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Case Report

A rare occurrence of a metastatic urothelial carcinoma to the thoracic vertebra: A case report

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ABSTRACT

Background: Urothelial carcinoma (UC) is a common urinary tract malignancy that predominantly affect the urinary bladder with a low recurrence rate after surgical removal. It usually metastasizes to the lungs, regional lymph nodes, and liver. However, it rarely spread to the thoracic spine and bones, especially in the Asian populations.

Case presentation: A 50-years-old Asian man, with a one-year history of surgically resected UC, presented to us with a complaint of worsening upper back pain for three months. Magnetic resonance imaging (MRI) showed a destructed second thoracic (T2) vertebra with lytic lesion. A thoracic vertebrectomy was performed and histopathological examination (HPE) showed high-grade infiltrating metastatic malignant UC. Postoperatively, he was well and did not have any back pain. He was followed up under combined spine and oncology clinic regularly and was planned for chemoradiotherapy.

Discussion: UC commonly metastasizes to the lungs, liver, and lymph nodes. In young Asians, thoracic spinal metastases are rare. Urgent palliative spinal surgery is indicated to prevent further deterioration of function. Intraoperative usage of targeted controlled infusion (TCI) of remifentanil and propofol as maintenance of anaesthesia are gold standard in assisting spine surgeons who are guided by neuromuscular monitoring.

Conclusion: Spinal metastasis to the thoracic vertebra is rare among young Asian men. Patients presented with acute neurological deficits and back pain are indicated for spinal surgery. Multidisciplinary approach is needed for management of patients with spinal metastasis. Targeted controlled infusion (TCI) of remifentanil and propofol are gold standard for maintenance of anaesthesia for spine surgeries which are guided by somatosensory, and motor evoked potential monitoring.

1. Introduction

Urothelial carcinoma (UC) is a common urinary tract malignancy in the Western countries [1]. However, its occurrence among young Asian populations, is extremely rare. In addition, patients who present with upper back pain for advanced UC which spinal metastasis is very uncommon.

We herein discuss about a young Chinese man who had completed chemoradiotherapy for recurrent UC, presenting to us with instability upper back pain. An urgent MRI showed a destructed T2 vertebra with lytic lesions. An elective vertebrectomy of T2 was performed, of which the HPE showed metastatic UC. We discuss the overview of UC, its metastatic clinical manifestations, management options, anaesthetic considerations and prognosis. This work has been reported in line with the SCARE criteria [2].

2. CASE PRESENTATION

A 50-year-old-man (Weight = 75kg, height 1.64 m, American Society of Anaesthesia ASA = 2), with underlying hypertension, presented to our centre with complains of upper back pain for the past three months which was localized at the thoracic area and radiating to the anterior chest. It was on and off in nature and relieved by rest and oral analgesics. However, the pain worsened for the past one month which was

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aggravated by doing heavy work and not relieved by analgesics. It was not associated with chest pain nor shortness of breath. Otherwise, he did not complain of any neck pain, neurological deficits, painless hematuria bowel nor urinary incontinences. He also denied having any history of trauma, fever nor close contacts with patients with active tuberculosis. However, his past surgical history was very significant of urothelial carcinoma (UC) which metastasized to the left kidney. He safely underwent left nephron-ureterectomy one year ago. Histopathological examination (HPE) findings from this previous surgery, showed malignant urothelial cells with papillary and exophytic appearances which were suggestive of invasive high grade recurrent UC. He was commenced on chemoradiotherapy for 6 cycles with regular oncology follow up. The patient denied any family history of malignancies.

On clinical examination, he was pale with no other significant physical findings detected. Spine and neurological examinations were normal; however, he had complained of severe radiating pain, with a score of 7/10, to the upper anterior chest which corresponded to T2 level. His blood pressure (BP), heart rate (HR) and oxygen saturation (SpO2) of 135/72 mmHg, 74 beats per minute and 97% respectively. His airway assessment was unremarkable with Mallampati of 2 and adequate thyromental distance.

