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ARTICLES IN THIS ISSUE

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Arthroscopic PCL reconstruction Tips & Tricks

Surgical indications:

Isolated Grade III PCL injuries or grade II injuries associated with chondral /meniscal injuries.

Technique:

Can be done using Single bundle/Double bundle technique
Single bundle reconstruction is the commonly employed technique that recreates the AL bundle.

Portals Employed:
High anteromedial portal for placing the tibial jig, Accessory lower anterolateral portal for inside out femoral tunnel drilling, PM portal for viewing the PCL tibial foot print.

Tibial tunnel to be drilled while viewing through the PM portal 1.5cm -2cm below the joint line with adequate protection to the neurovascular bundle

Hybrid fixation using an interference screw and a post is recommended for tibial fixation.

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POPLITEAL PSEUDO-ANEURYSM IN A CHILD OPERATED FOR HTO WITH ALL-INSIDE PCL RECONSTRUCTION

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Abstract:

In this case report, we discuss a 12-year-old male child having a Grade III posterior cruciate ligament rupture along with varus alignment of the knee and a pre-existing popliteal pseudoaneurysm from a 2-year-old traffic accident causing popliteal artery injury along with medial tibial physis injury.

Despite undergoing an uneventful surgery, the child developed vascular complications from the pre-existing pseudo-aneurysm which was treated with a bypass graft and thrombin injection into the pseudo-aneurysm.

Introduction:

The proximity of the PCL insertion to the neurovascular bundle makes PCL reconstruction a skilful surgery to perform. Cases of vascular complications associated with PCL reconstruction are well reported in the literature(1,2,3,4). This case report discusses the need to be cautious with the close neurovascular structures even when all seems to be going well.

Case Report:

We present a 12-year-old male with a symptomatic grade 3 PCL rupture along with varus mal-alignment of the knee caused by an accident about 2 years prior to presentation. The child had suffered a vessel injury 2 years back with a proximal tibial fracture going through the medial physis along with grade 3 PCL rupture. As per the history provided and old documents the child had undergone vessel repair along with fasciotomy at that time while the rest of the injuries were left to be handled later.
Physical examination showed full range of motion (ROM), significant varus alignment of the knee and an obvious posterior sag and a positive posterior drawer test (grade III), with no sign of other ligamental injuries. (Figure 1) Old healed scars of the vessel repair and fasciotomy were present

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Figure 1: Pre-operative clinical images A: Varus alignment B: Posterior sag

The limb was warm, all distal vessels were palpable and there was no distal neurological deficit. Scannogram and MRI (Figure 2) were obtained to confirm the diagnosis and the child was posted for a single-stage PCL reconstruction and High Tibial Osteotomy.

With full informed consent, an all inside PCL reconstruction using Peroneus Longus autograft and high tibial osteotomy was performed under tourniquet control (280mmhg for 1.5 hours). The limb was placed on the table in 90 degrees of flexion. The graft was harvested from the ipsilateral ankle and weaved into a three-strand 9mm graft over an ACL tight rope and ABS Loop Arthrex Inc. (Naples, FL, USA). Arthroscopy was done and the transtibial tibial tunnel was prepared under complete vision using a 9mm flip-cutter Arthrex Inc. (Naples, FL, USA) with scope in the posteromedial tunnel.

There was no breach of the posterior capsule and the tip of the flip-cutter was kept under vision at all times. The shuttle suture was parked and the femoral tunnel was then prepared. The graft was pulled into the tibial tunnel first and then into the femoral tunnel and the femoral end loop shortened after confirming the flipping of the button on the cortex. After passing of the graft the tourniquet was deflated and HTO under C-arm control was performed and a 15mm Puddu plate Arthrex Inc. (Naples, FL, USA) was used to fix the open wedge osteotomy. The osteotomy gap was filled with a 15mm synthetic graft.

The tibial end of the graft was then fixed by shortening the loop and fixing on an ABS button Arthrex Inc. (Naples, FL, USA). The surgery underwent uneventfully.

