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## Case Report

# Snapping of bilateral biceps femoris tendons: A case report and brief review

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## ARTICLE INFO

## Article history:

Received 4 November 2021

Revised 19 December 2021

Accepted 30 December 2021

## Keywords:

Biceps femoris

Biceps femoris tendon snapping

Bilateral fibular head

Knee pain

## ABSTRACT

Snapping of the biceps femoris tendon is a rare cause of lateral knee pain often due to multiple factors including fibular head deformity and thickening of the anterior band of the biceps femoris tendon inserting on the tibia. Understanding the complex and poorly understood anatomy of the biceps femoris tendon is crucial and essential for proper diagnosis of its snapping. In this report, we describe the rare entity of bilateral biceps femoris tendon snapping in a young man using a multimodality diagnostic approach.

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## Introduction

Snapping of the biceps femoris tendon is an uncommon cause of lateral knee pain described as painful “cracking sound” of the knee on flexion and extension of the knee joint. It is often due to gliding of the distal tendon of the long head of the biceps femoris over the fibular head [1,2].

Etiologies are diverse and grouped under anomalous tendon insertion [3–11], subluxation of an anatomically normal

tendon [12,13], abnormal fibular morphology [14–17] or trauma [2,18] with the anomalous insertion etiology being the most common. Symptoms may be mild but, in few cases, they have been reported to affect daily activities [1].

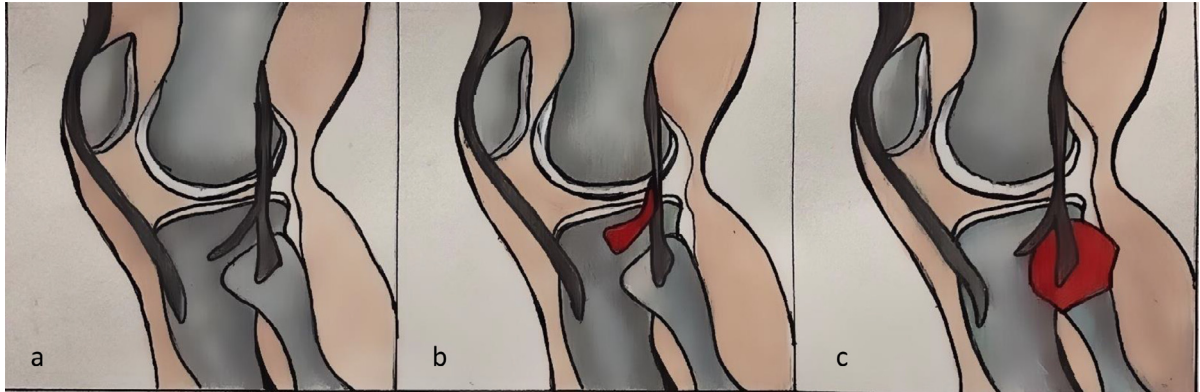
In this case report, we present a case of bilateral biceps femoris tendon snapping due to a combined congenital deformity of the fibular heads and thickening of the anterior band of the biceps femoris tendon inserting on the tibia. [Figure 1](#) is a drawing illustrating the 2 entities separately.

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<https://doi.org/10.1016/j.radcr.2021.12.058>

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**Fig. 1** – Illustration showing the two pathologies in two separate diagrams. (A) is the normal anatomy, (B) shows a hypertrophied anterior band of the biceps femoris tendon and (C) shows a hypertrophic fibular head



**Fig. 2** – Prominent fibular head with anterior and posterior bumps (arrows)

### Case presentation

Our patient is an 19-year-old previously healthy male presenting for evaluation of chronic bilateral “clicking sensation” at the lateral aspect of both knees of 10 months duration. He reports that the “clicking sensation” is more pronounced with exercise, particularly on forceful knee flexion and extension during squatting. He denies any history of old or recent trauma or lower extremity surgeries.

Physical examination was positive for a mild bilateral genu varum deformity and palpable lateral tilt of both fibular heads (Fig. 2). There was no tenderness or knee joint effusion on either side. No joint instability was detected. There was no decrease in range of motion or abnormal gait.