Biochemical investigations showed he was anaemic with haemoglobin level of 9.1g/dl (normal range: 12.5–15.5 g/dl). The blood urea and creatinine levels and liver function tests were within normal ranges. A Magnetic Resonance Imaging (MRI) of the spine showed single-level T2 vertebral body metastasis with epidural extension but no spinal cord deformation. There were concomitant severe T2 spinal canal stenosis, cervical spondylosis and degenerative disc disease from the third till the seventh cervical vertebra (C3–C7) levels. There were no radiological masses seen on the neck or chest (Figs. 1 and 2). Contrast enhanced computed tomography (CT) thorax, abdomen and pelvis showed new lesions in the segment VIII of liver, pancreatic tail, bilateral adrenals, and urinary bladder. However, there were no regional lymph nodes nor prostate enlargement were visualized. His sputum acid fast bacilli (AFB), chest X-ray and Mantoux tests were negative for TB.

The provisional diagnosis for our patient was recurrent metastatic UC to the T2 spine (T2NxM1).

Due to his worsening back pain, he was planned for posterior spinal instrumentation and fixation (PSIF) of C7-T4 with en bloc vertebrectomy of T2 guided by somatosensory evoked potential (SSEP) and motor evoked potential (MEP) monitoring. The patient was fasted 8 hours prior to surgery. His antihypertensive medication namely amlodipine 10mg was served with oral midazolam 7.5mg as anxiolysis on the morning of surgery. In the operating theatre, he was initially placed supine with regular anaesthetic monitoring, namely non invasive blood pressure (NIBP), electrocardiogram (ECG), pulse oximetry and temperature probe. His 18G intravenous (IV) cannula on the right upper limb was flushed to ensure patency. A preload of 250ml normal saline was administered over 30 minutes prior to induction of anaesthesia. Anaesthesia was induced with targeted controlled infusion (TCI) remifentanil and propofol, without muscle relaxants. Oral intubation using flexometallic endotracheal tube (FM ETT) size 8.0mm was gently and successfully inserted. It was anchored at 20cm from the incisor. An invasive arterial and femoral central venous line was cannulated on the right radial artery and femoral vein, respectively for intraoperative monitoring. The patient's airway pressure (AP), tidal volume (TV) and Oxygen saturation (SpO2) were 19–22cmH20, 420–500ml and 99–100% respectively during prone position.

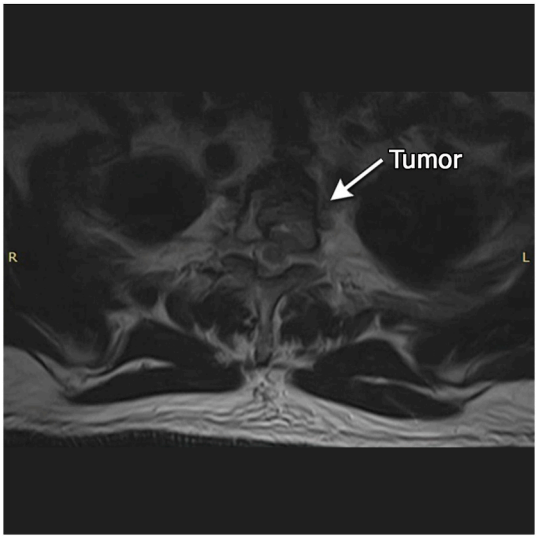

Fig. 1. MRI spine axial cut showing tumor at the T2 vertebra body.

