

Case Study

Parotid metastasis from carcinoma urinary bladder treated with CyberKnife-based stereotactic body radiotherapy: case report and review of literature

Tejinder Kataria, Shyam S Bisht, Deepak Gupta, Ashu Abhishek, Govardhan Hb, Shikha Goyal, Trinanjan Basu, Vikash Kumar

Division of Radiation Oncology, Medanta cancer institute, Medanta The Medicity, Gurgaon, India

(Received 15 September 2014; revised 24 September 2014; accepted 24 September 2014; first published online 30 October 2014)

Abstract

Metastases to the parotid region are relatively infrequent and originate primarily from head and neck cancer. Metastases of an infraclavicular origin are uncommon. Moreover, metastasis from the carcinoma of urinary bladder (CUB) to any part of the head and neck, including parotid gland, is rare. Surgery and chemotherapy are usually offered. We report a case of solitary parotid metastasis from CUB, who was successfully treated with stereotactic body radiotherapy (SBRT) using CyberKnife. SBRT is a safe alternative in cases unwilling/unfit for surgery.

Keywords: carcinoma urinary bladder; CyberKnife; parotid metastasis; stereotactic body radiotherapy

INTRODUCTION

Metastases to the parotid region are relatively infrequent and originate primarily from head and neck cancer.¹ Metastases of an infraclavicular origin are uncommon.² Moreover, metastasis from the carcinoma of urinary bladder (CUB) to any part of the head and neck, including parotid gland, is rare.³ Surgery and chemotherapy are usually offered. This report describes a case of solitary parotid metastasis from CUB, who was successfully treated with stereotactic body radiotherapy (SBRT) using CyberKnife. To the best of our knowledge, this is the first documented case of parotid metastasis from transitional cell CUB treated by SBRT.

CASE HISTORY

A 79-year-old gentleman was operated for CUB in December 2011 and the tumour was staged as pT4pN0cM0 after radical cystectomy. He was free from disease recurrence on routine cystoscopy and [¹⁸F]fluorodeoxyglucose positron emission tomography (FDG-PET). In October 2012, he complained of insidious swelling and dull ache over right parotid region. Clinical examination revealed non-inflammatory, 3 × 3 cm hard swelling over upper pole of right parotid gland without any cervical lymphadenopathy. Needle cytology suggested epithelial neoplasm. Panendoscopy did not reveal any primary focus. The only positive finding in PET-computed tomography (CT) scan was FDG avid lesion with maximum standardised uptake value of 8.37. It was well defined enhancing lesion measuring

Correspondence to: Dr Deepak Gupta, Division of Radiation Oncology, Medanta cancer institute, Medanta The Medicity, Gurgaon, India. E-mail: deepakonco@gmail.com

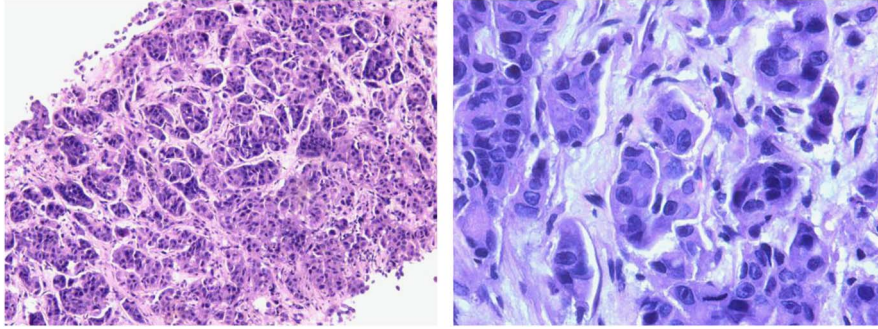


Figure 1. Biopsy from parotid metastasis showing transitional cell carcinoma of urinary bladder.

2.5(AP) × 1.5(TR) × 2.3(CC) cm in the cranial part of the superficial lobe of right parotid gland. Case was discussed in multi-disciplinary tumour board (TB). Ultrasound-guided trucut biopsy from the intraparotid lesion was suggested. Histopathology report favoured a diagnosis of metastasis from the CUB (Figure 1). Case was re-discussed in the TB and radical parotidectomy followed by adjuvant chemotherapy was offered. Patient declined to undergo parotidectomy, so it was planned to irradiate the parotid oligometastasis with SBRT using CyberKnife System (Accuray Incorporated, Sunnyvale, CA, USA) and then subsequently administer chemotherapy. After written consent for SBRT, thermoplastic head and neck cast was fabricated. Radiation planning non-contrast PET-CT scan of 1 mm slice thickness was performed in view of deranged renal function parameters. PET-CT images were imported on Multiplan planning station (Version 4.6). Gross tumour volume (GTV) was delineated and verified by radiologist. Planning target volume (PTV) was generated with 2 mm isotropic expansion to GTV. Organ at risk (OARs) delineated were: right temporomandibular joint, right mandibular head, mandible, left parotid, oral cavity, spinal cord and brain stem. A dose of 45 Gy in five fractions at 95% coverage and 85% isodose line was prescribed to PTV. Plan was then evaluated for coverage and dose to OARs (Figure 2). After plan was approved, first fraction was delivered uneventfully in 50 minutes. Patient returned to the clinic within 4 hours of receiving first fraction, with the complaint of sudden painless swelling over right parotid region. High dose of dexamethasone and analgesic was administered. Acute swelling regressed within 2 days, and subsequently he completed the remaining four fractions without any other

