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GUEST EDITORIAL

Bone and soft tissue tumours are increasing in frequency in India. The critical function of the limb, the vascularity of the area, the propensity for distant metastasis, add to the complexity of this disease. The need for a multi-disciplinary team approach is evident.

The aim should be to treat these tumours aggressively and correctly at the first instance. And give adequate attention to limb salvage, without compromising survival by judicious use of chemotherapy, guided by genomic and other studies of this nature.

I am glad that the Orthopedic oncology department has taken the lead in bringing out the Newsletter of Orthopedic Oncology to share activities in this area with other clinicians.

Dr. B.S. Ajai Kumar, Chairman, HCG

ABOUT THE NEWSLETTER

The idea of the newsletter for orthopaedic oncology emerges from the need to share the changing trends in practice of orthopaedic oncology. It also presents a perspective for young aspirants who wish to pursue their interest in Orthopaedic oncology.

It seeks to share current best practices such as Multi-Disciplinary Clinics discussion, interesting cases, points to ponder on and includes a Journal Round up of interesting Orthopaedic reports.

It is an ongoing effort of the Orthopaedic Oncology Division of the Surgical Oncology Department of HCG. Feedback on this newsletter will be welcome (drpramods@gmail.com), and we will seek to continuously improve and update our efforts to be relevant.

You could send any interesting articles/reports with relevant learning for readers for publication in the newsletter. The newsletter will be widely circulated across the country and read by Oncologists, General surgeons, ENT-Head Neck Surgeons and Orthopaedic surgeons.
A Case Report

A Case of Osteosarcoma of Proximal Tibia in 10 yr Old Child with Resurfaced Auto graft-Prosthetic Composite for Proximal Tibial Reconstruction

Osteosarcoma (osteogenic sarcoma) is the most common malignant bone tumor in children and adolescents. The neoplasm is composed of a sarcomatous stroma and malignant osteoblasts that directly form tumor osteoid or bone. Although fibrous and cartilaginous elements may coexist or even predominate. The classic osteosarcoma develops in the medullary cavity of a bone, usually in the metaphysis of a long bone. The cause of osteosarcoma is unknown. The tumor is usually situated near the metaphyseal region of a long bone, but on occasion it may be diaphyseal in location. The most common sites, accounting for more than 50% of cases, are the lower end of the femur and the upper end of the tibia.

We report here a case of a 10 years old male child, who referred to us with swelling of left proximal tibia with night pain. This patient first presented to an Orthopaedic Surgeon for complaints of pain in the left proximal leg which is insidious in onset and gradually progressive six months back. The patient was diagnosed osteosarcoma following initial investigation and was referred to M S Ramaiah research institute for further management. Biopsy was done and diagnosed as osteosarcoma of proximal tibia and given 2 cycles of chemotherapy. As the patient had persistent pain patient came to HCG Hospital for further management. Patient slides and films were reviewed and reconfirmed the diagnosis and 3 cycles of chemotherapy was given. The patient was symptomatically improved. Later on --/--/-- patient was posted for Resurfaced of ECRT treated Autograft-Prosthetic Composite for Proximal Tibial Reconstruction and immobilization in A/K cast for 6 weeks.

HPE of the tumor revealed it to be Osteosarcoma of proximal tibia with tumor free margins.

Fig 1: intra-operative picture
Osteosarcoma of Proximal Tibia

Once the diagnosis of osteosarcoma has been made, the disease should be staged. The objectives of the staging workup are to establish the final tissue diagnosis, delineate the local extent of the tumor, and discover any distant metastases. Both radiologic staging and open biopsy should be done by the surgeon who will perform the definitive operation. The questions to be answered are as follows:

1. Is it a low- or high-grade tumor?

2. Is the tumor limited to the bone (intracompartmental), or has it spread to the adjacent soft tissues (extra compartmental)?

3. Is there evidence of metastatic spread to the lungs or other bones?

Carefully planned imaging of the lesion should precede open biopsy. If a needle biopsy is chosen, the surgeon should direct the placement of the needle in careful discussion with the interventional radiologist. Determining the local extent of disease after biopsy performed elsewhere is difficult and inaccurate because of the disruption of tissue planes, hematoma formation, edema, and wound healing. In choosing the proper surgical procedure, it is vital to know whether there are natural barriers to tumor extension. Is the lesion intracompartmental (bounded by natural barriers to tumor extension) or extracompartmental (with no proximal, distal, or peripheral barriers to tumor extension)? The vast majority of high-grade osteosarcomas are extracompartmental. During staging, the surgeon should meticulously assess the muscle compartment and the tumor’s proximity to neurovascular structures to determine whether limb salvage is feasible. Usually, the final decision is based on postchemotherapy MRI.

