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CLINICAL AND FUNCTIONAL FOLLOW UP OF UTILIZING MESH IN LIMB SALVAGE PROCEDURES FOR BONE TUMOR MANAGEMENT

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ABSTRACT

Background: Because of the diagnostic ambiguities associated with malignant bone tumours, a practicing general orthopaedic surgeon may find it challenging to make the diagnosis. The results of limb salvage surgery have greatly improved after advancements in radiation and chemotherapy, as well as enhanced diagnostic tools. After limb salvage procedures, the standard procedure is to remove the tumour and then replace the prosthesis in large quantities. Meshes are often used to improve functional outcomes.

Aims: The current study assessed the long-term clinical and functional outcomes of using mesh in limb salvage surgeries for malignant bone tumours based on a comparison of movement range with patients without mesh. **Methods**: The orthopaedic limb salvage surgery for malignant bone tumours in the present retrospective clinical analysis covered 18 participants and involved the upper end of the humerus, upper end of the femur, upper end of the tibia, and lower end of the femur area. After that, a mega-prosthesis replacement was carried out. These patients were divided into two groups based on the use of mesh or not. Mesh was used in the first reconstructive operation.

Results: The results were graded using the Musculo Skeletal Tumour Society system, and it was found that the ranges of motion for the shoulder abduction and knee extension were satisfactory following limb salvage surgeries.

Conclusion: In summary, mesh provides fibrosis induction and muscle and soft tissue anchoring following limb salvage operations, hence shortening the period of immobilisation and increasing range of motion for active motions. Better psychosocial rehabilitation of the family and community is aided by this.
Keywords: Mesh in Orthopaedic Oncology, Mega-prosthesis, Limb salvage surgery, Bone cancer surgery, Orthopaedic oncology surgery, Psychosocial recovery following bone cancer

INTRODUCTION

Malignant bone tumours can be challenging for a practicing general orthopaedic surgeon to diagnose because of the diagnostic ambiguity involved. The results of limb salvage surgery have greatly improved after advancements in radiation and chemotherapy, as well as enhanced diagnostic tools.

In conclusion, mesh shortens the duration of immobilisation and increases range of motion for active movements by inducing fibrosis and providing muscle and soft tissue anchoring after limb salvage procedures. This contributes to the family and community's better psychological recovery. Due to the inherent diagnostic ambiguity, malignant bone tumours might be difficult for a practicing general orthopaedic surgeon to diagnose. With the development of better diagnostic instruments, radiation and chemotherapy treatments, and limb salvage surgery, the outcomes have significantly improved.

In certain situations, mesh was employed, but not in others. The results in both research groups were assessed using the MSTS technique. Studies that compare the use of mesh with non-mesh in patients undergoing orthopaedic cancer surgery are scarce in the literature, especially those that do not include long-term evaluations.2 Malignant tumours usually attack young family members, who are usually the breadwinners and so have a detrimental effect on the family's financial status. Consequently, the psychological recovery of the family and society depends on the successful rehabilitation of malignant tumours.3

The current study was conducted to assess the long-term clinical and functional outcomes of using mesh in limb salvage surgeries for malignant bone tumours based on comparison of mobility range with patients without mesh.

MATERIALS AND METHODS

The current study assessed the long-term functional and clinical outcomes of using mesh in limb salvage treatments conducted for malignant bone tumours based on a comparison of mobility range with patients without mesh. The research population consisted of the individuals who had limb salvage procedures performed for bone malignancies. The study included 18 individuals in total, all of both sexes, with a minimum follow-up of six months. After providing each participant with a comprehensive description of the study's design, informed consent was acquired.

Subjects who satisfied the inclusion criteria were those who had undergone limb salvage procedures, had at least a 6-month follow-up, and were open to taking part in the research. Patients with mesh problems, mesh difficulties after abdominal surgery, people with a history of allergies, and subjects unable or unwilling to provide permission were among the exclusion criteria.

Standard surgical procedures were used to remove the tumours from each of the eighteen participants. Following preoperative treatment, the resection margins, which measured 3 cm broad, were assessed using MRI. After negative margins were determined, the frozen slice was removed from the proximal canal. All patients' postoperative specimens were confirmed to be 8–10 mm margin-free. Chemotherapy was given following surgery per the oncologist's suggestion. In order to construct a tight mesh sleeve between the patellar tendon and bony plug, a bone plug was kept at the site of patellar insertion in patients having upper-end tibia replacement after mesh was tightly wrapped around implants.

