Out Come of Distal Tibial Malignant Tumor Treated With wide margine Excision Followed by Tibialisation Of Fibula.

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Abstract: Distal tibial tumor are not uncommon ,but reconstruction of distal tibial defect after resection of the whole tumor out with sound oncological margine ,is very difficult,because of ankle mortis.After resect distal tibial articular surface,its very difficult to reconstruct the ankle mortis. Distal tibialmegaprosthesis,is very costly,in our study we have done tibialisation of fibula,along with centralization of fibula and arthodesis of distal talofular joint ,further augmentation by distal tibial locking plate applied on bridge mode.

Gap bone defect is a major challenge. Its treatment has evolved over the years from amputation to limb reconstruction through vascularised graft, distraction osteogenesis and use of customized implants. Availability and affordability of these innovative techniques have always been an additional challenge in the developing resource poor countries. We report the use of Tibialization of ipsilateral fibula first suggested by Hahns in 1884 to bridge a gap of 12 cm in an 8 year old male,with segmental tibia loss from chronic osteomyelitis. We did an end to end transposition of the ipsilateralfibular into the tibia gap defect in a one stage procedure. This was after eradication of the infective process of osteomyelitis. He commenced partial weight bearing ambulation in cast at 3months and out of cast ambulation at 18 monthspost surgery. The transposed fibula was 75%tibialized at 18 monthspost surgery.

Conclusion: Fibular is a useful armamentarium in fillingsegmental bone defect.

I. Introduction

Primary malignant bone tumours of the distal tibia or the distal fibula are very rare. Amputation has been a standard surgical treatment with satisfactory functional results obtained using an appropriate prosthesis. As the surgery oflimb salvage has developed, reconstruction has been attempted using autograft, allograft, implanted prostheses and composites.(1-6) When the ankle is involved, limb salvage presents unique difficulties both in terms of biomechanics and soft-tissue coverage. According to Casadei et al,arthrodesis is the best reconstructive procedure for the ankle in patients for whom operation for limb salvage is indicated. Ankle replacement arthroplasty has been occasionally carried out in patients with advanced arthritis.(7-13)

Medial displacement of fibula with intact all muscular attachment with arthrodesis at talofibular junction,and augmentation with distal tibial anatomical locking plate in bridge mode helps in easy skeletal contruct and soft tissue coverage.After 3 month below knee cast immobilization and partial weight bearing from 3 months onwards help in hypertrophy of fibula.as other tarsal joint remain unaffected patient can bear weight easily.

We present six cases with distal tibial malignant tumor treated with excision and biological reconstruction by same side fibula with there follow up.

II. Material And Method

Between July 2012 and December 2016, at West Bengal six patients, three men and three women, with bone tumours of the distal leg had biological reconstruction. The mean age at the time of surgery was 26 years (11 to 46) and the mean follow-up 30 months (24 to 60). MRI was carried out on all patients after plain radiography to determine the extent of each lesion. Each patient had a bone scan, chest radiographs and CT of the lungs. The location of the tumours was the distal tibia in five patients and the distal fibula in one. Histopathological diagnosis was obtained by core needle biopsy under local anaesthesia; there were four cases of osteosarcoma, and two cases of small blue cell PNET. Alloosteosarcomas were stage IIb. Five patients with malignant tumours received neoadjuvant and adjuvant chemotherapy consisting of ifosfamide, doxorubicin and cisplatin. The final evaluation included oncological investigation, the recording of complications and the evaluation of the functional results, based on the system of the International Society of Limb Salvage (ISOLS). Regarding vascularised fibula, it works like a mother bone, anywhere it can do a miracle.

That’s why we planned for medialisation of ipsilateral fibula with out disturbing it’s muscle attachment.
Operative techniques

After proper clinical and all radiological study including metastatic work up we confirm histopathology by core needle biopsy under local anesthesia with only 3 to 5 mm scar in every case. Which help us during soft tissue coverage in final limb salvage operation. After 3 weeks of completion of neoadjuvant chemotherapy we plan for resection of the whole tumor out with proper safe margin through as per Kwaguchi barrier concept. We use to cut proximal tibia with 3 cm safe margin from bone marrow oedema caused by tumor as per T-1 image of pre neoadjuvant chemo. As articular surface act like a physiological barrier of tumor spread we dissect out the distal articular surface of tibia. We use to approach through anteromedial longitudinal incision. After proximal tibia cut we send frozen section of proximal tibial marrow. Then we progress to distal part for dissection. As soon as frozen section reports give negative margin we cut fibula 2 cm above the preplanned tibial cut. Then distal mortis disarticulate. We dig a square hole on the dome of talus, then mediallyised the fibula reconstruct the defect after Intramedullary incertion of fibula in the proximal cut margin of tibia.

