A symptomatic cyamella in the popliteus tendon causing snapping knee: a case report and literature review

Shouwen Su†, Yunxiang Lu†, Yuxian Chen and Zhiyong Li*

Abstract

Background: Cyamella, the sesamoid bones of the popliteus muscle, are rare in humans. Snapping knee is an uncommon problem which can be difficult to diagnose.

Case presentation: In this case, we report a 24-year-old male with snapping knee caused by symptomatic cyamella in the popliteus tendon. A large cyamella was identified upon surgery and was removed. Postoperatively, the patient had immediate relief of preoperative symptoms, and there were no signs of recurrence after 1 year of follow-up.

Conclusions: Although not previously suggested, symptomatic cyamella in the popliteus tendon should be considered as part of the differential diagnosis of the snapping knee.

Keywords: Cyamella, Popliteus, Sesamoid, Snapping knee, Surgery, Knee joint

Background

Cyamellae, the sesamoid bones of the popliteus muscle, are rare in humans [1]. Snapping knee, which is defined as a patient hearing or feeling a snapping or popping of joints at some specific activity [2], is an uncommon problem and can be difficult to diagnose [3]. Some differentials for the snapping knee include the presence of a discoid meniscus [4], rheumatoid nodules [5], iliotibial band (ITB) friction [6], biceps femoris tendon [3, 7], semitendinosus and gracilis tendons [8], popliteus tendon [9, 10] and intra-articular pathological changes. Firstly in this case, we report a 24-year-old male with snapping knee caused by symptomatic cyamella in the popliteus tendon. Secondly, diagnosis and treatment of this rare pathology are discussed. The literature associated with symptomatic cyamella in the popliteus tendon are also reviewed.

Case presentation

A 24-year-old male patient was presented to the outpatient department with a history of right lateral knee snapping and recurrent sensation of discomfort for the past 2 years. Snapping was elicited upon extending the knee and could be reproduced by applying direct pressure on the posterolateral knee. There was no actual or previously sustained trauma noted on this patient.

The patient was initially and preliminarily diagnosed with knee joint plica syndrome and underwent arthroscopic surgery in a previous institution. This however did not relieve his symptoms. As the snapping continued, the patient became unable to tolerate physical activities or prolonged walking.

Upon thorough physical examination, full active range of motion was observed to be intact, but a reproducible audible and palpable snapping of the lateral knee when moving from flexion to extension. However, this was not consistently reproducible with passive range of motion. Other special tests were negative except for the Cabot sign, which clearly produced a snapping sensation.

X-rays presented a round osseous structure in the posterolateral part of the joint, similar to the normal sesamoid (Fig. 1). CT scanning and MRI were additionally conducted. No pathological results were obtained apart from a clearly visible ovoid-shaped bone that was located posterior and superior to the proximal musculo-tendinous intersection of the popliteus muscle. The sesamoid bone articulates non-
cartilagenously with the lateral dorsal femoral condyle (Figs. 2 and 3). The popliteus muscle and tendon presented signs of inflammation. A steroid injection was administered into the snapping point but did not relieve his symptoms. A posterior approach was used to incise the bone which lead us to discover that the biceps femoris tendon presented no pathological changes. Deeper in the popliteus tendon, a large cyamella was found. With the knee in a passive range of motion, we found there was snapping of the popliteus tendon over the cyamella. (see Additional file 2) An incision was made directly over the located area and the sesamoid bone was excised (see Additional file 3). The cyamella located near the musculo-tendinous intersection of the popliteus muscle (Fig. 4). The specimen measured 15*7*9 mm (Fig. 5). Radiographs following the procedure demonstrated removal of the cyamella (Fig. 6).

Postoperatively, the patient recovered well and had immediate relief after treatment. He was able to return to physical fitness activities at 8-week follow-up.

**Discussion and conclusions**

Snapping knee is defined as a patient hearing or feeling a snapping or popping of joints at some specific activity [3]. Some differentials for the snapping knee include the presence of a discoid meniscus [4], rheumatoid nodules [5], iliobial band (ITB) friction [6], biceps femoris tendon [7], semitendinosus and gracilis tendons [8], popliteus tendon [9, 10] and intra-articular pathological changes. Snapping of the knee caused by symptomatic cyamella in the popliteus tendon however, is extremely rare and has never been reported in the literature.

Cyamella, the sesamoid bones of the popliteus muscle, are rare in humans. While in animal research, they are...
thought to assist in muscle function by modifying pressure, diminishing friction and altering the direction of the pull [1]. Studies have shown a close interaction between intrinsic genetic factors and extrinsic epigenetic stimuli ultimately controls the development and evolution of sesamoid bones [11]. The cyamella is located in either the popliteus muscle or adjacent to its myotendinous junction. Other knee sesamoid bones include the patella and fabella. The fabella is located within the lateral head of the gastrocnemius muscle and posterior to the lateral femoral condyle [12].

