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CASE REPORT

Minimally invasive strategy for gynecologic cancer with solitary periacetabular metastasis

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Available online 4 May 2012**KEYWORDS**cisplatin-loaded cement;
periacetabular bone metastasis;
reconstruction of hip joint

Summary Tumor with bone metastases to the periacetabulum is rare, and its surgical management is challenging. Instead of wide excision with reconstruction of the hip joint, we used a relatively noninvasive method to manage periacetabular metastasis. Such a procedure for this condition has the benefits of short surgical time, less bleeding, and fewer complications during surgery. Our surgical management of the case reported here included curettage, phenol cauterization and filling of cisplatin-loaded cement in order to reduce local recurrence. After following-up for 2 years, there was no local recurrence and disease progression.

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1. Introduction

Bone destruction in the acetabulum by metastatic tumor will cause hip pain and limitation of weightbearing. Harrington and colleagues¹ showed that hip reconstruction for periacetabular metastasis could improve functional status and reduce pain. The treatment of acetabular bone

metastases presents numerous clinical challenges including the necessity for careful patient selection for surgery, determination of the extent of bone destruction, and providing the patient with stable surgical reconstruction of the pelvis. According to the system of Enneking and Dunham,² pelvic resection for malignancy can be sorted out into three types by region: iliac wing resections (Type I), periacetabular resections (Type II), and anterior arch resections (Type III). After the publication of papers on wide periacetabular excision, several surgical methods were reported for reconstruction such as by recycled iliofemoral and ischiofemoral arthrodesis, acetabulum allograft, or saddle prosthesis.³

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Recently, we successfully treated a case of synchronous primary cancer of the ovary and that of the endometrium with acetabular metastasis with a newly developed cisplatin-loaded cement support surgery. Instead of wide excision and reconstruction of the hip, we filled the tumor lesion with cisplatin-loaded cement after curettage. After a 2-year follow-up, there was no local recurrence at or around the acetabulum. The hip joint was preserved with intact function.

2. Case report

A premenopausal woman aged 39 years presented to a local gynecologist with chief complaints of abnormal vaginal bleeding and abdominal discomfort for 1 month. There was no body weight loss, poor appetite, or dysmenorrhea. A transvaginal ultrasound was performed that revealed a right adnexal mass. The tentative diagnosis of ovarian cyst was made, and laparoscopic salpingo-oophorectomy on the right side was performed. During the operation, rupture of the right ovary with fluid accumulation at the cul-de-sac was noted and the histopathology reported serous adenocarcinoma of the right ovary. The patient was subsequently transferred to our hospital for further evaluation and management. No distant metastasis was found by an image study. Based on ovarian cancer with incomplete surgery, optimal debulking surgery was done, including hysterectomy, bilateral oophorectomy, salpingectomy, pelvic lymph node, para-aortic lymph node sampling, omentectomy and appendectomy. Grossly, residual tumor masses were completely removed from the cul-de-sac, uterovesical pouch, sigmoid, and transverse colon. The histopathology report showed endometrioid adenocarcinoma of the endometrium and left ovary with invasion into the uterine myometrium ($< 1/2$) and metastatic adenocarcinoma in the right pelvic wall, colon, and para-aortic lymph nodes. The cervix, fallopian tubes, and omentum were tumor-free. The patient was staged as having endometrial adenocarcinoma stage IC, Grade 2, and ovarian serous carcinoma, Stage IIIC. She was advised to receive adjuvant chemotherapy after the surgery with the regimens of Taxol (260 mg) and Abiplatin (110 mg).

Progressive right hip pain was complained of after the debulking surgery. The patient was able to ambulate but required an assistant device, especially at night. However, she did not pay attention to the pain at first. After nine courses of chemotherapy with a 3-week interval, the pelvic plain film revealed a suspicious lytic, expansile bony lesion (Fig. 1). The follow-up computed tomography (CT) scan indicated bony metastasis at the right periacetabular region (Fig. 2). CT-guided biopsy was performed, and the histopathologic examination reported metastatic tumor, well-differentiated adenocarcinoma. A whole-body bone scan disclosed bone metastasis to the right periacetabular region without other metastasis. Considering her age, performance status, and quality of life, palliative surgery was suggested mainly to relieve pain.

