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Equal Oncologic Results for Laparoscopic and Open Resection of Adrenal Metastases

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Background. **While open adrenalectomy is often performed for malignant adrenal tumors, increasing numbers of surgeons have adopted the laparoscopic approach. The postoperative benefits of laparoscopic adrenalectomy are well established, but questions persist about long-term oncologic outcomes when used for malignant lesions. The current study was undertaken to compare laparoscopic with open adrenalectomy for isolated adrenal metastases.**

Methods. **From March 1993 to April 2006, 20 adults underwent adrenalectomy for isolated metastases to the adrenal gland. Three patients were excluded because of a concomitant nephrectomy (2) and an unresectable tumor (1). Patient demographics, tumor characteristics, and oncologic outcomes of the remaining patients were reviewed and analyzed.**

Results. **Of the 17 patients who received adrenalectomy for an isolated metastasis, there were 11 men and 6 women with a mean age of 58 ± 3 y. Nine patients underwent laparoscopic adrenalectomy, and 8 patients had open adrenalectomy. Laparoscopic adrenalectomy was associated with less blood loss (63 ± 8 mL *versus* 2207 ± 1067 mL, $P = 0.05$), a lower complication rate (0% *versus* 63%, $P = 0.009$), and a shorter length of stay (2.4 ± 0.6 d *versus* 5.4 ± 0.7 d, $P = 0.02$). With a follow-up of up to 97 mo, there were no port site metastases, no tumor recurrences, and no difference in survival between laparoscopic and open adrenalectomy (median 19 months *versus* 17 months, 5-year survival 34% *versus* 54%, $P = 0.96$).**

Conclusions. **When not limited by tumor size or invasion of surrounding tissue, laparoscopic adrenalectomy is a safe alternative to open adrenalectomy with equivalent oncologic outcomes and clear postoperative benefit for patients with isolated metastases to the adrenal gland.**

Key Words: **adrenal metastases; laparoscopic adrenalectomy; adrenal neoplasm; adrenal mass; adrenalectomy**

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INTRODUCTION

Since its description in 1992 [1], laparoscopic adrenalectomy has become the procedure of choice for resection of benign tumors of the adrenal gland [2, 3]. Compared with open resection, laparoscopic adrenalectomy is associated with a shorter length of hospital stay, decrease in postoperative pain, shorter time to return to preoperative activity level, improved cosmesis, and reduced economic impact [2–4]. The short-term benefits of laparoscopic adrenalectomy have been clearly established.

The role of laparoscopic adrenalectomy in malignant lesions of the adrenal gland remains controversial. Because of concerns regarding tumor cell spillage with the laparoscopic approach, open adrenalectomy is the preferred treatment for primary cancers of the adrenal gland [5, 6], although some support laparoscopic resection for small tumors [7]. Additionally, acceptable oncologic outcomes have been reported for resection of metastatic lesions of the adrenal gland [8–12]. These reports come from small series or concentrate only on one primary tumor, such as non-small cell lung cancer or renal cell carcinoma. Others have shown promising results in combined series of primary tumors for laparoscopic removal [7, 13–15], but only one study has been performed to date in which open and laparoscopic techniques for resection of adrenal metastases were directly compared [16].

Laparoscopic adrenalectomy is not yet considered standard treatment for metastases of the adrenal gland because of concerns regarding long-term outcome and the risk of tumor cell spillage. Because there is a paucity of data on this subject, the study of these outcomes is both important and useful for advancing the surgical treatment of the adrenal gland. Randomized, prospective studies may never be done because of the rarity of this condition. Therefore, retrospective studies may be the only practical manner to evaluate this surgical approach for isolated adrenal metastases. This study was undertaken to compare both surgical