**Fig. 3** – Figure A before snapping shows the biceps tendon (arrow) anterior to the fibular head (arrowhead) and Figure B after extreme flexion shows the tendon just posterior to the fibular head

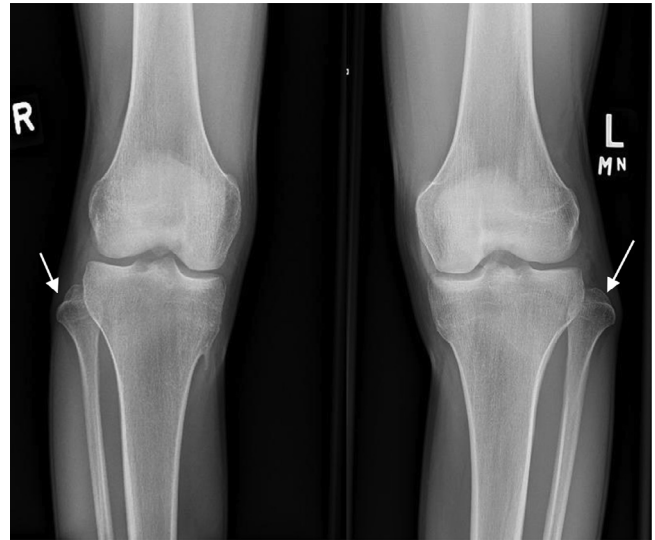
No snapping was noted on passive knee flexion and extension. Snapping was only evident on forceful flexion and extension during squatting (Fig. 3, Video 1, Supplemental Audio file and Supplemental Video 1 file). Snapping of the tendon on the fibular head was noted from anterior to posterior during knee flexion at around 100–110 degrees flexion, and from posterior to anterior during knee extension at the same level.

Initial imaging review included a lower extremity scanogram (Fig. 4) and bilateral knee radiographs (Fig. 5 showing mild bilateral genu varum deformity with the mechanical angle more than 5 degrees and symmetrical focal lateral prominence of both fibular heads. Ultrasound images showed focal bone prominence along the lateral aspect of the fibular head bilaterally (Fig. 6). Ultrasound also showed thickening and tendinosis with small low-grade interstitial tear of the distal biceps femoris tendon (Fig. 7).

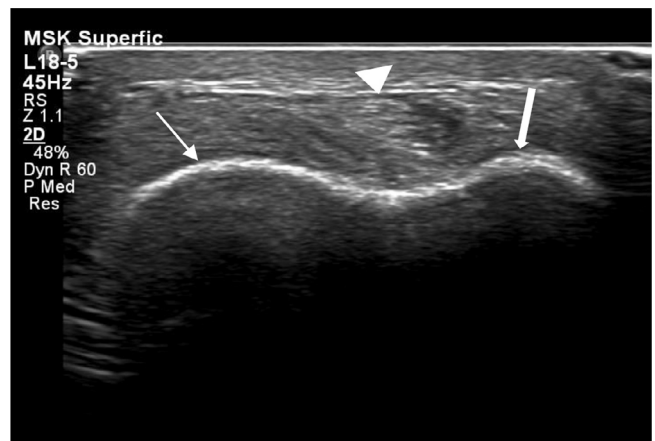
Dynamic ultrasound images over the fibular head region during squatting revealed the posterior gliding and snapping



**Fig. 4 – Lower extremity scanogram. Genu Varum deformity with increased mechanical angles measuring 6.5 degrees on the right side and 7 degrees on the left side**



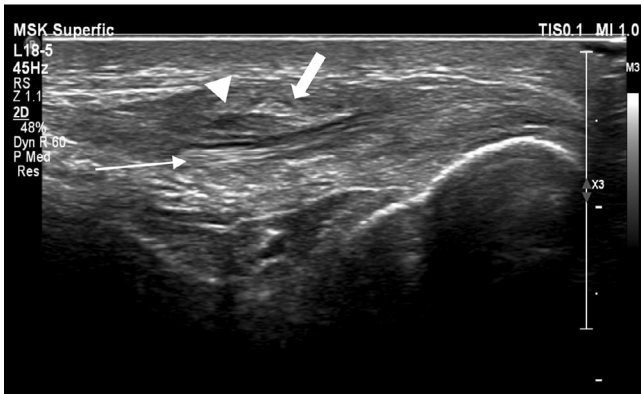
**Fig. 5 – AP radiograph of the knees. Symmetrical prominence of both fibular heads pointing laterally (Arrows)**



**Fig. 6 – Short axis transverse ultrasound of the right fibular head. Bump of the lateral aspect of the fibular head (thin arrow). Bump of the posterior aspect of the fibular head (large arrow). Biceps tendon showing heterogenous echotexture due to degeneration (arrowhead)**

of the biceps tendon over the lateral edge of the fibular head (Fig. 8).