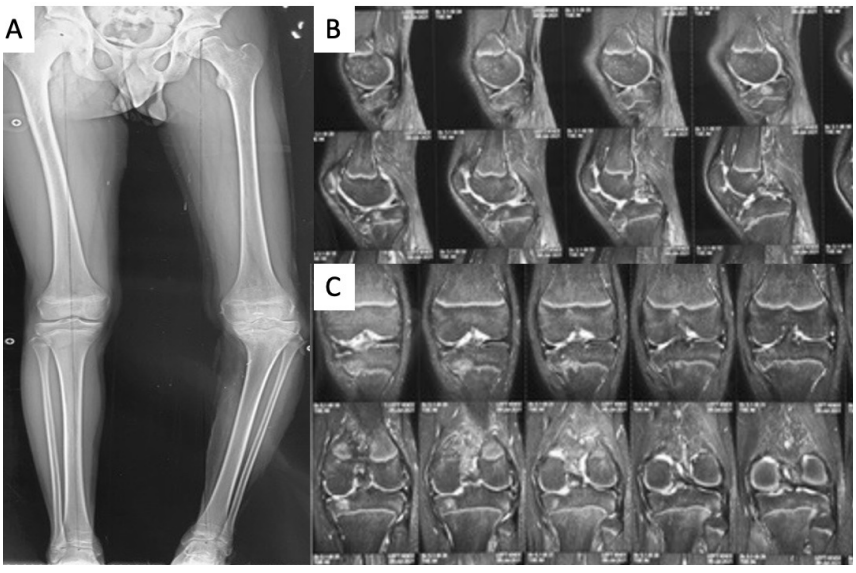

Figure 2: A: Scannogram showing the varus alignment of left knee. B & C: Pre-operative MRI confirming the diagnosis of proximal medial tibial physis injury and PCL injury

Figure 3: Post PCL reconstruction CT angiography showing presence of popliteal pseudo-aneurysm with calcific deposits suggestive of chronic existence(red circles).

In the immediate post-operative period, the limb appeared congested and the capillary refill was delayed. The posterior and anterior tibial arteries were not palpable and the limb became cold. A vascular surgeon was consulted immediately and the patient was given a bolus dose of low molecular weight heparin followed by a maintenance dose and the limb put in a warmer. The congestion settled and the limb became warm following the onset of anti-coagulant. There was no motor or sensory deficit. A CT angiography was obtained which confirmed a popliteal pseudo-aneurysm. On detailed evaluation of the CT angiography it became evident that there were calcific deposits along the wall indicative of its chronic existence. (Figure 3). The vascular surgeon clarified that the stasis from the use of the tourniquet would have induced spasm and some new thrombus formation leading to venous congestion and reduced distal circulation. The patient and relatives were counselled and the child was kept under observation. The limb remained warm and neurologically intact. The distal pulses were still not palpable and the capillary refill delayed. The vascular surgeon counselled the relatives and the patient for an elective bypass grafting of the aneurysm and thrombin injection into the aneurysm to obliterate it.