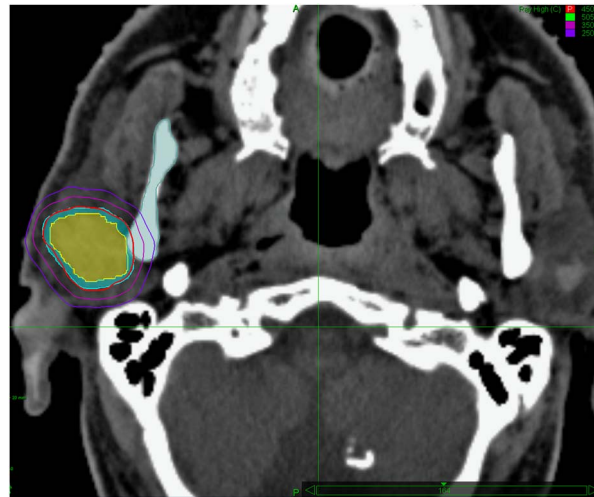


Figure 2. Plan showing isodose lines, tightly surrounding the planning target volume and sparing normal tissues (red: 45 Gy isodose line; purple: 25 Gy isodose line).

acute toxicity. Patient returned for the first follow-up at 6 week post treatment. Clinical examination revealed regression in size of right parotid swelling with hyperpigmentation and decreased sensation over the right parotid area. No mucosal ulcerations were detected. He was referred to medical oncologist for chemotherapy but patient deferred the chemotherapy. PET-CT was performed at 3 and 6 months post treatment, which revealed complete metabolic and morphological regression of right parotid lesion (Figure 3). No FDG avid lesions were seen elsewhere in the body.

DISCUSSION

Metastasis to the parotid gland is uncommon. The primary sites contributing to parotid gland involvement are predominantly from head and neck

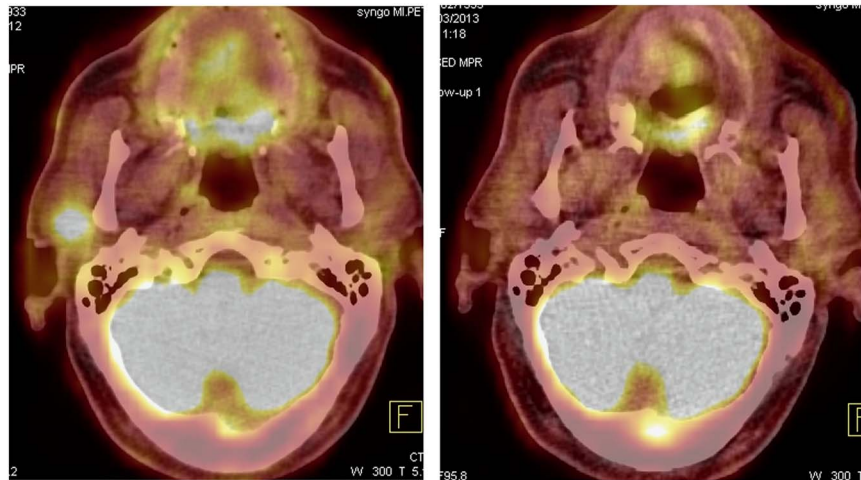


Figure 3. Pre and post treatment positron emission tomography computed tomography (PET-CT) comparison showing complete metabolic and morphological response in parotid metastasis.

region.⁴ Metastasis from the bladder to any part of the head and neck is rare.³ Hirshberg et al.⁵ listed six cases of CUB with maxillofacial metastasis; of these, four cases were located in the mandible and one each in the tongue and maxilla. We could find only one case of parotid metastasis from bladder carcinoma (urachus) in the literature.⁶ Patient's previous history, biopsy, magnetic resonance imaging and PET contrast-enhanced computed tomography are the most useful combinations for the diagnosis of metastatic tumour, with a sensitivity of 100%.⁷ Histopathology and immunohistochemistry aids in identifying the primary tumour. PET-CT imaging has sensitivity of 94.5%, specificity 87.5% and accuracy of 93.8% in diagnosing bladder tumour metastasis.⁸

Surgery is considered to be the treatment of choice in parotid tumours, including metastases. Controversies exist both with respect to deciding which surgical technique to employ and to adjuvant radiotherapy.⁹ Rates of local control at 5 years after surgery on the parotid region are 75% for squamous cell carcinomas, 94% for melanomas and 100% for other metastatic tumours ($p < 0.01$).¹⁰ Results with conventional fractionated radiation alone are not comparable with surgical series. Krenge et al.¹¹ reported local control rate of 57% after conventional radiotherapy alone.

