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Original Research Article

Use of mesh in orthopaedic oncology surgery

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Abstract

Background: Malignant bone tumors are always considered diagnostic dilemma for general orthopaedic surgeon. And treatment for the same is again not known to general orthopaedic surgeon. Due to better availability of diagnostic modalities and advancement in chemotherapy and radiotherapy the results of limb salvage surgeries are improving day by day. In limb salvage surgeries after tumor resection, replacement with megaprosthesis is one of the standard method. We have used mesh in soft tissue reconstruction to improve functional outcomes after such surgeries.

Aims and Objectives: The aim of our study is to evaluate the results of use of mesh in Orthopaedic oncology surgeries in terms of movements in comparison to surgeries where mesh was not used. Objective is to assess functional and clinical outcomes of the patients.

Material and methods: A retrospective study of 19 patients with minimum follow up of 6 months was carried out. We have studied proximal humerus, proximal femur, distal femur and proximal tibia tumors treated by limb salvage surgery and replacement with megaprosthesis. Two study groups, one without mesh and one with use of mesh were compared.

Results: Results were evaluated by Musculo Skeletal Tumor Society (MSTS) scoring system.

Conclusion: Mesh is a good option for Orthopaedic Oncology surgeries to induce fibrosis and provide attachment to the muscles and soft tissues. It helps in achieving good range of active movements and can lessen the time for immobilization.

Keywords: Orthopaedic oncology surgery, limb salvage surgery, Megaprosthesis, bone cancer surgery, mesh in Orthopaedic oncology

Introduction

Malignant bone tumors are always considered diagnostic dilemma for general orthopaedic surgeon. And treatment for the same is again not known to general orthopaedic surgeon. Due to better availability of diagnostic modalities and advancement in chemotherapy and radiotherapy the results of limb salvage surgeries are improving day by day. Surgery for malignant bone tumors consists of mainly three parts; wide marginal resection, replacement with mega prosthesis and soft tissue reconstruction. Soft tissue reconstruction is major part after replacement and adherence of muscle to metallic prosthesis is the key to achieve the movements after such surgeries.

There are various methods to achieve adhesion of muscles to metallic prosthesis like hydroxy appetite coating at sites of major tendon insertion, use of bone plug and use of mesh¹. In our retrospective study of 19 patients treated by limb salvage by mega prosthesis of different regions like proximal humerus, proximal femur, distal femur and proximal tibia, we have used mesh in some cases and compared the results of movements. We have calculated and compared the results by MSTS system in both the groups.

Unfortunately the patients affected by malignant bone tumors are of young age and may be the only bread earning member of the family. Saving the limb and giving them good functional outcome will ultimately enhance their earning capacity and will be of definitely of help to the society.

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Aims and objectives

The aim of our study is to evaluate the results of use of mesh in Orthopaedic oncology surgeries in terms of movements in comparison to surgeries where mesh was not used. Objective is to assess functional and clinical outcomes of the patients. We have used mesh in all primary surgeries after January 2016 in limb salvage surgeries of all the regions (proximal humerus, proximal femur, distal femur and proximal tibia replacement).

Materials and methods

A retrospective study of 19 patients with minimum follow up of 6 months was carried out in rural tertiary care cancer hospital in department of Orthopaedic Oncology. Patients operated from June, 2014 to December, 2017 are taken in the study. The mesh was used after January, 2016. So, comparison could be done regarding the advantage of use of mesh.

Distribution of various regions are as below;

S. No	Region involved	Number(June 2014 to January 2016)	Number(January 2016 to December 2017)
1	Proximal femur	01	03
2	Distal femur		06
3	Proximal tibia	02	04
4	Upper Humerus	01	02
	Total	04	15

We have used following inclusion and exclusion criteria.

Inclusion criteria	Exclusion criteria
(1) Patients operated for limb salvage surgeries. (2) Patients who came for follow up atleast at 6 months.	(1) Patients who gave history of allergy to mesh or had complication related to mesh used in abdominal surgery (1-patient).

Surgical technique

Out of 19 cases mesh was used in 15 cases. 4 patients were of proximal tibia, 2 were of proximal humerus and 6 were of distal femur and 3 were of proximal femur replacements. We have used Bard mesh made up of prolene material of 15X15 cm size [Figure 6].

In all cases standard oncology resection principles were followed. MRI measurements after pre operative chemotherapy were taken and 3cm wide marginal resection was done. Frozen section from proximal canal was done in all cases and surgery was done only after confirmation of negative margins. In all case post operative specimens were reported margin free (8-10mm). Post operative chemotherapy was given as per the advice of oncophysician.

