

Computer navigation aided precision aggressive curettage for treating giant cell tumor of limbs

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Introduction: Giant cell tumors of bone are benign aggressive neoplasm, located more often in near the knee. Improper surgery will influence the important joint activities. The surgical treatment results of the Giant cell tumor of bone have a obvious progress. The local recurrence rate have descended. The local recurrence rate of curettage in the lesion is 40~50% in the past 30 years. The local recurrence of resection with marginal margin or wide margin is very low, but the function of the limb is poor and the complications may be occurred. In the closest 10 years, the local recurrence rate is under 5% with high speed drill. The most crucial step is how to identify the boundary of the tumor, this has been more and more clinical evidence confirmed. Up to now, surgical planning has been based almost exclusively on the surgeon's experience and on the interpretation of 2-dimensional (2D) radiologic information. Computer assisted navigation technology has been widely used in various Orthopaedic branch. The advantage is instantly real-time identification tumor edge. In the operation, can instantly conform the resection boundary with preoperative planning. The image-guided computer navigation technology will facilitate surgical resection and save more normal bone for reconstruction.

Objective: To assess the clinical significance of the application of computer assisted navigation technology in aggressive curettage for bone giant cell tumor of limbs.

Methods: from November 2007 to December 2011, 45 patients with GCT of limbs were treated with computer navigation assisted aggressive curettage in our hospital. 22 cases were male and 23 females, aged 14 to 64 years, mean 32 years old. 23 cases are located in the distal femur, 18 cases in the proximal tibia and 4 case in the distal tibia. 37 cases had primary giant cell tumor and 8 cases had recurrence. CT and MRI with the preoperative data put into the computer navigation workstation. CT images determine the scope of the invasion of tumor in bone tissue. MRI determine the scope of the invasion of tumor in medullary cavity and soft tissue. The CT and MRI image fusion identify the precise boundaries of the tumor in CT images and made markers for navigation guidance in the operative. According to preoperative marker in CT images, the aggressive curettage were completed with the real time computer navigation. The high-speed burr expanded the scope of lesions. The precise surgical removal of the lesions boundary were verified by computer navigation according to the preoperative planning.

Results: 45 patients were followed up for 1 months to 50 months, an average of 21.7 months and 34 patients were followed up over 12 months, no recurrence. 1 case had deep wound infection after operation 2 weeks. The wound healing was well after debridement. The remaining cases had no delayed wound healing and joint infection.

Conclusions: Computer navigation technology helps to precise aggressive curettage for giant cell tumor of bone lesions, to reduce the recurrence rate, and to retain more the normal bone. The real-time operation is helpful for the surgical team cooperation.