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How to avoid the metal invasion? Non-prosthetic Management of Partial Acetabular Defects After Primary Malignant and Benign Aggressive Tumor Resection

Introduction:

Restoring anatomical and functional integrity of the acetabulum is one of the most challenging problems in orthopedic oncology. Depending particularly on the size and location of the defect and other systemic & local factors, the defect can be ignored. Ideally, the defect should be reconstructed to enable load transfer, to prevent dislocation and to preserve stability and mobility. This paper aims to present treatment outcomes of partial acetabular defects managed with biological techniques.

Patients and Methods:

We retrospectively reviewed 20 patients (M/F : 6/14), who were enrolled to a single institution's orthopedic oncology registry and underwent partial acetabular resection due to primary bone tumor between 1990-2014. The mean age of the patients was 23 (6-61) years and the mean follow-up period was 68 (13-217) months.. The pathology was Ewing's sarcoma (EWS) in 6 patients, chondrosarcoma in 4, aneurysmal bone cyst in 3, desmoid tumor in 2, giant cell tumor in 1, osteosarcoma (OS) in 1, synovial sarcoma (SS) in 1, eosinophilic granuloma in 1 and chondromyxoid fibroma in 1 patient. The pelvic resection type was 2+3 in 10 patients, type 3 in 5 patients, type 2 in 2 patients, type 1+2 in 2 patients and type 1+2+4 in 1 patient. The resultant acetabular defect was AAOS type IA (peripheral segmental) in 11 patients, type IV (pelvic discontinuity) in 5 patients and type IB (medial wall) in 4 patients.

All patients with Ewing's sarcoma underwent neoadjuvant chemotherapy. Five out of 6 patients with Ewing's sarcoma, who had reached skeletal maturity in the periacetabular region, also received full-dose radiotherapy (RT) to facilitate resection with minimal morbidity. Those 5 Ewing's sarcoma patients, who received both preoperative chemotherapy and radiotherapy, underwent intentional marginal resection, cryopreservation of the resected specimen and re-implantation with screws. Bone cement was used to augment the lytic parts in 2 of these patients. The pediatric patient, who did not receive neoadjuvant RT, underwent wide resection of the tumor core and the anteromedial acetabular defect was neglected.

The partial acetabular defect was neglected in two out of 4 chondrosarcoma patients while one of them underwent reconstruction with structural iliac autograft and one with polypropylene mesh. Three patients with aneurysmal bone cyst, 2 patients with desmoid tumor and 1 patient with synovial

sarcoma underwent resection with no reconstruction. Wide resection was attempted in one patient with non-responding osteosarcoma of the iliac bone and polypropylene mesh was used to reconstruct the acetabular dome in the setting of lumbopelvic fixation. One patient with chondromyxoid fibroma underwent wide resection and reconstruction with transposition of medial wall to the acetabular dome. Although the acetabular cartilage was still intact after curettage of giant cell tumor of bone in 1 patient, due to extensive loss of subchondral bone, this was accepted as a partial acetabular defect. Augmentation with bone cement and bridging K-wires was performed.

Results:

The oncological outcome at an average follow-up period of 66 months was evaluated as NED in 12 patients and AWD in 4 patients. Three patients (OS, EWS, SS) died of disease at postoperative 17th, 20th and 22nd months respectively following local recurrences and lung metastases. The mean MSTS score was 66,3 %(23,3-96,7). Six out of 20 patients underwent a mean number of 1,9 additional surgical interventions for the treatment of complications related to acetabular resection and reconstruction. Four out of 5 EWS patients, who were treated with cryopreserved bone, demonstrated delayed union, nonunion and degenerative changes in the hip joint. Degenerative changes and associated chronic pain were observed in a total of 5 cases in the whole group. Injury of urologic structures occurred in 3 patients. Treatment required open exploration, followed by nephrostomy, cystostomy and extended catheterization. Wound problem and subsequent deep infection was seen in 2 cases, which necessitated repeat debridements and extensive use of VAC device. Implants had to be removed due to sciatic nerve compression in 1 case, due to deep infection in 1 case and due to persistent joint pain in 1 case. Subtrochanteric osteotomy and lengthening with Ilizarov was done in 1 case with hip transposition, which caused leg length discrepancy.

Conclusion:

Every creative effort must be made to keep the femoral head contained in the native acetabulum in periacetabular tumor resections. Re-implantation of cryopreserved bony acetabular parts yield variable results but is a useful method considering the scarcity of satisfactory options. Although polypropylene mesh, is a synthetic tissue substitute, it behaves as a good biological reinforcement material. Risk of infection, neurovascular damage and urogenital system injury must be carefully assessed while planning reconstruction. Ewing's sarcoma and osteosarcoma patients were associated with unfavorable functional outcomes and greater number of complications. It must not be forgotten that the first goal is saving the patient's life, especially in pelvic OS and EWS cases where mortality is inherently very high. Although the sample size is small, chondrosarcoma patients seem to have more favorable outcomes in terms of complications, possibly due to absence of radiotherapy and chemotherapy. Small partial acetabular defects can be safely ignored with satisfactory functional outcomes.