

Successful conservative treatment for Ogden type-IV tibial tubercle avulsion fracture with transverse fibular fracture in 15 years old boy in remote area: a case report

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ABSTRACT

Background: Tibial tubercle avulsion fracture is very rare. Its incidence has been reported to account for only 3% of all proximal tibia fractures and less than 1% of all growth plate injuries. This fracture occurs when the quadriceps are forcefully contracted against resistance, such as during jumping, or when rapid knee flexion occurs with contracted quadriceps, such as during landing. Most authors recommended surgical options in type IV tibial tubercle avulsion; however, we reported successful conservative treatment in this case report.

Case report: A 15-year-old male athlete with no significant past medical history presented via emergency medical services after a ground-level fall while playing basketball which landed with his left foot in a pivot position. He felt immediate pain and swelling about the left knee, all sensation was intact, as were pedal pulses, and neurovascularly remained intact. The patient did not want to go for medical evacuation to do surgery and consent to be managed with conservative treatment with close follow-up.

Conclusion: The results and prognosis of these fractures are excellent, despite the fracture pattern or treatment used, as long as an anatomical reduction is obtained.

Keywords: ATT, Fracture, Ogden type IV, Conservative.

Cite This Article: Sutandio, M. 2022. Successful conservative treatment for Ogden type-IV tibial tubercle avulsion fracture with transverse fibular fracture in 15 years old boy in remote area: a case report. *Bali Medical Journal* 11(3): 1426-1429. DOI: 10.15562/bmj.v11i3.3550

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Received: 2022-07-16
Accepted: 2022-09-18
Published: 2022-10-23

INTRODUCTION

The anterior tibial tuberosity (ATT) is the attachment of the leg's extensor complex, with the apophysis appearing between ages 11 and 14 and fusing to tibial epiphysis between ages 14 and 18 years.¹

In 1955, Watson-Jones provided the original classification based on the proximal extent of the fracture. Ogden subsequently refined this classification to include several subtypes based on the degree of displacement and comminution.² Type I is a fracture through the tubercle itself. Type II fractures fail at the level of the tibial physis. Type III describes a fracture that extends from the tubercle apophysis along the anterior tibial physis and exits proximally through the articular surface.³

Ryu and Debenham, in 1985, described a single case of a tibial tubercle fracture that extended posteriorly through the physis,

exiting posteriorly inferiorly through the metaphysis. They proposed that this Salter-Harris II type fracture be referred to as a type IV tibial tubercle fracture.⁴

Surgical fixation is indicated for the displacement of one or more fragments of the tuberosity anterosuperiorly and extension of the fracture through the proximal tibial ossification center into the joint, with disruption of the articular surface. Without surgical fixation, these fractures rarely heal because the strong contraction of the quadriceps causes fracture displacement.⁵

Nonsurgical management of nondisplaced injuries has been successful. When this injury goes on to non-union development, a re-curvature deformity is a theoretic risk; however, this is rare because the fracture often occurs as the apophysis is already beginning to close.⁶ We reported successful conservative treatment in ATT avulsion fracture Ogden type IV.

CASE ILLUSTRATION

A 15-year-old male with no significant past medical history presented via emergency medical services after a ground-level fall while playing basketball. The athlete states he was playing basketball when he jumped up and awkwardly landed with his left foot in a pivot position. He immediately felt a crack in his left knee and immediate pain and swelling about the left knee. The patient could move his toes, and all sensation was intact, as were pedal pulses, demonstrating he remained neurovascularly intact (Figure 1).

Radiographs of the left knee and tibia revealed an Ogden Type IV tibial tubercle avulsion fracture and transverse fibular fracture with minimal displacement (Figure 2).

The left lower extremity was placed in a long leg posterior splint in the emergency department with gently looking for not too-tight pressure to prevent compartment



Figure 1. Physical examination of the left knee shows deformity and swelling.



Figure 2. The AP & Lateral Knee X-Ray shows fracture line.



Figure 3. The AP Knee X-Ray after 6 weeks long leg casting.



Figure 4. The AP Knee X-Ray after 12 weeks long leg casting.

syndrome because of the splint. After 6 weeks of long leg casting, the patient can do the full range of motion of his left knee without complaining of any pain (Figure 3).

The patient advised to do physiotherapy for 6 weeks. Patient return to his basketball hobby after 12 weeks without any inhibition (Figure 4).

