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**Precision en bloc resection of periacetabular tumor and reconstruction with a novel individualized custom prosthesis**

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**Background:** Although various surgical methods have been adopted, it is still a challenge to perform a precise tumor resection and reconstruction for patients with periacetabular tumor. **Purposes:** To investigate an effective method to reconstruct periacetabular defect using a novel individualized custom prosthesis after accurate en bloc tumor resection with the help of computer assisted navigation system (CANS) or osteotomy guide plate. **Patients and Methods:** 3D model of image fusion was used in preoperative design. A novel individualized custom acetabular prosthesis was designed and manufactured using CAD/CAM or 3D metal printing techniques. The tumor was resected accurately and the prosthesis was fixed precisely by CAN or guide plate. From December 2010 to March 2015, 5 patients with periacetabular tumor (chondrosarcoma 3 cases and GCT 2 cases) were performed. The tumor control, function and complication were evaluated postoperatively. **Results:** 5 cases were treated by accurate en-bloc resection and precise reconstruction with a novel individualized prosthesis. One case suffered dislocation of hip joint and two cases presented deep venous thrombosis. 5 patients were followed up for 4 to 46 months. 4 patients survived free of disease. One patient died from distal metastasis after three years. No infection, prosthesis loosening and breakage occurred. The MSTS score was 18~27. **Conclusion:** Accurate tumor resection and precise reconstruction with individualized prosthesis can be achieved by CANS or guide plate. 3D printing instrument and implant might be a promising approach for precision operation of periacetabular tumor.