The Benefit of a Surgical Resection of a Solitary Pulmonary Metastasis of Prostate Cancer after Radical Prostatectomy

Dries Mortier a, Evert Baten b, c, * Kurt Vandeurzen d Koenraad van Renterghem b, c, e

a Department of Urology, AZ Vesalius, Tongeren; b Faculty of Medicines, KU Leuven, Leuven; c U Hasselt, Hasselt; d Department of Pneumology, Maria Ziekenhuis, Overpelt; e Department of Urology, Jessa Ziekenhuis, Hasselt, Belgium

*These authors contributed equally to the manuscript.

Key Words
Prostate specific antigen • Radical prostatectomy • Metastasis • Local therapy

Abstract
Historically, a solitary pulmonary metastasis of prostate cancer was considered as metastatic or disseminated disease and could only be treated systemically. However, some patients may benefit from surgical metastasectomy of a solitary pulmonary metastasis. We present an uncommon case of resection of a solitary pulmonary metastasis of prostate cancer after previous radical prostatectomy, resulting in undetectable prostate specific antigen.

Introduction
Cancer-free survival benefit has been reported after surgery for a solitary pulmonary metastasis for colonic [1], renal cell [2] and breast cancer [3]. Visceral metastasis of prostate cancer (PCa) is regarded as only treatable by systemic therapy [4]. Only a few case reports on resection of a solitary pulmonary metastasis after previous radical prostatectomy have been published [5–11].

Case Report
A 82-year-old man underwent a non-nerve sparing radical prostatectomy without pelvic lymph node dissection 12 years earlier for a pT3a Gleason 6 adenocarcinoma with an initial prostate specific antigen (PSA) of 10.1 µg/l. Surgical margins were negative. The postoperative PSA was 1.6 µg/l and adjuvant radiotherapy (66 Gy) was performed together with androgen deprivation therapy. The PSA was afterwards undetectable during 2 years. Because of biochemical recurrence bicalutamide was associated but PSA continued to rise and the PCa was considered as castrate refractory.

Nine years postoperatively, the patient was admitted to the gastroenterology department for hematochezia. An incidental lesion in the right lower lung lobe was found on chest radiograph. CT scan showed a nodular lesion of 2 cm in the right lower lobe with hypercapitation on PET scan without mediastinal adenopathies or distant metastases (fig. 1, 2). A bronchoscopy with bronchial brushing was performed next, which showed atypical glandular epithelial cell, suspicious for adenocarcinoma.

The case was discussed in a multidisciplinary oncology meeting and local therapy with surgical excision was suggested. The patient refused however and preferred follow-up. The PSA had risen in the meantime to 3.32 µg/l. A CT scan, performed 3 months later, showed a slight increase in volume of the known lesion and this time the patient agreed with surgery. Resection of the nodular lesion was performed by thoracotomy with lobectomy. Immunohistochemical staining of PSA on the resection specimen was positive, confirming the diagnosis of a single pulmonary metastasis of PCa. Postoperatively, the PSA lowered to undetectable levels (< 0.03 µg/l). Consequently, the hormonal therapy was interrupted and 1 year later, the PSA remained under the detection level.
Discussion

PCa generally metastasizes to bone and regional lymph nodes and less frequent to lung, liver and brain [12–14]. Metastatic PCa is believed to benefit only from systemic therapy, however increasing evidence of the benefit of metastasectomy is found [14, 15]. An isolated pulmonary metastasis, as presented here, is rare. Autopsy studies of patients with metastatic PCa, show isolated pulmonary metastasis in less than 1% [16]. Fabozzi et al. [17] found radiologic evidence of pulmonary metastases in 48/1,290 patients, with only 11 being a solitary pulmonary nodule (0.86%). In our case, the PSA lowered to non-detection level (< 0.03 µg/l) after resection of the solitary pulmonary metastasis, enabling us to withdraw the hormonal treatment. The PSA still remained undetectable 1 year after withdrawal of the hormonal treatment. Our findings are supported in literature suggesting the benefit of local therapy in patients with low metastatic load [14–16].