The present case precisely fits into the category of oligometastasis.¹² Metastasis directed SBRT

within first few months of appearance can result in a potential cure.¹³

Hypofractionated radiotherapy has definite radiobiological advantage over conventional fractionation. With the rapid technological development in radiation oncology, high dose of radiation can be now delivered safely, with minimal surrounding toxicity and in a much abbreviated time using SBRT. The CyberKnife SBRT system uses real-time image guidance for targeting without rigid external fixation. SBRT for the primary (definitive or adjuvant) treatment and re-irradiation of recurrent primary parotid tumours has been reported by Karam et al.^{14,15} With a median follow-up of 14 months, local control rate of 92% and an actuarial rate of 84% at 2 years has been reported. We were unable to find studies of SBRT for parotid metastasis. To the best of our knowledge, this is the first case of parotid metastasis treated by SBRT using CyberKnife. Dose of 4,500 cGy in five fractions has the potential to eradicate the metastasis. It can be offered to patients who are surgically unfit or unwilling for surgery without any significant acute and subacute toxicity and excellent control. SBRT should be accompanied with high dose of steroid to prevent any acute oedema.

Acknowledgement

None.

References

1. Vara A, Madrigal B, Perez del Rio M J et al. Parotid metastasis from renal clear cell adenocarcinoma. An unusual site of metastasis. *Uro Int* 1998; 61: 196–198.
2. Pisani P, Angeli G, Krangli M, Pia F. Renal carcinoma metastasis to the parotid gland. *J Laryngol Otol* 1990; 104: 352–354.
3. Hessian H, Strauss M, Sharkey F E. Urogenital tract carcinoma metastatic to the head and neck. *Laryngoscope* 1986; 96: 1352–1356.
4. Conley J, Arena S. Parotid gland as a focus of metastasis. *Arch Surg* 1963; 87: 757–764.
5. Hirshberg A, Buchner A. Metastatic tumours to the oral region. An overview. *Oral Oncol Eur J Cancer* 1995; 31B: 355–360.
6. Shimoyama T, Horie N, Yamada T, Ide F. Parotid lymph node metastasis from adenocarcinoma of the urachus. *Dentomaxillofac Radiol* 2000; 29: 185–188.
7. Horii A, Yoshida J, Honjo Y, Mitani K, Takashima S, Kubo T. Preoperative assessment of metastatic parotid tumors. *Auris Nasus Larynx* 1998; 25 (3): 277–283.
8. Li Y, Yang Z Q, Ye H, Qi L, Hu J W. Application of (18)F-FDG PET/CT imaging in diagnosing bladder tumor metastasis lesions. *J Huazhong Univ Sci Technolog Med Sci* 2013; 33 (2): 234–237.
9. Jecker P, Hartwein J. Metastasis to the parotid gland: is a radical surgical approach justified? *Am J Otolaryngol* 1996; 17 (2): 102–105.
10. Bron L P, Traynor S J, McNeil E B, O'Brien C J. Primary and metastatic cancer of the parotid: comparison of clinical behavior in 232 cases. *Laryngoscope* 2003; 113 (6): 1070–1075.
11. Krenqli M, Pisani P, Pia F. Exclusive radiotherapy of parotid metastases. Results in 14 cases. *Radiol Med* 1993; 86 (5): 684–686.
12. Weichselbaum R R, Hellman S. Oligometastases revisited. *Nat Rev Clin Oncol* 2011; 8: 378–382.
13. Niibe Y, Hayakawa K. Oligometastases and oligo-recurrence. *Jpn J Clin Oncol* 2010; 40: 107–111.
14. Karam S D, Snider J W, Wang H, Wooster M. Survival outcomes of patients treated with hypofractionated stereotactic body radiation therapy for parotid gland tumors: a retrospective analysis. *Front Oncol* 2012; 2: 55.
15. Karam S D, Snider J W, Wang H et al. Reirradiation of recurrent salivary gland malignancies with fractionated stereotactic body radiation therapy. *J Radiat Oncol* 2012; 1 (2): 147–153.