

Current surgical management of melanoma metastases to the lung

Prasad Palani Velu¹, Christopher Cao², Tristan D. Yan^{2,3}

¹Royal Infirmary of Edinburgh, Scotland, UK; ²The Collaborative Research (CORE) Group, Sydney, Australia; ³Department of Cardiothoracic Surgery, University of Sydney, Royal Prince Alfred Hospital, Sydney, Australia

J Thorac Dis 2013;5(S3):S274-S276. doi: 10.3978/j.issn.2072-1439.2013.08.42

Introduction

Spread of melanoma can be cutaneous, to distant lymph nodes or to visceral organs such as the lung (18-36%), liver (14-20%), brain (12-20%) and bone (11-17%) (1). Overall, the lung is the commonest site of distant metastases and patients with non-metastatic disease have an increasing risk of developing pulmonary metastases: 10% risk at 5 years and 17% at 15 years (2). Median survival after developing pulmonary metastases is 7.3 months, which is favorable compared to patients with metastases to other visceral sites (median survival <7 months) (1,3).

Current evidence suggests significant improvements in survival can be achieved when pulmonary metastasectomy is performed with curative intent. A retrospective review of 5,026 pulmonary metastasectomies (of various histological types) identified a median survival of 35 months in patients who underwent complete resection (4). More recent studies reported median survival of as high as 3 years following pulmonary metastasectomy (4). This makes surgical intervention an attractive option in the management of patients with limited pulmonary involvement in metastatic melanoma, especially given that response rates for systemic chemotherapy in patients with pulmonary metastases remain between 10% to 15% and translate to a survival benefit in only a few patients (5).

Patient selection

Patient selection is a crucial factor in determining survival outcomes following pulmonary metastasectomy in malignant melanoma. Pre-operative selection should focus on the exclusion

of extra-thoracic disease (by careful physical examination and imaging including CT, PET-CT and MRI) and assessment of resectability. In addition, the primary disease must be controlled and the patient should possess adequate pulmonary reserve to proceed with metastasectomy.

Ultimately, patients who are considered for this surgery often have isolated pulmonary metastases, show no evidence of other distant metastatic disease and usually have had their primary disease treated prior to management of pulmonary metastases.

Surgical approaches

Pulmonary metastasectomy can be performed through sub-lobar resection (wedge resection or segmentectomy) or lobectomy. The majority of pulmonary metastases are located peripherally and in many cases are immediately sub-pleural, making them very amenable to wedge resection. Wedge resections confer the advantage of maintaining lung parenchyma whilst achieving clear margins (6). However, pulmonary segmentectomy, taking the segmental artery, vein and bronchus individually, has a superior oncological advantage, as segmental lymph nodes can also be removed with meticulous dissection.

Surgical approaches include conventional open thoracotomy and minimally invasive thoracoscopic approach, also known as video-assisted thoracoscopic surgery (VATS). The thoracoscopic approach is a more favored approach especially for small (<5 cm) and peripheral lesions. It allows for comparable survival outcomes to open surgery but with less morbidity (smaller incisions, less post-operative pain, shorter in-hospital stay, better pulmonary function, better cosmesis and lower risk of developing pneumonia) (7) (Video 1). For patients undergoing lobectomy for non-small cell lung cancer (NSCLC), a recent meta-analysis demonstrated that VATS-based procedures were associated with statistically significant improvements in perioperative morbidity rates, incidences of pneumonia and atrial arrhythmia, and a shorter hospital stay in both matched and unmatched patients (8).

Early data comparing open *vs.* thoracoscopic approaches suggested the risk of 'missing' smaller lesions without the ability to perform bi-manual palpation for metastatic nodules intra-

Corresponding to: Associate Professor Tristan D. Yan, BSc MBBS, MS, MD, PhD, FRACS. The Collaborative Research Group (CORE), Sydney, Australia; Department of Cardiothoracic Surgery, Royal Prince Alfred Hospital, the University of Sydney, Sydney, Australia. Email: tristanyan@annalscts.com.

Submitted Jul 10, 2013. Accepted for publication Jul 28, 2013.
Available at www.jthoracdis.com

ISSN: 2072-1439

© Pioneer Bioscience Publishing Company. All rights reserved.



Video 1. Current surgical management of melanoma metastases to the lung.

operatively during thoracoscopy (9). However, current data from studies utilising high resolution CT imaging suggest that thoracoscopic approach achieves comparable results (9).

Outcomes

Survival

Overall effects on survival varied between the few studies that assessed the potential benefits of pulmonary metastasectomy for melanoma. Leo *et al.* report 18% 5-year survival and a median survival of 17 months postoperatively (2). Andrews *et al.* report an estimated 5-year survival of 33% (5). Petersen *et al.* report a 19-month median survival in patients who underwent complete resection, and a 21% 5-year survival in these patients (3).