![Figures 1-7](images1-7.png)
We further augment the construct with distal tibial anatomical medial locking plate in bridged mode. As there is only one remaining bone in distal part of leg hence soft tissue coverage became quite easy, even after put a locking plate medially. We use to put an negative suction drain every case for at least 5 days. After 2 weeks we remove stichs and put a short-leg cast for at least three months to resist atendency towards equinus. When the fibula is subjected to more than normal weight bearing stresses, it undergoes hypertrophy and becomes an integral part of static supporting architecture of the leg. Hypertrophy occurs more commonly when the is mechanically loaded \[23,24\]. Our rehabilitations schedule did not depend on hypertrophy of the fibula; patients progressed to full weight-bearing once there was radiological evidence of bony union. Hypertrophy was seen later after continued weight bearing. The morbidity of this procedure was low regarding frequency and type of reoperations. We were able to obtain adequate margins with primary closure of the skin in all our cases and did not encounter complications like wound dehiscence, deep infections and skin sloughing in any of our patients.

### III. Results

No local recurrence or distant metastasis occurred in any of our patients and all remain free from disease at the latest follow-up. The margin of resection was described as wide in three patients and marginal in the other three; histologic examination showed the margin to be clear in all specimen. Pain was minimal; no patient required analgesics during daily activities. Disturbance of gait was minimal; one patient used a cane for a lengthy walk. The overall functional score (Table I) was 24.2 (80.5%) with a range of 19 (63%) to 28 (93%). Complications occurred in one patient. The patient complained only of mild pain after extended periods of walking (H). Satisfaction to the treatment was excellent in 9 patients expressed

<table>
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<tr>
<th>Case No</th>
<th>Age</th>
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<th>Stage</th>
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<td>INFECTION</td>
<td>20</td>
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Fig-1 – Planning  
Fig-2,3 – Clinicoradiological Pic Of Distal Tibial PNET  
Fig-4,5- Resected Specimen And Surgical Defect.  
Fig-6—Talar Dome Preparation For Engagement Of Distal Fibula And Talofibulararthodesis.  
Fig-7 DTALP Augmentation  
Fig-8,9 –Post Op Pic  
Fig-10-fibular hypertrophy ..During wait bearing
Out Come Of Distal Tibial Malignant Tumor Treated With En Block Excision Followed.

IV. Discussion

Below-knee amputation has been the standard surgical procedure for malignant bone tumours involving the distal tibia and fibula.(19) Limb-salvage surgery was rarely considered for several reasons. It is difficult to obtain a wide margin of resection because of the limitations of soft-tissue coverage, but a below-knee prosthesis can provide very satisfactory function. With the help of advances in chemotherapy, such procedures in the distal tibial tumor. Among the many options of reconstruction, arthrodesis was regarded as best, providing excellent stability of the ankles and avoiding problems relating to prosthetic implantation. Casadei et al. (13) reported good functional and oncological results in 12 patients with malignant bone tumors of the distal tibia, treated by resection and arthrodesis without autogenous bone graft. Complications included infection, limb shortening, fracture, and failure. Bishop et al. (1) achieved success with a reconstruction using a vascularised free fibular graft for the treatment of malignant tumors in the distal tibia.

Over a period of five years we have treated nine patients with malignant tumors of the distal tibia and fibula, using this type of reconstruction in five of them. The principal concerns in the choice of limb-salvage surgery are the extent of soft-tissue invasion and the involvement of the distal blood vessels. The distal half of the tibia has few direct muscle attachments. If neither the posterior tibial artery nor the dorsalis pedis artery proved to be salvageable, amputation was carried out. Oncologically, all patients remain free from disease, although the resection was marginal in two and the response to chemotherapy was less than 80% in two patients with osteosarcoma.

The two disadvantages of this procedure are loss of movement at the ankle joint and a little leg length discrepancy in skeletally immature patients. Fortunately, distal epiphysis is not a major contributor to limb length, and the discrepancy is less than that seen around the knee. Moreover, they were well tolerated by our patients, without major disabilities. We encountered no donor site morbidity like motor weakness and flexion contracture of the toes, as muscles originating from the transferred fibula were left unreleased. The reconstruction of a large defect resulting from resection of a tumor has always been difficult. Arthrodesis with centralisation of the fibula is a relatively straightforward procedure, requiring no microsurgical expertise, giving durable and satisfactory functional results.
V. Conclusion

Limb-salvage surgery using a fibula has an acceptable functional outcome with clearance of the tumour in the medium-term analysis of six patients. Larger numbers and a longer follow-up are needed to evaluate the results of prosthetic reconstruction fairly. Careful patient selection with regard to emotional and...
cosmetic factors may justify this type of reconstruction. Distal tibial resection and biological reconstruction is very easy procedure with minimum complications and good long term follow up.

Declaration - No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.

References