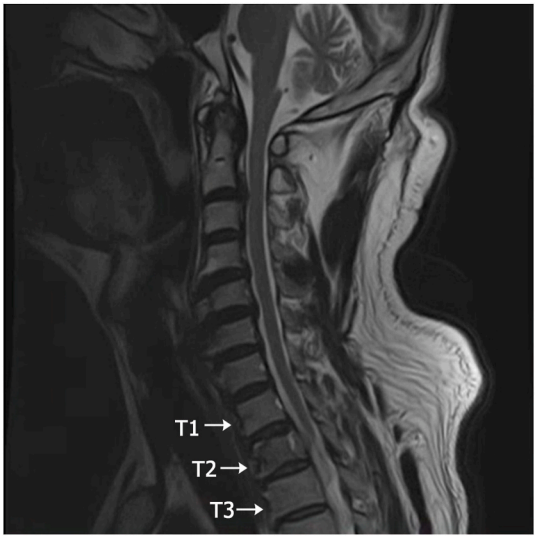

Fig. 2. MRI spine sagittal cut showing lytic lesion at T2 vertebra.

Intraoperatively, his BP and HR were stable. Anaesthesia was maintained using TCI remifentanil and propofol in the ranges of 4–6.5ng/ml and 5-8mcg/ml respectively supplemented with oxygen of inspired oxygen (FiO2) of 40%. No muscle relaxants were used throughout the surgery to facilitate SSEP and MEP monitorings. However, bleeding was estimated at 3.8 L and he required 4 pints of packed cells, 4 units of fresh frozen plasma and 4 units of platelets transfusion. En bloc resection of T2 was done through single posterior approach, tumor was successfully delivered in single piece under continuous SSEP and intermittent MEP monitoring with normal signal throughout the surgery. Implant was then carefully inserted and secured safely without any complications. Total duration of anaesthesia and surgery was 10 and 9 hours, respectively. He was successfully extubated at the end of surgery and was sent back to the ward with patient controlled analgesia (PCA) morphine 1mg/ml.

On second post-operative day, he was well and complained of tolerable back pain. He was put on regular chest and limb physiotherapy to ensure muscle strength. The patient was discharged 4 days later to home. The HPE report showed fragments of bony tissue being infiltrated by malignant cells and invading the underlying bone stroma in lobules, trabeculae and glandular patterns, suggestive of metastatic lesion from bladder. Two weeks later, our patient underwent a transurethral resection of bladder tumor (TURBT). The HPE confirmed the presence of high-grade infiltrating UC into the muscularis propria of the bladder neck and cuff.

Upon clinic review three weeks later, he was well and did not have any back pain. He was followed up under combined spine and oncology clinic regularly and was planned for chemoradiotherapy.

3. DISCUSSION

Urothelial carcinoma (UC), also known as transitional cell carcinoma, is one of the commonest urinary tract malignancies in the United States and Europe [1,3]. It commonly affects urinary bladder and about 5% will affect the renal calices and ureter. UC occurs commonly in the elderly age group with men is twice at higher risk than women [4]. Risk factors that predispose to UC includes cigarette smoking, exposure to carcinogens such as benzidines and 2-naphthylamine which are commonly found in textile dye and rubber chemicals [5]. Common signs and symptoms of UC include painless hematuria, dysuria, frequency and urgency, apart from constitutional symptoms such as loss of weight and appetite.

In a study by Hsieh et al., in 2015, the metastatic rate of UC is 10.1% [6]. It commonly metastasizes to lymph nodes, liver, lungs, and peritoneum via the lymphatic system. Sengelov et al. mentioned that UC predominantly metastasize to the bone in 35% of the cases in the West, with the spine being the commonest site at 40% of all bone metastases [7]. However, in Asian countries, UC rarely metastasizes to the spine, occurring at about 15% [8,9]. Commonly, the lumbar spine is more affected than the thoracic, cervical and sacrum. Spine metastasis in UC often present with cord compression, spinal instability, intractable tumor pain hence leads to poor quality of life [8], which hinder the commencement of radiotherapy and chemotherapy [10].

