Metastatic adenocarcinoma of Proximal Femur treated by Custom made Hip Prosthesis

Chandra Prakash Pal¹, Surabhi Gupta¹, Deepak Kumar¹, Pulkesh Singh¹

INTRODUCTION
A single space occupying mass in an adult is much more likely to be a focus of metastatic carcinoma [1]. In females, the breasts and lungs are the most common primary disease sites; approximately 80% of cancers that spread to bone arise in these locations [2]. In males, cancers of the prostate and lungs make up 80% of the carcinomas that metastasize to bone [3]. The remaining 20% of primary disease sites in patients of both sexes are the kidney, Gastro-intestinal tract and thyroid as well as sites of unknown origin[3]. A new bone tumor in the elderly is more likely to be malignant [4]. Metastatic bone tumors are much more common than primary tumors [5] and proximal femur is the most common site of involvement in the appendicular skeleton [6]. Pain, pathological fractures and hypercalcemia are the major sources of morbidity with bone metastasis [4]. Treatment goals aim to preserve function of the lower limb, eliminate pain and improve the quality of remaining life [6]. Treatment for bone metastasis is normally palliative [4]. An assessment of the risk of pathological fracture must be made by an experienced orthopaedic surgeon [4]. Lesions that do not represent a risk for fracture may be treated with radiation or by appropriate chemotherapy directed at the primary tumor [4]. Lesions that are regarded as a risk for pathologic fracture should be surgically stabilized on an elective basis before a fracture occurs [2]. The goals of surgery are to preserve stability and function of the musculoskeletal system as well as to alleviate pain [7]. Patients who were candidates for extensive femoral resection because of malignant tumor were long considered a high-risk group for limb-sparing procedures because of the extent of bone and soft-tissue resection, as well as the use of adjuvant chemotherapy and radiation therapy [8]. Hip disarticulation or hemipelvectomy was therefore the classic treatment for patients with large lesions of the proximal or mid femur [9]. Both procedures were associated with a dismal functional and psychological outcome [10]. The limb salvage

ABSTRACT
Introduction: Bone is the third most common site of metastatic disease. Treatment of metastatic tumours of proximal femur usually used to be either palliative in the form of radiotherapy and chemotherapy or a very radical in form of hemipelvectomy and hip disarticulation. Both forms of treatment were associated with dismal outcomes. Now with the technological advancement and refinement in surgeries a custom made hip prosthesis offers a much better treatment option to the surgeon and a good quality life to the patient.

Case presentation: We are presenting a case of metastatic adenocarcinoma of upper end of left femur with pathological fracture with a small primary in right lung treated with custom made hip prosthesis. Patient received chemotherapy for primary lesion and is doing well at 11 months of follow up.

Conclusion: This case is being presented on account of its unusual presentation and to give emphasis that in spite of metastatic disease, patient can be considered for limb salvage and megaprosthesis to improve his/her quality of life. This can be considered provided patient’s general condition permits and if only a single solitary metastasis is present.

Keywords: metastatic adenocarcinoma, prosthesis, radical intent, proximal femur

¹Dept of Orthopaedics, Sarojini Naidu Medical College, Agra -282002, Uttar Pradesh, India.

Corresponding Author:
Dr. Chandra Prakash Pal
Assistant Professor. Dept. of Orthopaedics, Sarojini Naidu Medical College, Agra -282002, Uttar Pradesh, India
Ph-09634031500
Email :- drcportho@gmail.com
calcium – 10.2 mg/dl. Plain radiographs of the affected part showed ill-defined osteolytic permeative pattern or moth eaten type of lesion with destruction of bone involving the diaphyseal and metaphyseal region of proximal femur and extension into the soft tissues (Fig. 1A, B).

Figure 1A, B: Pre-Operative radiograph of the patient showing permeative pattern or moth eaten type of lesion seen over the metadiaphyseal region of left femur with pathological fracture.

There was pathological fracture of femur at the distal margin of the tumor lesion with no periosteal new bone formation. The hip joint of the affected side appeared normal. Magnetic resonance imaging revealed a large expansile intramedullary osteogenic hypo intense vascular primary mitotic lesion of upper metadiaphyseal aspect of left femur with extra osseous extension of soft tissue in anterior and lateral myofascial compartment without any involvement of adjacent hip joint or neurovascular bundle.

Figure 2: Contrast enhanced CT Scan of thorax-showing mass lesion in the apical segment of right lower lobe.