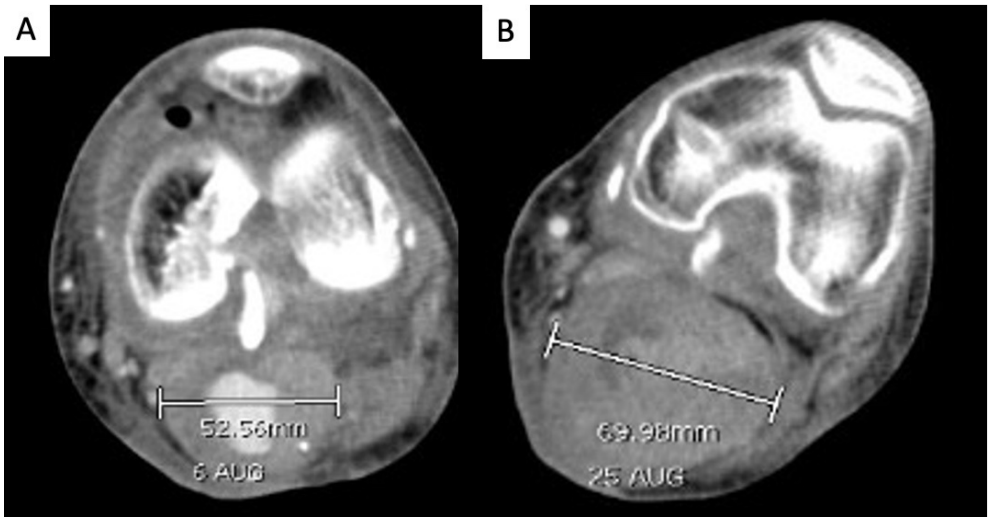

Figure 4: CT angiography images.
A: Pre vascular surgery, B: Post vascular surgery

The procedure was performed after 2 weeks from the primary surgery and a saphenous bypass grafting along with thrombin injection into the pseudo-aneurysm was done. Post surgery the posterior tibial artery became palpable and the capillary refill became normal. On follow up CT angiography there was no fresh flow of contrast into the pseudo-aneurysm and the distal circulation was good. (Figure 4)
The limb remained viable in the follow-up, the wounds healed well and the patient recovered well. (Figure 5).

Discussion:

PCL Reconstruction involves working in close proximity to the neurovascular bundle making the risk of vascular complications significantly high. This case report stresses how one can never be too cautious with this possible complication while performing a PCL reconstruction surgery.
At 90° flexion of the knee, the approximate distance between the posterior capsule and the popliteal artery is only 7.6 mm (standard deviation [SD], 2.4) at the level of the joint. The vessel is located lateral to the lateral border of the PCL in the majority of the cases(5). The vessel remains dangerously close at 7.2 mm (SD, 2.6) and 9.7 mm (SD, 3.3), one and two cm below the joint line(5).

Several steps during the surgery can be potentially crucial and put the neuro-vascular bundle at risk :
a) during transtibial guide wire drilling,
b) while reaming of the tibial canal due progression of the guidewire
c) by the edge of the reamer. One should also be aware that primary popliteal neurovascular injuries can be present in patients with acute PCL ruptures or avulsions6).
There are various precautions which if considered can decrease the risk of neurovascular complications. Use of a posteromedial portal while drilling the tibial tunnel keeping the guidewire/reamer always under vision(7). Instruments such as a spade tip guidewire, a tapered drill bit, or an oscillating reamer or using the all-inside technique(8) are relatively safer. Maintaining the knee at 90 degrees of flexion, performing limited capsule release, also increase the distance between the posterior capsule and the popliteal vessels(5,9,10).

We ensured that most of the safety measures were used. The surgery underwent uneventful with no step to suggest any breach of the capsule or a lesion of the vessel.

Figure 5: 3 month follow up radiographs. A: Anteroposterior view. B: Lateral view

The existence of the pre-existing pseudo-aneurysm was however not contemplated. Use of the tourniquet led to stasis and secondary extension of the thrombus causing compromised distal circulation.

Conclusion:

Popliteal vessel injuries post PCL surgeries are not uncommon

Adequate steps to prevent vessel injuries during guidewire insertion/using shaver/reamer are necessary

Close monitoring of vascular status postoperatively mandatory in all PCL surgeries

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PINCER TYPE OF FEMORO-ACETABULAR IMPINGEMENT MANAGED BY HIP ARTHROSCOPY

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Abstract:

PINCER is a type of FemoroAcetabular Impingement(FAI) wherein there is pathological contact between femoral head–neck junction with the acetabular labrum and rim. It is one of the major predisposing factors for the development of osteoarthritis hip. Causes for PINCER typeFAI include focal or global over coverage of femoral head by acetabulum.

Management includes open or arthroscopic resection of over coverage and this article highlights the arthroscopic technique

Introduction:

FemoroAcetabular Impingement(FAI) is defined as abnormal abutment between femoral head-neck junction with acetabular labrum and the rim[1]. CAM and PINCER are two types of FAI described. CAM type of FAI is generally due to non-spherical head of femur resulting from osseous bump at lateral or anterosuperior aspect. Coxa vara and femoral retroversion can also cause CAM impingement [2]. On the other hand PINCER type of FAI are due to excessive acetabular overcoverage which can be global as in cases of coxa profunda or protrusio acetabuli or can be focal in the form of anterior or posterior overcoverage. Anterior overcoverage can result in acetabular retroversion and posterior overcoverage can show a prominent posterior wall on radiography. GenerallyPINCER is associated with CAM type of impingement.