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TABLE 1

Patient Characteristics

	Laparoscopic (n = 9)	Open (n = 8)	Total (n = 17)	P value
Age, year*	59 ± 5	58 ± 3	58 ± 3	0.94[a]
Gender**				1.00[b]
Male	6 (67)	5 (63)	11 (65)	
Female	3 (33)	3 (38)	6 (35)	
Lesion side**				0.34[b]
Right	4 (44)	6 (75)	10 (59)	
Left	5 (56)	2 (25)	7 (41)	
Origin of metastasis**				0.52[b]
Renal cell carcinoma	3 (33)	3 (38)	6 (35)	
Non-small cell lung carcinoma	3 (33)	2 (25)	5 (29)	
Melanoma	2 (22)	0 (0)	2 (12)	
Breast adenocarcinoma	1 (11)	0 (0)	1 (6)	
Colorectal adenocarcinoma	0 (0)	1 (13)	1 (6)	
Lymphoma	0 (0)	1 (13)	1 (6)	
Gastric adenocarcinoma	0 (0)	1 (13)	1 (6)	
Interval type**				0.62[b]
Synchronous	2 (22)	3 (38)	5 (29)	
Metachronous	7 (78)	5 (63)	12 (71)	

* Values reported as mean ± SE.
** Values reported as n (%).
[a] Student's t test.
[b] Fisher's exact test.

and oncologic outcomes of patients with isolated adrenal metastases who underwent adrenalectomy at our institution.

MATERIALS AND METHODS

From March 1993 to April 2006, 143 patients underwent adrenalectomy at the University of Wisconsin. Of these patients, 20 had isolated metastases to the adrenal gland. Two patients were excluded due to a concomitant ipsilateral nephrectomy, and 1 patient was excluded because the tumor was determined to be unresectable at the time of operation. Patients with previous nephrectomy were not excluded. Data were collected on the 17 remaining patients by chart review of patient demographics, tumor characteristics, surgical method, perioperative outcomes, and oncologic results. Length of follow-up, recurrences, and vital status were obtained from patient medical records. The study period ended May 31, 2006.

Data analysis was performed with SPSS (version 11; SPSS Inc., Chicago, IL). As appropriate to presented data, Student's t test, Fisher's exact test, and log rank tests were used for analysis. Statistical significance was defined as $P \leq 0.05$. Data collection and analysis were approved by a protocol through the University of Wisconsin Human Subjects Institutional Review Board.

RESULTS

Patient Characteristics

The mean age of all patients undergoing adrenalectomy for isolated metastases was 58 ± 3 years. There were 11 (65%) men and 6 (35%) women. Ten (59%) patients had metastases to the right adrenal gland, and 7 (41%) had metastases to the left adrenal gland. Nine (53%) patients underwent laparoscopic adrenalectomy, and 8 (47%) patients underwent open adrenalectomy. There was no difference in age (P = 0.94), gender (P = 1.00), or side of lesion (P = 0.34) between the two surgical groups.

The primary tumors were: 6 (35%) renal cell carcinoma, 5 (29%) non-small cell lung cancer, 2 (12%) melanoma, 1 (6%) breast adenocarcinoma, 1 (6%) colorectal adenocarcinoma, 1 (6%) lymphoma, and 1 (6%) gastric adenocarcinoma. There was no difference between surgical method and origin of primary tumor (P = 0.52). Five (29%) patients presented with synchronous (disease-free interval <6 months) metastases, while 12 (71%) patients presented with metachronous (disease-free interval ≥6 months) metastases. There was no association (P = 0.62) between disease-free interval and surgical approach. These data are summarized in Table 1.

Operative and Perioperative Outcomes

One patient began as a laparoscopic exploration and was converted quickly due to extensive adhesions. Another operation began as hand-assisted/open operation and was converted to a full open operation because of an inadvertent colotomy. Because these tumors were effectively resected with an open approach, with no attempt at laparoscopic resection, both were included in the open resection group. Eight different surgeons performed the operations. One surgeon performed 6 (35%) cases, 5 of which were laparoscopic. Operative data are shown in Table 2. Laparoscopic adrenalectomy was associated with less blood loss (63 ± 8 mL *versus* 2207 ± 1067 mL, P = 0.05, mean ± SE), a