

Case Report

Utilization of pedicle screw and rod reconstruction system for treating sacral-lumbar defect after excision of sacral chordoma: a case report

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ABSTRACT

Introduction: Sacral chordoma is a malignant lesion that is hard to treat and almost always presents with patient's significant disability associated with neurological disturbance. The aim of treatment is often to remove the tumor as much as possible while maintaining healthy tissue as many as one's can. A usage of pedicle-rod system is still debatable for filling the stability after the excision of the sacrum.

Methods: We present a case of a 41-year-old patient came with chief complaint of pain on the buttock for quite a long time. On examination, there was a hard-palpable mass on the buttock area which causing pain on palpation. Patient was bedridden due to pain and loss of motoric function. We did a sacral-lumbotomy on this patient, definitely eliminating the whole sacrum and vertebrae L5. Afterwards, we construct the defect by using a pedicle-rod system hoping to maintain the stability.

Results: The tumor was successfully removed, together with some sacral nerve plexus and roots of lumbar nerve. After the surgery, the pain improved; however, the patient had defecation and urinal incontinence.

Conclusion: Utilization of pedicle screw that may provide stability is much needed. The patient may at least sit up straight after the surgery if the stability is achieved.

ABSTRAK

Pendahuluan: Chordoma sakrum adalah lesi ganas yang sulit diobati dan hampir selalu hadir dengan kecacatan signifikan pasien yang terkait dengan gangguan neurologis. Tujuan dari tatalaksana adalah untuk mengangkat tumor sebanyak mungkin dengan tetap menjaga jaringan sehat sebanyak mungkin. Penggunaan sistem pedicle-rod masih diperdebatkan untuk mengisi stabilitas setelah pemotongan sakrum.

Metode: Kami menghadirkan kasus pasien berusia 41 tahun yang datang dengan keluhan utama rasa sakit di pantat untuk waktu yang cukup lama. Pada pemeriksaan, ada massa yang teraba keras di area bokong yang menyebabkan rasa sakit pada palpasi. Pasien terbaring di tempat tidur karena rasa sakit dan kehilangan fungsi motorik. Kami melakukan sacral-lumbotomy pada pasien ini, yang secara definitif menghilangkan seluruh sakrum dan vertebra L5. Setelah itu, kami merekonstruksi defek dengan menggunakan sistem pedicle-rod dengan harapan menjaga stabilitas

Hasil: Tumor berhasil diangkat, bersama-sama dengan beberapa pleksus saraf sakral dan akar saraf lumbar. Setelah operasi rasa sakit membaik, namun pasien memiliki inkontinensia alvi besar dan urin.

Kesimpulan: Pemanfaatan sekrup pedikel dapat memberikan stabilitas yang sangat dibutuhkan. pasien setidaknya dapat duduk tegak setelah operasi jika stabilitas tercapai.

Keywords: pedicle-rod system, sacral chordoma, wide excision

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INTRODUCTION

Chordoma is a slowly growing tumor, thus making it a low-grade malignant bone tumor. It is locally aggressive and usually is hard to diagnose due to the nature of it. It is said that it arises from the embryonic remnants of notochord. It may arise at sacrococcygeal area (40-50%), base of the skull (35-45%), or in vertebral bodies (15-20%). It happens in the fifth to seventh decade of life. It is more common in male than female, almost two times fold.¹⁻³

As it is a slow growing tumor, it is almost all the time the tumor was found later. Early diagnosis is hard to achieve. Buttocks pain usually is the earliest sign although the mass is initially unpalpable. Defecation and/or urinary problem is often observed. Imaging is essential in order to approximate the volume of the tumor, thus better assisting in the future planning of treatment.⁴⁻⁹

The main treatment plan for this tumor is *en bloc* resection of the tumor, while maintaining intact important surrounding structures. Although much improvement has been done in recent surgical perspectives, blood loss, sacrifice of sacral nerves, and lumbo-sacral stability still possess a significant amount of challenge. Traditional radiation and chemotherapy are not options as the tumor is not sensitive to them.^{5,7}

Reconstruction after excision of sacral chordoma tumor remains a hot topic for debate even until today. The options are wide but whether it is worth is still not clear. Traditionally, reconstruction includes various combinations of rods, bolts, screws and grafts. It is not clear whether the reconstruction facilitates the postoperative rehabilitation.⁶⁻⁹

We present of a patient with diagnosis of sacral chordoma treated with total sacrectomy and excision of vertebrae body, augmented with a pedicle-rod system for reconstruction of the bone defect.

METHODS

A 41-year-old male came to visit our outpatient clinic with a complaint of pain on his buttock for the last 4 years. The pain was dull and radiating, at first it was intermittent, but not until the recent months the pain had become worst in intensity and frequency. He admitted that he once sought medical attention, was told to have a

sacral tumor, but refused to do surgery. That was around 8 months before the patient visited our clinic. He instead went to a masseur and was massaged for quite amount of time. The pain got worse and the patient decided to visit our clinic.