Prognostic factors for metastasectomy include:

- I. Extent of complete resection-median survival reached 19 months for patients who achieved complete resection versus 11 months in those who had incomplete resection (3). Pathological involvement of the surgical margin has been identified to be independently associated with poorer progression-free survival (HR 1.5) (10);
- II. Interval from diagnosis-patients with a disease free interval of more than 5 years gained a 12-month survival advantage when they underwent pulmonary metastasectomy (median survival 19 months) compared to patients who had a disease free interval of less than 5 years (median survival 7 months) (3);
- III. Time to pulmonary metastases (TPM)-patients with a TPM of less than 36 months had 30% survival at 5 years compared to patients with TPM of more than 36 months who had 15% survival at 5 years (2);

IV. Number of pathologically proven metastases-patients with single lesions had 25% 5-year survival compared to patients with multiple lesions who had 19% survival at 5 years. Patients with 4 or more lesions were found to have significantly poorer prognosis (8% at 5 years) (2). Chua *et al.* similarly identified an independent association between the number of pulmonary metastases and poorer overall survival (10).

Chua *et al.* reported a significant independent association between the size of the largest metastasis (>2 cm) and poorer overall survival (HR 1.6) (10). Data from Petersen *et al.* additionally suggest that nodular histologic type of the primary lesion and evidence of extra-thoracic metastases are indicative of poorer prognosis (3). Leo *et al.* identified no association between age, sex, surgical approach, type of resection, need for extra-pulmonary resection, chemotherapy or hilar and mediastinal lymph node involvement with survival (2).

Disease recurrence

Leo *et al.* reported a 63.8% disease recurrence rate in patients who underwent pulmonary metastasectomy, including intra- and extra-thoracic recurrence. In their cohort, intra-thoracic disease recurrence alone was not an absolute contraindication for further pulmonary metastasectomy, and in these patients the overall survival was 19% at 5 years (2).

Conclusions

In conclusion, existing data highlights the importance of performing radical metastasectomy for pulmonary metastases early, for patients who have solitary or a minimal number of pulmonary metastases without extra-thoracic involvement. Additionally, minimally invasive approaches to pulmonary metastasectomy allow for reduced morbidity and shorter hospital stays, greatly improving the experience of patients with metastatic melanoma.

Acknowledgements

Disclosure: The authors declare no conflict of interest.

References

1. Tas F. Metastatic behavior in melanoma: timing, pattern, survival, and influencing factors. *J Oncol* 2012;2012:647684.
2. Leo F, Cagini L, Rocmans P, et al. Lung metastases from melanoma: when is surgical treatment warranted? *Br J Cancer* 2000;83:569-72.
3. Petersen RP, Hanish SI, Haney JC, et al. Improved survival with pulmonary metastasectomy: an analysis of 1720 patients with pulmonary metastatic melanoma. *J Thorac Cardiovasc Surg* 2007;133:104-10.

4. Long-term results of lung metastasectomy: prognostic analyses based on 5206 cases. The International Registry of Lung Metastases. *J Thorac Cardiovasc Surg* 1997;113:37-49.
5. Andrews S, Robinson L, Cantor A, et al. Survival after surgical resection of isolated pulmonary metastases from malignant melanoma. *Cancer Control* 2006;13:218-23.
6. Erhunmwunsee L, D'Amico TA. Surgical management of pulmonary metastases. *Ann Thorac Surg* 2009;88:2052-60.
7. Cao C, Manganas C, Ang SC, et al. A meta-analysis of unmatched and matched patients comparing video-assisted thoracoscopic lobectomy and conventional open lobectomy. *Annals of Cardiothoracic Surgery* 2012;1:16-23.
8. Richards JMJ, Dunning J, Oparka J, et al. Video-assisted thoracoscopic lobectomy: the Edinburgh posterior approach. *Annals of Cardiothoracic Surgery* 2012;1:61-9.
9. McCormack PM, Bains MS, Begg CB, et al. Role of video-assisted thoracic surgery in the treatment of pulmonary metastases: results of a prospective trial. *Ann Thorac Surg* 1996;62:213-6; discussion 216-7.
10. Chua TC, Scolyer RA, Kennedy CW, et al. Surgical management of melanoma lung metastasis: an analysis of survival outcomes in 292 consecutive patients. *Ann Surg Oncol* 2012;19:1774-81.



Cite this article as: Velu PP, Cao C, Yan TD. Current surgical management of melanoma metastases to the lung. *J Thorac Dis* 2013;5(S3):S274-S276. doi: 10.3978/j.issn.2072-1439.2013.08.42