Chest radiograph was showing a small ill defined area in right lower lobe. Contrast enhanced computed tomography scan of thorax was done to know about the nature of ill-defined opacity and it revealed a lobulated soft tissue density mass lesion measuring 26x30 mm noted in apical segment of right lower lobe. Mild adjacent pleural thickening is noted (Fig. 2).
Computed tomography guided Fine needle aspiration cytology from the lung lesion revealed adenocarcinoma. Ultrasound of whole abdomen was normal. Fluoroscopic guided needle biopsy of the femoral lesion revealed it to be a metastatic adenocarcinoma.

As patient was symptomatic due to metastatic lesion but not due to primary lesion so priority was given to metastatic site. The patient was planned for surgery, but as tumor was very vascular so to reduce the risk of bleeding at the time of surgery pre-operatively Radiotherapy was planned. Palliative Radiotherapy was given at a dose of 30 Gy in 10 fractions in 2 weeks with cobalt 60 in department of Radiotherapy of our institution to relieve pain and to reduce vascularization of tumor.

3 weeks after the completion of radiotherapy, hip was exposed by the postero-lateral approach extending the incision more distally. Careful dissection of the soft tissues was performed to avoid spilling of tumor cells. Wide local excision of the tumor was done. 17 cm of the affected bone including the head of the femur was resected out (Fig. 3). Involved soft tissues were also resected. First a trial of the prosthesis was performed and checked for stability. Then it was replaced by customised steel bipolar cemented proximal femoral mega prosthesis. The cut muscles were tied at the ports at the upper end of the prosthesis. Wound was closed over suction drain. High groin slab with abduction bar was applied. Stitches were removed on 12th post-operative day and patient was allowed to walk with the help of walker.

After operative procedure for bone lesion patient was planned for chemotherapy and Radiotherapy for primary lung lesion. She received 4 cycles of chemotherapy in the form of inj. Gemcitabine and Cisplatin intravenous on day 1 and day 8, q-3wks followed by radical dose of loco-regional Radiotherapy (60 Gy/30 fractions). There were no wound problems or any other complications. She completed her treatment in April 2011. She has completed 11 months of follow up and is totally asymptomatic, pain free and walks independently with support (Fig. 4 A, B).

DISCUSSION
Metastatic disease is the most common malignant lesion of bone [12]. Typically multifocal but renal and thyroid carcinomas are notorious for producing only a solitary lesion [13]. In our case patient presented with pathological fracture due to a solitary secondary bony lesion with incidental diagnosed lung primary. Treatment for bone metastasis is normally palliative [4]. An assessment of the risk of pathological fracture must be made by an experienced orthopaedic surgeon [4]. Lesions without a risk for fracture should be treated with radiation or by appropriate chemotherapy directed at the tumour [4]. Lesions with a risk for pathologic fracture should be surgically stabilized before a fracture occurs [2]. The goals of surgery are to preserve stability and function of the musculoskeletal system as well as alleviate pain [7]. When any patient presents with metastatic disease our intent of treatment is changed from radical to palliative; But in this case our intent of treatment was curative, because primary was a small lesion and only a single metastasis was present though patient was having pathological fracture but keeping in mind good general condition of the patient and no other metastatic lesion elsewhere, we started our treatment with radical intent. Most patients with metastatic bone disease survive for 6-48 months [9]. Our patient had a good general condition and life expectancy; she was only rendered immobile due to the pathological fracture. There are various possible constructive options to treat femoral bone loss are long-stem cemented or press-fit stems, impaction allografting, resection arthroplasty, allograft-prosthetic composite (APC) and proximal femoral mega prosthesis [14]. Most of patients with metastatic lesions to the
proximal femur respond well to radiation therapy [15]. Of the 5–10% of these patients who require surgery, the most common reason is pathologic fracture, followed by tumor progression and intractable pain [14]. Hip disarticulation or hemipelvectomy was therefore the classic treatment for patients with large lesions of the proximal or mid femur [9]. Both procedures were associated with a poor functional and psychological outcome [10]. Improved survival of patients with musculoskeletal malignancies, refinements in surgical technique and developments in bioengineering, has allowed the execution of limb-sparing surgeries in these extreme situations [10]. As a result, proximal and total femur resection have become surgical options in the treatment of primary bone sarcomas and metastatic bone disease [11]. Expecting a favorable outcome and to improve the quality of life of the patient we went for a limb salvage surgery in form of custom made hip prosthesis despite of it being a metastatic tumor. The justification for using proximal femoral replacement surgery with a one year mortality of 65% is debatable [9]. Wedin et al [16] reported 30% one year, 10% two years and 7% three years patient survival following surgery for proximal femoral metastases while Chandrasekhar et al [17] reported 35%, 20% and 10% as respective figures. In our case patient is fine at almost one year of follow-up and longer follow up will be needed to further comment of survival.