In evaluation of the tumor, magnetic resonance imaging examination was performed before surgery and showed a mass of about 3 cm in diameter without joint space involvement (Fig. 3). This was considered to be

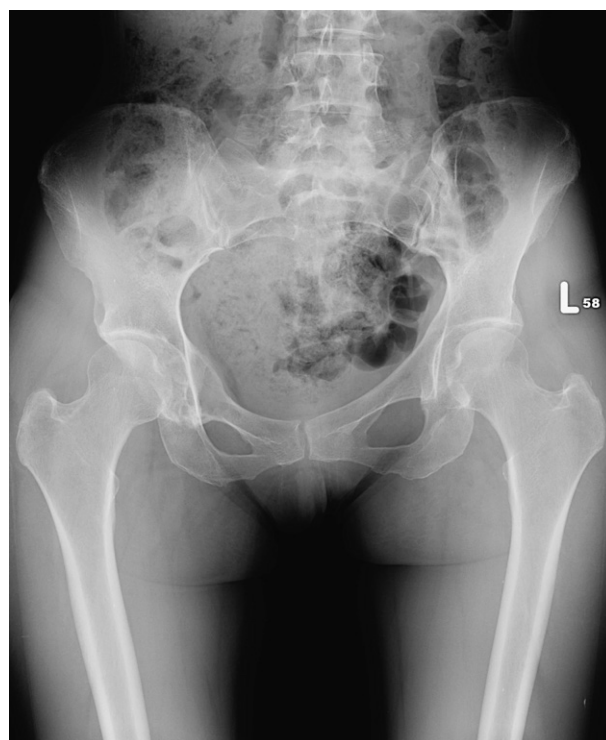


Figure 1 Bony expansile lytic lesion in the right periacetabular area.

a periacetabular metastatic tumor, which required wide excision including hip joint. However, the patient had undergone major gynecologic surgery and series of chemotherapy within 6 months, which made her weak and depressed, probably unsuitable for further major surgeries. After discussion with the patient, she agreed to undergo intralesional curettage with hip preservation, instead of a Type II resection of the pelvic bone. In a lateral position, the operation was performed through a posterolateral approach with a wound about 10 centimeters in length. At the lateral side of the acetabulum, we made a burr hole of 2 cm in diameter and executed adequate intralesional



Figure 2 Suspected bony metastasis in the right periacetabular region.

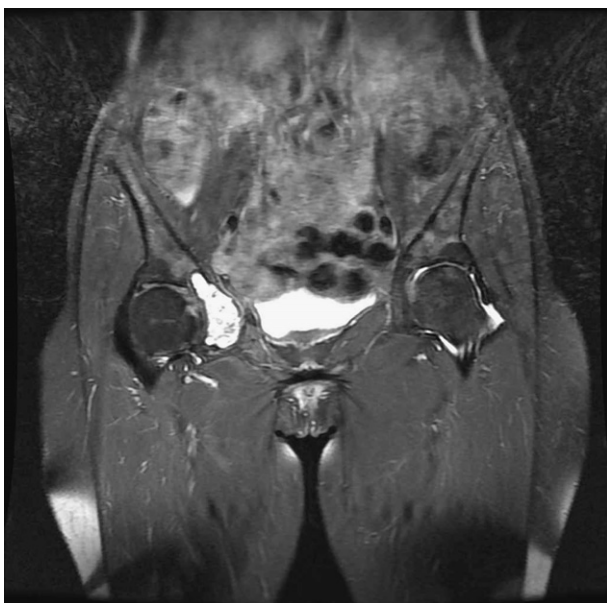


Figure 3 Metastatic tumor in the right periacetabular area.

curettage. The cavity was irrigated with a large amount of normal saline, and the free margin was cauterized by phenol. One package of cement (40 mg) (Howmedica, Mahwah, NJ, USA) was blended with cisplatin (50 mg/100 ml). As humidity lengthened the setup time from the liquid to the doughy phase, we added cisplatin drop by drop with persistent stirring from the liquid phase. The capacity of 40 mg cement is equivalent to about 30 ml of cisplatin (50 mg/100 ml). It took 10 minutes to reach the doughy phase and another 5–7 minutes to the solid phase. The progress was prolonged and yet smooth. In the doughy phase, the cisplatin-loaded cement filled the bone cavity created by curettage of the tumor. The neurovascular structures were left intact after surgery, without injuring the articular space. The skin-to-skin operative time was 80 minutes with a blood loss of less than 200 ml.

