

## Clinical Quiz

## Pellegrini-Stieda Disease in a Severely Injured Patient with Spinal Cord Injury

Avraam Ploumis<sup>1,2</sup>, Orestis Petropoulos<sup>2</sup>, Apostolia A. Balta<sup>2</sup>, Ioannis Manolis<sup>1</sup>, George I. Vasileiadis<sup>1</sup>, Dimitrios N. Varvarousis<sup>1,2</sup>

<sup>1</sup>Department of Physical Medicine and Rehabilitation, University Hospital of Ioannina, Ioannina, Greece;

<sup>2</sup>Faculty of Medicine, University of Ioannina, Ioannina, Greece

**Keywords:** Medial Collateral Ligament, Pellegrini-Stieda Disease, Spinal Cord Injury, Traumatic Brain Injury



**Figure 1.** Thoracic spine MRI sagittal T1 sequence showing T6 chance fracture with spinal cord edema.

### Case

A 68-year-old man suffered a run-off-road collision while driving and was immediately transported to the emergency department of a Tertiary University Hospital with a Glasgow coma scale of 7, where he was intubated. During his 2-month hospitalization in the intensive care unit, he was diagnosed with pulmonary contusions, a subdural hematoma in the brain, and a displaced T5–6 Chance fracture with spinal cord injury (ASIA C T6) (Figure 1), without knee injury. The fracture was treated nonoperatively, with immobilization by a 3-point hyperextension brace, and subsequently, the patient was transferred to the Department of Physical Medicine and Rehabilitation for recovery and physiotherapy, where he complained of pain and swelling along the medial side of the knee with restricted range of motion. The knee X-ray showed a characteristic Pellegrini-Stieda disease (PSD) lesion (Figure 2), while the knee MRI did not reveal other injuries. Medication was administered (risedronate sodium), a knee brace was used with an adjustable angle, and mild active assisted kinesiotherapy of the knee was performed until the threshold of pain was reached (initially knee flexion was 35 degrees while knee extension was normal). Progressively and at the limit of pain, knee flexion was increased to 95 degrees. The daily physiotherapy session lasted 45 minutes and used a tilt table to help him stand until he was able to walk, assisted by the physiotherapist or a walker. Then he was tasked with climbing stairs and walking a certain distance. Six months later, the patient can walk (ASIA E) with slightly reduced knee flexion.

### Commentary

Pellegrini-Stieda disease or syndrome is an ossification or calcification at the medial side of the knee, usually within

The authors have no conflict of interest.

Corresponding author: Avraam Ploumis, MD, Department of Physical Medicine and Rehabilitation, University of Ioannina, Ioannina 45110, Greece  
E-mail: [aploumis@uoi.gr](mailto:aploumis@uoi.gr)

Edited by: G. Lyrakis

Accepted 28 June 2023





**Figure 2.** Anteroposterior radiograph displaying ossification on the medial side of the knee.

the proximal attachment of the medial collateral ligament<sup>1</sup>. However, a few other origin sites have been proposed, including the adductor magnus tendon, the medial head of gastrocnemius muscle and the medial patellofemoral ligament<sup>1</sup>. The pathogenesis of this disease is typically a traumatic injury, either direct or indirect; there have also been reports of micro-repetitive trauma from therapeutic manipulations of a stiff joint or rehabilitation after surgery<sup>2</sup>. Most patients are asymptomatic. Other symptoms and clinical findings may include pain, local swelling, and range of motion limitation. In plain radiographs, the lesion is seen as a thin curvilinear or crescent line in the soft tissue medial to the femoral condyle<sup>1</sup>. The goal of this report is to present an unusual case of PSD in a severely injured patient with a spinal

cord injury but no recent trauma to the knee and to conduct a review of the literature.

An extensive review of the literature was carried out (CINAHL, Pubmed, Cochrane Clinical Trials, DARE, MEDLINE, Scopus, Embase, and Science Direct) using specific key words, regarding PSD and its connection with indirect musculoskeletal trauma and neurological injuries. More specifically, for the period from January 2000 to December 2022, and using the terms (Pellegrini Stieda, Traumatic Brain Injury, Spinal Cord Injury, Neuropathy, Neurogenic, Brain Injury), there were only 2 cases of PSD after a spinal cord injury and 1 case after a traumatic brain injury<sup>2-4</sup>.

