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A unique variant of reverse segond fracture: A case report and review of literature

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Abstract
The case is a variant of reverse segond fracture which involves injury to the anterior tibial condylar region in addition to the usually involved posterior cruciate ligament (PCL) and medial collateral ligament (MCL) injury. It further highlights the importance of recognizing a variation in the mechanism of injury required to produce such a rare fracture pattern and effective management in order to improve functional outcome.

Keywords: Reverse segond fracture; mechanism; injury complex; management; functional outcome

Introduction
The typical segond fracture includes a triad of avulsion fracture of the lateral tibial plateau with anterior cruciate ligament tear (75 – 100% of cases) and lateral meniscus tear (35%) [1]. the injury mechanism consists of a flexed knee subjected to varus stress and tibial internal rotation, with the fracture occurring at the insertion of the lateral collateral ligament (LCL).
The reverse segond fracture was first reported by Hall and Hochman in 1997 [2]. The application of opposite forces to those needed for the segond fracture, to the flexed knee, of excessive valgus stress with the tibia in external rotation may cause an injury complex mirroring the classic segond fracture. It consists of combination of medial tibial plateau avulsion fracture, PCL and medial meniscal tear.
This case is unique in terms of the mechanism of action and injury complex which has not been described before which leads us to believe that this is a variant of the already rare reverse segond fracture.

Case report
A 20 years old male involved in a motorcycle road traffic accident, sustained injury to his left knee. Patient presented in emergency with left knee pain and swelling. On examination distal pulses and neurological status of the affected limb were found normal. Knee radiographs revealed an avulsion fracture at the left MCL tibial insertion site along with depression at the anterior tibial condylar region. This prompted the suspicion of an atypical type or variant of reverse segond fracture. After taking prior approval from the patient further imaging in the form of CT scan and MRI of the knee joint was conducted to better understand the anatomy of the avulsion fracture and the associated ligamentous and meniscal injuries. CT scan revealed fracture in the posteromedial tibial condylar region and anterior condylar depression. MRI showed PCL and MCL avulsion fractures along with anterior tibial condylar damage.

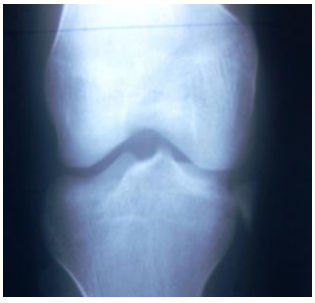

Fig 1: Ap view of the knee joint showing the reverse segond sign injuries

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Fig 2: Lateral View of Affected Knee Showing the Avulsion Fracture

Fig 3: A 3d Ct Scan Revealing the Fractures in the Medial and Posterior Tibial Conylar Region

Fig 4: Sagittal ct image showing anterior tibial condylar damage

After obtaining informed consent Patient was planned for examination under anaesthesia and fixation of the avulsion fractures in OT the next day. Valgus stress test at 0 and 30 degrees of knee flexion was positive with medial opening of knee joint indicating MCL laxity. Posterior drawer test and PCL sag sign were positive indicating PCL laxity. Other tests for knee stability (anterior drawer, lachman, varus stress test) were negative.

Fig 5: Pre- Operative Image Intensifier Image Showing Positive Posterior Drawer Test

Fig 6: Pre- Op Image Intensifier Image Showing Medial Joint Opening on Valgus Stress Test Suggesting Mcl Injury

A posteromedial approach to proximal tibia in supine position with figure of four position of affected leg was undertaken. The fragments were reduced and fixed with three 4mm partially threaded cannulated screws and spiked washers. An above knee slab was applied post- surgery in 15 degree knee flexion. Dressing was changed on post-operative day 3 and subsequently the patient was discharged the next day. The patient was seen in OPD clinic after 10 days when plaster slab and the sutures were removed. Also the patient was referred to physiotherapist and encouraged to start active knee mobilization and non- weight bearing walk with the help of a walker.

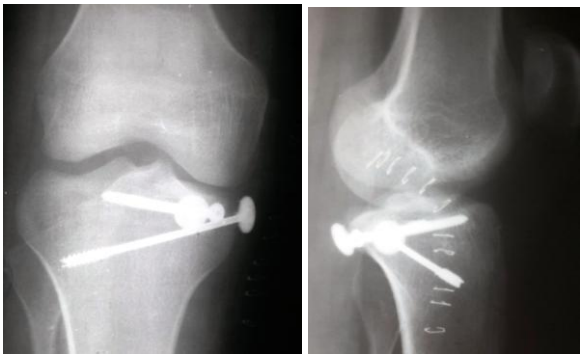

Fig 7: Ap And Lateral Views Post-Operative X Rays

At 1 month follow up range of motion at knee joint-90 degrees, no medial laxity was noticed on valgus stress test and partial weight bearing walk was initiated. Subsequently at 3 months follow up fracture union was achieved as was

noticed on radiographs, patient had pain- free knee ROM of 120 degrees and full weight bearing was initiated. Patient did not experience any giving way sensation or instability in knee joint and was able to resume his daily work activities. Posterior drawer and valgus stress tests were negative.

