

Proximal Femoral Replacement for Metastatic Bone Disease - A Case Series

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DOI: <https://doi.org/10.58624/SVOAOR.2023.03.042>

Received: March 30, 2023 Published: April 30, 2023

Abstract

Background: The proximal femur is a common area for development of skeletal metastasis that further disrupts an ill patient's quality of life. Resulting complications include pathological fractures leading to compromised functionality. Proximal femoral replacement allows to attain the requirements of surgery in metastatic bone such as stable fixation of the entire bone, allowing immediate weight bearing and the earliest possible return to function. Preventative treatment for metastatic lesions using an endoprosthesis before a fracture occurs, can modify the patient's quality of life, reduce pain and may decrease mortality associated with the lesion. Our aim is to present case based evidence to show that proximal femoral replacement provides a better option for limb salvage surgery after metastatic bone disease.

Methods: Study design: Case Series

Setting: Department of Orthopedic & Spine Surgery, Dr Ziauddin Hospital, Clifton, Karachi.

Duration: December 2021 – December 2022

Inclusion criteria: Patients that had skeletal metastasis in the proximal femur and were managed with endoprosthesis were included.

Exclusion criteria: Patients that had concurrent infection in the body and patients that were ASA IV and deemed high risk were excluded.

Data collection: Through inpatient and surgical records. Direct patient interaction and via an SF-36 health questionnaire.

Results: we evaluated the patient's outcome and progress after proximal femoral endoprosthesis replacement using the SF-36 health questionnaire. Showing PFR is a valid option for proximal femoral metastasis.

Conclusion: PFR is a good option for preservation of limb function in cases of metastasis and thereby improves the patient's quality of life as resecting the diseased bone has an added benefit of reducing tumor burden.

Keywords: Proximal Femoral Replacement; Metastatic Bone Disease; endoprosthetic reconstruction

Introduction

Metastatic and aggressive proximal femoral neoplasms require resections with adequate margins that result in a large skeletal defect. These defects can then be reconstructed using proximal femoral replacement endoprostheses. The earliest published example of an endoprosthetic reconstruction for treatment of a bone neoplasm dates back to 1940 (1)

Metastatic or primary skeletal lesions that may result in pathologic fractures in the proximal femur, require surgical fixation to manage pain and allow immediate mobilization. (2) Fractures in diseased or irradiated bone quite often show substandard healing and result in non-union hence the surgeon must take into account that the bones may not unite favorably. (3)

In cases where there is failure of fixation of pathologic fractures, endoprosthetic reconstructions of the proximal femur put forward limb salvage operations. (4) Guidelines from the British Orthopaedic Association (5) for the management of metastatic bone disease and those of the Breast Speciality Group of the British Association of Surgical Oncology (6) suggest that reconstruction for metastases should provide immediate stability of the entire bone, allowing weight bearing, last the lifetime of the patient and assume that any fracture will not unite. Mirels criteria study showed fair to moderate agreement between authors when using the Mirels score to quantify the need for fixation in pathological and diseased bone. (7)

We present four cases of metastasis to the proximal femur in patients managed with Proximal femoral replacements.

Cases

Case 1

A 55 year old female presented to us via clinics with right groin prodromal pain of 2.5 months duration. She had a background of parotid CA (Adenoid Cystic CA) diagnosed 9 years ago and had previously undergone multiple resections of the primary cancer and radiation therapy due to recurrences. She then underwent a PET CT which revealed widespread multiple destructive bony lesions. Plain films and an MRI revealed a large lytic lesion in the neck, intertrochanteric region and proximal shaft of the right femur with mild bony expansion, cortical thinning and erosion in lesser trochanteric region which was most likely the source of her pain. She was unable to mobilise and this necessitated a proximal femoral replacement, this was done via an extensile hardinge approach. The abductors were reflected along with a 360° soft tissue release and a proximal femoral segment of 130cm was removed. The Abductors were reattached to the proximal stem and the procedure and immediate postoperative recovery went uneventfully. Six months later she had a postero-superior dislocation which was dealt with via an open reduction.

Case 2

A 50-year female presented to us via clinics with left hip pain for 3 years which had progressively worsened and increased in intensity over the last 3 months and was now so debilitating that it had made the patient nearly bed bound. She had a background of breast CA, treated with a mastectomy performed 5 years ago and had had 6 cycles of chemotherapy and was currently on hormone receptor antagonists. Plain films showed an expansile lytic area identified in the left superior pubic bone with cortical break as well. Patchy lucency was also appreciated in the left acetabulum. Further MRI and bone scan confirmed it to be a metastatic deposit likely from primary Breast Ca. A Proximal Femoral replacement was undertaken with resurfacing of the acetabulum with a cemented polyethylene cup.