A multidisciplinary team (MDT), which consist of experienced senior spine surgeons, urologists, anesthesiologists, radiologists, psychologists and medical oncologists, is required in the management of a thoracic spinal metastasis [11]. The patient should understand regarding the underlying condition, long term prognosis and the treatment options available. A whole-body MRI should be performed to locate distant metastases, especially to the trachea and mediastinum which may cause critical airway stenosis that may complicate intubation and ventilation [12,13]. Non-surgical management, which consists of chemo-radiotherapy, hormonal and high steroid therapy, are applied for patients with no spinal instabilities nor neurological deficits [14].

Surgical options, such as metastatectomy, laminectomy with fusion and decompression, are usually palliative in nature for patients presenting with intractable pain, neurological dysfunction, and spinal instability [15]. For solitary spine metastatic lesion with no other distant metastasis such as in this patient, excisional surgery is recommended, hence we did en bloc resection of the T2 vertebra. Once the histopathological examination (HPE) findings are available, the patient should be referred to the oncologists for chemoradiotherapy. The median overall survival for excisional and palliative surgery are 14 and 12 months, respectively. Overall survival for individual who received post-operative chemotherapy are slightly better than those who did not, at 15 months vs 10 months, respectively [16,17]. The recurrence rate for patients with primary bladder tumor is 2–6% to develop upper tract UC after surgical treatment. However, patients with upper tract UC have 15–50% risk of developing bladder tumor after 2.1 years of resection, as seen in our patient [18]. Patients are usually followed up using intravenous urogram (IVU) or whole body CT scan.

Our patient is extremely unfortunate in several aspects, namely, he is a very young Asian man who developed UC with T2 metastasis. Secondly, despite having completed radiotherapy one year ago, the UC recurrence with T2 metastasis was extremely rapid as contradiction to an article mentioned by Milojevic et al. [18,19]. This might be due to factors such as poor surgical excision of tumor borders, poor surveillance mechanisms or the nature of the UC itself. He presented with intractable pain due to epidural extension of the lesion and thus the need for an urgent PSIF, of which he successfully underwent. Special anaesthetic attentions for this surgery in prone position includes dislodgement of the ETT, the usage of TCI remifentanil and propofol to provide adequate depth of anaesthesia to allow intraoperative SSEP and MEP monitoring, cardiorespiratory embarrassment, and massive haemorrhage due to fragile tumor tissues.

4. CONCLUSION

UC is a common urinary tract malignancy affecting the elderly with higher preponderance in the male, smokers and associated with chemical dyes. Spinal metastasis to the thoracic vertebra is extremely rare especially among young Asian men. Patients presented with neurological deficits and severe intractable back pain are indicated for palliative spinal surgery. Multidisciplinary approach is needed for management of patients with spinal metastasis. Judicious intraoperative anaesthetic and surgical preparations are needed to avoid severe complications. Targeted controlled infusion (TCI) remifentanil and propofol are gold standard for maintenance of anaesthesia for spine surgeries which are guided by somatosensory, and motor evoked potential monitoring.

Declaration of competing interestCOI

There is no conflict of interest in our manuscript.

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There are no funds received for this manuscript.

Author contributions

Dr Boon Tat Yeap and Dr Chin Pei Bong were the clinicians and co-authors for this manuscript.

Dr Kai Ming Teah, Dr Shankaran Thevarajah and Dr May Zaw Soe were co-authors for this manuscript and assisting in data collection.

Ethical approval

This case report does not need any ethical approvals.

Registration of research studies

Name of the registry.

Unique Identifying number or registration ID.

Hyperlink to your specific registration (must be publicly accessible and will be checked).

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Guarantor

DR BOON TAT YEAP.

Provenance and peer review

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Patient's perspective

When I first found out that my back pain was caused by the cancer I had in the past, I felt really upset and that the world had repeatedly gone against me. It took me some time to calm myself and listen to the doctors' opinions. Fortunately, they were professional and explained to me what was going and what treatment was available. The confidence they had in me made me went for the surgery. Now, I am glad about my decision. I no longer have back pain and I can work like I used to and enjoy my time with my family. I am now very compliant to the chemoradiotherapy prescribed and hope that I will be able to lead a normal

daily life with my beloved family.

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