On the glenoid of the upper end of the humerus, the mesh was placed and sutured with the labrum. When there was not a larger tuberosity tip, it was not cut. When it came to proximal femur replacement, the same protocol that applied to proximal humerus replacement was followed. The iliopsoas tendon and muscle were sutured to the great trochanter tip in cases where the greater trochanter tip was not preserved. Implant-hole mesh was used for suturing in patients whose greater trochanter tip was still intact.

A tightly wound mesh was sutured to the preserved area during the restoration of the lower femur. Antibiotics were administered intravenously for five days until the drain was withdrawn. After that, they were taken orally for ten days until the sutures were removed. For 4-6 weeks, splintage was employed to cause fibrosis and immobilise the afflicted region. Throughout the period of immobilisation, static physiotherapy was advised; after six weeks following surgery, intensive activity was to be replaced. In cases where the lower leg was affected, partial weight-bearing using a walker was started the day following surgery. Following the 8–10 week surgery, a tripod or walking stick was recommended.

The results were formulated using one-way ANOVA and the t-test following the statistical evaluation of the collected data with SPSS software version 21 (Chicago, IL, USA). Together with their averages and standard deviations, the data were shown as percentages and numerical values. The criterion for significance was set at P 0.05.

RESULTS

The current study assessed the long-term functional and clinical consequences of using mesh in limb salvage surgeries conducted for malignant bone tumours based on a comparison of mobility range with patients without mesh. The study included 18 individuals in total, all of both sexes, with a minimum follow-up of six months. The research participants' demographic data and disease-related features are listed in Table 1.

The age range of the research participants was 28 to 56 years, with a mean age of 48.6 4.82 years. The research participants had follow-up periods ranging from 7 months to 4.2 years, with an average follow-up of 3.6 years. There were 38.88% (n=7) females and 61.11% (n=11) males in the current research. Proximal femurs in 22.22% (n=4) study participants, distal femurs in 27.7% (n=5), proximal tibias in 33.3% (n=6) persons, and upper humeruss in 16.6% (n=3) participants were the impacted sites. The mesh was implanted in the lower end of the femur in 14 study participants, the upper end of the tibia in 22.2% of participants, and the higher end of the humerus in 11.1% of individuals (Table 1).

The MSTS scores for the knee (lower femur and upper tibia) were determined to be 20, whereas the MSTS scores for the upper-end humerus and upper-end femur were both 22. These results were obtained by comparing the scores of the two groups of research participants.

Table 2 displays the MSTS scores for the upper-end humerus, upper-end femur, and knee (lower femur and upper tibia) for the four participants in which mesh was not utilised. These values were 12, 13, and 9, respectively. The upper-end humerus was assessed for deformity (range of motion), shoulder abduction strength, and combined motions when the MSTS scores were categorised based on the area and the criteria applied for each region.

DISCUSSION

The current study assessed the long-term functional and clinical outcomes of using mesh in limb salvage treatments conducted for malignant bone tumours based on a comparison of mobility range with patients without mesh. The study included 18 individuals in total, all of both sexes, with a minimum follow-up of six months. The age range of the research participants was 28 to 56 years, with a mean age of 48.6 4.82 years. The research participants had follow-up periods ranging from 7 months to 4.2 years, with an average follow-up of 3.6 years. There were 38.88% (n=7) females and 61.11% (n=11) males in the current research.

The research individuals who had proximal femur involvement were 22.22% (n=4), distal femur involvement was 27.7% (n=5), proximal tibia involvement was 33.3% (n=6), and upper humerus involvement was 16.6% (n=3). The mesh was implanted in the lower end of the femur, the upper end of the tibia, and the higher end of the humerus in 14 research participants. These results were consistent with studies on subjects with comparable characteristics in an orthopaedic surgery context done by Buch RG et al. in 2009 and Liu B et al. in 2019.

According to the study results analysing the MSTS scores in the two groups of study participants, the upper-end humerus, upper-end femur, and knee (lower femur and upper tibia) were shown to have MSTS scores of 22, 24, and 20, respectively, in patients where mesh was utilised. Based on the results for four patients, the MSTS score for the upper-end humerus was 12, the upper-end femur was 13, and the knee (lower femur and upper tibia) was 9.

These results were consistent with those of Uehara K et al. and Strony D et al. from 2019, who found that individuals who had orthopaedic surgery when mesh was being used had higher MSTS ratings following the procedure.