In the present case, we found Cabot sign could reproduce the snapping while other spacial tests were unremarkable. The Cabot test is performed on the patient in a supine position with the involved knee flexed with the lower leg crossed over the contralateral leg. The patient is then asked to extend the knee while the examiner palpates the lateral joint line. The sign is considered positive when snapping is elicited upon knee extension. We noted that this is a typical physical examination for differential diagnosis of the snapping knee [10].

Isolated case reports include the imaging appearance of cyamella. CT showed cyamella to be a well-corticated os- sicle with a hypodense center due to the presence of marrow fat [13]. On T1-, T2-, and T2*-weighted MRI scans, a cyamella presents as an ossicle with low signal intensity along its borders [14]. According to these results, we were able to exclude an osteochondral flake, a loose body or a periossous calcification in this case, the diagnosis of a cyamella was given. Ultrasound has its unique value in diagnosis and evaluation of snapping knee. The benefit of musculoskeletal ultrasound includes quick examination, high accuracy and no radiation [15–17]. As the patient did MRI scans in the first place, we did not employ ultrasound for diagnosis.

The review of the literature available via the PubMed online data revealed four case reports associated with
symptomatic cyamella in the popliteus tendon [18–21]. The results are summarized in Table 1.

The novelty of this article includes the following points. Firstly, the unique clinical feature in this case is lateral knee snapping while pain, swelling, discomfort were reported in previous case reports. During the surgery, we found a cyamella adjacent to myotendinous junction of popliteus tendon and snapping of the popliteus tendon over the cyamella. This is previously unreported in the existing literature. We postulate that the unique clinical feature is associated with the location and size of cyamella. Secondly, we reported surgical excision in dealing with snapping knee caused by symptomatic cyamella for the first time and achieved satisfied outcome after 8 weeks follow-up. The treatment of existing case reports includes physical therapy, hinge brace and arthroscopy, the pathology of snapping is unclear and the clinical outcome is uncertain. Thirdly, we noted that Cabot sign is a typical physical examination for differential diagnosis of the lateral snapping knee, Cabot sign could reproduce the unique snapping while other spacial tests were unremarkable, thus a symptomatic cyamella should be considered as differential diagnosis. Fourthly, we proposed that symptomatic cyamella in the popliteus tendon should be considered as part of the differential diagnosis of the snapping knee. Many differentials for the snapping knee have been reported as mentioned above, symptomatic cyamella in the popliteus tendon causing snapping knee is identified for the first time and should be considered in clinical works.

The reported case is the first that the authors have evaluated with a symptomatic cyamella in the popliteus tendon as an etiology for snapping knee. This was an unexpected finding intraoperatively and was only discovered by directly visualizing and palpating the popliteus tendon snapping over the cyamella during passive range of motion. This case offers a contribution by adding to the differential diagnosis that should be considered in the evaluation of snapping knee syndrome.

Although not previously suggested, symptomatic cyamella in the popliteus tendon should be considered as part of the differential diagnosis of the snapping knee. Although an early diagnosis could be difficult to establish, the typical MRI is an ovoid structure with internal cancellous bone signal in the popliteus tendon. An open excision of the cyamella is the optimum surgical treatment for this condition.

### Table 1 Details derived from four case reports

|                      | Mishra. 1996 [15] | Benthen. 2010 [16] | Dheer. 2012 [17] | Rehmatullah. 2014 [18] |
|----------------------|-------------------|-------------------|------------------|------------------------|
| **Age of patient**   | 28Y               | 25Y               | 14Y              | 64Y                    |
| **Symptoms**         | Unable to bear weight, swelling | Posterolateral knee pain, swelling and discomfort for 6 weeks | Lateral knee pain, swelling, inability to fully extend his knee | Intermittent knee pain for 4 months |
| **History of trauma**| Y                 | N                 | N                | Y                      |
| **Treatment**        | Arthroscopy       | Physical therapy  | Not mentioned    | Hinge brace            |
| **Follow up**        | Asymptomatic after 6 weeks | Asymptomatic after 1 year | Not mentioned    | Symptoms recurred once the brace was removed |

**Fig. 6** Postoperative radiograph after excision of cyamella. “Lateral” indicates lateral side of the knee, “Medial” indicates medial side of the knee, “Anterior” indicates anterior side of the knee, “Posterior” indicates posterior side of the knee.

**Supplementary information**

Supplementary information accompanies this paper at [https://doi.org/10.1186/s12891-019-2882-8](https://doi.org/10.1186/s12891-019-2882-8).

