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Isolated Adrenal Metastasis: The Role of Laparoscopic Surgery

F. Sebag, F. Calzolari, J. Harding, M. Sierra, F. F. Palazzo, J. F. Henry

Department of General and Endocrine Surgery, Hôpital de la Timone, Boulevard Jean Moulin, 13385 Marseille Cedex 5, France

Abstract

Background: Solitary adrenal metastases (AM) are rare and their management unclear. Surgery, especially laparoscopic adrenalectomy (LA), is debatable in the management of AM. This retrospective study analysed the feasibility and the results of LA for AM.

Methods: From 1997 to 2003, 16 patients underwent LA for isolated AM. Completeness of resection, postoperative morbidity and follow-up (FU) were recorded.

Results: There were 10 synchronous AM and 6 metachronous AM. Primary tumours included lung cancer (n = 9), melanoma (n = 3), mesothelioma (n = 1), rhabdomyosarcoma (n = 1), colonic adenocarcinoma (n = 1) and renal cell carcinoma (n = 1). Five patients required conversion to an open procedure. Minor complications occurred in three patients. Pathology confirmed the diagnosis of AM. Mean tumour size was 60 (range: 15–110) mm. Nine patients (56%) had complete resections, 3 had positive margins and 4 had incomplete macroscopic resections. Mean observed FU was 25 (range: 1–68) months. Median overall calculated survival was 23 months. Overall 5-year survival was 33% (Kaplan–Meyer). At the end of study, 8 patients were alive with a mean FU of 35 months (3 without evidence of disease). No patient presented with local relapse or port-site metastasis. We did not identify any predictive factors. All patients with incomplete macroscopic resection died within 24 months.

Conclusions: LA can achieve an acceptable 5-year survival, comparable to open surgery but with better postoperative comfort. It should be considered for AM with the intention of complete resection. It offers the patient the possibility of tumour resection with the benefit of a laparoscopic approach.

Surgery has been advocated for metastatic disease provided the disease is limited and/or amenable to complete treatment. In selected patients, it has been demonstrated to be effective for colon cancer with liver metastasis and lung cancer with brain metastasis.[1–3] The adrenal gland is a common site for metastatic disease. However, isolated adrenal metastases (AM) are rare[4], and their management remains unclear. Prolonged survival have been described after adrenalectomy for metastasis.[5–10] Over the last decade, laparoscopic adrenalectomy (LA) has become the treatment of choice for small benign secreting tumours. Conversely, LA is contraindicated for invasive primary adrenal tumours (adrenal cortical carcinoma). The place of LA is still unclear for large and potentially malignant tumours and for AM.[11] Laparoscopy may also be considered as a staging or diagnostic tool in potential metastatic disease.[12,13] With the accuracy of noninvasive diagnostic studies [computed tomography (CT) scan, magnetic resonance imaging (MRI), positron emission tomography (PET) scan], diagnostic laparoscopy should be rare.[14] Given the progressive validation of laparoscopic oncologic surgery in different fields[15] and the feasibility and safety of LA for large and potentially malignant adrenal tumours,[12,16,17]

Correspondence to: F. Sebag, e-mail: frederic.sebag@ap-hm.fr

LA for AM was introduced 3 years after the introduction of LA in our department. The aim of this retrospective study was to evaluate results and place of LA for metastatic disease.