DISCUSSION

The current study reports a rare Ogden Type IV tibial tubercle avulsion and transverse fibular fracture that was

successfully treated conservatively. This result is coherent with a previous study by Checa Betegón, which stated that tibial tubercle avulsion without significant displacement could be treated conservatively.³ In the previous contrary study by Pace, James L feels that tibial tubercle avulsion Ogden type IV should be treated surgically.⁶

ATT avulsion fractures are a less common type with a low prevalence. Fractures most often occur in adolescents who are influenced by tuberosity development. The development has four stages: the cartilage phase, the apophyseal phase, the epiphyseal phase, and the bone phase. The epiphyseal phase is the peak moment of weakness, so there is a risk of causing fracture; due to the modification of fibrocartilage.^{7,8}

A review shows the patient's average age is 15.1 years, where the highest prevalence of fracture causes is sports training, especially basketball.^{5,6,9} A literature found that only three cases of fractures were not caused by exercise. Those cases were due to a sudden quadriceps contraction due to direct trauma, a defense mechanism that causes a tuberosity tear.^{5,10}

The treatment of this fracture is dominated by surgery by 85-90%. Fractures without dislocation can be treated with prevention by maintaining active extensions, such as the Ogden classification, namely types IA, IB, and IIA. While fractures Ogden classification III and IV should be treated with surgery.^{1,5,11} Treatment in Ogden's type IV classification is most important to obtain a good reduction maintained through

KNEE SOCIETY SCORE: SHORT FORM

DEMOGRAPHIC INFORMATION

1 - Sex
 Male
 Female

2 - Date of birth
 Enter dates as mm/yy/yy
 06 / 24 / 2005

3 - Height (ft/in)
 5 2

Weight (lbs.)
 110

4 - Today's date
 23 / 10 / 2021

5 - Surgically treated knee
 Left Right

6 - Race
 American Indian or Alaska Native
 Asian
 White
 Native Hawaiian or other Pacific Islander
 Black
 Other

7 - Ethnicity
 Not Hispanic
 Hispanic

SYMPTOMS

8 - Pain with level walking
 0 1 2 3 4 5 6 7 8 9 10
 none severe

9 - Pain with stairs or inclines
 0 1 2 3 4 5 6 7 8 9 10
 none severe

10 - Does this knee feel "normal" to you?
 Always Sometimes Never

PATIENT SATISFACTION

11 - Currently, how satisfied are you with your knee function while performing light household activities?
 very satisfied satisfied neutral dissatisfied very dissatisfied

FUNCTIONAL ACTIVITIES

12 - For how long can you walk (with or without aid) before stopping due to knee discomfort?
 cannot walk 0-5 minutes 6-15 minutes
 16-30 minutes 31-60 minutes more than an hour

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STANDARD ACTIVITIES

How much does your knee bother you during each of the following activities?	no bother 5	slight 4	moderate 3	severe 2	very severe 1	cannot do (because of knee) 0	I never do this
13 - Walking on an uneven surface	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14 - Climbing up or descending a flight of stairs	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15 - Getting up from a low couch or a chair without arms	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
16 - Running	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

DISCRETIONARY KNEE ACTIVITIES

Many people consider the following activities important. Of these activities, which one is the most important to you?
 (please do not write in additional activities)

<input type="checkbox"/> Swimming	<input checked="" type="checkbox"/> Weight-lifting
<input type="checkbox"/> Golfing (18 holes)	<input checked="" type="checkbox"/> Leg Extensions
<input type="checkbox"/> Road Cycling (>30mins)	<input checked="" type="checkbox"/> Step-Climber
<input type="checkbox"/> Gardening	<input type="checkbox"/> Stationary Biking / Spinning
<input type="checkbox"/> Bowling	<input checked="" type="checkbox"/> Leg Press
<input type="checkbox"/> Racquet Sports (Tennis, Racquetball, etc.)	<input type="checkbox"/> Jogging
<input checked="" type="checkbox"/> Distance Walking	<input type="checkbox"/> Elliptical Trainer
<input type="checkbox"/> Dancing / Ballet	<input type="checkbox"/> Aerobic Exercises
<input checked="" type="checkbox"/> Striking Exercises (reaching out your muscles)	

How much does your knee bother you during the activity checked above?

no bother 5	slight 4	moderate 3	severe 2	very severe 1	cannot do (because of knee) 0
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Figure 5. Knee Society Score Short Form after 12 weeks.

a cast or cannula. The prognosis of this fracture has a good prognosis approaching 100%.^{5,8,9,12}

CONCLUSION

The results and prognosis of these fractures are excellent, despite the fracture pattern or treatment used as long as an anatomical reduction is obtained.

DISCLOSURE

Conflict of Interest

None.

Author Contribution

The author contributed to all aspects of this case report.

Ethical Consideration

The patient has permitted this case report to publish the data.

Funding

None.

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