Author’s response to reviews

Title: Intravertebral cleft in pathological vertebral fracture resulting from spinal tuberculosis: a case report and literature review

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Author’s response to reviews:

I greatly appreciate both your help and that of the referees concerning improvement to this paper. We are sending the revised manuscript according to the comments of the reviewers. All changes to the manuscript are indicated in the text by highlighting

Reviewer 1:

Thank you for your affirmation of our paper.

Reviewer 2:

1. We are sorry that the patient's neurological deficit has not been described in detail. The patient experienced a delayed posttraumatic vertebral collapse with weakness of both lower limbs and progressive pain. According to American Spinal Injury Association (ASIA) grading criteria, the neurological function was rated as ASIA C. Minor changes had been made on Case presentation section, paragraph 1, line 5-8, page 2. Three months after surgery, the neurological function recovered to ASIA E. We added it in the Case presentation section, paragraph 4, line 4, page 4.

Initially, the patient was misdiagnosed as Kümmell’s disease with neurological deficits. We performed a one-stage posterior vertebral column resection and internal fixation for spinal cord decompression and reconstruction of spinal stability. To our surprise, caseous necrosis and inflammatory granulation could be seen in the surgically resected lesions. It was a pity that we didn't take a picture. We described it in detail in the Case presentation section, paragraph 2, line 2-13, page 3.

2. Intravertebral cleft (IVC) is commonly considered to be a sign of avascular necrosis in patients with osteoporotic vertebral compression fractures (OVCFs), and is a widely reported radiological sign associated with Kümmell’s disease. A few cases of IVC have been identified in patients with infection, multiple myeloma and cancer metastasis, which were similar to those observed in
OVCFs. In terms of IVC resulting from infection, several case reports suggested that the gas observed in vacuum phenomena may be produced directly by gas-forming organisms which was different from the pathogenesis in OVCFs. The distribution of IVC in tuberculosis spondylitis is uneven, bubble-like, even extends to the paravertebral soft tissue. However, in our case, IVC appears as a linear shadow on the X-ray image, near the upper endplate of the affected vertebral body. Unlike normal imaging characteristics about spinal infections or tuberculosis with endplate destruction or disc space narrow in plain radiographs, necrotic and reactive bone form in CT scans and adjacent vertebral bodies signal changing in MRI, the imaging features of IVC in this case are similar to those in OVCFs. We reported a case of IVC similar to Kümmell’s disease. We described it in detail in the Discussion section, paragraph 2.

3. Initially, the patient was misdiagnosed as Kümmell’s disease with neurological deficits. Preoperatively, we plan to perform a posterior vertebral column resection and internal fixation for spinal cord decompression and reconstruction of spinal stability for this patient. We explained why this approach was used instead of anything else in the Discussion section, paragraph 3-4. Considering the incidence of implant-related complications is from 14.3% to 21.6% in anterior reconstruction surgery for Kümmell’s disease. We chose a '3-D printed implant' for anterior column reconstruction and added advantage of a '3-D printed implant' in the Discussion section, paragraph 5. Different from individualized custom prosthesis, in this case, we used an ‘off-the-shelf’ (OTS) 3D printed artificial vertebral body. Based on preoperative 3D reconstruction of CT and MRI images, the artificial prosthesis was designed in conformity with the expected defects that may occur after the affected vertebral body resection. The OTS one could provide various models and sizes of prostheses to deal with different intraoperative conditions. Although the patient may be found to be tuberculosis during the operation, we still used the original surgical plan for debridement.