**Additional file 1.** A reproducible audible and palpable snapping of the lateral knee when moving from flexion to extension.
In the surgery, we found there was snapping of the popliteus tendon over the cyamella.

After excision surgery, the snapping was gone.

Acknowledgements
Not applicable.

Authors’ contributions
SS did the data collection and writing. YL was a major contributor in writing the manuscript. YC and ZL contributed to the conception and design of the study. All authors read and approved the final manuscript.

Funding
There is no funding received for this paper.

Availability of data and materials
Not applicable.

Ethics approval and consent to participate
Not applicable.

Consent for publication
Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of the written consent is available for review by the Editor of this journal.

Competing interests
The authors declare that they have no competing interests.

Received: 8 March 2019 Accepted: 4 October 2019
Published online: 27 October 2019

References
1. Le Minor JM. Brief communication: the popliteal sesamoid bone (cyamella) in primates. Am J Phys Anthropol. 1992;87:107–10.
2. Marchand AJ, Proisy M, Ropars M, et al. Snapping knee: imaging findings with an emphasis on dynamic sonography. AJR Am J Roentgenol. 2012;199:142–50.
3. Date H, Hayakawa K, Nakagawa K, et al. Snapping knee due to the biceps femoris tendon treated with repositioning of the anomalous tibial insertion. Knee Surg Sports Traumatol Arthrosc. 2012;20:1581–3.
4. Chen LX, Ao YF, Yu JK, et al. Clinical features and prognosis of discoid medial meniscus. Knee Surg Sports Traumatol Arthrosc. 2013;21:398–402.
5. Chu A, Ginar D, Terzak J, et al. Chonic sarcoïd arthritis presenting as an intra-articular knee mass. J Clin Rheumatol. 2009;15:190–2.
6. Ilizaliturri JAM, Camacho-Galindo J. Endoscopic treatment of snapping hips, iliotibial band, and iliopectos tendon. Sports Med Arthrosc. 2010;18:120–7.
7. Bernhardson AS, LaPrade RF. Snapping biceps femoris tendon treated with an anatomic repair. Knee Surg Sports Traumatol Arthrosc. 2010;18:1110–2.
8. von Dercks N, Theopold JD, Marquass B, et al. Snapping knee syndrome caused by semitendinosus and semimembranosus tendons. A case report. Knee. 2016;23:1168–71.
9. Krause DA, Stuart MJ. Snapping popliteus tendon in a 21-year-old female. J Orthop Sports Phys Ther. 2008;38:191.
10. Mariani PP, Mauro CS, Margheritini F. Arthroscopic diagnosis of the snapping Popliteus tendon. Arthroscopy. 2005;21:88.
11. Sarin VK, Erickson GM, Giori NJ, et al. Coincident development of sesamoid bones and clues to their evolution. Anat Rec. 1999;257:174–80.
12. Zeng S, Dong X, Dang R, et al. Anatomic study of fabella and its surrounding structures in a Chinese population. Surg Radiol Anat. 2012;34:65–71.
13. Akaniel G, Tan N, Sarsys HT, et al. Popliteus muscle sesamoid bone (cyamella): appearance on radiographs, CT and MRI. Surg Radiol Anat. 2006;28:642–5.
14. Munk PL, Althathlol A, Rashf F, et al. MR features of a giant cyamella in a patient with osteoarthritis. Skelet Radiol. 2009;38:69.
15. Chang KW, Wu WT, Han DS, et al. Static and dynamic shoulder imaging to predict initial effectiveness and recurrence after ultrasound-guided subacromial corticosteroid injections. Arch Phys Med Rehabil. 2017;98:1084–94.
16. Chang KW, Wu WT, Huang KC, et al. Limb muscle quality and quantity in elderly adults with dynapenia but not sarcopenia: an ultrasound imaging study. Exp Gerontol. 2018;108:54–61.
17. Wu W, Chang K, Moizian K, et al. Basis of shoulder nerve entrapment syndrome: an Ultrasonographic study exploring factors influencing cross-sectional area of the Suprascapular nerve. Front Neurol. 2018;9:202.
18. Mishra AK, Jurist KA. Symptomatic cyamella. Arthroscopy. 1996;12:327–9.
19. Benthen JP, Brunner A. A symptomatic sesamoid bone in the popliteus muscle (cyamella). Musculoskelet Surg. 2010;94:141–4.
20. Dheer S, Silverberg C, Zoga AC, et al. A 14-year-old with lateral knee pain and locking. Skelet Radiol. 2012;41:1339–40.
21. Rehmatullah N, McNair R, Sanchez-Ballester J. A cyamella causing popliteal tendonitis. Ann R Coll Surg Engl. 2014;96:1–3.

Publisher’s Note
Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.