

CASE REPORT

Combination drug chemotherapy and massive skeletal allograft in the management of hydatid disease of femur

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SUMMARY

Hydatid disease of long bone is a rare presentation. Chemotherapy and surgery constitute the standard treatment of choice. Non-union of a pathological fracture of femur particularly due to hydatid disease has been known to be resistant to treatment. These resistant cases require combination drug chemotherapy and excision of the lesion. Reconstruction of a large skeletal defect following resection of the lesion poses a challenge to the orthopaedic surgeons. We discuss the staged treatment of hydatid disease of shaft of femur with resection and cement spacer application followed by reconstruction using massive skeletal allograft under cover of combination drug chemotherapy.

BACKGROUND

Hydatid disease is a parasitic zoonotic disease, endemic in several areas of the world. The causative organism is *Echinococcus granulosus* and occasionally, *E. multilocularis*.¹ Visceral organs especially liver, lungs and kidneys have been reported to be the most common sites of involvement. Skeletal involvement accounts for 0.5%–2.5% of all human hydatidosis of which spine is the most common site followed by the pelvis and the long bones, especially femur.^{1–3} Clinical presentation is mostly asymptomatic. Radiological features are inconclusive. When symptomatic, it is characterised by pain and most commonly pathological fracture at presentation. Although, chemotherapy and surgery are the recommended treatment of choice, resistant cases are difficult to treat. Single-drug therapy may not be sufficient for disease control; hence, a combination drug therapy may be required. Curettage alone may not be adequate, and hence, an excision of the lesion may be necessary.

CASE PRESENTATION

A 25-year-old male sustained subtrochanteric fracture shaft of right femur (figure 1) due to fall from a height. There was no history of pain before the injury. Femoral interlocking nail (figure 2A) was done elsewhere. The follow-up X rays showed non-union of the fracture. In addition, there was progressive lytic lesion around the fracture site which was initially not appreciable in the X-ray (figure 2B). The patient was referred to our institute.

INVESTIGATIONS

MRI showed elongated cystic lytic lesion involving the upper one-third of the shaft of femur with hyperintense signal in the soft tissue over the antero-lateral aspect of the thigh. As the MRI findings was not conclusive, a bone biopsy was done. The histopathological examination revealed hydatid disease of the bone (figure 3).

DIFFERENTIAL DIAGNOSIS

- ▶ Malignant lesion like sarcoma
- ▶ Benign cystic lesion like myxoma
- ▶ Infection
- ▶ Lymphatic malformation with superadded infection
- ▶ Cystic metastasis.

TREATMENT

The patient was started on tab. albendazole 400 mg twice daily. Curettage and debridement with hydrogen peroxide, betadine solution and hypertonic saline followed by exchange nailing and cement spacer application were done. At 3 months, MRI was done which showed persistence of infestation. He was then put on combination drug chemotherapy (tab. praziquantel 300 mg once daily in addition to Tab. Albendazole 400 mg twice daily). In view of persistence of disease, excision of the lesion was carried out followed by cement spacer application (figure 4). Intraoperatively, care was taken to keep the margins grossly clear and no hydatid membrane be left behind. The bone marrow from either ends of the native bone was also sent separately for frozen section, which was reported negative. The excised mass was sent for histopathology which was consistent with hydatid disease of bone.

Reconstruction procedure

After a combination drug chemotherapy of 6 months, the patient was declared disease-free from radiological point of view as revealed by the MRI. In view of severe loss of bone segment, a reconstruction plan was made using a massive femoral shaft allograft. Combined spinal epidural anaesthesia was given and the patient was placed in a left lateral position. A 2.5 cm incision was given in the supra trochanteric region to remove the intramedullary nail. Lateral incision about 18 cm long was given over previous scar mark to remove the cement spacer. Thorough wash



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Figure 1 X-ray of right hip with thigh showing fracture at the subtrochanteric region.

was done using betadine solution, hydrogen peroxide and hypertonic saline. A step-cut osteotomy was made over the proximal and distal fragments of the host femur. A freeze-dried irradiated femoral shaft allograft was selected from the bone bank and prepared using betadine solution, hydrogen peroxide, normal saline and absolute alcohol. Femoral shaft allograft of about 14cm was prepared and matching step cut osteotomy was made corresponding to the step cuts in the host femur. The prepared allograft was placed bridging

