International Journal of Chemical and Biochemical Sciences
(ISSN 2226-9614)

Journal Home page: www.iscientific.org/Journal.html

Evaluation of Functional Outcome Following Proximal Femur Tumor Resection and Endoprosthetic Reconstruction

Mohammed Mahmoud El Hefnawy, Mohammad Hassan Abd El-Latif Hassan, Basem Abdelbaset Hasan Elsafy, Elsayed El Etewy Soudy

Orthopeadic surgery Department, Faculty of Medicine, Zagazig University, Egypt.

Abstract

Primary and secondary bone tumors can occur in bone and cartilage tissues. Primary bone tumors occur in children and adolescents and are an important contributor to death and disability in this age group. Secondary bone tumors, i.e., bone metastases, are 30–40 times more common than primary ones and are characterized by higher prevalence and poor quality of life. Except for the spine, the proximal femur is the most frequent site of bone metastases (approximately 10%) and is the most commonly affected long bone. The risk of pathologic fracture of the proximal femur metastases is high due to weight bearing and biomechanical conditions. Endoprosthetic replacement is one method of reconstruction after resection of a proximal femur tumors. It has the advantage that patients recover rapidly and can bear weight early. The main complications of its use infection , aseptic loosening , fracture of the prothesis or bone, mechanical failure and local recurrence.

Keywords: Proximal Femur Tumor Resection, Endoprosthetic Reconstruction, Outcome.

Mini review article **Corresponding Author*, e-mail: *basemelsafy4@gmail.com*

1. Introduction

Outcome of proximal femoral replacement after tumor resection, to be well evaluated, should involve precise clinical and radiological assessment aiming for detection of revision rate, reasons for revision, survival of implants, limb salvage rate, reason for amputation and functional outcome [1]. A revision of an unsuccessful reconstruction includes patients who had complete or incomplete revision or removal of endoprosthesis, fixation of peri-prosthetic fractures, soft-tissue reconstruction to improve stability, and amputation [2]. Revisions can be categorized into major revision: removal of bone-anchored parts of an implant or limb amputation for any cause, and minor revision: all implant-related operations with no removal of bone-anchored components, for example, change of polyethylene, local recurrence without prosthetic contamination, DAIR (debridement, antibiotic therapy, and implant retention), closed and open hip reduction with or without insertion of constrained liner because of dislocation. [3]. The majority of reports defined implant survival as the percentage of implants which required no revision or removal of any part, while limb salvage rate is defined as the percentage of individuals who did not had amputations during study duration. Reasons for amputation included infections, tumor recurrence and or progression, and poor stability [1].

2. Clinical evaluation

At follow-up, physical evaluation of the affected limb must be performed to assess the hip range of movement and for any evidence of lumps (local recurrence), delayed infection, loosening or dislocation of the prosthesis [4].

3. Functional evaluation

Function of proximal femoral replacements done for musculoskeletal tumors is evaluated with gait analysis, clinician reported scales including Musculoskeletal Tumor Society (MSTS) score, Toronto Extremity Salvage Score(TESS), Harris hip score and more non-specific patient reported scales such as the Short Form-36 [5].

3.1. Musculoskeletal tumor society (MSTS) score

The MSTS score is a widely used functional scoring system to assess the function in patients with extremity tumors. It was developed in 1983 and later modified by the MSTS in 1993. It involves 6 items of pain, function, emotional acceptance, utilization of any external support, walking ability, as well as gait change. Each item is scored from 0 to 5. The total score ranges between 0 and 30, with higher scores indicate better function (Table 1). The results were graded according to the following scale: Excellent >22; good 14-22; fair 8-14 and poor < 8 [4].

3.2. The Toronto Extremity Salvage Score (TTESS)

The TESS is a questionnaire of 30 items including activity restrictions in daily activities including body movement, mobility, self-care, and performance routine tasks. It is utilized to functionally assess the patient after limb

Salvage operation. The degree of physical disability is rated from zero (not possible) to five (with no problem). The raw score is converted to a score that ranges between 0 and 100 points, with higher scores indicate less disability [6].

4. Radiological evaluation

4.1. Plain radiograph

Antero-posterior and lateral radiography of the proximal femur and hip joint of the affected limb to detect local control, position of prosthesis, loosening, subluxation and stress fractures [1]. Magnification-corrected supine radiographs are used to detect and measure acetabular erosion in hemiarthroplasty proximal femoral replacement by measuring acetabular cartilaginous thickness as reported by Houdek and associates [7] or using the system adopted by Wetherell and associates [8] which describes reference to the acetabular line and the obturator line as a method for accurate measurement of acetabular erosion to finally detect any possibility of protrusio which is defined as medial migration of the acetabulum > 3 mm in males and > 6 mm in females past the ilioischial line [9].

4.2. CT chest and bone scan

Chest CT must be done in outpatient service to detect distant metastasis at 3 months intervals for first 2 years postoperatively, and then once yearly thereafter. Also, a bone scan required every 6 months in first 2 years postoperatively, and then once yearly thereafter for ten years. [1].

References

[1] S.J. Janssen, D.W. Langerhuizen, J.H. Schwab, J.A. Bramer. (2019). Outcome after reconstruction of proximal femoral tumors: A systematic review. Journal of Surgical Oncology. 119(1): 120-129.

[2] E.R. Henderson, J.S. Groundland, E. Pala, J.A. Dennis, R. Wooten, D. Cheong, R. Windhager, R.I. Kotz, M. Mercuri, P.T. Funovics. (2011). Failure mode classification for tumor endoprostheses: retrospective review of five institutions and a literature review. JBJS. 93(5): 418-429.

[3] C.E. Holm, M.S. Soerensen, M. Yilmaz, M.M. Petersen. (2022). Evaluation of tumor-prostheses over time: Complications, functional outcome, and comparative statistical analysis after resection and reconstruction in orthopedic oncologic conditions in the lower extremities. SAGE Open Medicine. 10: 20503121221094190.

[4] W.F. ENNEKING, W. Dunham, M.C. GEBHARDT, M. Malawar, D.J. PRITCHARD. (1993). A system for the functional evaluation of reconstructive procedures after surgical treatment of tumors of the musculoskeletal system. Clinical Orthopaedics and Related Research (1976-2007). 286: 241-246.

[5] C.M. Ogilvie, J.S. Wunder, P.C. Ferguson, A.M. Griffin, R.S. Bell. (2004). Functional outcome of endoprosthetic proximal femoral replacement. Clinical Orthopaedics and Related Research®. 426: 44-48.

[6] A. Davis, J. Wright, J. Williams, C. Bombardier, A. Griffin, R. Bell. (1996). Development of a measure of physical function for patients with bone and soft tissue sarcoma. Quality of Life Research. 5(5): 508-516.

[7] M.T. Houdek, P.S. Rose, P.C. Ferguson, F.H. Sim, A.M. Griffin, M. Hevesi, J.S. Wunder. (2019). How often do acetabular erosions occur after bipolar hip endoprostheses in patients with malignant tumors and are erosions associated with outcomes scores? Clinical Orthopaedics and Related Research®. 477(4): 777-784.

[8] R. Wetherell, A. Amis, F. Heatley. (1989). Measurement of acetabular erosion. The effect of pelvic rotation on common landmarks. The Journal of Bone & Joint Surgery British Volume. 71(3): 447-451.

[9] T.G. Armbuster, J. Guerra Jr, D. Resnick, T.G. Goergen, M.L. Feingold, G. Niwayama, L.A. Danzig. (1978). The adult hip: an anatomic study: Part I: the bony landmarks. Radiology. 128(1): 1-10.