MATERIAL AND METHODS

From September 1994 to December 2003, 421 adrenalectomies were performed in our department (353 via a laparoscopic approach). Twenty-four patients underwent surgery for AM. From 1997 to 2003, 16 of these were considered appropriate for laparoscopy. There were 13 men and 3 women. Mean age was 55 (range: 40–74) years. All patients referred with the diagnosis of AM were investigated with CT scan, MRI and since 2003, PET scan. All patients underwent investigations appropriate to their primary tumour. In the early stages, 1 patient underwent biopsy of their adrenal lesion prior to referral to our department. No further patients were biopsied. Fourteen patients were referred after the management of their primary tumour. Of the 2 patients with primary tumours in situ, both had lung cancer, one undergoing LA prior to lung resection and the other prior to combination chemoradiotherapy. All patients presented with isolated AM at the time of referral. Nine presented with other metastases in their history. These had been appropriately treated prior to referral. A metachronous metastasis was defined as adrenal metastasis appearing at least 6 months after the initial diagnosis. For all patients, the feasibility of LA was analysed. Macroscopic and microscopic completeness of resection was recorded. R0 resection was defined as complete macroscopic and microscopic resection on final pathology examination. R1 resection was defined as macroscopic complete resection but positive margins on final pathology examination. R2 resection was defined as macroscopic incomplete resection. Postoperative morbidity and follow-up (FU) were recorded for all patients. Statistics were performed with Statview software. *P* values of less than 0.05 were considered significant.

RESULTS

All patients underwent surgery with the diagnosis or suspicion of AM. Ten patients presented with synchronous AM and 6 patients with metachronous AM. For patients with a metachronous metastasis, median delay between primary tumour and metastasis [disease-free interval (DFI)] was 19.5 (range: 9–144) months. Primary tumours were non-small-cell lung cancer (n = 9), melanoma (n = 3), pleural mesothelioma (n = 1), rhabdomyosarcoma (n = 1), colonic adenocarcinoma (n = 1) and renal cell carcinoma (n = 1). All patients underwent LA through a lateral transperitoneal approach.[18] This approach allowed not only adrenalectomy but also clearance of all fatty tissue surrounding the gland. There were 9 right and 7 left LA. Five patients required conversion to an open procedure. For 1 patient, conversion was necessary for the extraction of the specimen (enlarged nephrectomy for an 11-cm lung AM invading the kidney). The 4 other conversions were necessitated by difficulties in dissection.

Minor complications occurred in 3 patients: lung infection, superficial wound infection and pain requiring narcotic intravenous analgesia. All 3 patients had undergone conversion to an open procedure. Their hospital stays were 8, 10 and 18 days. Mean hospital stay for the whole series was 5 (range: 3–18) days. For patients in whom the procedure was completed laparoscopically, median hospital stay was 5 (range: 3–7) days. Pathology examination confirmed the diagnosis of metastasis related to the primary tumour for all patients. The mean tumour size was 60 (range: 15–110) mm. Nine patients (56%) had complete macroscopic resections and negative margins (R0 resection). Three patients had complete macroscopic resections and positive margins on final pathology examination (R1 resection). Four patients had incomplete macroscopic resections (R2 resection).

Mean observed FU was 25 (range: 1–68) months. Median overall calculated survival was 23 months (Kaplan–Meyer). The overall 5-year survival (Kaplan–Meyer) was 33% (only 3 patients with FU of 60 months or greater) (Fig. 1). At the end of the study, 8 patients were alive, with a mean FU of 35 months. Three patients were alive without evidence of disease 60, 24 and 19 months after adrenalectomy. No patients presented with local relapse or port-site metastasis. One patient presented with local progression following an R2 resection completed after conversion. This was in the context of disseminated metastatic disease. The patient died 24 months after surgery.

In univariate analysis for this small series, neither the site of primary tumour, metachronous/synchronous metastasis, size, conversion nor completeness of resection influenced survival. All patients with R2 resections died within 24 months. All patients alive without disease (n = 3) underwent either complete resections (2 patients) or an R1 resection with postoperative chemotherapy (1 patient).

