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Original research

Patient selection for laparoscopic excision of adrenal metastases: A multicenter cohort study

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HIGHLIGHTS

- Positive surgical margins and complications rates were 26.7% and 17.8% respectively.
- Tumor size >5 cm was the only predictor of positive margins and/or complication.
- Non renal origin of the primary tumor was the only survival prognostic factor.

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ABSTRACT

Introduction: The use of laparoscopy for the excision of adrenal metastasis remains controversial. We aimed to report oncological and perioperative outcomes of laparoscopic excision of adrenal metastases and to seek for predictive factors of unfavorable oncological outcomes.

Methods: A retrospective chart review was conducted and all consecutive patients who underwent laparoscopic adrenalectomy (LA) in the setting of metastatic cancer in two academic urology departments from November 2006 through January 2014 were included. Primary tumors were categorized as pulmonary, renal or "other primary" tumors to allow statistical comparison. Unfavorable surgical outcomes were defined as the occurrence of either postoperative complications and/or positive surgical margins.

Results: Forty-three patients who underwent a total of 45 LA were included for analysis. There were 8 complications (17.8%). Positive surgical margins were found in 12 specimens (26.7%). After a median follow-up of 37 months, estimated overall survival rates were 89.5% and 51.5% at 1 year and 5 years, respectively. In multivariable analysis the only predictor of unfavorable surgical outcomes was a tumor size >5 cm (OR = 20.5; p = 0.001). In multivariate analysis the pulmonary (OR = 0.3; p = 0.008) or "other" (OR = 0.1; p = 0.0006) origin of the primary tumor was the only prognostic factor of shorter cancer specific survival.

Conclusion: Laparoscopic resection of adrenal metastasis can be safely performed in most patients but is associated with an increased risk of positive surgical margins and postoperative complications in larger tumors (>5 cm). Adrenalectomy provides better oncological outcomes in metastases from renal cell carcinoma compared to other primary tumors.

1. Introduction

Despite a low level of evidence, adrenalectomy is now recommended in case of isolated adrenal metastasis [1,2], as many retrospective series have shown the oncological benefit of surgical excision in this situation [3].

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Firstly reported by Gagner et al., in 1992 [4], laparoscopic adrenalectomy (LA) has become the gold-standard treatment of benign adrenal tumors. Several series have proven the lower morbidity of this approach in adrenal surgery (notably decreased complication rate and blood loss, shorter length of stay) [5,6]. Although most of the series of LA have shown similar surgical and oncological outcomes to those reported in the open era [7,8], the role of laparoscopy in the treatment of malignant adrenal tumors remains controversial. In recent years, two series have raised concern about the laparoscopic approach for resection of adrenal metastases. In a single center cohort of 16 patients, Sebag et al. noted high rates of positive surgical margins, complications and conversion to open surgery [9]. In their single-center series of 13 patients, Crenn et al. reported similar findings [10].

In this work, we therefore hypothesized that both the adrenal resection in itself and the laparoscopic approach could not be beneficial for every patient with isolated adrenal metastasis. We aimed to report oncological and perioperative outcomes of laparoscopic excision of adrenal metastases and to look for predictive factors of unfavorable surgical outcomes in order to determine which patients could benefit of laparoscopic resection of adrenal metastases.

2. Patients and methods

2.1. Study design

A retrospective chart review was conducted to include all consecutive patients treated by LA in the setting of metastatic cancer in two academic urology departments, from November 2006 through January 2014. Adrenalectomies performed as part of radical nephrectomy or for extra adrenal tumor with local extension to the adrenal gland were excluded. All patients were treated with curative intent. The study received approval of the local ethics committees (Unique Identifying Number (UIN) from the Research Registry: 538).