Management of PINCER type of FAI in failed cases of conservative management includes surgical resection of causes of contact by either open or arthroscopic method[3]. This case report highlights the successful outcome of focal type of acetabular overcoverage managed by the arthroscopic method.

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Case Report:

55-year-old diabetic female patient presented with right-sided hip pain for 8 years. Pain was insidious onset, gradually progressive, severe sharp aching type with no obvious trauma. On examination, the patient had an antalgic gait with anterior joint line tenderness. Range of movements were all severely painful and restricted. However, there was no obvious deformity. Flexion adduction internal rotation (FADIR) impingement test was positive. On radiography, joint space narrowing particularly on the periphery with prominent marginal osteophytosis and lateral overhang(Fig 1). Acetabular index was decreased (20 °) with an increased CE angle (45°). Computed Tomography (CT) and Magnetic Resonance Imaging(MRI) revealed similar findings. On clinicoradilogical findings, diagnosis of PINCER type of femoroacetabular impingement of hip was made.

Patient underwent arthroscopic debridement and acetabuloplasty on a fracture table with traction. With anterior and anterolateral portal, initial capsulotomy was done at the superolateral part of the joint. Cartilage defect of around < 1cm was noticed at the lateral aspect of the femoral head(Fig 2) which was debrided and microfracture was done.

Lateral acetabular overcoverage was resected with burr from 11 'o'clock to 3 'o'clock position and adequacy was checked under fluoroscopy.

Postoperative radiographs showed complete excision of osteophyte(Fig 3A) Patient was advised protected weight-bearing for 4 weeks with crutches. At one year follow up, all the movements at hip were full and pain-free with patient able to sit crossed legged comfortably and had a satisfactory outcome (Fig 3B).

Discussion:

PINCER type of FAI is responsible for hip pain in 8% of the population[4].

Due to excessive acetabular overcoverage, femoral head-neck junction abuts acetabular rim during hip flexion which results in repetitive microtrauma that causes multiple cleavage planes between labrum and cartilage (WAVE SIGN).

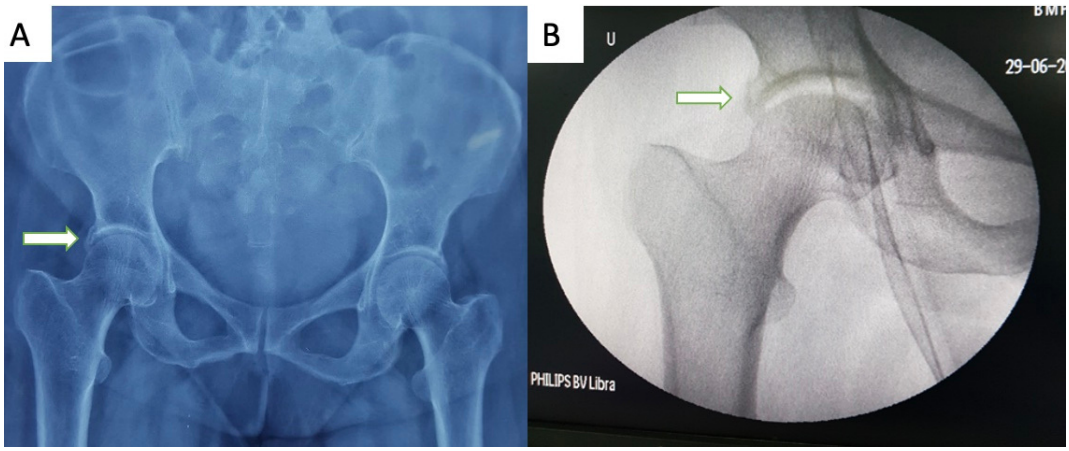

Fig 1:Showing acetabular marginal osteophytosis with lateral overhang
A: Pre-operative radiograph, B: Intraoperative C Arm Image

Further insult can cause cartilage delamination, unstable flaps, labral hypertrophy, intralabral cyst formation and degeneration[5].