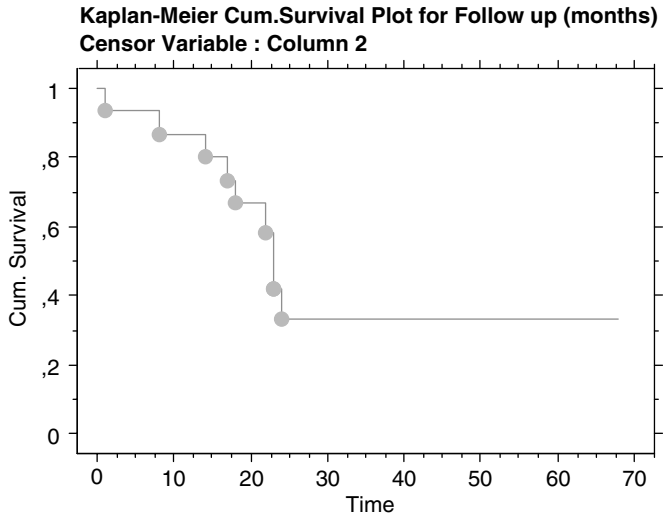

Figure 1. Overall survival curve (Kaplain–Meyer) (months).

Principle patients' characteristics are summarised in Table 1.

DISCUSSION

The introduction of LA for AM was motivated by different factors. LA is now recognised as the gold standard treatment for small benign secreting tumours, but it remains a matter of debate for large and potentially malignant adrenal tumours and adrenal metastases.[11] Over the last decade, with increasing experience there have been more reports of the feasibility of LA for large adrenal tumours (> 6 cm).[16,17] This development was facilitated not only by increasing surgical skills but also by technical progress with the introduction of new sealing devices and harmonic scalpel. This increased experience led us progressively to consider this intervention for disease outside the usual field of LA. In the beginning of our experience, LA for large tumours was anecdotal. It is only after 3 years and more than 100 procedures that LA was considered for AM.

Selected metastatic malignancies no longer herald the end of effective treatment. Palliative and supportive care is not necessarily the only treatment option, and short survival periods cannot always be assumed. Development of multimodal aggressive strategies has been shown to be effective in metastatic large bowel and lung cancers. Surgical removal of the metastasis is often an unavoidable part of the strategy and sometimes the only treatment proposed. Oncologists have also recognised the potential advantages of LA compared with open adrenalectomy,[19–21] and these advantages are also present for LA for large adrenal tumours.[22] Surgery with minor morbidity offering a better quality of life is a strong argument for patients with metastatic disease given their shortened life expectancy.

With increasing experience, LA for AM was feasible and safe. During the 16 procedures performed for large and sometimes invasive tumours, no intraoperative complications occurred. There was no mortality, and only 3 patients presented minor complications. Our conversion rate of 31% was notably higher than the global rate of conversion in our department (<5%.) Three of the five conversions occurred in the initial part of our experience. Potentially, some may have been avoided now. To date, we have no experience in hand-assisted laparoscopic adrenal surgery, but this modality may have provided a solution and avoided a complete open approach.[23,24] Above all, in 4 of the 5 converted cases, preoperative investigations were inaccurate as they had been performed at least 2 months before surgery and underestimated the size and extent of invasion of the AM. Of the converted patients, two were classified as R2 and one as R1. We thus strongly recommend complete and appropriate evaluation using at least thin-cut CT scan and PET scan performed close to the time of surgery.

During FU, no patient presented with port-site metastases. One patient presented with local evolution after R2 resection in the context of disseminated metastatic disease. In our experience and as previously reported, LA did not result in port-site metastases or local recurrence.[12,13,25,26] As anticipated, LA, when completed, offered better comfort for the patient with no morbidity in this short series. Pathology examination confirmed complete (R0) resection in 56% of cases. Thus, as in other departments,[26] a high rate of incomplete resection was observed. Incomplete resection was obvious at surgery (R2) in 4 cases. Pathological examination diagnosed microscopic incomplete resection (R1) in 3 cases (positive margins and/or tumoral foci in the fatty tissue surrounding the adrenal gland). Mean observed FU was 25 (range: 1–68) months. Median overall calculated survival was 23 months (Kaplan–Meyer). The overall 5-year survival was 33% (Kaplan–Meyer). This is comparable to other studies.[7–9,26,27] Our results could be considered satisfactory, but there were only a few patients. At the end of the study, 8 patients were alive with a mean FU of 35 months, with only 3 of these alive after more than 60 months of FU. Only 3 patients in the series are alive without evidence of disease 60, 24 and 19 months post-adrenalectomy. These results remain to be verified by prolonged FU.