MR study was then performed to better evaluate the anatomy of the biceps tendon. Axial proton density (PD) images show prominent fibular heads with bumps over the lateral and posterior aspects (Fig. 9). Axial proton density (PD) fat suppressed images show thickened biceps tendon at its distal insertion, more on the right side (Fig. 10). Coronal T1Weighted images display the combination of thickened biceps tendons inserting on the prominent fibular heads (Fig. 11). In addition to that, there is a prominent bilateral distal band of the biceps femoris tendon inserting along the anterolateral aspect of the proximal tibia (just posterior to Gerdy's tubercle) (Fig. 12).



**Fig. 7 – Long-axis view of the lateral aspect of the knee. Thickened biceps femoris tendon (thick arrow) showing decreased echogenicity due to degeneration with tear (arrowhead). Thin arrow pointing to lateral collateral ligament**

The patient opted conservative treatment with physical therapy and nonsteroidal anti-inflammatory agents if needed and will be followed up in the orthopedic clinic in 6 months.

## Discussion

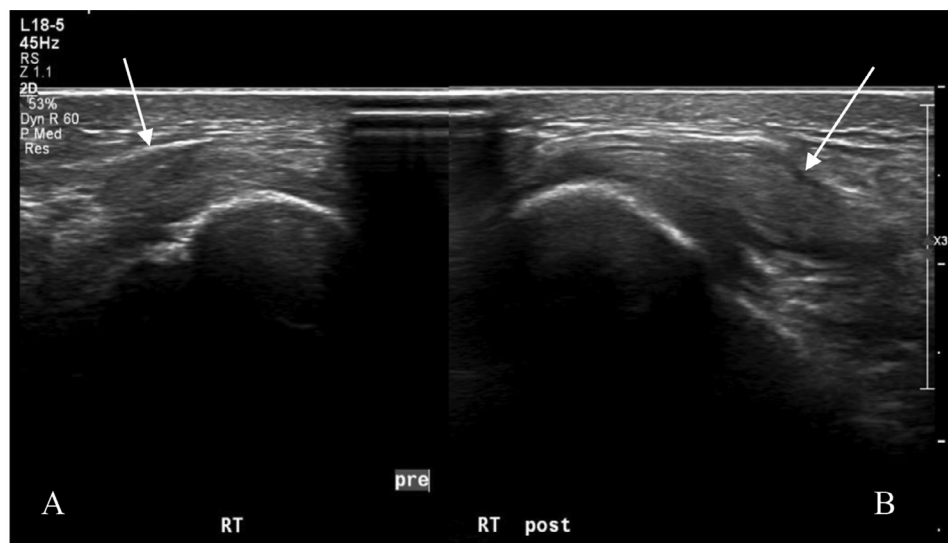
The biceps femoris tendon acts as a strong dynamic knee stabilizer and external rotator of the tibia by preventing anterolateral and anteromedial rotatory instabilities. This is mainly due to the strong biomechanical effect of the complex tendinous attachment of the biceps femoris muscle that remains poorly studied and understood [19,20]. In fact, the biceps femoris attachment was previously simplified as a single fibu-

lar head attachment. However, a study conducted by Salter et al [21] about the complexity of biceps femoris tendon insertions in cadaveric knees showed that the biceps femoris tendons are divided into medial and lateral slips by the lateral collateral ligament. Each slip is further divided into anterior and posterior components divided into small slips with the posterior components inserting on the fibular head and the anterior components inserting on the proximal lateral tibia, popliteus tendon and arcuate ligament [21].

