What Abductor Repair Technique Provides the Best Functional Outcomes after Proximal Femur Endoprosthetic Reconstruction for Oncologic Indications? – A Systematic Review of the Literature

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INTRODUCTION: The proximal femur serves as a common site for primary tumors and bone metastases. Inadequate preservation of the abductor mechanism (AM) during reconstructive surgery have been associated with joint instability and diminished functional outcomes. There is conflicting data regarding the optimal AM repair technique after resection of proximal femur tumors. We sought to compare functional outcomes following tumor resection and reconstruction with proximal femoral replacement (PFR) based on the AM repair technique utilized.

METHODS: We conducted a systematic review following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines. We established two study groups based on AM repair technique: soft-tissue reattachment (STr) and greater trochanter preservation (GTp). In the STr group, the gluteus medius and minimus were reattached to the endoprosthesis, whereas in the GTp group, the greater trochanter and gluteal tendons were preserved. The STr group was further subdivided into direct and indirect reattachment, with the latter involving the use of a Trevira tube, Prolene mesh or synthetic ligament. Weighted means adjusting for sample size were calculated. P values of < 0.05 were considered statistically significant.

RESULTS: A total of 658 patients from 12 articles were included. Patients with STr displayed higher Musculoskeletal Tumor Society (MSTS) scores (75% vs. 67.3%, p<0.001), and lower rates of Trendelenburg gait (33.9% vs. 52.4%, p<0.01) and ambulation with assistive devices (AD) (30.4% vs. 54.9%, p<0.001) compared to the GTp group. Within the STr group, indirect reattachment was associated with higher MSTS scores (87.2% vs. 70.1%, p<0.001), and lower rates of Trendelenburg gait (3.8% vs. 36.3%, p<0.001) and ambulation with AD (0% vs. 42.4%, p<0.001) compared to direct reattachment. Reattachment hardware failure rate in GTp was 15%.

DISCUSSION AND CONCLUSION:

Reliable restoration of the AM of the hip prevents soft-tissue-related postoperative complications such as pain, joint instability and altered ambulation. To date, AM repair techniques primarily involve osseous fixation of the greater trochanter or soft-tissue repair of the abductors to the endoprosthesis. In our review, we found that STr of the AM yielded better functional outcomes compared to GTp after resection of proximal femur tumors and endoprosthetic reconstruction. Indirect STr appeared to further improve the outcomes compared to direct reattachment.

Figure 1. Flowchart of study inclusion.

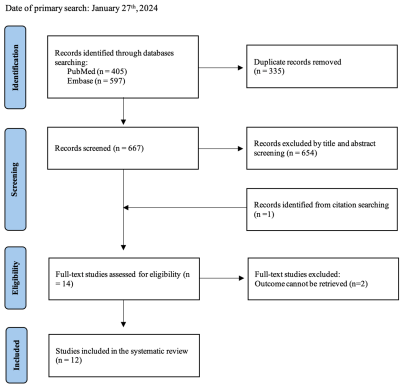

Table 1. Comparison of functional outcomes by type of abductor mechanism repair.

	GTp	STr	p-value
MSTS score (%)	67.3 (8.8)	75.0 (9.0)	**<0.001**
Trendelenburg gait (%)	52.4 (31.0)	33.9 (32.4)	**<0.001**
Ambulation with AD (%)	54.9 (28.4)	30.4 (26.4)	**<0.001**

AD: assistive devices; *GTp*: greater trochanter preservation; *MSTS*: Musculoskeletal Tumor Society; *STr*: soft-tissue reattachment.

Table 2. Comparison of functional outcomes by type of soft tissue repair.

	Direct (n = 256)	Indirect (n = 103)	p-value
MSTS score (%)	70.1 ± 4.7	87.2 ± 3.9	**<0.001**
Trendelenburg gait (%)	76.3 ± 11.7	3.8 ± 0.0	**<0.001**
Ambulation with AD (%)	42.4 ± 21.6	0.0 ± 0.0	**<0.001**

AD: assistive devices; *MSTS*: Musculoskeletal Tumor Society.