In the preoperative staging of osteosarcoma, the following diagnostic tests are performed: complete history and physical examination; CBC count with differential, ESR, and serum levels of calcium, phosphorus, ALP, and LDH; conventional radiographs of the tumor site and the chest; scintigraphy with technetium 99m; MRI to assess the intraossseous extent of the tumor, joint involvement, and the relationship of the soft tissue mass to adjacent neurovascular structures; and PET CT of the whole body to rule out metastases.

A pediatric oncologist, radiologist, and pathologist should be part of the treatment team from the beginning, taking part in the staging and subsequent decision making. The management of osteosarcoma requires a multidisciplinary approach, and patients should be treated in medical centers specializing in pediatric oncology.

Reconstruction of the proximal part of the tibia after tumor resection presents a challenge. Infection rates are high and technical difficulties abound: vascular anomalies are not uncommon and soft-tissue coverage options are limited. Providing adequate function requires restoration of the extensor mechanism.

Neoplasms in this area are troubling in children because of the proximal tibial physis that usually contributes approximately 30% of the limb’s growth. Should the reconstruction also affect the distal femoral physis, approximately two-thirds of the residual limb’s growth may be affected. Current options for functional knee reconstruction after intra-articular proximal tibial resection include modular megaprostheses, osteoarticular allografts, allograft-prosthetic composite, and, rarely, Van Nes rotationplasty. All of those reconstructions have to deal with the reattachment of the extensor mechanism and with the lack of soft-tissue coverage. In young children, the small size of the bone is another problem. One major limitation related to megaprostheses and standard composite devices is that both eliminate the otherwise unaffected distal femoral physis.

Osteoarticular tibial allografts do not affect the distal part of the femur and allow host-graft fixation with load transfer at the osteotomy site, but they are often infeasible in prepubertal patients because the small joint size does not allow for acceptable articular congruency, thereby increasing the risk for subchondral collapse and degenerative arthritis.

To obtain and maintain the potential advantage of osteoarticular allografts, we used an original technique, consisting of the use of a precision-matched rotating platform of an unconstrained tibial component of a total knee replacement system to resurface a proximal tibial allograft that is then fixed to the residual tibia by a plate. Polyethylene spacer trials are available in various sizes depending on the total knee replacement system used. These are matched to the exposed femoral condyles, and the appropriate size is chosen for optimal fit.
How I Do it. (The scalpel's edge)

Intraoperative

Post op X Ray
CASE REPORT: A 20yr old male presented with complaints of painful swelling over the right foot to Health Care Global hospitals, a tertiary care hospital specializing in cancer care.

Examination revealed a solitary tender swelling measuring 6.5cmX5cmX4.5cm stony hard in consistency, with presence of local rise of temperature. He was discussed in Orthopedic multi disciplinary clinic and advised chemotherapy and surgery.

Chemotherapy was started with systemic chemotherapy VAC/IE regimen, intra arterial chemotherapy with cisplatin, and radiotherapy 50Gy+16Gy. Amputation was advised. The patient refused amputation in view of his young age. Therefore, wide resection of tumor with free vascularised osteomyocutaneous flap from right fibula was done. Post operatively graft was taken up well (Figures8). Functionality of the limb gradually returned to normal. Post operative chemotherapy and radiotherapy was continued.

Two years later, he presented with similar complaints which was diagnosed as metastasis to cuboid. Wide resection of tumor with free vascularised osteomyocutaneous flap from left fibula was done. Post operatively chemotherapy and radiotherapy was continued.

An year later, follow-up PET CT showed internal development of metabolically active intramedullary deposits in right upper tibia, which was suspected to be metastasis to the tibia. He underwent wide resection with interlocking nailing for the same.

The patient is alive and doing well now, with good functionality of the limb.

CONCLUSION: Ewings sarcoma in the foot is a rare entity, accounting for about 2% of all sarcomas in the body. Slow growth of the tumor with delayed metastasis ensured good prognosis in the patient. Free vascularized osteomyocutaneous flap showed excellent acceptance and limb anatomy and function returned to normal.

REFERENCES

Abstract: An allograft-prosthesis composite in the proximal tibia combines the mechanical stability of a prosthesis with the biologic reconstruction of the extensor mechanism. This retrospectively reviewed 62 patients who had proximal tibia reconstructions with allograft-prosthesis composites to ascertain the complications and functional outcomes. By combining an allograft with a prosthesis, placing cement in the graft, and press-fitting the prosthesis in the tibial diaphysis, satisfactory Musculoskeletal Tumor Society scores in 90.4% of patients, with a 5-year survival rate (73.4%) comparable to that of reconstruction with a modular prosthesis. However, high infection rates (24.2%) and rotation of the medial gastrocnemius seemed not to reduce this complication. The ideal candidate is the young patient with a benign aggressive or malignant low-grade tumor who has not undergone previous surgery.