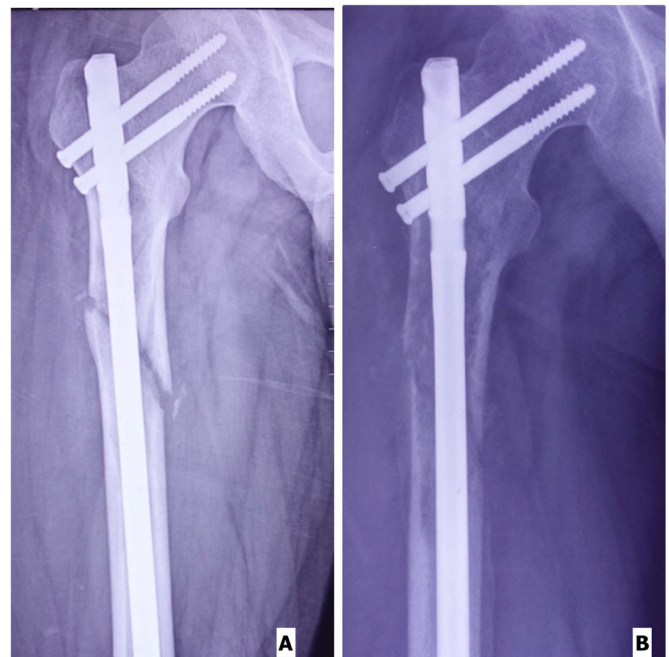


Figure 2 (A) Immediate postoperative X-ray of right hip with thigh showing reduced fracture with intramedullary nail in situ. (B) Follow-up X-ray of right hip with thigh showing non-union of fracture. Note the expansible lytic lesion around the non-union site.

the host bone matching the step cuts. Fixation was done using an intramedullary nail. As the femoral nail could not be pushed more distally in the host bone even with the smallest available diameter nail (probably due to mismatch in the femoral bow), a proud nail was accepted and locking done both proximally and distally (figure 5A). Wound closed in layers over a drain which was removed after 48 hours. Postoperatively, the patient was continued with combined drug chemotherapy for 6 months.

OUTCOME AND FOLLOW-UP

At 6 months, the patient was declared disease-free as revealed from the MRI. At the latest follow-up of 2 years, the patient is doing well. There is complete incorporation of the allograft

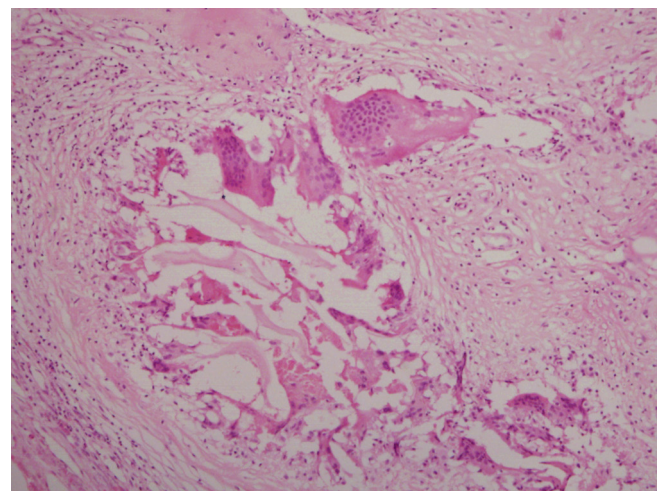


Figure 3 Histopathology showing acellular lamellated membrane of Echinococcus with dense foreign body type giant cell reaction around them (H&E stain, x40).



Figure 4 X-ray of right hip with thigh showing an intramedullary nail with cement spacer in situ.

with the host bone ([figure 5B](#)). There is no apparent limb length discrepancy and the patient is doing well ([figure 5C](#)).

