

Does segmental replacement prosthesis provide a better option for treatment of impending or established pathologic fracture of the humeral shaft than intramedullary locking nail or plate?

Yan Taiqiang, Guo Wei, Yang Rongli, Dong Sen, Yang Yi, Wang Jichuan

Musculoskeletal Tumor Center, People's Hospital, Peking University, Beijing, 100044.

Corresponding author: Guo Wei, bonetumor@163.com ;yantqzh@163.com

Objective The humerus is the second most common long bone sites of metastatic disease after the femur. An impending or established pathologic fracture is associated with pain, morbidity, loss of function and a diminished quality of Life. Prompt alleviation of disabling pain and restoration of arm function are the main goal of surgery. Intralesional curettage and cementation with either intramedullary (IM) nail fixation or plate fixation is currently the most common method for treating such patients. However, this treatment is associated with violation of the rotator cuff, radial nerve palsy or local recurrence. To determine if a humeral segmental replacement prosthesis (marginal or en bloc tumor resection) would provide a better operative option compared with an IM nail or plate (intralesional tumor resection)in this setting regarding operation time , blood loss, complications and functional outcome.

Material and methods In a retrospective study 34 patients were surgically treated for an impending (11 cases) or completed (23 cases) pathological humeral shaft fracture with a diagnosis of metastatic disease or myeloma were identified from our database (Jan. 2007-Feb 2015). Bronchial carcinoma was the most common primary tumor (13 cases) followed by multiple myeloma (11) and kidney carcinoma (3). There were 17 men and 17 women in the series with a mean age of 61.5 years (40 to 80). Intralesional curettage and cementation followed by fixation with intramedullary IM nail in 12 cases or plating in 12 cases; Marginal or en bloc resection with cemented custom-made segmental replacement prosthesis in 10 cases.

Results There was no mortality related to the surgical procedure. The mean operation time and blood loss were significant less in patients with interclary prosthesis compared with IM nailing (97.5minutes Vs 135minutes, $p = 0.01$; 280ml Vs 1162.5ml, $p = 0.048$); likewise, the mean operation time and blood loss for marginal/en bloc procedure (prosthesis) and intralesional procedure (IM+plating) were also significant (128.1minutes Vs 97.5, $p = 0.027$; 875ml Vs 280ml, $p = 0.091$). The mean follow-up is 11 months (3-42 months), the patients' survival rate was 34.9% after 12 months and 15% after 24 months. There were 1 radial nerve palsy and 2 local recurrence in IM group, 1 radial nerve palsy, 1 hardware failure and 1 local recurrence in plating group, however, there was no any complication found in prosthesis group ($X^2 = 3.036$, $p = 0.081$). All patients achieved well pain relief and restoration of arm function was improved in 94%.

Conclusion Reduced operation time, less blood loss, few complications and good local tumor control make marginal/wide resection and reconstruction with an interclary prosthesis preferable to intralesional curettage and cementation with IM nail or plate for treatment of pathological (impending) fractures of the humerus shaft. It could be a more reliable and safe way to restore arm function and improve life quality.