Limb Salvage in a Fungating Osteosarcoma; don't give up when it's worth trying. A case report and Literature review

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Limb Salvage in a Fungating Osteosarcoma; don't give up when it's worth trying. A case report and Literature review

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Abstract:

Introduction: Osteosarcoma is the most common primary malignant bone tumor affects the limbs. Osteosarcomas are most commonly located in the metaphysis of long bones, especially around the knee in the distal femur or proximal tibia. Osteosarcoma is managed by neoadjuvant chemotherapy, surgery and adjuvant chemotherapy. There are 2 types of surgery: limb salvage and amputation. The location and size of the tumour, extra-medullary extension, existence of metastasis, preliminary tumour necrosis, age and skeletal development are the selection criteria for the type of surgery. Limb-salvage surgery refers to the surgical procedure to restore bone and joint function after extensive resection of malignant bone tumors of the limbs. Nowadays, Limb salvage with neoadjuvant chemotherapy is the preferred option for osteosarcoma management by most surgeons.

Case presentation: a 19 years male present to the orthopaedic clinic complaining of pain and fungating swelling with offensive odor for six months in his left proximal tibia. On physical examination knee movement was restricted. Biopsy was obtained and revealed patient had osteosarcoma. Patient underwent neoadjuvant chemotherapy and limb salvage surgery.

Clinical discussion: limb salvage surgery was good option to maintain patient limb, to improve patient quality of life, maintain psychological status of the patient and had higher 5-year survival rate more than amputation. Limb salvage surgery also maintains the function of the limb.

Conclusion: limb salvage surgery was better than amputation in preservation of limb function, psychological status and quality of live. Not any fungating tumor for amputation.

Keywords: Osteosarcoma, Fungating, Limb salvage.

Introduction:

The limbs are the principal locations of osteosarcoma, which is the most frequent primary malignant bone tumor in children and adolescents.(1) The majority of osteosarcoma cases have genetic changes in TP53, specifically TP53 inactivation and RB inactivation. Osteosarcoma is derived from bone-forming mesenchymal cells.(2) The metaphysis of long bones, particularly the distal femur or proximal tibia around the knee, is where osteosarcomas are most frequently found. The prevalence of osteosarcoma is bimodal, peaking at ages 18 and 60, and is slightly more prevalent in men.(3) With survival rates of 20% to 30%, osteogenic sarcoma was formerly treated with amputations to control the gross disease. However, it has lately been made clear that the optimum therapeutic strategy for osteogenic sarcoma is the introduction of neoadjuvant systemic chemotherapy followed by a surgical procedure to remove the malignant regions and adjuvant chemotherapy that has improved the survival rate to 70%–80%. (4) Surgical procedures for limb salvage have been performed for more than a century for primary bone sarcomas of low or moderate grade. In the past decade, advances in adjuvant and neoadjuvant treatment, in diagnostic imaging, and in the surgical techniques for reconstruction of limbs have led to serious consideration of limb-salvage surgery for most patients who have osteosarcoma, the most common high-grade sarcoma of bone.(5)

Whereas most of the cases that underwent surgical elimination of osteosarcomas alone with no chemotherapy died within a year of diagnosis as the lung became metastasized with a median time of 10 months, providing a comparatively rapid endpoint for surgery.(6,7,8,9) However, chemotherapy alone cannot be taken as a treatment methodology to cure this rare and noticeable malignancy. Nowadays, the best line of treatment for osteogenic sarcomas is enough cycles of chemotherapeutic drugs like doxorubicin, cisplatin, and methotrexate followed by surgical removal of tumour. The location and size of the tumour, extra-medullary extension, existence of metastasis, preliminary tumour necrosis, age and skeletal development are the selection criteria for the type of surgery. Limb-salvage surgery (LSS) refers to the surgical procedure to restore bone and joint function after extensive resection of malignant bone tumors of the limbs. Nowadays, LSS with neoadjuvant chemotherapy is the preferred option for osteosarcoma management by most surgeons.(10)

Case presentation:

A 19 years old male, student, with no history of trauma, complaining of left proximal tibial pain, gradual onset, not radiated to any site, aggravated by movement and relieved partially by analgesia and associated with swelling for three months. He sought traditional treatment several times. After six months of his complained he came to our orthopaedic clinic with fungating limb, offensive odor. Systemic review was unremarkable, no history of similar condition, chronic diseases or hospital admission. No family history of similar condition and he was not smoker or alcoholic. Not known allergic to any medication, no chronic medication.

On physical examination patient looks ill, there was left knee discharge sinus, left quadriceps muscle wasting comparing to other site, patient demonstrate abnormal gait. The left knee temperature was high and the knee was tender. The left knee movement was restricted compared to other side.

Some investigations were requested. General investigations include CBC low Hg 8 gm/dl, ESR 83, CRP = 10, RFT (normal), LFT (increase ALP and LDH). Specific investigations include X-ray shows mixed lytic and plastic lesion and periosteal reaction, MRI shows heterogeneous proximal tibial lesion, soft tissue involvement, no skin lesion and no nerve involvement, CT chest revealed single right basal lung nodule approximately 1.3 cm and bone scan revealed right proximal tibial and right single basal lung nodule. Also biopsy was obtained and sent to histopathology study which revealed osteosarcoma. The patient planned to follow treatment protocol of osteosarcoma neoadjuvant chemotherapy, surgery and adjuvant chemotherapy. Patient received three cycle neoadjuvant chemotherapy and then planned for surgery.