The connection between the ectopic bone formation in PSD and neurological injuries can be attributed to several factors, including tissue hypoxia, hypercalcemia, changes in sympathetic nerve activity, prolonged immobilization, and mobilization with frequent periods of exercise following prolonged immobilization, resembling the pathogenesis of neurogenic heterotopic ossification<sup>5</sup>. Early recognition and proper treatment of PSD show satisfactory rehabilitation, even when it is accompanied by a neurological injury.

## References

1. Somford MP, Janssen RPA, Meijer D, Roeling TAP, Brown C Jr, Eygendaal D. The Pellegrini-Stieda Lesion of the Knee: An Anatomical and Radiological Review. *J Knee Surg* 2019;32:637-41.
2. Yildiz N, Ardic F, Sabir N, Ercidogan O. Pellegrini-Stieda disease in traumatic brain injury rehabilitation. *Am J Phys Med Rehabil* 2008;87(6):514.
3. Yavuz F, Yasar E, Hazneci B, Tuğcu I, Alaca R. Pellegrini-stieda disease in a patient with cauda equina syndrome. *Am J Phys Med Rehabil* 2011;90(2):175.
4. Altschuler EL, Bryce TN. Images in clinical medicine. Pellegrini-Stieda syndrome. *N Engl J Med* 2006;354:1.
5. Campos da Paz A, Francisco J, Carod Artal, Ricardo K, Kali I. The function of proprioceptors in bone organization: a possible explanation for neurogenic heterotopic ossification in patients with neurological damage. *Med Hypotheses* 2007;68:67-73.

## Questions

1. What is the usual clinical presentation of PSD?
  - A. Knee pain and decreased range of motion of the right knee joint
  - B. Asymptomatic
  - C. Pain and local swelling in the medial aspect of the knee
  - D. Tender lump on the inside of the knee

### Critique

The vast majority of patients have no symptoms. This is why continuous clinical and radiological examinations of those patients are critical. Patients with PSD can exhibit any of the symptoms and signs listed in the other answers.

The correct answer is B.

**2.** What is the radiographic finding of PSD on X-ray?

- A. Small curvilinear fragment close to the medial femoral condyle at the origin of the medial collateral ligament
- B. The presence of bone in soft tissue anywhere near the knee joint
- C. There are no specific findings on X-ray and an MRI is needed
- D. Circumferential calcification with a lucent center and a radiolucent cleft (string sign) that separates the lesion from the cortex of the adjacent bone

*Critique*

Pellegrini-Stieda sign is typically described by a longitudinally linear opacity, characteristic of calcification in the soft tissue located medial to the medial femoral condyle. This calcification seen on imaging represents the ossification of the medial collateral ligament, which typically does not develop until approximately three weeks after the initial injury. The string sign is typical for Myositis ossificans, the most common form of heterotopic ossification. Finally, the fragment in answer A is characteristic of a Stieda fracture.

The correct answer is A

**3.** What is the treatment of PSD?

- A. Surgical excision of medial collateral ligament calcifications on all cases.
- B. Conservative management with non-steroidal anti-inflammatories, bisphosphonates, and physiotherapy on mild and moderate cases
- C. Observation-only management

*Critique*

The treatment of PSD is usually conservative. Non-steroidal anti-inflammatory preparations, range-of-motion exercises, as well as bisphosphonates could be prescribed in the treatment of this condition. Corticosteroid and lidocaine injections have also been used successfully. Surgical excision has a high rate of relapse and is only performed in severe cases.

The correct answer is B.

**4.** What are the possible complications of PSD?

- A. Restricted knee joint range-of-motion and contracture developing into gait abnormalities
- B. Decreased activities of daily living, and chronic pain
- C. Recurrence after surgery
- D. All of them

*Critique*

When a full range of motion in the knee is attained and the patient does not feel any form of pain, he can resume his activities. But this is not always the case; the prognosis is not great for every patient, and relapse after surgery is common.

The correct answer is D.