It was evident that the upper-end humerus' deformity (range of motion), the force of shoulder abduction, and combined movements were the regions analysed when the MSTS scores were broken down by region and the criteria applied for each region. The region of the upper femur that was considered for a functional outcome was the hip abduction. The knee MSTS scores (upper tibia and lower femur) were determined by functional activity and emotional acceptance. These outcomes were in line with studies conducted in 2015 by Wang B. et al. and Umari A. in which the MSTS scores of a related region were assessed.

CONCLUSION

Within its constraints, the current study draws the conclusion that mesh usage in limb salvage procedures can offer soft-tissue anchoring and cause fibrosis. Thus, with the mesh aiding in the psychological rehabilitation of society, family, and individual, less time may be spent immobilized and good active motions range can be accomplished. The present study did, however, have certain drawbacks, such as a small sample size, a briefer monitoring period, and geographic region biases. A firm conclusion will thus be reached with the aid of more longitudinal studies that have a bigger sample size and a longer monitoring period.

REFERENCES

1. Martin M, Malawer, James C. Wittig, Jackob Bickels: Operative Techniques in Orthopaedic Surgical Oncology. Sam W. Wiesel (ed: Wolters Kluwer | Lippincott Williams & Wilkins, United States, 2012. http://solution.IWW.com/operativetechniquesoncology.

2. Endo Prosthetic reconstruction of the proximal humerus after tumor resection with polypropylene mesh. Int Orthop. 2015; 39(3):501-6. doi: 10.1007/s00264-014- 2597-2. Epub 2014 Nov 23.
3. Puri A, Agarwal M. Use of polypropylene mesh to stabilize skeletal reconstructions. after resection for bone tumors. J Surg Oncol 2007; 2:158-60.
4. Endo Prosthetic reconstruction of the proximal humerus after tumor resection with polypropylene mesh. Int Orthop. 2015; 39(3):501-6. doi: 10.1007/s00264-014- 2597-2. Epub 2014 Nov 23.
5. Buch RG. Orthopedic Oncology. Limb Salvage Using Newer Implant Prosthetic Designs. Baylor Univ. Med Center Proceedings 2009; 5(3): 27-39.
6. Liu B, Tan JC, Wang HL, Wu Z, Yuan ZC, Wei CY. The role of mesh technology with tumor prosthesis reconstruction to reconstruct the extensor mechanism of the knee joint after resection of proximal tibial tumors. J Orthop Surg Res. 2019;14(1):64.
7. Strony D, John BS, Brown A, Scot MD, Choong F, Peter BS, et al. Musculoskeletal Infection in Orthopaedic Oncology. J Bone Joint Surg 2019;101(20):e107.
8. Uehara K, Ogura K, Akiyama T. Reliability and Validity of the Musculoskeletal Tumour Society Scoring System for the Upper Extremity in Japanese Patients. Clin Orthop Relat Res 2017; 475: 2253–2259.
9. Umari A. A review on quality of life in cancer patients: an Indian scenario in the next 20 years. Int J Cur Res Rev. 2017; 46(9): 234-236.
10. Wang B, Wu Q, Liu J, Yang S, Shao Z. Endoprosthetic reconstruction of the proximal humerus after tumor resection with polypropylene mesh. Int Orthop 2015, 39:501-6.

S. No	Characteristics	Percentage (%)	Number (n)
1.	**Mean age**	48.6±4.82	
2.	**Follow up range (months to years)**	7-4.2	
3.	**Mean follow-up (years)**	3.6	
4.	**Age Range**	28-56	
5.	**Gender**		
a)	Females	38.88	7
b)	Males	61.11	11
6.	**Site involved**		
a)	Proximal femur	22.22	4
b)	Distal femur	27.77	5
c)	Proximal Tibia	33.33	6
d)	Upper humerus	16.6	3
7.	**Mesh use based on site**		
a)	Upper-end tibia	22.2	4
b)	Upper-end humerus	11.1	2
c)	Lower end femur	27.7	5
d)	Upper-end femur	16.6	3

Table 1: Demographic and disease-related characteristics in the study subjects

Involved Region	MSTS score with mesh (max. 35)	MSTS score without mesh (max. 35)
Upper-end humerus	22	12
Upper-end femur	24	13
Knee (Lower femur and upper tibia)	20	9

Table 2: MSTS scores in the two groups of study subjects

MSTS score	Region
Upper-end humerus	Combined movements, Strength of shoulder abduction Deformity (range of motion) Stability
Upper-end femur	Hip abduction
Knee (Lower femur and upper tibia)	Functional activity Acceptance

Table 3: MSTS scores based on region distribution in the study subjects