CONCLUSION:
In long bones, the most common site for metastases is the proximal femur. For lesions involving this region, osteosynthetic devices frequently fail, and for this reason, endoprosthetic reconstruction may be the optimal choice for treatment. Despite the metastatic lesion from lung primary limb salvage by using custom mega prosthesis is a good option in the management of these patients. Although the survival rate remains grim, the patients can benefit from an improved quality of life. Moreover, the psychosocial morbidity associated with disfiguring amputations can be avoided by extending the realms. High cost is a constraint.

CLINICAL MESSAGE
A palliative megaprosthetic replacement is a good option in cases of pathologic fractures secondary to metastatic adenocarcinoma. This will improve the patients quality of life for the remaining years, however cost is a constraint.

REFERENCES:
1. Keene JS, Sellinger DS, McBeath AA, et al. Metastatic breast cancer in the femur. A search for the lesion at risk of fracture. Clin Orthop Relat Res. Feb 1986;(203):282-8.
2. Quattrrocchi CC, Picciuichi S, Sammarra M, et al. Bone metastases in breast cancer: higher prevalence of osteosclerotic lesions. Radiol Med (Torino). Oct 2007;112(7):1049-59
3. Edwards J, Src kinase inhibitors: an emerging therapeutic treatment option for prostate cancer. Expert Opin Investig Drugs. 2010 May;19(5):605-14.
4. Vinholes J, Coleman R, Eastell R. Effects of bone metastases on bone metabolism: implications for diagnosis, imaging and assessment of response to cancer treatment. Cancer Treat Rev. 1996 Jul;22(4):289-331.
5. Scutellari PN, Antinolfi G, Galeotti R, Giganti M. [Metastatic bone disease. Strategies for imaging]. Minerva Med. 2003 Apr;94(2):77-90.
6. Ward WG, Spang, Howe D. Metastatic disease of the femur, Surgical management. Orthop. Clin. N. Am. 2000; 31: 633-45
7. Walter J Curran Jr. Effective treatment strategies for bone metastasis, symposium proceedings, Baltimore July12, 2006, Jon Hopkins advanced studies in medicines.
8. Capanna R, Guerra A, Ruggieri P, Biagini R, Campanacci M. The Kotz prosthesis in massive osteoarticular resections for bone tumors: preliminary results in 27 cases. Ital J Orthop Traumatol. 1985;11:271–81.
9. Johnson ME, Mankin HJ. Reconstructions after resections of tumors involving the proximal femur. Orthop Clin N Am. 1991;22:87–103.
10. Lewis MM, Chekofsky KM. Proximal femoral replacement for neoplastic disease. Clin Orthop. 1982;171:72–9.
11. American Cancer Society. Cancer Facts and Figures, 2010. Atlanta, Ga: American Cancer Society; 2010
12. Stoll, B, Parbhoo S. Bone Metastasis, Raven Press Books Ltd., New York, NY, 1983, p. 14. 3
13. Enneking WF, Shirley PD. Resection-arthrodesis for malignant and potentially malignant lesions about the knee using an intramedullary rod and local bone graft. J Bone Joint Surg. 1977;59A:223–35.
14. Mankin HJ, Fogelson FS, Thrasher AZ et al. Massive resection and allograft transplantation in the treatment of malignant bone tumors. N Engl J Med. 1976;294:1247–55.
15. Horowitz SM, Glasser DB, Lane JM, Healey JH. Prosthetic and extremity survivorship after limb salvage for sarcoma. How long do the reconstructions last? Clin Orthop. 1983;293:280–6.
16. Bauer HC, Wedin R. Survival after surgery for spinal and extremity metastases. Prognostication in 241 patients. Acta Orthop Scand 1995, 66(2):143-6.
17. Chandrasekhar CR, Grimer RJ, Carter SR, Tillman RM, Abudu A, Buckley L. Modular endoprosthetic replacement for tumours of the proximal femur. J Bone Joint Surg Br. 2009 Jan;91(1):108-12.

Conflict of Interest : NONE
Source of Funding : NONE