DISCUSSION

The symptoms of bone hydatid cyst are non-specific and often misleading. Diagnosis of skeletal hydatid disease is challenging. Imaging studies are not very specific for diagnosis and often the diagnosis is suspected when the patient presents with pathological fracture. The eight-test battery



Figure 5 (A) X-ray of right hip with thigh with an allograft fixed with an intramedullary nail in situ. (B) X-ray of right hip with thigh showing full incorporation of the allograft into the host bone. (C) Standing scanogram of bilateral limbs with incorporated allograft in right thigh. There is no apparent limb length discrepancy.

for immunodiagnosis, though proved to be most sensitive and specific for alveolar and hepatic echinococcosis,⁴ is not commonly done for skeletal cysts because the disease in the bone induces less antibody response and is more difficult to detect by the common serological methods.¹ Accurate diagnosis is often made histologically only. Although, in cases with suspected echinococcosis, diagnostic biopsy or aspiration is contraindicated,⁵ in this case, it was carried as our first possibility was neoplasm and we were lucky enough not to have any hypersensitivity reaction. Hydatid disease of the bone is difficult to treat, often is recurrent and progressive despite treatment.^{6,7} Surgery is usually the treatment of choice combined with chemotherapy. Surgery involves debridement of the cyst, which may be intralesional, that is, curettage, or extralesional, that is, wide resection. Curettage is supplemented with application of scolical agents like hypertonic saline, hydrogen peroxide, betadine, etc. Curettage often leaves some residual disease which is responsible for recurrence. In this case, there was recurrence despite curettage, hence, wide resection was necessary to achieve local control. Even after surgical resection, the disease cannot be completely cured; hence, effective chemotherapy is of great benefit. Albendazole alone has been found ineffective in the treatment of hydatid cyst who are surgical candidates especially in cases where intraoperative spillage is expected. Hence, praziquantel was added. The combination chemotherapy has been found to be safe and effective in treating human hydatidosis.⁸ There is no clear consensus regarding the duration of chemotherapy before and after the surgery in case of bony hydatidosis. Although, there have been reports of no chemotherapy to monotherapy and/or combination chemotherapy ranging from few days to few months, we decided to go for prolong combination chemotherapy in view of recurrence. Further, the surgery was also

Table 1 Reported cases of hydatid cyst of femur treated by massive allograft

Authors	Disease location	Chemotherapy	Duration of chemotherapy	Surgical intervention	Follow-up	Result
Neogi <i>et al</i> ⁹	Femoral shaft	Albendazole	Twice daily for 4 weeks followed by a gap of 2 weeks and cycle repeated	Resection+femoral allograft	26 months	Full incorporation of the allograft
Jain <i>et al</i> ¹⁰	Iliac blade	Albendazole monotherapy	One month	Resection+allograft+ autograft (Rib)	6 months	No abnormality in radiology
Domingo <i>et al</i> ¹¹ (two cases)	1. Femoral diaphysis 2. Femoral metaphysis	No chemotherapy Albendazole	Preoperatively for 1 month and 6 months postoperatively	Femoral shaft allograft Allograft prosthesis composite of proximal femur	9 years 5 years	Excellent outcome Excellent result
Current case	Femoral shaft	Albendazole+praziquantel	6 months preoperatively+6 months postoperatively	Femoral shaft allograft	2 years	Excellent result

Learning points

- ▶ Hydatid disease of bone is rare and difficult to treat.
- ▶ Combination drug chemotherapy is preferred to monotherapy if the response is not seen early, that is, in resistant cases.
- ▶ Excision of the mass is preferable to curettage to eliminate the disease in accessible sites.
- ▶ Large skeletal defect can be managed with massive allograft.
- ▶ The authors recommend aggressive approach for hydatid disease of bone in the form of combination drug chemotherapy along with excision of the mass.

planned in stages to reduce the recurrence rate and prevent the failure of reconstruction. Resection left a massive bone defect which was filled up with cement spacer in first stage. Reconstruction of such massive defect was another challenge as the autograft would be insufficient to bridge the large defect. In addition, the multiple graft site comorbidities were of concern, as the patient would require the fibula as well as both the iliac crest autografts to fill up the defect. Furthermore, the strength of the graft would significantly delay the weight bearing in the patient. Hence, the reconstruction was carried out with massive skeletal allograft. Although, the use of allograft has its own potential risk of infection and disease transmission, and, complications like non-union and fracture of the allograft, the size of the defect and age of the patient suited the use of skeletal allograft. There are very few reports of the use of massive skeletal allograft for reconstruction of bone defects after wide resection for hydatid disease of the femur which are summarised in table 1.⁹⁻¹¹ Current case report further strengthens and supports the use of a massive skeletal allograft as a reliable reconstructive procedure after extensive bone resection for osseous hydatid disease.

Contributors DG prepared the manuscript. RM is the chief surgeon and provided valuable inputs in drafting the manuscript. SD was responsible for the collection of data and preparation of draft.

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