

Early surgical intervention for spinal infection in patients with malignancy requiring chemotherapy: report of two cases and review of the literature

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Abstract Advances in chemotherapy for various malignancies have contributed to the increased life expectancy of patients. If such a patient has a concurrent infection, his/her oncologist would hesitate to perform prompt chemotherapy owing to the risk of inducing sepsis. Therefore, the treatment of infection would have priority over initiating chemotherapy for the malignancy. We present a 69-year-old female with malignant lymphoma requiring prompt chemotherapy who also demonstrated spinal infection with *Mycobacterium tuberculosis* and a 66-year-old male with esophageal cancer who also demonstrated spinal infection with *Staphylococcus aureus*. Anterior debridement and interbody fusion were performed for both patients. One patient died of malignant lymphoma 4 years after surgery, and the other is still alive and has remained disease-free 4 years after surgery. Saving the life of a patient with malignancy would be difficult without prompt chemotherapy. Conservative treatment for spinal infection requires prolonged antibiotic treatment, and there is no guarantee that the spinal infection would be controlled only with antibiotics. Therefore, early surgical intervention would be an alternative option under such a condition.

Each author certifies that the Institutional Review Board of Faculty of Medicine, Tottori University has approved the reporting of this case report and that informed consent for participation in the study was obtained.

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Introduction

Spinal infection is a relatively rare condition and accounts for 2–16.7 % of all cases of osteomyelitis [1–4]. In developed countries, improved public hygiene has facilitated the control of spinal infections since the 1970s; however, several papers [4–8] have warned that the incidence of spinal infections has recently been rising again. One of the factors behind this has been reported to be the increased number of immunocompromised hosts such as patients undergoing chemotherapy for malignancy [8].

Recent advances in chemotherapy for various malignancies have contributed to the increased life expectancy of such patients; therefore, prompt chemotherapy is required as soon as a patient is diagnosed as having malignancy. If such a patient has a concurrent infection, his/her oncologist would hesitate to perform prompt chemotherapy owing to the risk of inducing sepsis, since the management of sepsis would be extremely difficult for a patient undergoing chemotherapy. Therefore, the treatment of infection would have priority over initiating chemotherapy for the malignancy.

Surgery for spinal infection is generally indicated under the following situations: (1) in cases demonstrating spinal cord compression causing a neurological deficit; (2) in cases with significant deformity or with significant vertebral body destruction; (3) in cases refractory to prolonged nonsurgical treatment; (4) when a clinically significant abscess is present; and (5) to obtain a bacteriologic diagnosis when closed biopsy is negative [9]. When nonsurgical treatment is selected, prolonged antibiotic therapy is

recommended [9]. However, there is no guarantee that a patient will be cured by nonsurgical treatment.

We encountered two patients with malignancy requiring chemotherapy, who also demonstrated spinal infection, and performed early surgical intervention to avoid excessive delay in initiating chemotherapy.

Case reports

Case 1

A 69-year-old female was transferred to our hospital for possible surgical intervention for spinal infection. She first experienced lower back pain 5 months before transferring to our hospital, and then, her symptom deteriorated. She was taking acarbose for type 2 diabetes mellitus (DM). Imaging studies at a local hospital demonstrated vertebral body destruction of L3 and L4 (Fig. 1a, b) and abnormal mass of the right lung. She was transferred to the previous hospital 1 month before transferring to our hospital and diagnosed pathologically as having malignant lymphoma (diffuse large B cell lymphoma) of the right lung. *Mycobacterium tuberculosis* was detected from a specimen obtained at the L3–4 disk.

We were requested to perform early surgical intervention for spinal infection because prompt chemotherapy was required for malignant lymphoma. She underwent anterior debridement and interbody fusion between L3 and L4 with autogenous iliac graft combined with posterior fixation between L1 and L5 (Fig. 1c). Since there was a possibility

that infection would recur under myelosuppression after the introduction of chemotherapy, we did not place pedicle screws into the involved vertebrae. Semi-hard thoraco-lumbo-sacral orthosis (TLSO) was applied for 3 months. Thirteen days after surgery, she was transferred back to the previous hospital for chemotherapy. Four years after surgery, the patient died of malignant lymphoma.

