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Partial Adrenalectomy—Why Should it be Considered?

Alosh Madala, Michael Daugherty and Gennady Bratslavsky*

From the Department of Urology, SUNY Upstate Medical University, Syracuse, New York

Abstract

Introduction: When a biochemically active adrenal mass is found, surgery is usually recommended. While partial adrenalectomy is increasing in popularity for small adrenal masses, it is not clear which patients will benefit from adrenal sparing to preserve adrenal function in case of contralateral adrenal pathology. We reviewed the available literature to evaluate the frequency of bilaterality of adrenal involvement with most common primary adrenal tumors and the frequency of other pathologies potentially threatening the health of the adrenal gland.

Methods: We reviewed the available PubMed® literature to evaluate the reported bilaterality of primary adrenal tumors, including hereditary and nonhereditary pheochromocytomas, aldosterone producing adenomas and cortisol producing adenomas, and identified 25 articles describing the frequency of bilaterality of adrenal masses. We also reviewed the literature to assess the etiologies of adrenal damage due to other pathological processes that may affect the adrenal gland in the life span of a patient and calculated the combined probability for adrenal damage.

Results: Bilaterality of adrenal tumors in hereditary and nonhereditary diseases ranged from 4.25% to 80%. Hereditary pheochromocytomas were bilateral in up to 80% of cases while nonhereditary pheochromocytomas were bilateral in up to 25%. Aldosterone producing adenomas were bilateral in about 4% of cases while only case reports reported bilaterality in cortisol producing tumors. Additionally, review of other processes, such as infections, infiltrative etiologies, adrenal metastasis and others accounted for about a 1% chance of adrenal damage from all possible causes.

Conclusions: Partial adrenalectomy may be a valid option for patients with hereditary syndromes as there is an increased likelihood of disease in the contralateral gland. Pheochromocytomas followed by aldosterone producing adenomas appear to have the highest rate of bilateral involvement. Coupled with the possibility that an additional 1% of the population may have adrenals affected by various pathological processes, partial adrenalectomy in patients with metabolically active adrenal tumors should be considered.

Key Words: adrenalectomy, adrenal gland diseases, adrenal insufficiency

Abbreviations and Acronyms

APA = aldosterone producing adenoma

CPA = cortisol producing adenoma

MEN = multiple endocrine neoplasia

PHEO = pheochromocytoma

VHL = von Hippel-Lindau

Submitted for publication December 15, 2014.

No direct or indirect commercial incentive associated with publishing this article.

The corresponding author certifies that, when applicable, a statement(s) has been included in the manuscript documenting institutional review board, ethics committee or ethical review board study approval; principles of Helsinki Declaration were followed in lieu of formal ethics committee approval; institutional animal care and use committee approval; all human subjects provided written informed consent with guarantees of confidentiality; IRB approved protocol number; animal approved project number.

* Correspondence: Department of Urology, SUNY Upstate Medical University, Syracuse, New York 13306 (telephone: 315-464-4473; FAX: 315-464-6117; *e-mail address:* bratslag@upstate.edu).

2352-0779/15/26-359/0
UROLOGY PRACTICE

http://dx.doi.org/10.1016/j.urpr.2015.03.006
Vol. 2, 359-366, November 2015
Published by Elsevier

A recent review demonstrated that partial adrenalectomy is gaining popularity for small adrenal masses worldwide,[1] yet the wide application of adrenal sparing surgery has not been uniformly adopted. While surgery is usually recommended for a biochemically active adrenal mass,[2] it is not clear which patients will benefit from adrenal sparing surgery to preserve adrenal function in the case of contralateral adrenal pathology.

With the increase in comfort of minimally invasive techniques, it is likely that a greater number of urological surgeons will perform adrenal surgeries. Numerous recent reports have confirmed the role of urologists in the management of adrenal gland tumors.[3,4] With the number of patients undergoing adrenal surgery by urologists and with the number likely to continue to increase, it becomes important to define the role of adrenal sparing surgery.

Several investigators have described partial adrenalectomy in various settings for various pathologies. Some have performed adrenal sparing surgeries in the setting of hereditary multifocal recurrent pheochromocytomas, while others have advocated the use of adrenal sparing surgeries for unifocal sporadic adrenal tumors.[1,5,6] While there is little argument on the role of partial adrenalectomy for patients with bilateral adrenal involvement or a solitary gland, it is unclear what the optimal management is in patients with small biochemically active nodules and a normal contralateral gland.

Currently the role of partial adrenalectomy can still be considered in its infancy, but the argument for optimal management of the adrenal gland may be compared with the ongoing argument for the management of the small renal mass. While observation and ablation of the adrenal mass have also been described,[4,7] the mainstay is the surgical removal. Similar to the argument so well-known in renal cell carcinoma management, one must balance the risk of recurrent disease, and functional and long-term outcomes. In the case of adrenal gland management, one more issue of long-term sequela is the possibility of steroid dependence (in case of subsequent surgical or functional loss of the contralateral adrenal in patients with a previously surgically removed adrenal gland due to tumor). Thus, there is no clear consensus or guideline dictating the optimal use of partial adrenalectomy.

To critically appraise the role of partial adrenalectomy we reviewed the available literature to evaluate the frequency of bilateral adrenal involvement with common primary adrenal tumors as well as frequency of other pathologies potentially threatening the health of the adrenal gland.

Methods and Materials

We reviewed the available English language PubMed literature to evaluate the reported bilaterality of primary adrenal tumors, including hereditary and nonhereditary pheochromocytomas, APAs and CPAs, and identified 25 articles describing the frequency of bilaterality of adrenal masses. We tabulated the bilaterality of the common adrenal neoplasms based on sporadic or hereditary etiologies. We also reviewed the literature to assess the etiologies of adrenal damage due to other pathological processes that may affect the adrenal gland in the life span of a patient and calculated the combined probability for adrenal damage. The probability of the adrenal involvement was calculated by multiplying the prevalence of a given condition, normalized per 1,000,000, by the chance that the given condition will affect the adrenal gland. We calculated the probability of adrenal involvement in the population for a given disease based on the published literature for the incidence of the disease. These probabilities were summated to determine the percentage of patients at risk for adrenal involvement.

Results

Table 1 presents the bilaterality of adrenal tumors in hereditary and nonhereditary diseases, and demonstrates that adrenal tumors range in bilaterality between 4.25% and 80%. Hereditary PHEOs were bilateral in up to 80% of cases whereas nonhereditary PHEOs were bilateral in up to 25%. APAs were bilateral in about 4% of cases while only case reports reported bilaterality in cortisol producing tumors.

Table 2 provides the prevalence of a given disease per 1,000,000 people along with the probability of adrenal involvement for a given disease. The probability of adrenal involvement/damage from other processes, such as infections, infiltrative etiologies, adrenal metastasis and others, was calculated to account for a 0.98% chance of adrenal damage from all possible causes.

Discussion

The standard surgical treatment for an adrenal lesion requiring extirpation has traditionally included total

Table 1.
Percentage of bilaterality of adrenal tumors in hereditary syndromes and nonhereditary disease

Incidentaloma	7.8
Hereditary PHEO:	
MEN syndrome	35–80
VHL (14%)	40–60
Nonhereditary PHEO:	
Pediatric	25
Adrenal incidentalomas	10–15
APA	4.26
CPAs	Case reports only