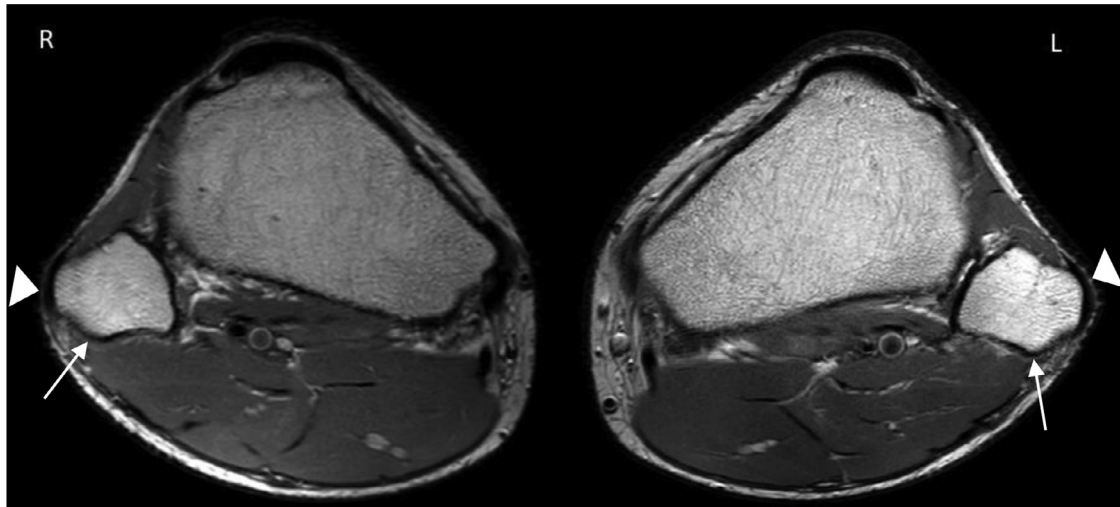
The normal fibular head morphology is a pyramidal shaped structure composed of 3 facets, the lateral, posterior, and proximal tibiofibular facets. A cadaveric study performed by Doita et al [20], dissected 21 cadaveric knees and reviewed the fibular head anatomy, performed 3D measurements, and visualized the tendinous insertions on the fibular head and showed consistency in the data where the fibular collateral ligament inserts on the lateral aspect of the fibular head and the popliteal fibular ligament inserts on the styloid process. Despite reviewing in details the fibular head morphology, this study did not discuss the biceps femoris tendon insertion.

There are very few case reports in the literature addressing congenital prominence of the fibular head. Agrawal et al [22] showed a case of bilateral prominent fibular head causing knee pain without mentioning snapping of the biceps femoris tendon. It was successfully treated with surgical resection; no cross-sectional images were performed. Only 2 case reports in the literature showed bilateral snapping due to abnormal bilateral fibular morphology [9]. Our case combines abnormal fibular head prominence and thickened biceps femoris tendinous insertion, factors that contributed to biceps femoris tendon snapping.

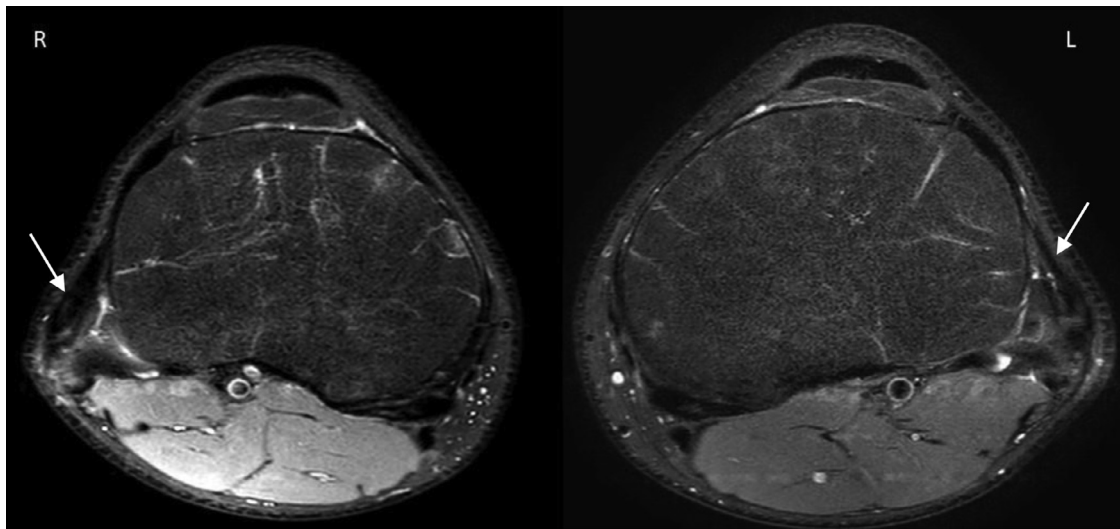
Guillin et al [23], reviewed the etiologies of biceps femoris snapping and found several abnormalities including hypertrophied anterior band of the biceps femoris tendon, isolated anterior band, wide insertion on the fibular band and prominent fibular head.



