

# Anterior inferior iliac spine fracture: Another component of seat belt syndrome?

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## ABSTRACT

Seat belt syndrome occurs when seat belts are used improperly, and it is a cause of significant morbidity and mortality. The spectrum of seat belt syndrome includes spinal, intra-abdominal and vascular injury. Here, we report the case of anterior inferior iliac spine avulsion fracture in association with seat belt injuries in a 24-year old man involved in a head on motor vehicle collision.

**Keywords:** Seat belt syndrome, seat belt injury, anterior inferior iliac spine, fracture

## INTRODUCTION

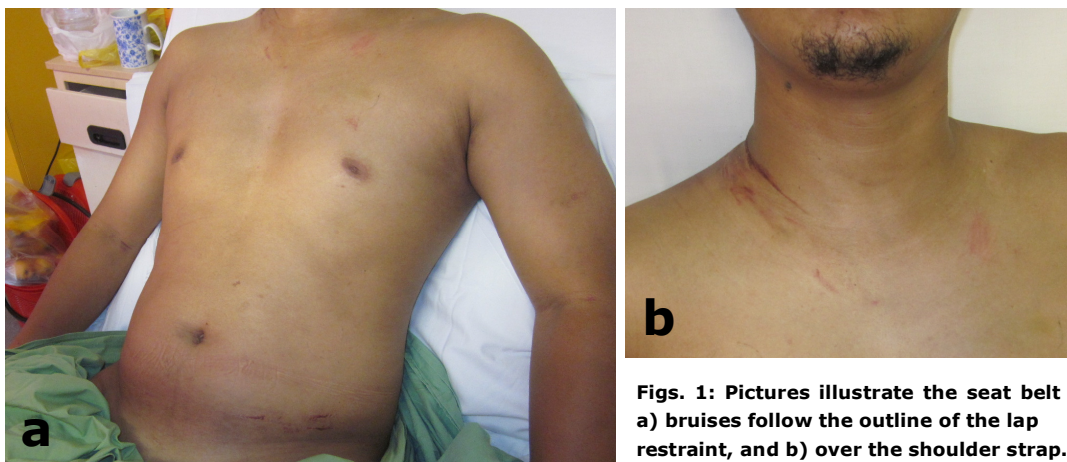
The widespread use of seat belts (shoulder-lap restraint) has significantly reduced mortality and morbidity during motor vehicle accidents. However, this has led to the emergence of Seat Belt Syndrome. This syndrome was first described in 1962 by Garret, who described the possible injuries occurring in high velocity motor vehicle accidents while being restrained by seat belts. <sup>1</sup> These injuries include spinal, axial vessel and intra-abdominal visceral injury. An avulsion fracture of anterior inferior iliac spine is rare injury and often resulted from sport injury. Here, we report an avulsion fracture of the anterior

inferior iliac spine in association with seat belt syndrome in an adult patient. To the best of our knowledge, this is the first time this association has ever been reported.

## CASE REPORT

A 24-year-old male driver was involved in a head on collision in a motor vehicle. He was wearing a seat belt (shoulder-lap restraint) during the accident. Upon arrival to the emergency medicine department, he was alert and conscious. His Glasgow coma scale was 15/15. He denied any abdominal or spinal pain. There was a seat belt mark present on his body (Figure 1A and Figure 1B). There was tenderness over the bruises and point tenderness over the left side of the patient's pelvis and right side of the base of his neck.

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**Figs. 1:** Pictures illustrate the seat belt mark; a) bruises follow the outline of the lap restraint, and b) over the shoulder strap.

There was no tenderness noted along his spine. The patient's abdomen was soft and no neurological deficits were noted. His vital signs did not indicate any abnormalities.

Radiological investigations revealed a fracture of the right anterior inferior iliac spine (Figure 2). No spinal fractures were noted on the plain radiographs and CT scan. There was also no intra-abdominal organ injury.

The patient was treated with a soft collar for the soft tissue neck injury. The anterior inferior iliac spine was managed conservatively. At the three-month follow up, the patient was comfortable with no complaints.

## DISCUSSION

The introduction of the shoulder-lap undoubtedly significantly reduced the mortality and morbidity of motor vehicle accidents.<sup>2</sup> The shoulder-lap reduces injury by preventing ejection during the collision. It consists of a 3-point restraint (i.e. a shoulder strap, diagonal body strap and lap belt). This configuration prevents rapid deceleration of the body and flexion of the spine. In addition, it prevents compression of the abdominal cavity.<sup>2</sup>

Seat belt syndrome occurs when the seat belt is not properly applied, especially when the lap belt is not appropriately placed. The lap belt must rest on the anterior superior



**Fig. 2:** Pelvic radiograph showing an avulsion fracture of the right anterior inferior iliac spine (white box).

iliac spine for the bone to absorb the force of the impact. With this placement, the shoulder/diagonal strap can prevent sudden flexion of the upper body (jack-knife effect).<sup>2,4</sup> Several reports in the literature mention the occurrence of injuries in the paediatric age group. This occurs because the seat belt is too big for this age group. As a result, children can slip under the lap belt,<sup>3,4</sup> which changes the axis of the abdomen and the lumbar spine. This can also happen in adults, especially when the person slouches. The lap belt may not function properly when a person is in the reclined position and it may also not work appropriately when it is improperly placed (not on the anterior superior iliac spine).<sup>5</sup>

An isolated avulsion fracture of the anterior inferior iliac spine is a rare injury. It results from violent pulling of the rectus femoris muscle. This might happen due to concentric or eccentric contraction of the muscle.<sup>6</sup> Concentric contraction usually occurs during acceleration, which is frequently seen in sport-related injuries as patients try to push off the ground with the legs. Eccentric contraction usually happens when a patient decelerates. In the case of a motor vehicle accident, it is difficult to ascertain the exact mechanism of the fracture. However, Reggiori *et al.* suggested it might be due to violent hyperextension of the hip.<sup>7</sup>

Plain radiograph of the cervical, thoraco-lumbar and lumbar spine, and pelvis, must be taken. If spinal injury is suspected, a CT scan must be performed. Intra-abdominal injuries should be ruled out with an urgent

ultrasound and a CT scan of the abdomen. The diagnosis of an anterior inferior iliac spinal fracture is usually made after a pelvic radiograph is done. A physical examination is usually not helpful as the fracture is deep and difficult to define the precise location of pain.

In conclusion, awareness of the spectrum of seat belt injuries is important as motor vehicle accident cases is increasing exponentially. Medical personnel, especially those on the front lines, must be able to recognise this injury. Adequate education must be provided to the motorist regarding the condition and the proper application of the seat belt.

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