For Proximal tibial replacement, the prosthesis was wrapped with the mesh. A bone plug was kept at the site of insertion of patellar tendon. The mesh was sutured at the end of the turn on its own with Ethibond No.5 material. In some cases Ethibond No.2 or Fiber wire suture No2 were used too. It was made like a sleeve around the implant. So, at the junction of insertion of patellar tendon the interface of patellar tendon--->mesh--->bone plug---> metal prosthesis was created.

For proximal humerus the mesh was put on glenoid. Its edges were sutured with labrum. The pear shape of glenoid was cut and the outer margins were wrapped around head and rotator cuff margins were sutured with Ethibond No. 5. The tip of greater tuberosity was preserved in some case as the tumor was not involving it (keeping in mind wide marginal resection). In other cases tendons were directly sutured with prosthesis with interface of the mesh. So the layers will be bone-> mesh->implant. The cases in which tip of greater tuberosity was not preserved, the tendon was directly sutured

with the mesh which was wrapped with the proximal humerus prosthesis.

For, Proximal femur replacement same principle as proximal humerus replacement was applied. The cases in which we have preserved tip of greater trochanter, it was sutured with the implant holes with mesh in-between. The cases in which the bone was not preserved, the abductors or the preserved muscles and ilio-psoas tendon were sutured with tip of greater trochanter (prosthesis) and lesser trochanter site (prosthesis). For, distal femur replacement cases; the inner layer of preserved muscles was sutured to the mesh which was wrapped to implant and knee was kept in flexion to keep muscles in optimum tension.

Antibiotics were given intravenous for five days till removal of drains as per the case and oral antibiotics were given till suture removal (at around two weeks). All patients were immobilized for 6 to 8 weeks for allowing time to induce fibrosis and were then started physiotherapy. All lower limb patients were allowed partial weight bearing with walker from 2nd post operative day and were advised to use stick/tripod after 8 to 10 weeks.

Results

The cases which were operated by mesh (operated after January, 2016) showed good range of movements in terms of knee extension [Figure 4 & 5] (less than 10 degree of FFD) (for Proximal tibial and distal tibial replacements) and Shoulder abduction (for Proximal humerus replacement) [Figure 1, 2 & 3].

In terms of evaluation by MSTS scoring system, following results were found.

Region involved	MSTS score (without mesh) (Out of 35)	MSTS score (with mesh) (Out of 35)
Knee (Distal femur+Proximal tibia)	13	23
Proximal femur	14	25
Proximal humerus	9	20

Following scores were higher in respective regions as per MSTS scoring system.

Region involved	MSTS score
Knee (Distal femur+Proximal tibia)	-Functional activity -Emotional acceptance
Proximal femur	-Hip abduction
Proximal humerus	-Combined movements -Deformity (ROM)/Stability -Shoulder abduction strength



Fig 1: (case operated without mesh); (a) Post operative movement, (b) Pre operative X-ray, (c) Post operative X-ray

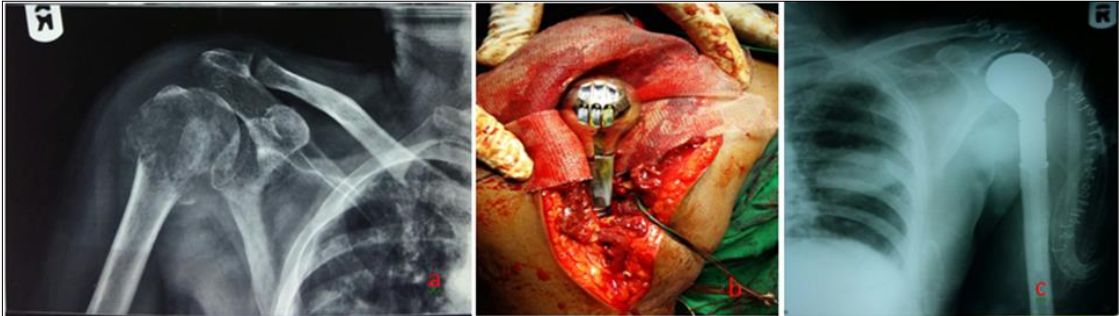


Fig 2: (case with mesh); (a)Pre operative X-ray, (b) Intra operative photograph, (c) Post operative X-ray



Fig 3: (case operated with mesh); (a) Forward flexion, (b) extension, (c) Abduction, (d) External rotation

