The Role of Bone Grafting versus Bone Cement in the Treatment of Giant Cell Tumor of Bone: A Systematic Review and Meta-Analysis of the Risk of Recurrence

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INTRODUCTION: Giant cell tumor of bone (GCTB), though benign, presents a unique challenge in management due to the tumor's aggressive nature and the high propensity for recurrence after surgical intervention. Intralesional curettage followed by polymethylmethacrylate (bone cement) or bone graft (BG) to fill the defect is typically utilized, with adjuvants such as phenol or argon beam also employed. However, an optimal choice to fill the defect after intralesional curettage has yet to emerge and remains an active topic of debate, necessitating a systematic evaluation of the efficacy in mitigating a predominant outcome: recurrence rate. The purpose of this systematic review was to examine the impact of bone cement versus bone grafting on recurrence rates in GCTB patients who underwent intralesional curettage.

METHODS: A literature search was performed using compiled sources from PubMed and Embase with 14 high-quality studies meeting all inclusion criteria. A meta-analysis was performed, using only studies which included recurrence data for both cement and allograft filling groups, resulting in 11 compatible studies for analysis (**Figure 1**). Intralesional curettage with bone allograft had a recurrence risk ratio of 1.68 (CI = 95%, p = 0.001, heterogeneity I2 = 0.53, homogeneity p = 0.02) when compared to intralesional curettage with bone cement. Of the 14 studies that qualified, those which included local recurrence data for at least one of the two groups were included, resulting in 14 studies for analysis with 758 subjects in the cement group and 696 in the allograft group. Minimum length of follow-up ranged from 3 months to 50 months.

RESULTS: 1,454 total patients were included (758 with BC and 696 with BG) (**Figure 2**). Intralesional curettage with BG had a recurrence risk ratio of 1.68 (CI = 95% [1.22-2.31], p=0.001, heterogeneity I2=0.53, homogeneity P=0.02) when compared with BC (**Figure 3**). The overall rate of recurrence for GCTB after intralesional curettage with BC was 20.05% versus 29.74% with BG, a significant difference (CI = 95% [0.17-0.23] versus [0.26-0.33], p<0.001) (**Figure 4**).

DISCUSSION AND CONCLUSION: While utilizing bone cement after intralesional curettage results in a lower risk of recurrence in GCTB, the treatment is not without its potential drawbacks. Even with the advantage of the lower ReR with bone cement, the ReR is still over 20% and performing future revisional procedures with bone cement is notably more difficult than with bone allograft. The exothermic reaction which occurs with the placement of bone cement can result in chondrocyte death and earlier osteoarthritis when employed near articular surfaces. The utilization of intralesional curettage followed by bone cement results in a decreased ReR when compared to intralesional curettage and bone allograft. though must be evaluated on an individual case basis.