Editorial Comments: Most proximal tibial tumors have a high propensity for infection. Allograft prosthetic composite is a biological graft. The infection rate is therefore not reduced. We believe in HCG, that by using Extracorporeal irradiated graft, the infection rates would become less in properly selected patients.


Allograft-prosthesis composite (APC) can restore capsular and ligamentous tissues of the knee sacrificed in a tumor extirpation. Retrospectively compared 50 knee APCs performed with non-constrained revision knee prosthesis (Group 1) with 36 matched APCs performed with a constrained prosthesis (Group 2). In Group 1, the survival rate was 69% at five and 62% at ten years. Sixteen reconstructions were removed due to complications: eight deep infections, three fractures, two instabilities, one aseptic loosening, one local recurrence, and one nonunion. In Group 2, the survival rate was 80% at five and 53% at ten years. Nine reconstructions were removed: 3 due to deep infections, 3 to fractures, and 3 to aseptic loosening. In both groups, we observed more allograft fractures when the prosthetic stem does not bypass the host-donor osteotomy (p > 0.05). Both groups had mainly good or excellent MSTS functional results. Survival rate and functional scores and aseptic loosening were similar in both groups. A rotating-hinge APC is recommended when host-donor soft tissue reconstruction fails to restore knee instability. The use of a short prosthetic stem has a statistical relationship with APC fractures.

Editorial Comments: With advanced prosthesis now available, in adults, a good uncemented prosthesis with a rotated gastrosoleus achieves a better result. APC should be reserved for young children, where a growth may still occur.


Abstract: Although previous reports on composite biologic reconstruction in the proximal tibial location vary, we hypothesized that this type of reconstruction may reduce the late infection rate and have advantages in terms of longevity by restoring bone stock.

Methods: Primary analysis addressed differences between 62 tumor prosthesis (TP) and 25 pasteurized autograft prosthesis composite (PPC) reconstructions in terms of survival rates, functional outcomes, and temporal patterns of infection.

Results: The 10-year survival rates of the TP and PPC groups were 73.9 = 11.7 and 68.7 = 20.1%, respectively (P=0.64). Reconstructive failure occurred in 16(25.8%) in the TP and in 7 (28%) in the PPC group. The cause of failures in the TP group was infection (16), whereas those of PPC group were infection (5), loosening (1) and local recurrence (1). The mean functional scores of TP (52) and PPC (20) patients that maintained a mobile joint were 24.2 (81%) and 25.1 (83.6%), respectively. Infection rates in the two groups were similar (P=0.328), but infections occurred earlier in the PPC group (P=0.011).

Conclusions: This comparative study suggests composite biological reconstruction shows a comparable long-term.

Editorial Comments: As this article mainly focusses on use of patients own graft, and the biological matching. Note that structural matching would be better. Also infection rates would come down by not using the allograft.

Background: Reconstruction of distal femur or proximal tibia in growing patients is a challenge for the high rate of complications and limb length discrepancy at the end of growth. The purpose of this study was to evaluate the long-term outcome of children affected by high-grade osteosarcoma of the knee region, reconstructed by osteoarticular bone allograft of distal femur, and proximal tibia.

Methods: We retrospectively reviewed 25 patients treated for high-grade osteosarcoma. 13 in the distal femur and 12 in the proximal tibia.

Results: Five patients died during the first 2 years of follow-up for disease-related causes. Of the remaining 20 osteoarticular allografts (10 of the distal femur and 10 of the proximal tibia), 12 failed: 4 in the distal femur and 8 in the proximal tibia. All the failures were related to a graft fracture, but in 4 patients with subchondral collapse the graft was maintained and converted into an allograft prosthetic composite. No deep infection of the primary reconstruction was observed. The overall rate of allograft survival was 70% at 5 years and 58% at 10 years in the distal femur, and 45% at 5 years and 20% at 10 years in the proximal tibia. At final follow-up, 8 patients still walked on the primary implant, 6 in the distal femur, and 2 in the proximal tibia. The functional outcome of these patients was evaluated as good in 5 patients (3 with distal femoral and 2 with proximal tibial allograft), and poor in 3.

Conclusions: Although mechanical complications significantly affect the outcome, osteoarticular allografts may represent aviable option for reconstruction in children older than 8 with high-grade sarcomas about the knee.

Editorial Comments: As commented earlier, the younger children, in whom further growth is expected, would be best benefitted by APC reconstruction as compared to expandable prosthesis.
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Artist
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Title
Untitled

Media
Mixed Media on canvas

Size
72 x 36 inches

Year
2009

Courtesy
Swasti Art Gallery, HCG K.R.Road

Proceeds of the sale of this painting will be used for assisting poor patients.

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