**Fig. 8 – Dynamic ultrasound images before (A) and after (B) extreme flexion showed snapping of the tendon over the fibular head from anterior to posterior positions over the posterior cortical bump**



**Fig. 9** – Bilateral axial proton density images (TR: 7147.36, TE: 30) performed on a 3T magnet of bilateral knees showing bumps of the lateral (arrowheads) and posterior aspects of the fibular heads (arrows)



**Fig. 10** – Bilateral axial proton density fat suppressed images (TR: 8747.63, TE: 30) performed on a 3T magnet of bilateral knees showing thickened and degenerated biceps femoris tendon more on the right side (arrows)

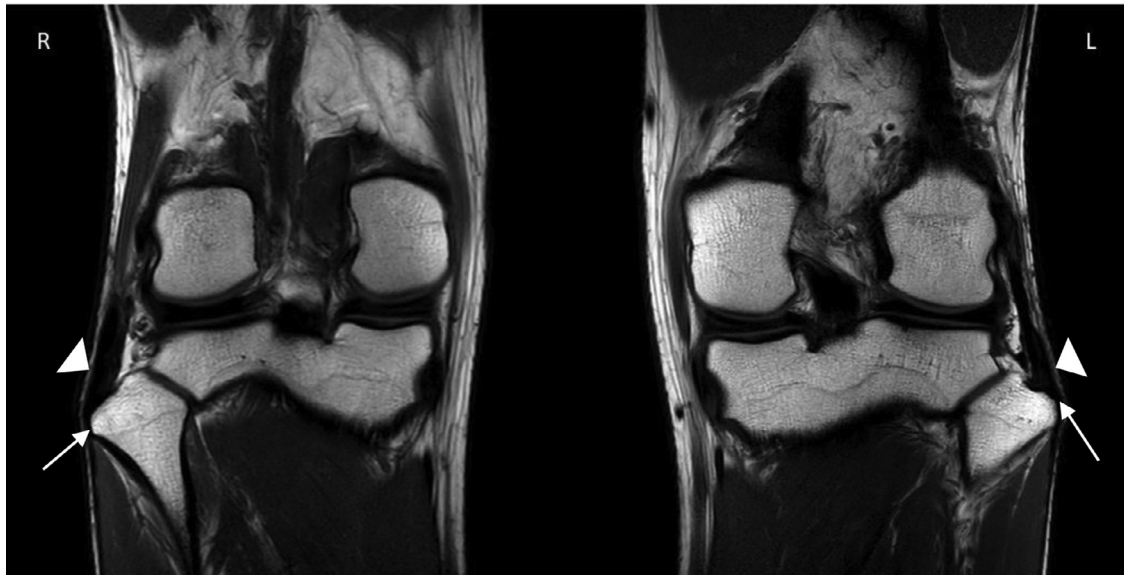
MR images of our patient showed thickening of the anterior band of the biceps femoris tendon inserting on the anterolateral aspect of the tibia posterior to Gerdy's tubercle more so on the right side. To our knowledge, this is the first report of multimodality imaging approach of the rare entity of bilateral biceps femoris snapping including radiographs, ultrasound, and magnetic resonance imaging, not previously described in the literature. In addition, our case combines multiple factors predisposing to snapping including prominent fibular head and thickened tendon insertion.

Multiple surgical treatment options have been described including resection of the lateral aspect of the fibular head or

reinsertion of the prominent anterior band of the distal tendon [9].

## Conclusion

In conclusion, we present a case of bilateral snapping of the biceps femoris tendon. Our case is related to both bony and tendon insertion anomalies. We present the radiographic, sonographic, and magnetic resonance findings of this rare entity. We hope that by reviewing the complex tendinous insertions,



**Fig. 11** – Bilateral coronal T1W images (TR: 669.35, TE:20) performed on a 3T magnet showing prominent fibular head (arrows) with thickened inserting distal biceps femoris tendons (arrowheads) more prominent on the right



**Fig. 12** – Coronal T1W image (TR: 669.35, TE:20) performed on a 3T magnet showing thickened band of the biceps femoris tendon along the anterolateral aspect of the proximal tibia

the fibular head morphology and different imaging findings that this rare entity will be better understood and easily diagnosed.

### Patient Consent

Informed consent was obtained from the patient for publication of this case report in future with the accompanying images.

### Declaration of Competing Interest

There is no conflict of interest in this case presentation. This case was written for educational purposes.

### Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.radcr.2021.12.058](https://doi.org/10.1016/j.radcr.2021.12.058).

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