Extended Curettage Combined With Liquid Nitrogen and Bone Cement Is An Effective Approach In Managing Recurrent Giant Cell Tumour Around The Knee Joint: A Retrospective Study.

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INTRODUCTION:
Giant cell tumor of bone (GCT) is a primary locally aggressive bone tumor that constitutes up to 20 % of benign bone tumors. GCT is characterized by its unpredictable behavior. Local recurrence rate has been reported to be 27-65 % with curettage, and as low as 6 % with wide resection, with no solid consensus about the risk factors for recurrence or the optimal mode of treatment. Studies focusing on the management of recurrent GCT are scanty and tend to heterogeneity as regarding location and mode of management.
In this study we represent a midterm follow up of cases with recurrent GCT around the knee joint who were treated in our institution by extended curettage using high speed burr, followed by liquid nitrogen as adjuvant and reconstructing subchondral bone with autogenous bone graft and filling the defect with poly methyl methacrylate (PMMA; bone cement).
Questions/purposes:
(1) What is the proportion of patients re-recurrence and time of occurrence by the end of the study period?
(2) What complications were observed in this series using this approach?
(3) What was the function of these patients as determined by Musculoskeletal Tumor Society (MSTS) score?
METHODS:
Between 2010 and 2022, we treated 64 patients of recurrent GCT around the knee joint in our institution. Preoperative histopathology was done for all patients. Of those, 13 patients were considered unfit for a re-do surgery due to extensive cortical extension or/and huge extra-osseous component; those patients were treated by wide resection and modular prosthesis. The remaining patients showed contained lesions amenable for revision surgery in the form of extended curettage with high speed burr, liquid nitrogen as adjuvant and polymethyl methacrylate (bone cement) for cavity reconstruction.
Surgical technique:
Extensive debridement of all suspicious soft tissue was done, with samples sent for histopathology and bacteriology.
We utilized extended curettage using high speed burr to enhance removal of any residual tissue. After that we utilized liquid nitrogen (LN) as adjuvant by the open pour technique. Gel foam was used to seal any cortical breaches and protect the soft tissues. Skin and soft tissue were protected by lap pads and irrigated with warm saline. Two freeze/thaw cycles were used. In cases where the residual subchondral bone was considered inadequate thickness less than 10 mm in the preoperative MRI or assessed intraoperatively), reconstruction of the subchondral zone with autogenous cancellous bone graft was done. This was followed by filling the resultant cavity with bone cement. We impacted thick K wires or cancellous screws into the cavity as structural support to alleviate the stresses within the cement mass.
Patients were assessed clinically and radiologically the proportion of patients experiencing local recurrence, time of recurrence, the occurrence of nononcologic complications, and MSTS scores.
RESULTS:
51 patients were included in the study: were 28 females and 23 males. Ages of cases at presentation ranged between 27 years and 48 years with a mean age of 34.6 years. After a mean follow up period of 88.4 months, all patients were fully weight bearing. Four cases (8%) got re-recurrences occurred at a mean of 33.5 months post-operatively (range: 27-40 months). Complication rate was 9.8%, all treated successfully without residual sequel. Mean MSTS score was 90.9% which is considered excellent. The correlation analysis revealed a negative relationship between the time to first recurrence and MSTS score ($r = -0.43$, $p = 0.001$). Conversely, the time to first recurrence exhibited a positive correlation with age ($r = 0.61$, $p < 0.0001$). There was no significant correlation between the time to first recurrence and gender, tumor site, tumor grade, or follow-up duration. Additionally, the functional outcome measured by the MSTS score demonstrated a negative correlation with age ($r = -0.59$, $p < 0.001$).
DISCUSSION AND CONCLUSION:
Giant cell tumor is an aggressive benign bone lesion with unpredictable behavior and high recurrence rate. Although GCT has been studied thoroughly, no solid consensus was reached regarding a reliable predictive clinical, radiological or pathological entity that can be linked directly to recurrence. Recurrent GCT lesions around the knee joint pose a special challenge to evade the risk of joint destruction and the need to perform endoprosthetic replacement. However, it can be effectively treated by extended curettage, liquid nitrogen as an adjuvant and bone cement for reconstruction. The main factor affecting the efficacy of management is proper patient selection, a refined technique done by an experienced surgical team.