Case 2

A 66-year-old male was referred to our department from the Department of Gastroenterological Surgery in our hospital owing to spinal infection. He was on insulin injections for type 2 DM. Eight months before this consultation, he was diagnosed as having esophageal cancer (squamous cell cancer: cT4N0M0) and then received definitive chemoradiotherapy. This regime was effective and his cancer had disappeared on radiology. Thereafter, he had to continue receiving chemotherapy regularly, and the next chemotherapy was planned to be initiated soon. His laboratory data did not show any myelosuppression. Imaging studies demonstrated vertebral body destruction of L2 and L3, epidural abscess, and involvement of the posterior segment (Fig. 2a, b). The specimen obtained at L2–3 disk by computed tomography-guided biopsy demonstrated *Staphylococcus aureus*.

We were requested to cure spinal infection as soon as possible. However, his infection had spread to all three columns, and there was a concern that instability would occur even after rigid immobilization. Moreover, there was no guarantee that the spinal infection would be controlled



Fig. 1 Case 1 MRI with gadolinium enhancement before surgery (a) and sagittal reconstruction CT (b) taken at a local hospital demonstrated vertebral body destruction of L3 and L4. A plain lateral

film taken one year after surgery c showed anterior interbody fusion between L3 and L4 with autogenous iliac graft combined with posterior fixation between L1 and L5



Fig. 2 Case 2 MRI with gadolinium enhancement before surgery (a) and sagittal reconstruction CT (b) demonstrated vertebral body destruction of L2 and L3, epidural abscess, and the involvement of the

posterior segment. A plain lateral film taken 3 years and 6 months after surgery c showed that anterior interbody fusion was achieved between L2 and L3

nonsurgically. Therefore, we performed anterior debridement and interbody fusion with autogenous iliac graft between L2 and L3, and posterior debridement and bone graft (Fig. 2c). Since there was a possibility that infection would recur under myelosuppression after the introduction of chemotherapy for this patient, with both anterior and posterior involvements, we did not apply any instrumentation. Semi-hard TLSO was applied for 1 year. Four years after surgery, the patient is still alive and has remained disease-free. Furthermore, he can walk without any assistance.

Discussion

Generally accepted risk factors for spinal infection are conditions of systemic immunocompromise such as malignancy, DM, and long-term corticosteroid administration. Bone marrow from patients with malignancy undergoing chemotherapy often shows prolonged periods of drug-induced myelosuppression [10, 11]. Therefore, an oncologist would hesitate to perform prompt chemotherapy if a patient with malignancy had concurrent spinal infection. The first choice for spinal infection is nonsurgical treatment including the administration of antibiotics and immobilization [9]. However, there is no guarantee that the spinal infection would be controlled after the completion of such prolonged antibiotic treatment.

To our knowledge, there have been no previous reports describing the necessity of surgery for spinal infection in a patient with malignancy requiring prompt chemotherapy. Our patients developed spinal infection before initiating chemotherapy, but there have been many reports [10, 12–16] on spinal infections during chemotherapy. All authors treated their patients nonsurgically probably because chemotherapy could lead to myelosuppression, which involves a risk of recurrent spinal infection or other infection after surgery. Most papers did not provide detailed information on the duration of antibiotic use or the duration of refraining from chemotherapy; however, some patients required antibiotics for more than 1 year [13, 14]. Moschettoni et al. [10] reviewed spinal epidural abscess complicating chemotherapy in patients with leukemia. Their paper focused on infection developing after the introduction of chemotherapy, and they recommended that a spinal epidural abscess be surgically drained in all cases. Meanwhile, they indicated that standard guidelines for surgical management of these infections had not yet been identified. Generally, patients before initiating chemotherapy do not demonstrate myelosuppression; however, anterior debridement and fusion with autogenous iliac graft is a major invasive surgery compared with drainage of a spinal epidural abscess. Saving the life of a patient with malignancy would be difficult without prompt chemotherapy; therefore, early surgical intervention is an alternative option under such a condition after the assessment of the risks and benefits for a patient.

Choosing the treatment strategy for spinal infection in patients with malignancy is still challenging. Prolonged antibiotic treatment is required for spinal infection; however, there is no guarantee that the spinal infection would be controlled with such conservative treatment. Therefore, early surgical intervention would be an alternative option for patients with malignancy before chemotherapy to avoid excessive delay in initiating chemotherapy.

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