Discussion

In 1997 when Hall and Hochman[2] described the Reverse Segond fracture, they suggested that this may represent a consistent and reproducible injury complex. The injury in their case was caused by a motor vehicle versus pedestrian incident with presumed valgus stress to the injured knee. Medial tibial plateau avulsion fracture was picked up on radiographs of the knee. The PCL and meniscal injuries were picked up on MRI. It is not clear what prompted them to undertake this extra investigation, but they concluded that if this injury complex was consistently reproducible, then a medial tibial avulsion fracture may be a clue to the mechanism of injury and presence of PCL and meniscal tear.

In 2001, Escobedo *et al* were the seond research group to link valgus stress applied to the knee with tibial external rotation to the triad of MCL tibial avulsion fracture, PCL and medial meniscus tear [3]. They described three cases of Reverse segond fractures. In all three cases there was an avulsion fracture of the medial aspect of the proximal tibia representing an avulsion of the capsular component of the medial collateral ligament, PCL tear and peripheral tear of the medial meniscus. However in one case there was also an ACL (anterior cruciate ligament) tear and in two cases a lateral tibial plateau fracture. Two of the injuries were due to motor vehicle versus pedestrian accidents and one was the result of a motor vehicle collision. Although no supporting evidence is provided, the presumed mechanism of injury for all three patients was valgus stress with the tibia externally rotated. Also in two of their cases the patients also sustained knee dislocations and one had a dislocatable knee. The conclusion was that this injury pattern requires high energy trauma and the multiligamentous instability which as a result may lead to a knee dislocation with the recognized complications of vascular and neurological injury.

In 2007 the third report of a reverse segond fracture was published by Angelini *et al*. [4] This case is consistent with the previous two, in that it was a result of motor vehicle versus pedestrian injury with again an assumed valgus stress mechanism, which resulted in a medial tibial plateau avulsion fracture caused by deep MCL tear associated with a complete tear of PCL. In this case there was also a partial tear of the ACL, but different from the others, as there was no medial meniscus injury.

A fourth report of a "reverse segond fracture" was published by Faroug *et al* in 2009 [5]. This case also highlighted a similar mechanism of injury of excessive valgus stress which resulted in a medial tibial plateau avulsion fracture associated with a PCL and medial meniscal tear. The patient was managed conservatively and was able to resume his pre injury activity levels after a period of eight months following his original injury.

In 2012 a fifth report of a Reverse Segond fracture without PCL injury was published by Varney J [6]. It was the first of its kind to be reported according to the author and a variation in the usual injury triad associated with Reverse Seagond fracture. Following a motorcycle versus tree accident, clinically patient was found to have ACL and MCL injury (anterior drawer, lachman and valgus stress tests at 0 and 30 degrees were positive) and other ligamentous testing was normal (posterior drawer, PCL sag sign and varus stress tests were negative). A medial tibial plateau avulsion fracture on radiographs was detected and further MRI revealed presence of ACL and MCL tear with no obvious meniscal involvement. The likely mechanism of injury reported was excessive valgus stress on an internally rotated tibia leading to ACL and MCL injury, instead of the typically reported valgus stress on an externally rotated tibia leading to PCL and LCL (lateral collateral ligament) injury. Due to financial issues patient could not undergo advised arthroscopic treatment and was managed conservatively with ACL brace and physical therapy. The avulsed fragment never fully healed to the tibia even on 3 month follow up X- rays. Eventually patient went on to have full knee ROM but continued to have some instability and persistent pain in knee joint likely due to development of osteoarthritis.

Conclusion

Our case represents sixth such report, adding another dimension to the already described reverse segond fracture. It represents an added mechanism of injury that is hyperextension of knee joint following the excessive valgus stress on an externally rotated tibia which may be responsible for the anterior tibial condylar damage. This may represent a variant of an already rare fracture. Also with early stable internal fixation of the fracture, the patient had a good functional outcome and was able to return to his work in a short span of time.

Thus our case adds to the growing body of evidence for the existence of the reverse segond fracture and the variations in which its injury pattern can present. It may also set a standard in effective management of such injuries.

References

1. Segond P. Recherches cliniques et experimentales sur les epanchments sanguins du genou par entorse. Progres Med 1879; 7:297-9. 319-21,240-341.
2. Hall FM, Hochman MG. Medial Segond- type fracture: Cortical avulsion off the medial plateau associated with tears of the posterior cruciate ligament and medial meniscus. Skeletal Radiol. 1997; 26:553-5.
3. Escobedo EM, Mills WJ, Hunter JC. The reverse segond fracture association with a tear of the posterior cruciate ligament and medial meniscus. AJR 2002; 178:979-83.
4. Angelini FJ, Malavolta EA, D'Elia CO, Pecora JR, Hernandez A, Camanho GL. Avulsion Fracture of the Medial Tibial Plateau (Reverse Seagond Injury). Acta Ortop. Bras. 2007; 15(3):169-70.
5. Farough R, Hasan A. Reverse Seagond fracture: A case report. Inj Extra 2009; 40(6):109-111.
6. Varney BJ. Reverse Segond fracture without PCl injury. Radiology case reports 2012; 7(1).