After the surgery, the pain at the hip was significantly relieved and, after 2 days, the patient recovered to complete weightbearing status, free of walking aids. Her general condition and wound condition were good and she was discharged on Postoperative Day 4. The adjuvant radiotherapy for local treatment with the total dose of 45 Gy in 28 fractions began 3 weeks later. Then, she was reviewed with surveillance radiographs every 3 months in the following 2 years (Fig. 4). Serial radiographs and clinical examination showed no signs of recurrence of disease (Fig. 5A and B). At her last follow-up on May 10, 2011, more than 2 years after the surgery, she had no residual pain and had a normal gait without the use of walking aids.

3. Discussion

There are three general principles for surgical treatment of metastatic bone disease: tumor removal, filling of the resultant bone defect, and bypass of the defect. For pelvic tumor, either primary or metastasis, surgical management

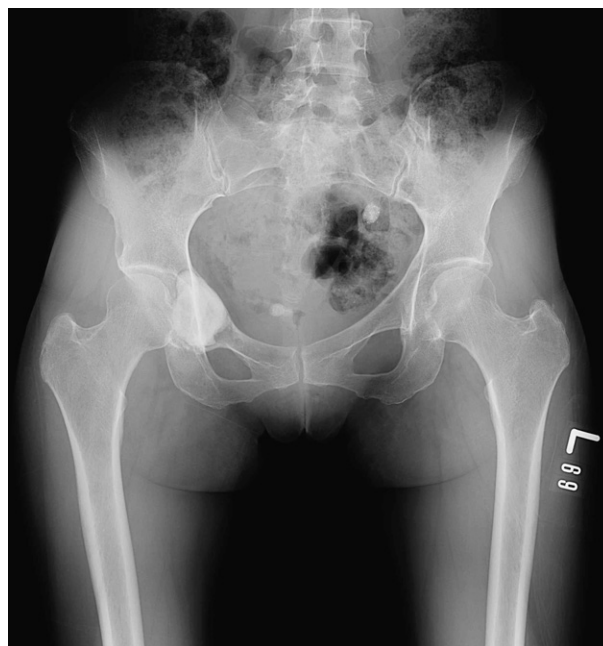


Figure 4 Postoperative plain film.

is challenging. The complexity of acetabular, pelvic bone anatomy, and the proximity of neurovascular structures can complicate the surgery. Type II periacetabular lesions are particularly difficult to treat, and their reconstruction results in a high incidence of mechanical complications. Besides, the reconstruction of the acetabulum is a major surgical procedure with a significant risk of complications.⁴ A retrospective review of surgical procedures for periacetabular metastasis shows that the average blood loss during the operation was 1600 ml in 43 patients and the bleeding exceeded 3000 ml in three patients with renal carcinomas.⁵ The complications of periarticular reconstruction included deep infections, superficial infections, wound complications, local recurrence, fracture, dislocations, rotational deformity, and even intraoperative mortality.⁶ The study also documented that the complication rate related to implants was 21.7%.⁷ A prospective multicenter study revealed that periacetabular endoprosthetic replacement was associated with acceptable functional and oncological outcome but a high complication rate owing, predominantly, to infection.⁸ The indication for hemipelvic prosthesis in patients with a metastatic disease must be considered seriously.

Instead of wide excision with reconstruction, in this case we designed an intralesional tumor excision to preserve the structures adjacent to the hip joint. To reduce local recurrence, phenol was used to cauterize the tumor margin and the defect was filled with cisplatin-loaded cement. Schiller and colleagues⁹ demonstrated that the recurrence rate was significantly lowered by using phenol following intralesional excision of nonmalignant bone tumors. Although there were no data on phenol management in malignant tumor, we assume the chemical cauterization effect of phenol is intended to destroy any remaining tumor cell remnants. Based on our hypothesis for reducing the local recurrence rate, phenol was used to cauterize the tumor margin.

