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Case Report

A flap graft technique for the reconstruction of extensor mechanism of the knee in a case of peri-articular synovial sarcoma managed by limb salvage

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ABSTRACT

Synovial sarcoma is a malignant soft tissue tumour arising from the primitive mesenchymal cells which has a delayed progression has a slow progression and often mis-diagnosed. A fifty-two years old female presented with complaint of swelling, pain and inability to move her left knee for three years duration. Presented with recurrence for which Wide excision of the tumour, with reconstruction of knee using custom mega-prosthesis and extensor mechanism reconstruction was done. Patient had a good functional outcome and no recurrence.

Keyword: Synovial sarcoma, Extensor mechanism reconstruction, Mis-diagnosed synovial sarcoma, Limb salvage

INTRODUCTION

Synovial sarcoma is a malignant soft tissue tumour arising from the primitive mesenchymal cells which has a delayed progression.[1-3] A fifty-two years old female presented with complaint of swelling, pain and inability to move her left knee for three years' duration. Initially she was diagnosed as having an intra-articular cyst for which arthrotomy and cyst excision was done. Histopathology revealed that the cyst was really a synovial sarcoma. She was lost to follow up and developed recurrence for which wide excision of the tumour, with reconstruction of the knee using custom megaprostheis and repair of the extensor mechanism was done. At six months follow up patient had a good functional outcome with no recurrence of the tumour.

CASE REPORT

Patient came with complaint of left knee pain and swelling since one year, which was insidious in onset, gradually progressive and associated with inability to move her knee. Swelling was non progressive. There was no history of loss of weight and loss of appetite. Patient had similar complaints three years back. At that time, she was diagnosed as having an intra-articular cyst. Arthrotomy of the left knee was done and the cyst was excised. The excised cyst sent for histopathology was reported as synovial cell carcinoma strongly positive for TLE 1. Patient was lost to follow-up after the surgery. She presented to us two years later i.e., one year back with recurrence of pain and swelling left knee. On clinical examination tender knee swelling without warmth with gross restriction of range of movements over the knee were present. A healed surgical scar was present over the anterior aspect of the knee. Obvious wasting of the quadriceps and calf muscles was noted. There was no distal neuro-vascular deficit.

A plain radiograph of the knee was taken and there was no bony abnormality. An MRI was done which showed a multilobulated enhancing T2 hyper intense lesion in the medial supra patellar region of the knee joint, deep to the medial patellar retinaculum suggestive of soft tissue tumour (Figure 1). Since the histopathological diagnosis

was already known, a PETCT was taken to rule out distant metastasis. PET CT showed no distant metastasis and the uptake was restricted to the medial aspect of the knee.

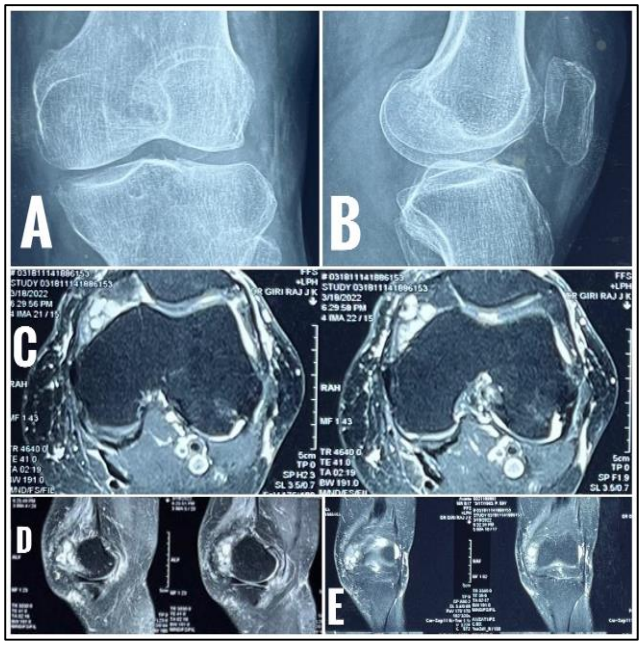

Figure 1 (A-E): Diagnostic imaging, plain radiographs of the knee. Axial, sagittal and coronal T2 MRI showing multilobulated enhancing T2 hyper intense lesion in the medial supra patellar region of the knee joint, deep to the medial patellar retinaculum suggestive of soft tissue tumour.

The goals of the treatment is to achieve tumour free margin, reconstruct the knee and restore the function of the knee by reconstructing the quadriceps mechanism. The first 2 goals were achieved by wide resection of the tumour, and reconstruction using a custom megaprosthesis. Hinged custom mega prosthesis was ordered based on the planned resection after a thorough study of the MRI. As planned wide excision of the tumour was done which entailed removal of the patella. The custom mega prosthesis was fixed proximally and distally with cement after ensuring correct rotation of both the components. The most important and difficult part of the operation was reconstructing the quadriceps mechanism. The pes anserinus tendons which were released from the proximal medial tibia was attached to the patella tendon. A mesh was used to augment the construct which was using a medial gastrocnemius flap which was transferred anteriorly and the skin loss was covered using split skin graft (Figure 2). Post-operatively the knee was immobilized for 6 weeks. The knee movement was gradually started after six weeks with intensive quadriceps exercises. Ninety degrees of knee flexion with no flexion deformity was present at 6 months follow-up. There were no skin site complications. Patient was ambulant without support even though there was an extensor lag of about 10 degrees (Figure 3). She had absolutely no pain. There was also no clinical recurrence of tumour on follow up.