Upon examination, we saw the patient was bedridden, with a complete loss of both lower limb motoric function. He had been using a silicone catheter due to his inability to control his urinary tract. He also wore a diaper because of his defecation problem. During palpation, we found a hard-felt tumor on his buttock, approximately 20x15cm in size. The border was not clear, immobile, and with tenderness around visual analogue score level of 4 to 5.



Figure 1. A clinical picture of the buttock area of the patient. Diminished buttock line was observed showing a protruding tumor. From the lateral we can see that the tumor tends to be larger on the left side

On the x ray we saw a significant loss of sacral body from the anterior, posterior, and lateral projection. From the magnetic resonance imaging it was clear that there was a tumor on the sacrum region, large enough that there was a doubt on whether the tumor involved the guts or the bladder. The MRI also revealed that the tumor had extended to the lumbar area. Considering this in mind, we decided to later proceed with surgery with the help of digestive, urology, and spine surgeons. A core biopsy that previously done revealed that this patient had a characteristic of a chordoma.



Figure 2. Anterior-posterior projection of the lumbo-sacral x ray showed a lytic lesion mainly involving the sacrum area

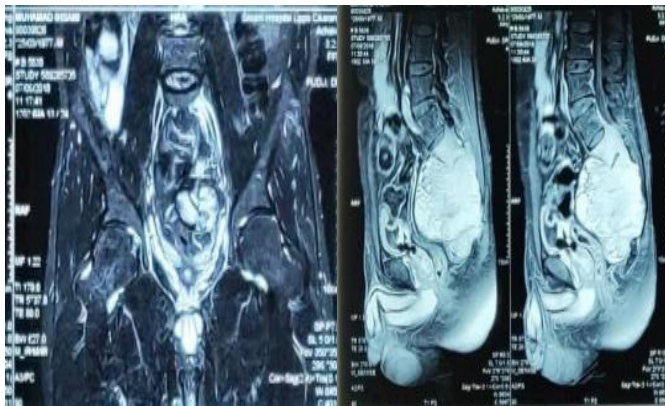
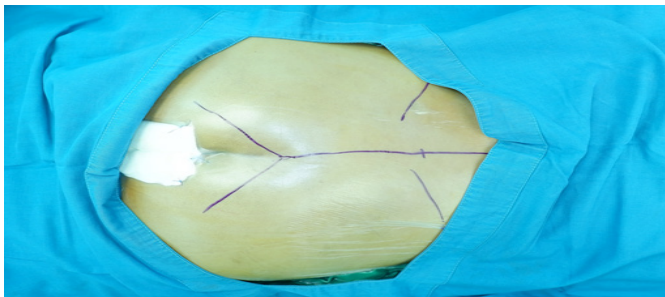
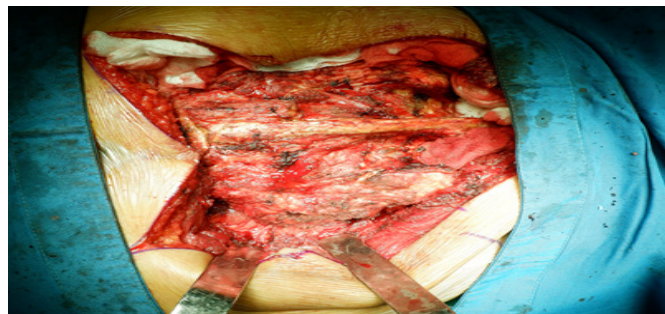


Figure 3. MRI of the patient showed a large tumor within the sacrococcygeal region infiltrating the surrounding area including the ascending vertebral body

We did a surgery with the steps as follows:



We positioned the patient on prone position, draped the lumbar and sacral area, and later designed as seen in the picture



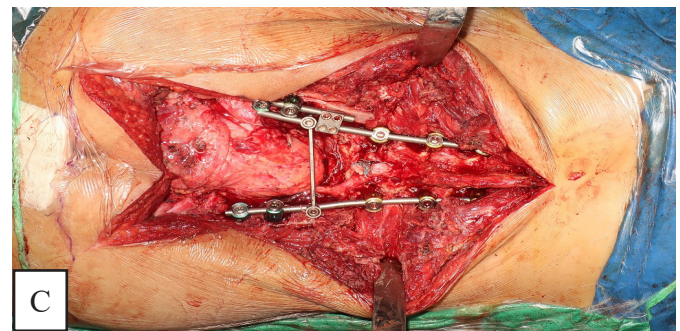
We exposed the tumor. Upon exposing, we found that the tumor had involved the lumbar-vertebral area, sacral nerve plexus and the roots of the lumbar nerves. We excised the sacrum, L5 vertebral body, the surrounding nerve, and retained the vascularity as many as we could. The guts and bladder, however, was not involved.