Patient was planned for proximal tibia resection and applied in liquid nitrogen to eradicate the malignant cells. Then proximal tibia was recycled and filled with bone cement. Medial and lateral gastrocnemins flap,

skin graft and internal fixation with plate and screws were done. Infection occurred and skin sloughed, so debridement and full thick skin graft was done two times.

Patient became well and continued the chemotherapy. Two years later on the follow up he came with single lung nodule about 0.4 * 0.5 cm at the lower left loop and inguinal lymphadenopathy.

Patient was fit and no comorbidities, leg was saved and TNR was 10%. Now the patient was 5 years on follow up and he was stable, near normal knee range of movement and patient completed his university study and graduated as Accounter. Now he is officer in private institute.

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Follow up:

Patient went through follow up protocol of osteosarcoma, a visit three monthly in first two years, then a visit six monthly up to five years.

Then annually:

- Examination of local area and chest.
- CT chest + X-ray for proximal tibia.
- Bone scan.

Now patient complete his six years and quite well and near normal life.

Discussion:

Osteosarcoma is the most common primary malignant bone tumor, occurring mainly in children and adolescents, and the limbs are the main affected sites. [(1)] Osteosarcomas are most commonly located in the metaphysis of long bones, especially around the knee in the distal femur or proximal tibia, Osteosarcoma incidence is bimodal, peaking at 18 and 60 years of age, and is slightly more common in males.[(3)] Osteosarcoma was treated with amputations to control the gross disease with survival rates of 20%–30%, Later on it was clarified that the best management plan for osteosarcoma is the introduction of neoadjuvant systemic chemotherapy followed by a surgical procedure to remove the malignant regions and adjuvant chemotherapy that has improved the survival rate to 70%–80%, Nowadays, Limb-salvage surgery (LSS) with neoadjuvant chemotherapy is the preferred option for osteosarcoma management by most surgeons. [(10)]

LSS refers to the surgical procedure to restore bone and joint function after extensive resection of malignant bone tumors of the limbs, Limb-salvage treatment has become one of the standard treatment methods for patients with limb osteosarcoma, with 90% of patients undergoing LSS and a success rate of 60%–80%. [(13, 14)] We followed this plan in this case and the surgery was success.

Patients treated with limb salvage or amputation experience similar survival, local recurrence, and complications, but better function is achievable for patients treated with limb salvage versus amputation. Local recurrence and complications are more common in patients with limb salvage. [(11)] LSS results in higher 5-year survival rates and better survival, while not increasing the risk of local recurrence; this study provided more evidences to support limb salvage surgery as a considerable treatment of osteosarcoma patients.[(12)]

Lower limb reconstruction is more acceptable psychologically to patients with severe lower limb trauma compared with amputation, even though the physical outcome for both management pathways was more or less the same.[(15)] Our patient was very young because of that LSS was the plan choice for him; his psychological status was preserved and had a better function.

Joint-preserving reconstruction using frozen autografts yielded excellent function in patients with osteosarcoma. [(16)]In this study patients sent to neoadjuvant chemotherapy, applied the affected bone to liquid nitrogen and underwent joint-preserving reconstruction. The result: patient responded to chemotherapy and their surgeries were success, patients could bend their knee more than 90 degree and some of them achieved full range of movement. Our patient had the same plan and got the same result.

Treating osteosarcoma around the knee with limb-salvage surgery can preserve most of the knee's functionality. [(17)] In this study all patients were followed for 6-144 months (mean of 56.8 months), the overall 5-year survival rate was 61.8%, lung metastasis developed in 31 patients. [(17)] In our case most of the knee function was preserved, follow up was 5 years; during follow up patient came with small lung nodule. The flap transposition of the medial head of the gastrocnemius muscle can reconstruct the soft tissue defect, decrease the local complication rate and improve the clinical outcome of the limb salvage for the proximal tibia malignant tumor.[(18)] The flap transposition of the medial head of the gastrocnemius muscle can reconstruct the soft tissue defect, decrease the local complication rate and improve the clinical outcomes of the limb-salvage for the proximal tibia osteosarcoma. [(19)]

Transposition of the gastrocnemius muscle after resection of proximal tibial tumors can improve the local blood supply, cover the deep structures and prevent from the failure of limb-salvage operation due to wound

complications. [20] The unique vascularization of the gastrocnemius muscle (one pedicle to each head), the size of the muscle belly, the fact that it is situated in the dissection field and that its transfer does not affect the function of the spared limb too adversely, makes it particularly suitable for limb sparing procedures for sarcoma in the region of the knee and popliteal fossa, the medial head is the workhorse muscle flap for soft tissue coverage of knee endoprothesis and reconstruction of extensor mechanism, this decreases the rate of complications and improves the functional outcome, reconstruction of the soft issue defect improves wound healing, protects exposed deep structures and subsequently prevents wound problems, delays adjuvant therapy and secondary amputation. [21]

Conclusion:

Limb salvage surgery was better than amputation in preservation of limb function, psychological status and quality of live. Not any fungating tumor for amputation.

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No funding was received.

Ethical Approval

From future hospital IRB.

Consent:

Written consent was taken from patient to publish this case and photo.

Credit Authorship Contribution Statement

Dr. Hassan Mohammed Hassan Elbahri: orthopaedic surgeon, Conceptualization, Methodology, Resources, Project administration.

Dr. Hozifa Mohammed Ali Abd-Elmaged: orthopaedic surgeon, Conceptualization, review and editing.

Ahmed Eltayeb Ali Hassan: Methodology, assist in writing original draft.

Mahmoud Alballa Almahdi Alhag: Methodology, assist in writing original draft.

Research Registration

Not applicable.

Declaration of Competing Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

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