Case 3

Similarly, another patient was a 71-year-old female survivor of Breast CA in remission for the last 24 years presented to clinics with a right sided sub-trochanteric fracture which turned out to be pathological in nature likely from the primary breast CA. A resection of the affected proximal femur was done and a proximal femoral replacement was performed.

Case 4

55-year male patient recently diagnosed with an advanced stage of renal cell carcinoma, presented to us in clinics with left proximal anterior thigh pain and difficulty mobilization for the past 3 months. Further investigations and scans revealed extensile lytic lesions involving the proximal left femur. It turned out to be metastatic renal cell carcinoma with a biopsy showing it to be consistent with features of primary renal cell CA. Affected area was resected and a proximal femoral replacement was done.

Discussion

Pathologic femur fractures and diseased proximal femurs at risk of fracture due to skeletal metastasis are a significant cause of morbidity in patients. (8) Preventative treatment for metastatic lesions before a fracture occurs, can modify the patient's quality of life, reduce pain and may decrease mortality associated with the lesion. Phillip et al. has shown that prophylactic fixation can reduce risk of death by up to 25% as compared to those who underwent surgical fixation after a pathological fracture. (9)

Proximal femoral replacement allows us to attain the requirements of surgery in metastatic bone such as stable fixation of the entire bone, allowing immediate weight bearing and an earliest possible return to function. (10) Options for fixation of such lesions include, intra-medullary fixation devices and endoprosthetic devices. Several series have revealed that endoprosthetic reconstructions have ameliorated implant survival in comparison to Intra-medullary Nail. (11,12,13) As observed in a study by Muratori et al , revision free survival of femur endoprosthesis was 87% at five years and 72% at 15 years, and Overall Survival of the implant was 90% at five, ten and fifteen years (14). Medellin et al. observed revision-free survival at five years and ten years of 71% and 63%, respectively. (15) Studies recommend that one should consider quality of life above and beyond the mortality benefit of treatment via QoL scores such as the SF36 (16) which is why we have used the SF 36 comparasion in our study, we also evaluated patients in terms of quality-of-life post procedure using the SF36 questionnaire which was taken at immediate postop and at 6 weeks postop to assess patient outcomes. The six-month survival rate for our procedure was 100%. Two of the patients have subsequently died since then. quality of life survey scores in terms of physical functioning were at 40% and role limitations are present at 100%. energy and fatigue and emotional well-being and social functioning were at 50%. pain is still quite high at 80% for a recently operated patient with general health hovering at about 50%. the second patient who is now 6 months down the line from her procedure is faring slightly better with energy and emotional well-being in 90 % but role limitations are still quite high. social functioning is at a 100% and pain is down to 70%. general health is currently hovering at a 50%.

Endoprosthetic replacement of a lesion confined to the proximal femur is a favorable option for reconstruction after tumor resection due to rapid restoration of function post-operatively and lower rates of complications. (17,18,19) In addition, this technique does not require reconstruction of an allograft or re-implantation of the resected segment which is corelated with higher infection rates. (20,21)

The proximal femur is a common area for development of skeletal metastasis that further disrupts an ill patient's quality of life due to complications such as pathological fractures resulting in pain and reduction of functionality. Cancer status, timing, estimated life expectancy and available surgical expertise should be considered in the choice of surgical strategy to optimize the outcome of surgery in these patients. (21, 22) Several series have revealed that endoprosthetic reconstructions have ameliorated implant survival in comparison to Intra-medullary Nails and they have shown to be superior. (23)

Conclusion

In conclusion, proximal femoral replacement provides a better option for limb salvage surgery after metastatic bone is resected as it aims at providing pain relief and immediate weight-bearing which allows preservation of limb function thereby improving the patient's quality of life.

Conflict of Interest

The authors declare no conflict of interest.

Acknowledgement

Not applicable.

References

1. Macedo F, Ladeira K, Pinho F, Saraiva N, Bonito N, Pinto L, Gonçalves F. Bone metastases: an overview. *Oncology reviews*. 2017 Mar 3;11(1).
2. Axelrod D, Gazendam AM, Ghert M. The surgical management of proximal femoral metastases: a narrative review. *Current Oncology*. 2021 Sep 28;28(5):3748-57.
3. Bickels J, Meller I, Henshaw RM, Malawer MM. Reconstruction of hip stability after proximal and total femur resections. *Clin Orthop Relat Res*. 2000;375:218-230.
4. Jacofsky, D.J.; Haidukewych, G.J. Management of pathologic fractures of the proximal femur: State of the art. *J. Orthop. Trauma* 2004, 18, 459–469.

