

# A rare presentation of tibial eminence avulsion fracture in adult

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**Keywords** — *tibial eminence, pediatric population, ACL.*

**Abstract** — *Tibial spine fracture are uncommon injuries in the pediatric population however they are rare in the adults. The treatment of the tibial spine fracture can be open or arthroscopic fixation for displaced fragments or casting. Treatment depends on the displacement degree. The paper presents the clinical history, surgical technique, pre-and postoperative images of a 37 years old female with tibial eminence avulsion fracture. The CT and MRI results show that the patient has a separation of the tibial attachment, which an arthroscopic surgical fixation performed on the patient using Hewson suture passer technique*

## I. INTRODUCTION

Knee injuries are caused by sprains described to the impact caused by the stress applied from a specific direction with the ligaments holding the knee in position undergoes tears due to the force. An anterior cruciate ligament (ACL) injury is one of the most common knee injuries (Webster & Hewett, 2018). The injury occurs when force is applied to planted foot either from the back or front of the knee, resulting in damaging the cruciate ligaments. Within few minutes, the knee swells, with the attempts of walking becoming challenging. Medical professionals usually confirm the diagnosis of knee injuries by MRI. Long-term treatment of ACL injuries usually involves surgical procedures with significant physical therapy designed to return the intended knee joint function. Tibial avulsion fracture are rare in adults yet their diagnosis and treatment is crucial to restore the function of the ACL and to prevent the patient from undergoing a more complex procedure with prolonged rehabilitation (ACL reconstruction surgery). The paper provides the atypical presentation 37-year-old female with a tibial eminence avulsion fracture with an intact ACL and avulsion of the anterior horn of lateral meniscus

## II. CASE REPORT

37 years old female staff at Fakeeh with a medical history of fall on the right knee reported while on a wheelchair complaining about pain and swelling in the right knee. A few hours after the injury, the patient said a swelling on the knee made her report to the hospital's emergency room. Several physical assessments were undertaken on the patient, including x-rays. The physician later discharged the patient from the ER but on pain-relieving medications. She denied a history of undergoing knee surgeries in the past. The patient also denied having a past medical history that might impact the current condition. The patient also denied the possibility of having any allergies.

The patient underwent physical examination illustrating a restrained effusion of the right knee joint. The extension of the right leg of the patient demonstrated a lag of 10 degrees with flexion of 40 degrees. According to the physical assessment, there were no open wounds on the right knee. The examination conducted on the patient was limited due to severe pain experienced by the patient. The patient could not bear the weight of the lower limb. Based on the allergic condition, which the patient denied being

allergic to, there were no known drug allergies prescribed

by the physician to the patient.



*Fig. 1: The images above provide the computerized tomography (CT) scan of the right knee of a 37-year-old patient with severe right knee pain. Precursory (a) representing the lateral view of the right knee showing swelling on the knee joint, and image (b) representing the anteroposterior (AP) view of the right knee.*



*Fig. 2. preoperative CT images of the right knee. (a) anteroposterior (AP) view and (b) lateral view of the right knee showing an avulsion of the knee joint.*

CT scan done for the patient and showed tibial eminence avulsion fracture (ACL attachment) (fig.2). The patient

was required to undergo a surgical procedure that was performed three days after visiting the hospital's

emergency room. The pre-operation planned procedure performed was arthroscopic vs open tibial spine avulsion fracture fixation

### III. TECHNICAL DETAILS OF THE PERFORMED PROCEDURE

Conducting procedures on patients requires following some routine that is not necessary for all the procedures. Below are the procedure details conducted on the right knee of the 37 years old female with tibial eminence avulsion fracture

Under spinal anaesthesia, supine position with the knee hanging and with the use of tourniquet, routine prepping and draping 2 portals inserted medial and lateral as standard knee scope finding were :intact ACL fibers but avulsed from its attachment intibialeminence with a displaced Fragmented

And an anterior horn lateral meniscus avulsion, after washing the hematoma in the knee and cleaning of the under bed of tibialeminence with a curette, then reduction done with preliminary fixation with k wire, Utilizing a suture pass technique with a Hewson suture passer, the medial tibial eminence fracture was reduced, then 2 drill Hole using the ACL c guide, after that Passing the suture through tibial tunnel and through the anterior horn of lateral meniscus, we pass a suture through the anterior horn lateral meniscus, then drilling a 4.5 mm tibial tunnel, Passing the suture through the bone tunnel By pulling the suture the ACL and meniscus reduced with the knee in full extension. The 2 suture was tied over the tibial shaft and fixed with a 4.5 mm screw with washer.

After completing the procedure successfully, x-rays taken showing reduced fragments. After three days of surgery, physical examination illustrated that the patient started gaining stability with a significant reduction in pain.



Fig. 3. postoperative CT scan images. (a) AP view and (b) Lateral view of the right knee with a reduced tibial eminence

### IV. DISCUSSION

The tibial spine fracture is also known as the anterior cruciate ligament (ACL) avulsion fracture, which is considered a type of avulsion fracture occurring in the knee. Tibial spine fracture entails the separation of the tibial ACL attachment by variable degrees. Femoral attachment separation is a rare case of fracture reported in healthcare organizations. Tibial spine fracture is commonly reported in children than in adults, but there are specific cases that involve this type of fracture in adults. There is an assumption about the commonness of the fracture in children than in adults. It is hypothesized that it occurs in children because of the relative weakness of the partly fossilized bone concerning the ligamentous fibres (Nakashima et al., 2020). It is also caused by the relative increase in the elasticity of the ligaments for the children.