Table 1.
Summary of patient characteristics

Patient	Primary tumour	S/M	Size (mm)	Conversion	R012	FU (months)	Status
1	Lung	S	15		R0	68	A WD
2	Lung	S	40		R0	66	A WD
3	Sarcoma	S	50	+	R0	60	A NED
4	Lung	M	70	+	R2	24	D OFD
5	Lung	M	110	+	R0	24	A NED
6	Melanoma	M	70		R0	23	D OFD
7	Lung	S	60		R0	23	D OFD
8	Lung	S	45		R1	22	D OFD
9	Melanoma	M	70		R0	20	A WD
10	Lung	S	90		R1	19	A NED
11	Colon	S	50	+	R1	18	D OFD
12	Kidney	M	60		R0	17	D OFD
13	Mesothelioma	M	45		R2	14	D OFD
14	Melanoma	S	80		R0	8	D OFD
15	Lung	S	60	+	R2	1	D OFD
16	Lung	S	50		R2	1	L FU

S: synchronous; M: metachronous; R012: type of resection; FU: duration of follow-up; A WD: alive with disease; A NED: alive with no evidence of disease; D OFD: dead of disease; L FU: lost to follow-up.

Statistical analysis did not show any significant predictive factor of survival. Usual reported predictive factors of prolonged survival, such as site of primary tumour, metachronous/synchronous metastasis, disease-free interval (DFI), size, conversion and type of resection (R0, 1, 2) did not influence survival in our series compared with others.[7,9,26–28] All patients with R2 resection died within 24 months. All patients alive without disease (n = 3) had complete macroscopic resection. Overall survival in our series did not differ from others; however, our population did not match the usual factors related to good prognosis. The majority of patients presented with synchronous AM (10/16, 62%). Nine of the 16 (56%) presented with other metastatic sites in their history (controlled at the time of LA).

Given our experience, we strongly recommend the most accurate imaging studies close to the time of surgery. This would aid in the decision-making process when determining the most appropriate approach (laparoscopic or open). It may also help avoid R2 resection, which often means conversion to an open approach and likely survival of less than 24 months. In such cases, it may be that an equivalent survival with a better quality of life could be offered by nonsurgical treatment.[5,28] One should mention that preoperative studies may help to avoid some but not all potential R2 resections. On occasions, resection will only be recognised as R2 after the introduction of the endoscope or at the end of the adrenalectomy. In such cases, what should be done is debatable.

Adrenalectomy should be considered for patients with AM. Certain criteria need to be observed. It must be a multidisciplinary approach. The therapeutic aim should be with a curative or complete intent. Preoperative investigations should be as extensive as possible in order to detect inaccessible metastatic sites or invasion resulting in incomplete surgery. This should help to avoid inappropriate indications and incomplete (macroscopic) resection. Metachronous AM and long DFI are classical good prognostic factors.[29] In our opinion, synchronous metastasis or short DFI should not be a exclusion criteria from surgical treatment. Furthermore, other metastatic sites, if controlled, cured or accessible to complete treatment, should not be the exclusion criteria.[26] AM, which satisfy the appropriate criteria, will also generally match those criteria for LA. As metastatic diseases matching these criteria are rare, the place of surgery can probably never be defined by a prospective randomised study. What's more, such a study would probably not be ethical.

Finally, in our opinion, in this highly selective population, if adrenalectomy achieves a complete macroscopic resection, survival compares favourably to nonsurgical treatment. Quality of life after surgery, especially laparoscopy, may also be compared favourably with medical treatment (chemotherapy). Ongoing prospective studies and FU are needed.

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