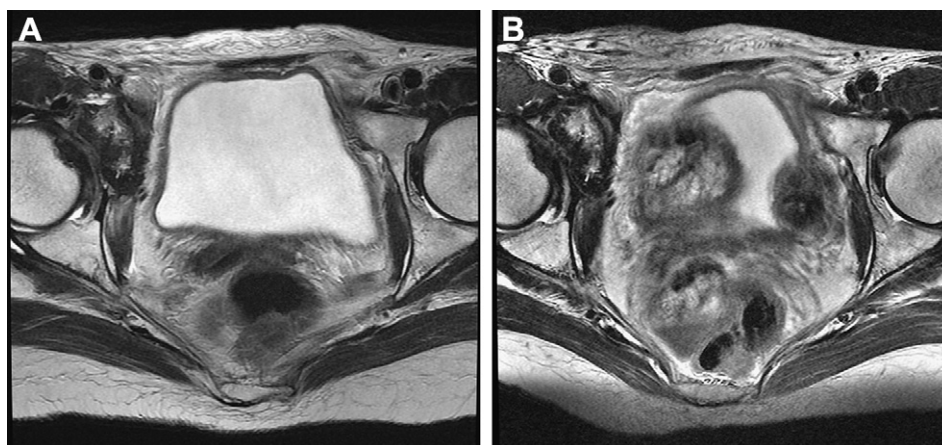


Figure 5 Magnetic resonance imaging follow-up on (A) July 7, 2010; and (B) January 23, 2011.

In recent years, calcium phosphate biomaterials have been used as bone drug delivery systems. Previous investigators described the use of bone cement containing antibiotics, and satisfactory results have been reported in the treatment of chronic osteomyelitis and post-operative infections.¹⁰ Recent study confirmed the potential of antiblastic-loaded cement as a possible adjuvant in the local treatment of bone metastases.¹¹ There are also some research studies^{12,13} that reported no changes in the stability and metabolic activity of antineoplastic agents (cisplatin, methotrexate and doxorubicin) during the heat polymerization of cement. Wasserlauf and colleagues¹⁰ demonstrated that cement pellets released these drugs slowly for up to 6 months *in vitro*; the release was greater in the first few days, rapidly declining with time. In *in vivo*, high levels of the drugs were recovered from blood drained from the operative wound of the rabbits, while very low levels of these drugs were found in the serum.¹⁴

According to previous studies, anti-neoplastic drug-loaded cement may be effective in the treatment of local tumor surgery and the improved delivery method may reduce the side effects that result from systemic administration of such drugs.¹⁴ As an adjuvant treatment, we used combined cement to fill the bone defect created by excision of the tumor and to release a local, high, and sustained concentration of antineoplastic agent to prevent the risk of recurrence. The drugs that were chosen are commonly used in the treatment of tumors frequently associated with bony metastases.¹¹ Since the tumor was gynecologic in origin, we selected cisplatin as our regimen of choice. In this case, 40 mg of cement blended with 30 ml of cisplatin prolonged the solid phase, but the solid cement remained in steady state.

Synchronous primary cancers of the ovary and endometrium have been reported in about 5 percent of women. There are only a few case reports describing bone metastasis in each cancer. The risk factors and clinical outcome of women with synchronous primary cancers differ with different histologic findings of the ovarian tumor. With the endometrioid/serous type, the prognosis did not seem favorable.¹⁵ Therefore, we used phenol cauterization and massive normal saline irrigation in the confined cavity to prevent tumor seeding. Cisplatin-loaded cement was also

applied, and adjuvant radiotherapy administered to reduce local recurrence. Although it is difficult to evaluate the effect of cisplatin-loaded cement, we believe it is beneficial for a patient, especially one with an advanced cancer that may be resistant to radiotherapy. It will be desirable to accumulate more cases for further research. However, it is worth noting that this method might be contraindicated in a patient with pathologic fracture that requires en bloc surgery.

4. Conclusion

A woman 39 years of age was diagnosed with acetabular metastasis and we treated her with minimal-injury surgery with preservation of the hip joint. In this case, cisplatin-loaded cement filling after curettage of the malignant periacetabular tumor proved to be a safe method. The advantages of the treatment include rapid rehabilitation, a short hospital stay, and favorable functional results with independent ambulation. This method appears to be an acceptable option in certain patients with periacetabular tumors.

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