Arthroscopic management offers several advantages over open technique. Arthroscopic technique avoids larger incisions and trochanteric osteotomy related complications used in surgical dislocations[6]. Similar to our case, there are studies that show successful resection of incarcerating type of PINCER type of FAI managed arthroscopically with relatively well preserved articular cartilage on the acetabulum and femoral head. In our case too, except for the subcentimeter cartilage defect on the lateral femoral head, the rest of the cartilage was normal based on MRI and intraoperative findings.

In advanced cases of cartilage damage and osteoarthritis , arthroplasty is the better option.

However, the arthroscopic method has limitations too in the form of capsular resection related hip instability and limited access to posterior acetabulum when compared to anterior acetabulum[6]. Similarly, we too had difficulty in accessing the posterior acetabulum, however, there was no instability postoperatively. Arthroscopic resection also has a limited role in severe global type of overcoverage and has not been widely used in such cases. Other options in those cases include periacetabular osteotomy or acetabular and femoral head recontouring through open surgical dislocation [7].

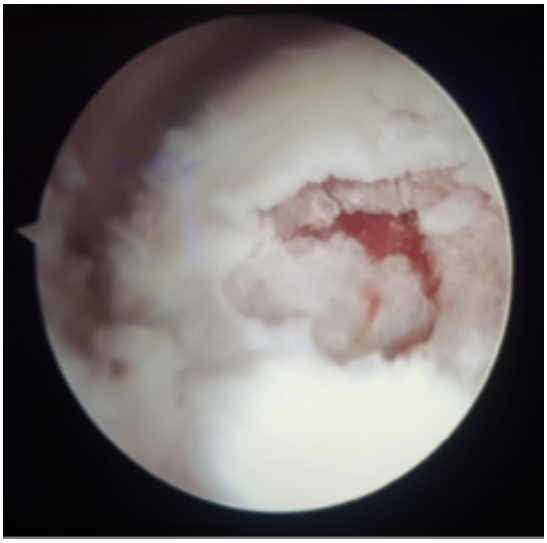

Fig 2: Arthroscopy image showing cartilage defect on femoral head

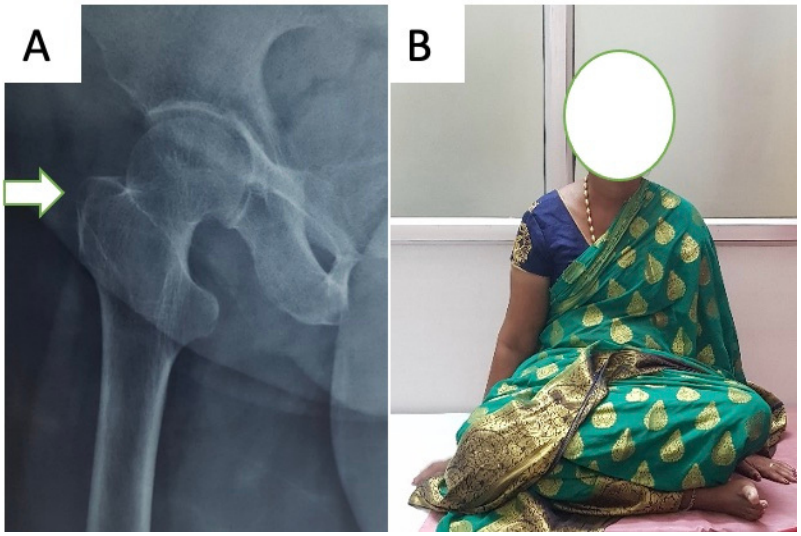

Fig 3: 1 Year Post operative Follow up. A: Post operative radiograph showing complete resection of marginal osteophyte B: Clinical image showing patient sitting cross legged comfortably without any pain

Conclusion:

Hip arthroscopy can be a useful intervention in advanced cases of PINCER type of femoroacetabular impingement as an alternative to arthroplasty for patients with healthy articular cartilage with good clinical outcomes.

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