Conclusion

Solitary pulmonary metastasis of PCa is rare. Chest radiography could be performed in patients with rising PSA after prostatectomy without signs of other visceral or bone metastasis to exclude pulmonary metastasis. Some patients may benefit from surgical resection of the metastatic lesion with excellent PSA-response.
References

1. McCormack PM, Burt ME, Bains MS, Martini N, Rusch VW, Ginsberg RJ: Lung resection for colorectal metastases: 10-year results. Arch Surg 1992;127:1403–1406.
2. Friedel G, Hurtgen M, Penzenstadler M, Kyriss T, Toomes H: Resection of pulmonary metastases from renal cell carcinoma. Anti-cancer Res 1999;19:1593–1596.
3. Kreisman H, Wolkove N, Finkelstein HS, Cohen C, Margolese R, Frank H: Breast cancer and thoracic metastases: review of 119 patients. Thorax 1983;38:175–179.
4. Heidenreich A, Bastian PJ, Bellmunt J, Bolla M, Joniau S, van der Kwast T, Mason M, Matveev V, Wiegel T, Zattoni F, Mottet N: EAU guidelines on prostate cancer. Part II: treatment of advanced, relapsing, and castration-resistant prostate cancer. Eur Urol 2014; 65:467–479.
5. Goto T, Maeshima A, Oyamada Y, Kato R: Solitary pulmonary metastasis from prostate sarcomatoid cancer: World J Surg Oncol 2010;8:101.
6. Smith CP, Sharma A, Ayala G, Cagle P, Kadowon D: Solitary pulmonary metastasis from prostate cancer. J Urol 1999;162:2102.
7. Chao DH, Higgins JP, Brooks JD: Biochemical remission after resection of prostate cancer lung metastasis. Urology 2004;63:584–585.
8. Pruthi RS, Hubbard JS, Koubi E, Wallen E: Androgen-independent prostate cancer treated with resection of the solitary metastatic site. Urol Int 2010;79:371–373.
9. Alberts A, Joniau S, Van Poppel H: Resection of two metachronous solitary pulmonary metastases of prostate cancer after radical prostatectomy: an exceptional case. Belg J Med Oncol 2014;8:217–219.
10. Arnold M, Karim-Kos HE, Coebergh JW, Byrnes G, Antilla A, Ferlay J, Renehan AG, Forman D, Soerjomataram I: Recent trends in incidence of five common cancers in 26 European countries since 1988: analysis of the European Cancer Observatory. Eur J Cancer 2015;51:1164–1187.
11. Siegel R, Ma J, Zou Z, Jemal A: Cancer statistics, 2014. CA Cancer J Clin 2014;64:9–29.
12. Bubendorf L, Schopfer A, Wagner U, Sauter G, Moch H, Willi N, Gasser TC, Mihatsch MJ: Metastatic patterns of prostate cancer: an autopsy study of 1,589 patients. Hum Pathol 2000;31:578–583.
13. Palmbos PL, Hussain M: Non-castrate metastatic prostate cancer: have the treatment options changed? Semin Oncol 2013;40:337–346.
14. Wallis C, English J, Goldenberg S: The role of resection of pulmonary metastases from prostate cancer: a case report and literature review. Can Urol Assoc J 2011;5:E104–E108.
15. Sai toh H, Hida M, Shimbo S, Nakamura K, Yamaga J, Satoh T: Metastatic patterns of prostate cancer. Correlation between sites and number of organs involved. Cancer 1984; 54:3078–3084.
16. Fabozzi SJ, Schellhammer PF, el-Mahdi AM: Pulmonary metastases from prostate cancer. Cancer 1995;75:2706–2709.

Erratum

Unfortunately, an author name ‘Ricardo Codas Duarte’ was written as ‘Ricardo C. Duarte’ by mistake in the paper by Baldini et al.: Holmium Laser Enucleation of the Prostate versus Laparoscopic Transcapsular Prostatectomy: Perioperative Results and Three-Month Follow-Up. Curr Urol 2016;10:81–86.