Barista’s fracture: a new occupational hazard

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Lesson
Stress fracture of the clavicle is a rare injury usually occurring in high-level athletes. It is typically a result of repetitive sporting activity or unusual strain. We present the first case of an occupational clavicle stress fracture in a young female barista. The patient initially presented with insidious onset clavicular pain. There was no history of trauma, and an undisplaced fracture was present on the plain radiograph but overlooked by the emergency physicians. Two weeks later, the patient presented again with worsening symptoms, and a displaced fracture of the clavicle was diagnosed on plain radiograph. A thorough occupational history revealed the cause of her pain, which was the mechanical activity of coffee tamping and the fracture went on to unite with no further complications. No other cause was found on investigations including magnetic resonance imaging. The fracture healed with cessation of coffee tamping. This case highlights a previously unrecognised occupational hazard of coffee tamping as a potential cause of stress fracture of clavicle.

Keywords
Occupational, stress fracture, clavicle

Introduction
With only 10 reported cases in the literature, stress fracture of the clavicle is a rare injury. Cases reported so far have involved elite athletes including gymnasts, divers and javelin throwers. Iatrogenic cases have also been reported following radical neck dissection, reverse geometry shoulder replacement and coracoid clavicular ligament reconstruction. We report the first occupational stress fracture of the clavicle in an individual with no known predisposing risk factors.

Case report
A 30-year-old right-handed female barista presented with a one-week history of pain and swelling over the mid-shaft of the clavicle with bony tenderness. She had no history of: prior trauma, known co-morbidities, regular medication or recently increased physical activity levels. Clinical examination showed normal pain-free shoulder function with mid-clavicular bony tenderness but no deformity. Initial radiographs demonstrated a small breach in the superior cortex of the mid-clavicle (Figure 1). This fracture was overlooked by the emergency department physicians, and the patient was discharged. She continued to work as a barista, and the symptoms worsened over the following two weeks. She therefore presented to the emergency department again with increasing clavicular deformity and pain. On examination, there was an obvious deformity of the clavicle with swelling and tenderness. Further radiographs showed an angulated mid-shaft clavicle fracture with bridging callus (Figure 2). A magnetic resonance imaging scan excluded the presence of any destructive or lytic pathological lesions within the clavicle and surrounding soft tissues. It confirmed the presence of a characteristic stress reaction around the fracture site. A dual-energy X-ray absorptiometry scan was performed, which confirmed the presence of osteopenia with a Z-score of −1.9 (normal z-score above −1.0). Of note, she was a non-smoker with a normal body mass index of 19. The patient reported regular menstruation, was not on oral contraceptive medication and no other associated risk factors for low bone mass. A detailed occupational history revealed the patient worked as a barista and the action that consistently coincided with the maximal exacerbation of pain was repetitively compressing ground coffee into the porta-filter basket with the tamper. There was no history of any other occupational or recreational activity that could have caused strain on the clavicle.

Results
The patient was treated conservatively with avoidance of occupational repetitive forceful activity and was advised to rest from making coffee. Rheumatology review was initiated to treat and monitor bone health, with no cause for osteopenia found after extensive investigation. The fracture
went on to unite without further complication over the following eight weeks.

Discussion

Stress fracture of the clavicle is extremely rare, with only 10 reported cases in the literature to date. Cases reported so far have involved elite athletes including gymnasts, divers and javelin throwers.1–3 Iatrogenic cases have also been reported following radical neck dissection, reverse geometry shoulder replacement and coracoid clavicular ligament reconstruction.4–7 This is the first reported case of this injury resulting from repetitive occupational movements.

On taking a detailed history, it was clear that the activity that coincided with maximal pain was tamping ground coffee beans in the patient’s full-time job as a barista. In order to make espresso coffee, the ground beans must be compressed into a porta-filter basket allowing hot water to be forced through the grind at high pressures. This compressive process is called ‘tamping’ and is a key step in ensuring flavour. If a barista under-compresses during tamping, then the espresso machine is unable to produce enough water pressure to extract the vital oils that provide flavour. Over-tamping leads to high pressure build-up and lower water flow rates, making the process inefficient. Professional baristas are regularly trained to apply 30 pounds per square inch of pressure during tamping.8 We estimate the daily cumulative force transmitted through this patient’s clavicle from tamping coffee alone was more than 6000 pounds or the equivalent of lifting 2.7 metric tonnes. This estimate was calculated based on making 200 cups per day.

Fracture union in this case was achieved by complete avoidance of tamping coffee and the cumulative force transferred across the patient’s upper limb girdle. This could have been modified in other ways. For instance, grinding the coffee beans to a finer powder would have allowed less force to be applied during the tamping process, whilst still producing sufficient pressure and flow rates for quality espresso making. A reduction in coffee grain size by a quarter would have taken the daily cumulative upper limb force to below the 2 tonnes, which may have been preventative or allowed fracture healing whilst allowing the patient to continue working.

As the only osseous connection between the arm and axial skeleton, the clavicle is subjected to significant forces, which are particularly high during compressive loads.9 Stress fractures are caused by either fatigue (repetitive sub-yield strength loading) or insufficiency (low bone mineral density).10 In this case, a combination of both mechanisms resulted in this first reported occupational clavicle stress fracture. Stress fracture is an important and easily missed musculoskeletal diagnosis. A high index of suspicion is often required and salient points in the history that may alert the clinician to the diagnosis include overuse (such as high-level athletes) or risk factors for low bone mineral density. This case helps to highlight the importance of a thorough and detailed occupational history of patients presenting with stress fractures, not only to aid diagnosis but also to ensure successful treatment by the avoidance of the precipitating activity.

Declarations

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