Variables collected included patients' characteristics (age, gender, ASA score, Body Mass Index), tumor related data (primary tumor, size, laterality, synchronous or metachronous, isolated or oligometastatic disease, adjuvant treatments), surgeon's experience (categorized as: < 30 cases of LA or > 30 cases of LA), perioperative outcomes (operative time, intra and postoperative complications, blood loss, length of stay, surgical margins, conversion) and oncological outcomes (recurrence, date of recurrence and death, causes of death, recurrence location, date of last follow-up visit). Complications were graded according to Clavien-Dindo classification [11] and reported with full respect of the EAU guidelines on reporting complications [12]. Metastases were considered as synchronous if detected within 6 months after treatment of the primary tumor. Otherwise, they were defined as metachronous. Diseases were categorized as isolated (only one adrenal metastasis) or oligometastatic (other synchronous metastasis or history of previous metastasis). Unfavorable surgical outcomes were defined as the occurrence of either postoperative complications and/or positive surgical margins. Primary tumors were categorized as pulmonary, renal or "other primary" tumors to allow statistical comparison between groups. Tumors sizes were categorized as > 5 cm or ≤5 cm.

Our main objective was to determine predictors of unfavorable surgical and oncological outcomes. Our secondary objective was to report outcomes of LA in a multicenter study.

2.2. Surgical techniques

All surgeries were performed laparoscopically. However, some procedures were performed through a transperitoneal approach whereas others were carried out by a retroperitoneal route. The choice of either the transperitoneal or retroperitoneal approach was left to surgeon's discretion. In one of the department all LA were performed through a transperitoneal approach while both approaches were used in the other department.

2.3. Patients follow-up

All patients were evaluated by their surgeon at an outpatient appointment 1 month after surgery. All complications occurring during the first post-operative month were collected and considered as post-operative complications. Further oncological follow-up was then left to the oncologist and involved a physical examination and imaging every six months during the first two years and then annually for a minimum of 5 years.

2.4. Statistical analysis

Means and standard deviations were reported for continuous variables and proportions for qualitative and categorical variables. Comparisons between groups were performed using χ^2 test and Fisher exact test for discrete variables and student t test for continuous variables. To confirm the findings of univariate analysis, a logistic regression model was used to assess predictors of unfavorable surgical outcomes. Overall survival (OS), cancer-specific survival (CSS) and recurrence-free survival (RFS) were estimated using the Kaplan–Meier method and compared with the log-rank test. A Cox proportional hazards regression model was used to define the prognostic factors. Statistical analyzes were conducted using JMP v.10.0 software (SAS Institute Inc, Cary, NC, USA). All tests were two-sided with a significance level at $p < 0.05$.

3. Results

3.1. Patients' characteristics

Forty-three patients who underwent a total of 45 LA (2 cases of bilateral metastases: 1 renal carcinoma and 1 neuroendocrine tumor) were included for analysis. Mean age was 60.8 years (±9.6) with 79.1% of male patients. Mean tumor size was 48.3 mm (±34.7). Primary tumors were renal carcinoma in 20 cases (44.4%), non-small cell lung cancer in 11 cases (24.4%), colorectal cancer in 3 cases (6.7%), bladder cancer in 3 cases (6.7%), melanoma in 3 cases (6.7%), neuroendocrine tumor in 2 cases (4.4%), glandular eye carcinoma in 1 case (2.2%) and breast cancer in 1 case (2.2%). All surgeries were performed laparoscopically, 14 (31.1%) through a retroperitoneal route and 31 (72.1%) via a transperitoneal approach, Twenty-four procedures (55.8%) were performed by highly experienced surgeons (≥30 cases) and 19 (44.2%) by less experienced surgeons (<30 cases). Twenty-seven patients (62.8%) had isolated adrenal metastasis and 16 (37.2%) had a history of previous metastasis (oligometastatic disease). Eight metastases were considered as synchronous (17.8%). A PET scan was requested in 15 patients (37.5%) and showed a localized hypermetabolic activity in 13 cases (86.7%), which reinforced the hypothesis of an isolated adrenal metastasis.

3.2. Surgical outcomes

Surgical outcomes are summarized in Table 1. Mean operative time was 162.2 min (±75.1). Eight complications occurred (17.8%): 4 blood transfusions due to intraoperative blood loss (Clavien grade 2); 1 pulmonary infection (Clavien grade 2); 1 reoperation due to