5. Gainor BJ, Buchert P (1983) Fracture healing in metastatic bone disease. *Clin Orthop Relat Res* (178):297–302
6. Johnson, J.D.; Perry, K.I.; Yuan, B.J.; Rose, P.S.; Houdek, M.T. Outcomes of endoprosthetic replacement for salvage of failed fixation of malignant pathologic proximal femur fractures. *J. Arthroplast.* 2019, 34, 700–703.
7. Auran RL, Duran MD, de Comas AM, Jacofsky DJ. Management of Pathologic Fractures Around the Hip: Part 1–Femur. *The Journal of Hip Surgery.* 2019 Jun;3(02):093-103.
8. British Orthopaedic Association (2001) *Metastatic bone disease: a guide to good practice.* British Orthopaedic Association, London.
9. The Breast Speciality Group of the British Association of Surgical Oncology (1999) British Association of Surgical Oncology Guidelines: the management of metastatic bone disease in the United Kingdom. *Eur J Surg Oncol* 25(1):3–23
10. Swanson KC, Pritchard DJ, Sim FH. Surgical treatment of metastatic disease of the femur. *J Am Acad Orthop Surg.* 2000;8: 56–65.
11. Philipp, T.C.; Mikula, J.D.; Doung, Y.-C.; Gundle, K.R. Is there an association between prophylactic femur stabilization and survival in patients with metastatic bone disease? *Clin. Orthop. Relat. Res.* 2020, 478, 540–546.
12. Orlic D, Smerdelj M, Kolundzic R, Bergovec M (2006) Lower limb salvage surgery: modular endoprosthesis in bone tumour treatment. *Int Orthop* 30(6):458–464
13. Steensma, M.; Boland, P.J.; Morris, C.D.; Athanasian, E.; Healey, J.H. Endoprosthetic treatment is more durable for pathologic proximal femur fractures. *Clin. Orthop. Relat. Res.* 2012, 470, 920–926.
14. Harvey, N.; Ahlmann, E.R.; Allison, D.C.; Wang, L.; Menendez, L.R. Endoprostheses last longer than intramedullary devices in proximal femur metastases. *Clin. Orthop. Relat. Res.* 2012, 470, 684–691.
15. Muratori F, Mondanelli N, Prifti X, Scoccianti G, Roselli G, Frenos F, Capanna R, Campanacci DA. Total femur prosthesis in oncological and not oncological series. Survival and failures. *Journal of Orthopaedics.* 2020 Jan 1;17:215-20.
16. Medellin MR, Fujiwara T, Clark R, Stevenson JD, Parry M, Jeys L. Mechanisms of failure and survival of total femoral endoprosthetic replacements. *Bone Joint Lett J.* 2019 May;101-B(5):522–528.
17. Kabukcuoglu Y, Grimer RJ, Tillman RM, Carter SR. Endoprosthetic replacement for primary malignant tumors of the proximal femur. *Clinical Orthopaedics and Related Research* 1999;358:8–14.
18. Bickels J, Malawer MM, Meller I, Kollender Y, Rubert KM, Henshaw RM. Proximal and total femur resections with endoprosthetic reconstruction. Surgical technique and prosthetic survivorship: analysis of 64 patients. In: Presented at the 10th international symposium of the international society of limb salvage (ISOLS). 1999
19. Dobbs HS, Scales JT, Wilson JN. Endoprosthetic replacement of the proximal femur and acetabulum. *Journal of Bone and Joint Surgery* 1981;63B:219–24
20. Harrington KD. The use of hemipelvic allografts or autoclaved grafts for reconstruction after wide resections of malignant tumors of the pelvis. *Journal of Bone and Joint Surgery-American Volume* 1992;74(3):331–41
21. Nieder E, Flson RA, Engelbrecht E, Kasselt MR, Keller A, Steinbrink K. The saddle prosthesis for salvage of the destroyed acetabulum. *Journal of Bone and Joint Surgery British Volume* 1990;72:1014–22.
22. Khattak MJ, Ashraf U, Nawaz Z, Noordin S, Umer M. Surgical management of metastatic lesions of proximal femur and the hip. *Annals of medicine and surgery.* 2018 Dec 1;36:90-5.
23. Casadei R, Drago G, Di Pressa F, Donati D. Humeral metastasis of renal cancer: Surgical options and review of literature. *Orthopaedics & Traumatology: Surgery & Research.* 2018 Jun 1;104(4):533-8.

Citation: Siddiqui K, Junaid J, Buriro H M, Assad M, Hashmi I. Proximal Femoral Replacement for Metastatic Bone Disease - A Case Series. *SVOA Orthopaedics* 2023, 3:2, 42-45.

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