A. After removal of the tumor



B. On L2, L3, and L4, pedicle screws and rod system were used to fix the bone defect and then strengthened by ilios acral screws as connector bridges for additional fixation



C. Final construct

Figure 4. Step by step implementation of pedicle screws and rod reconstruction system for treating sacral-lumbar defect after excision of sacral chordoma

RESULTS

During the procedure, there was blood loss of around 2,800 cc. For hemodynamic monitoring, the patient was observed in the ICU for 3 days. The patient was transferred to the ward afterwards. The patient felt increased pain, the pain persisted and caused him to experience difficulty in moving his body. On the 7th day, the patient was allowed to go home.

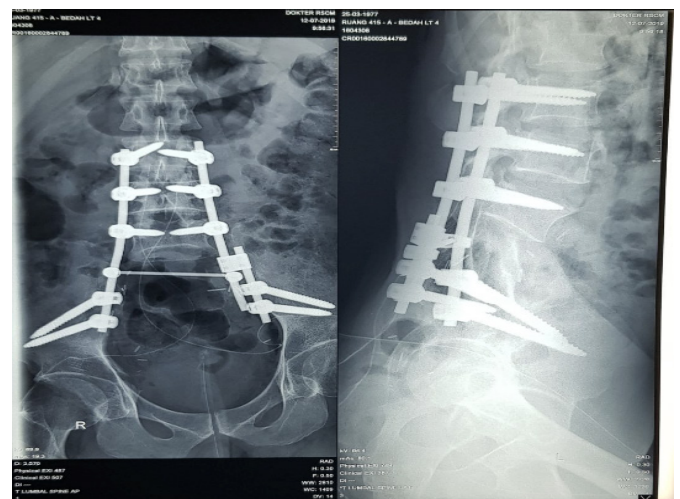


Figure 5. Postoperative X-ray

After 3 months follow up, the pain decreased eventually, but not as fast as we predicted. This was probably due to the sacrificed of the nerve due to the tumor infiltration. Strong analgetics and gabapentin were given to reduce the pain. The patient was able to sit on a wheelchair afterwards. There was no infection or dehiscence of the scar. However, the incontinence and muscle strength showed no improvement.

DISCUSSION

The mainstay of treatment for sacral chordoma is surgical removal as the tumor is not sensitive to chemotherapy or radiotherapy. It is essential to understand the dimension of the tumor and structures involved before planning the surgery.^{3,4} In this case, we had a patient with long-standing history of tumor that had already caused severe disability. His main concern was actually the pain that probably due to the destruction of the bone, compression of the nerve, or even inflammation surrounding the tumor. The patient was already dependent on a caregiver, which in this case, was his wife due to his inability to control defecation and urinary, and his paraplegia. However, the main indication for the surgery was not for the disability, instead it was for reducing the pain that had been disabling him for quite some time.

Complete initial removal in the first surgery is one of the main factors of success in cases of chordoma. Although many factors determine the type of tumor removal technique used, such as intralesional, marginal, wide or radical, it is widely believed that wide excision is the best choice in treating this kind of tumor. Several other determining factors may also deter the decision such as the estimation of blood loss, anatomical involvement, preservation of nerve roots, and many other technical and non-technical factors. The much feared complication is local recurrence, that may later cause a difficult curative resection in the next surgery.⁶⁻⁸ In this case, we chose to begin with wide excision by keeping in mind that the patient had already gain several disabilities and the surgery was not aimed to improve those disabilities. In our case, the blood loss reached almost 3,000 cc which was understandable considering the size of the tumor and the surrounding tissue involved.

The much debatable reconstruction issue is also one of the hottest topics in orthopaedic oncology. Several implants and techniques have been developed in order to support the motion, where a reconstruction is needed for

filling the after-defect. A study had concluded that after the amputation of the sacrum, the pelvis loss approximately 30% of their strength. However, several reports had stated that even if a pelvis loss 50% of its strength, it may still promote a person to at least stand up straight with a help from a device.^{11,12} Infection is one of the most fearsome complications after implantation of a device after a total sacrectomy. Wuisman *et al.*, stated that a reconstruction is highly dependent on the extent of the excision. He divided resection into four levels with the third and fourth level ultimately needed a reconstruction in order to promote pelvis stability. However, until now, multiple papers have produced no significant differences between the patients that had been reconstructed and those without any reconstruction.¹³

For our patient, we decided to do reconstruction by keeping in mind that the tumor was well extended into the lumbar area. We also hoped that after the reconstruction, the patient might be able to sit up straight and later on might be helped by rehabilitation. The infection was well avoided after a 3-months observation and wound tending. After 3 months, the patient was able to sit up straight with the help of his caregiver.

CONCLUSION

Reconstruction after amputation of sacrum for a tumor case may provide benefits for the patient. Careful assessment has to be done first in order to avoid unnecessary complications. Compromising the risks and benefits is up to the surgeon's preference while keeping in mind that each individual patient is not the same and should be treated accordingly.

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