The tibial spine is caused by the powerful hyperextension of the knee or even the straight impact of a knee flexed at the distal end of the femur. The diagnosis of the tibial spine fracture is usually confirmed with the use of knee radiographs (CT or MRI). MRI findings of a fractured knee can be helpful in the determination of associated meniscus tear. The treatment of the tibial spine fracture can be open fixation and reduction and closed casting and contraction, which depends significantly on the displacement degrees and closed reduction success.

**Meyers and Mckeever's classification**

Meyers and McKeever proposed a classification of injuries in 1959 (Green et al., 2019). In 1977, Zaricznyj modified the classification, considered the most common, and applied the ACL avulsion fracture description system. Under Meyers and McKeever classification system, injuries are categorized into four different types:

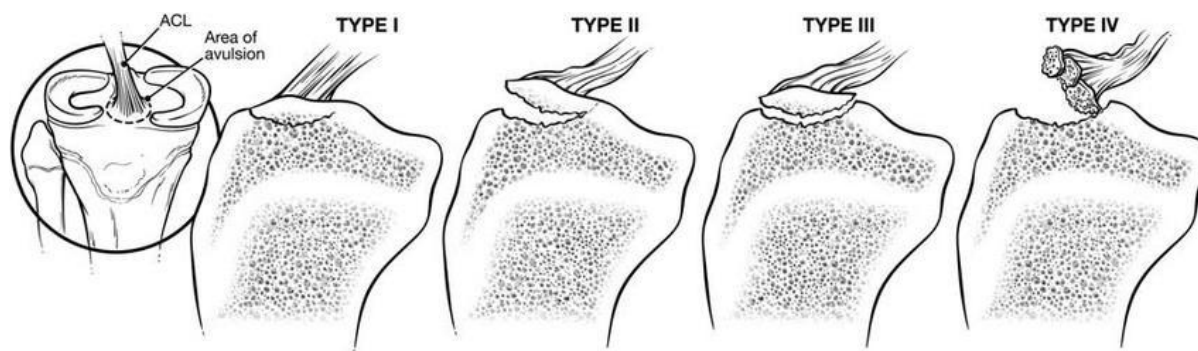
**Type one:** nondisplaced or minimally displaced fragment

**Type two:** anterior elevation of the fragment

**Type three:** complete fragment separation

- a. Entails the small eminence portion
- b. Entails the majority of the eminence

**Type four:** fracture fragment rotation or the comminuted avulsion



A tibial avulsion is categorized under the fracture fragment of the variable orientation entailing tibial eminence based on the fracture type. However, the anterior femur's translation is checked on the lateral view of the tibia.

Any fracture involving displacement of the entire tibial spine should undergo surgical fixation and anatomic reduction. Surgical management is almost always required in adults, due to the high prevalence of associated injuries and entrapment of soft tissues. Typically, because of the ACL is still attached to fragment the surgery is less complex and has better outcomes in comparison to a ACL reconstruction surgery, arthroscopic reduction with suture fixation has become the preferred treatment in compared to fixation with k wires and cannulated screws due to the potential of impingement or the need of another surgery for hardware removal.

In conclusion, early diagnosis and treatment of tibial spine eminence fracture is crucial to restore the function of the ACL and to prevent subsequent instability, post traumatic arthritis and the need for ACL reconstruction surgery latter.

## REFERENCES

- [1] Green, D., Tuca, M., Luderowski, E., Gausden, E., Goodbody, C., & Konin, G. (2019). A new, MRI-based classification system for tibial spine fractures changes clinical treatment recommendations when compared to Myers and McKeever. *Knee Surgery, Sports Traumatology, Arthroscopy*, 27(1), 86-92.
- [2] Muniandy, M., Rajagopal, S., & Tahir, S. H. (2019). Arthroscopic all-inside repair of tear of the anterior horn of the discoid lateral meniscus. *The Surgery Journal*, 5(1), e35.
- [3] Webster, K. E., & Hewett, T. E. (2018). Meta-analysis of meta-analyses of anterior cruciate ligament injury reduction training programs. *Journal of Orthopaedic Research*, 36(10), 2696-2708.
- [4] Zhang, B., Zhang, Y., Cheng, H. D., Xian, M., Gai, S., Cheng, O., & Huang, K. (2018). Computer-Aided Knee Joint Magnetic Resonance Image Segmentation-A Survey. *arXiv preprint arXiv:1802.04894*.
- [5] Anderson CN ,Anderson AF . Tibial eminence fracture. *Clin Sports Med* 2011;30:727-42 .
- [6] SapreV ,Dwidmuthe SC ,Bagaria V ,Yadav S . Functional outcome in tibial spine fracture treated with arthroscopic pull through suture technique. *J OrthopTraumatolRehabil* 2015;8:6-10 .
- [7] DeFrodaSF ,Hodax JD ,Shah KN ,Cruz AI . Tibial eminence fracture repair with double Hewson suture passer technique. *Arthroscopy Tech* 2017;6(4):e1275-9 .