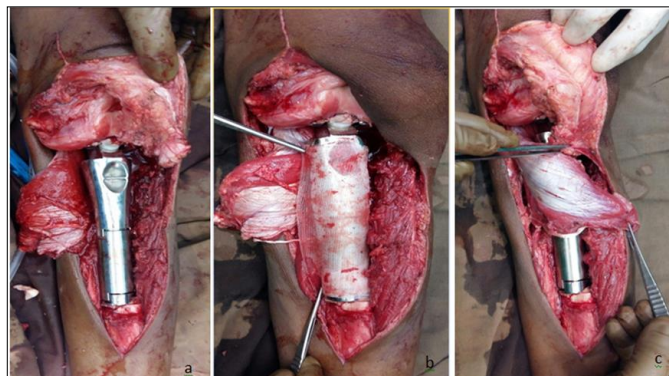


Fig 4: (use of mesh in Proximal tibia replacement); (a) Prosthesis in situ, (b) mesh wrapped around prosthesis, (c) gastrocnemius flap around mesh



Fig 5: (results of the movements in case with and without mesh); (a) & (b) with mesh; (c) & (d) without mesh

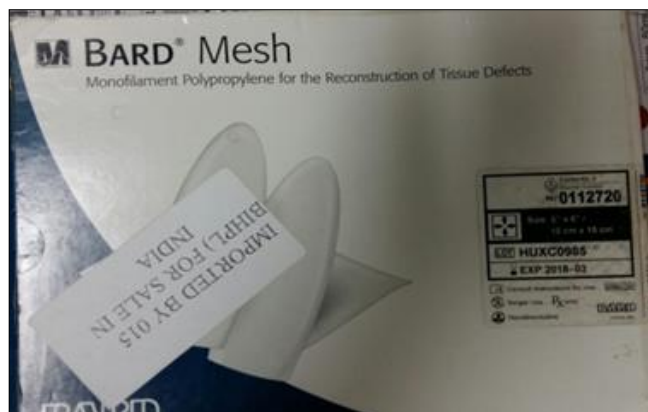


Fig 6: Mesh used for repair

In further evaluation, we are now planning to do prospective study of starting early mobilization at 4 weeks instead of 6 to 8 weeks.

Discussion

Limb salvage surgery is now known as gold standard for patients with malignant bone tumors. As Orthopaedic surgeon we aim at giving them good functional outcome for better living. There are 19 patients in our study. Out of which 14 were male and 5 were females. Age group is from 9 years to 70 years with mean age from 15 to 25 years. We have started using mesh from January, 2016 in the department of Orthopaedic oncology tertiary cancer care hospital in rural India.

After extensive search we could find few relevant references. Some have used mesh in revision tumor surgeries (after complication e.g. dislocation of prosthesis) [2]. Another author has done survey of use of mesh in proximal humerus surgery

[3].

Out of 19 cases 4 were of Proximal femur replacement, 6 were of distal femur, 6 were of proximal tibia and 3 were of proximal humerus replacement. We have evaluated our results as per MSTs rating system at the time of follow-ups of 6 months, 12 months and 24 months. Apart from that we have considered active extension of less than 10 degree as good result for lower limb surgeries and active abduction of more than 60 degree as good result for upper limb surgery (considering functional range for activities of daily routine). It is observed that in patients in whom we have not used mesh, we were able to get movements of knee extension with around 20 degree of extension lag. In patients in whom we have used mesh we were having better and even full extension. Medial gastrocnemius flap was used in proximal tibial replacement cases in standard manner as described in text books.

The cost of hydroxy apatite coated implants are much higher than non coated implants. So, this can be an option to cut down the cost of implant and thus total cost of surgery. In cases where no mesh was used, the mobilization of the joint occurs by soft tissue sleeve so that load is only born by the soft tissues. Mesh provides anchorage to soft tissues. By making tight sleeve of mesh around the implant it works like periosteum on which muscles and other soft tissues get attachment. The bond between metal and mesh is kept by sutures and holes provided in the implants at appropriate sites. We have used ADLER (Smith & Nephew) implants in almost all our cases.

The fear of using foreign body like mesh of causing foreign body reaction or infection was not found in our study. However there was flap necrosis in one case of proximal tibia replacement and flap was revised after one week of the surgery and on opening of the flap, there was no signs of any infection or foreign body reaction due to mesh.

We know that our series is less in number but we have covered all common regions of the limb salvage surgeries and that can be considered our strength. Time will of course help us in future.

Conclusion

Mesh is a good option for Orthopaedic Oncology surgeries to induce fibrosis and provide attachment to the muscles and soft tissues. It helps in achieving good range of active movements and can lessen the time for immobilization.

References

1. Text book of Orthopaedic Oncology by Malawer.
2. Puri A, Agarwal M. Use of polypropylene mesh to stabilize skeletal reconstructions after resection for bone tumors. J Surg Oncol. 2007; 95(2):158-60.
3. Endo Prosthetic reconstruction of 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.