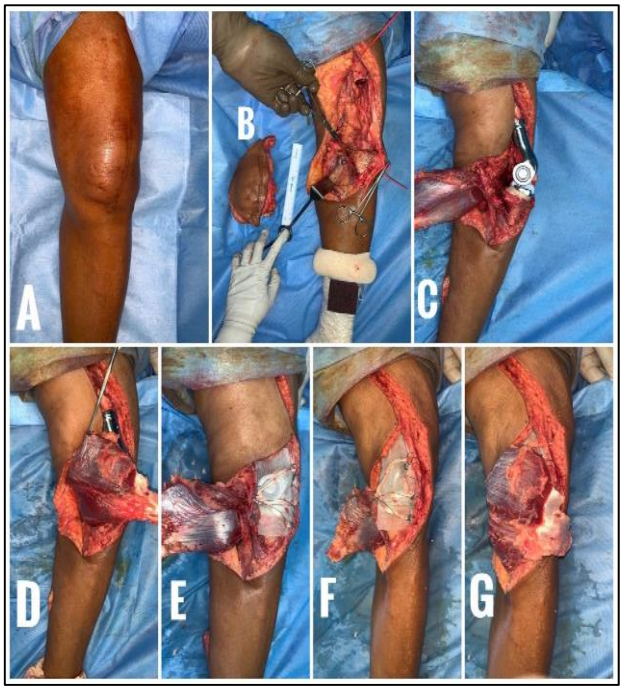

Figure 2 (A-G): Intra-operative clinical pictures: pre-operative image showing previous arthrotomy scar, resection of the tumour with wide margin. reconstruction of the knee with custom megaprosthesis. Medial gastrocnemius flap, hamstring triple graft attached to patella and augmentation mesh. Reinforcement of medial gastrocnemius flap.

Figure 3 (A-C): Post-operative radiological and clinical image. Post-operative clinical image showing the healed graft wound. Post-operative radiograph showing in-situ prosthesis. Six months post-operative clinical imaging showing 10 degrees of extensor lag on straight leg rising.

DISCUSSION

Synovial sarcoma is a rare soft tissue sarcoma accounts for 5%-10% of all the soft tissue sarcomas.[1-3] Synovial sarcoma presents at a younger mean age of onset and is common in young adults and affects both sexes equally.[4] Synovial sarcoma usually presents near the articular structures but not from the intra-articular synovium and synovial sarcoma is a misnomer, rather it arises from the primitive mesenchymal cells.[5] Most common site is the lower extremity and adjacent to the knee joint.[6,7] The soft tissue sarcomas usually present with large and quickly growing painless mass, but synovial sarcomas are slow growing and the mean duration of symptoms to diagnosis is usually 2 years.[8] Due to the long duration of symptoms, patients usually present with pain or joint contractures.[9] Given the insidious onset, patients may be mis-diagnosed as a case of septic arthritis, synovitis and arthritis.[18] In the present case report, the patient was a middle aged lady with long standing history, previously mis-diagnosed as a case of benign cyst. Since synovial sarcoma was not suspected arthrotomy was done and cyst excised which ideally should not have been done. This emphasizes the importance of a image guided biopsy in any suspicious lesion/cyst. The histopathological study of the excised cyst showed features of synovial sarcoma and the patient then was lost to follow. She represented with recurrent knee pain on and off and aggravated since the last 1 year with loss of knee movements. The history demonstrates the slow progression of the tumour.

Plain radiographs usually does not reveal much but can show re-modelling, bone invasion or calcification of the soft tissue.[10-12] Radiographs may show mineralization within the lesion in up to twenty-five percent of cases. The mineralization is spotty and resembles heterotopic ossification. MRI remains the gold standard diagnostic imaging for synovial sarcoma.[13] MRI defines the local extent and helps in the pre-operative planning for tumour excision. In our case x-rays were normal but MRI showed the multi-lobulated mass. Usually, MRI shows a heterogenous high signal lesion with septations and fluid filled levels and hence may mimic a cyst.

Surgical management is the main treatment in synovial sarcoma, and based on patient's character chemotherapy and radiotherapy are planned accordingly.[14] Limb-salvage has been considered due to the advancement in the surgical management and also imaging.[15] Main goals of treatment are achieving tumour free margins and to maintain the limb function. In tumours close to bone the periosteum is used as the margin to allow for a functional limb post-operatively.[16,17] We excised nine centimetres of distal femur and four centimetres of the proximal tibia to allow insertion of custom mega prosthesis. Soft tissue clearance of 5 cm around the tumour, along with excision of most of the patella was done to ensure tumour clearance. The gap was reconstructed using a custom megaprosthesis. The extensor mechanism reconstruction requires a special mention as it was reconstructed with triple tendon (pes anserinus) graft that was attached to the patella tendon, and augmented with a mesh. The whole construct was reinforced with a medial gastrocnemius flap. A split skin graft was used to cover the skin loss. Patient was started on knee range of movements after 6 weeks and achieved up-to 90 degrees of knee flexion.

CONCLUSION

Synovial sarcoma is slow growing tumour which can present as a peri/para-articular cyst. A high index of suspicion is needed to diagnose this tumour as tumour is slow growing. Pain is a common feature. Image guided biopsy can confirm the histopathological diagnosis following which the tumour can be treated with wide excision and reconstruction with good results.

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