whom the entire adrenal gland was examined along with the cyst. Bronchogenic cyst had no connection to the adrenal gland; this however could not be determined during the surgery. In the 15 cases involving cyst resection, no pathological lesions were detected upon the assessment of adrenal tissue fragments coating the cystic wall. Unremarkable adrenal tissue was observed in all these cases.

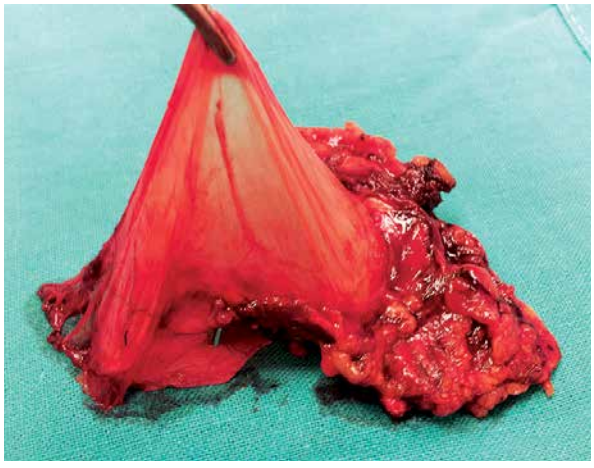

**Photo 2.** Specimen of adrenal cyst within adrenal gland (adrenal nodular hyperplasia)

## Discussion

The incidence of adrenal cysts in the overall population is very low. Reports from larger study populations are quite rare and were generated only at sites where large groups of patients with adrenal pathologies were available over considerable periods of time. One of the largest studies was presented by Chinese authors and encompassed 47 patients who had undergone treatment over a period of 10 years [6]. Most reports published in this area of research pertain to isolated cases or small case series [7, 8]. The larger the studies and the groups of patients with adrenal pathologies, the higher the incidence of adrenal cysts, reaching up to 11% of the overall population [9].

Reports show that about 15% of adrenal cysts are accompanied by hormonal hyperactivity of the adrenal cortex or medulla while ca. 7% of cysts are accompanied by mixed solid and cystic primary or metastatic tumors. Parasitic cysts comprise about 0.5% of lesions [2, 10]. Nearly in 80% of patients adrenal cysts develop as autonomous pathologies. These numbers appear to justify the adrenal-sparing approach restricted to the resection of the cystic wall and conserving as large a part of the gland as possible. Large, symptomatic and growing cysts require surgical treatment while small cysts (< 50 mm) may be treated in a conservative manner [9, 11]. Surgical treatment of adrenal pathologies is achieved by means of laparoscopic or open techniques. Laparoscopy can be classified according to the procedural approach; this includes either an anterolateral transperitoneal or a retroperitoneal approach. Although both methods are used frequently, laparoscopy is considered to be the method of choice due to its unquestionable advantages. All patients in our study material underwent transperitoneal laparoscopic treatment as we believe that this approach provides a better view of the surgical field, particularly for

cysts larger than 10 cm. Advocates of the extraperitoneal method highlight the fact of its being even less invasive upon marsupialization or resection of adrenal cysts. The method is also recommended for bronchogenic cysts located in the vicinity of adrenal glands [12, 13]. Radical treatment, i.e. adrenalectomy, was recommended by most authors, particularly in the somewhat earlier reports [4, 8, 9]. According to others, adrenal-sparing surgery may be performed after hormonal hyperactivity is ruled out, when the likelihood of cancer is considered to be low, or when the cyst is found to be large. The surgical procedure involves the resection or marsupialization of the cystic wall [2, 11–14]. The authors of this study are among the advocates of the latter strategy. This may be confirmed by the fact that histopathological examination of material collected from all patients who had undergone resection of cysts coated with adrenal tissue fragments revealed an unremarkable structure of the adrenal tissue. Only 3 (11.1%) out the remaining 12 cases of patients who had undergone adrenalectomy along with cyst resection were found to justify this extent of surgery; unremarkable structure of the adrenal tissue was observed in the remaining 9 patients. Therefore, we believe that adrenal-sparing treatment is justified in selected patient groups. Conservation of the adrenal gland with proper vascularization ensures that patients can maintain proper activity of adrenal hormones. Note should be taken of the young age and high life expectancy of patients undergoing the surgery. One should also keep in mind the possibility of a pathology requiring total organ resection developing in the future within the contralateral adrenal gland.

## Conclusions

Laparoscopic resection of adrenal cysts appears to be recommendable as a method for the treatment of these pathologies. The indication for surgical treatment is an enlarging, symptomatic cyst (compression on vena cava inferior or renal vein, non-specific complaints, e.g. epigastric fullness, abdominal pain), after confirmation in visual diagnosis. Because of the possibility of coexisting pathologies and diverse etiologies, every adrenal cyst qualified for surgical treatment requires hormonal activity assessment and parasitic exclusion. Also malignancy should be taken into consideration, despite being extremely rare – during the operation oncological safety should be maintained. Laparoscopic resection of an adrenal cyst is simpler than adrenalectomy and associated with low risk of any pathological lesion remaining within the adrenal gland following careful intraoperative assessment by an experienced surgeon.

## Conflict of interest

The authors declare no conflict of interest.

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