Clay-Shoveler's Fracture in a Paddler: A Case Report

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Abstract:

A clay-shoveler's fracture is a fracture of the spinous process of lower cervical and upper thoracic vertebrae. It has only rarely been reported as being caused by an overuse sports injury. This case report describes the first reported clay-shoveler's fracture in a paddler. A 51 year-old male paddler, preparing for a paddling adventure over 630km, felt a click and a sharp pain paravertabrally on the level of the upper thoracic vertebrae while paddling. Sonar investigation did not reveal any muscular injury but a CT scan revealed a fracture of the spinous process of T1.

In this case it is a stress injury due to the excessive paddling over a short period of time. This fracture causes debilitating pain in the acute phase and is mainly treated conservatively.

Key Words: clay-shoveler's fracture, spinous process fracture thoracic vertebra, paddling

Introduction

A clay-shoveler's fracture is a fracture of the spinous process of the lower cervical or upper thoracic vertebrae, most commonly found at the C6-T6 level.[1] The name originated in the 1930's from labourers using long handled shovels shovelling clay and throwing it above their heads out of the clay pit.[3] These overhead rotational forces lead to stress injuries. Such injuries may occur through shear forces exerted by the trapezius and rhoimboid muscles on the spinous process or through direct trauma to the posterior part of the neck in a flexed position. Muscle and ligamentous stress is transmitted through the supraspinous ligaments and result in an avulsion fracture of the spinous process.[1-3] In sport it is a rare fracture previously reported in rock climbing, power lifting, volleyball, American football and in an amateur golfer.[4-7] In this article we present a clay shoveler's fracture of T1 in a paddler training for a 630km endurance paddle.

Case Report

A 51-year-old male athlete presented with an intense stabbing pain paravertebrally in the upper thoracic region. He started training for a kayak adventure down the Zambezi River involving a total of 630km over twelve days. Since he was only invited to participate four months prior to the event, he had only four months in which to prepare.

He was a seasoned endurance athlete having completed three Ironman events and multiple endurance trail running events in the past ten years. His previous paddling experience was limited to flat water training ten years ago as part of a program for ultra distance canoe triathlons. As there was no set training program available for this kind of event he followed a sixteen-week incremental program.

The first four weeks focused on maintaining fitness and increasing upper body and core strength while gradually increasing paddling time. During this phase of the training he started with neck muscle spasms and mild headaches. He consulted a chiropractor in the beginning of week 3. She suggested Traumeel® (table) infiltrations in the Trapezius muscles along with manipulations on a weekly basis for four weeks and then spaced to alternate weeks. After the training weekend at the end of week 8, his headaches worsened. He continued with his chiropractor sessions, finding some relief from the intense headaches and muscle spasms. (Table)

TABLE. Traumee

Traumeel Injection Solution is an anti-inflammatory, analgesic, antiedematous antiexudative combination formulation of 12 botanical ingredients, 1 mineral substance, and 1 animal-derived substance. Traumeel Injection Solution is officially classified as a homeopathic combination drug	
Botanical ingredients	*Arnica montana*, Radix (Mountain arnica), *Calendula officinalis* (Marigold), *Hamamelis virginina* (Witch Hazel), *Achillea millefolium* (Milfoil), *Atropa belladonna* (Deadly nightshade), *Aconitum napellus* (Monkshood), *Chamomilla* (Chamomile), *Symphytum officinale* (Comfrey), *Bellis perennis* (Daisy), *Echinacea angustifolia* (Narrow-leaf coneflower), *Echinacea purpurea* (Purple coneflower), *Hypericum perforatum* (St. John's Wort)
Mineral ingredients	Mercurius solubilis (Hahnemann soluble mercury)
Animal-derived ingredient	Hepar sulphuris calcareum (calcium sulfide made from oyster shells)

By weeks 9 to11 he noted discomfort in the lower cervical and upper thoracic spine region, paravertebrally to the right. He experienced neck muscle stiffness with a decrease in rotation to the left and diminished neck flexion. At this point he was using non-steroidal anti-inflammatory drugs (NSAIDSs), muscle relaxants, heat packs and stretching along with visits to the chiropractor. There was no relief to the discomfort.

At the start of week 14 the pain intensified to a stabbing pain while paddling on an indoor Stroke2max ergometer. The pain was most intense in the late phase of the pull and the recovery phase of the stroke, mainly on the right side radiating towards the right shoulder. After an hour the pain subsided and a dull ache and mild muscle stiffness remained. At the next training session two days later a click was felt in the lower cervical spine and upper thoracic spine. The pain could now be pinpointed to an area next to the spinous process of T1 and T2. Arm extension, abduction and shoulder retraction caused a sharp stab in the area. No neurological symptoms or signs were present. Further treatment with the chiropractor yielded no positive results, and special investigations were warranted given the training time remaining. Ultrasound did not show any muscle injury. A computed tomography (CT) scan of the upper thoracic spine detected a fracture of the spinous process of T1 (Figure).

FIGURE. Computed tomography of fracture of spinous process of T1.

Discussion

A Clay shoveler's fracture is a rarely reported but well-known entity. Sport related cases include those of a 14-year-old competitive indoor rock climber, as well as a power lifter. In these cases the athletes experienced sudden onset pain during their activity, and the fractures were caused by intense traction forces on the spinous process.[6,7] Other case reports included two 17-year-old American football players both sustaining traumatic fractures of the C7 spinous processes after being tackled. Here the mechanism of injury was secondary to acute

hyperextension at the point of impact.[1] There were also the cases of a 40-year-old beginner golfer and a volleyball player who gives a history of pain prior to the acute incident of injury.[4,5] The mechanism here appears to be an overuse stress injury.

The fracture discussed in this study appears to be due to overuse. Factors that could have contributed to the to the injury includes the frequency and intensity of the training in a paddling-unconditioned athlete, the weight of the kayak when fully loaded and the short time frame the athlete had to achieve his training goals. The interval training done on the Stroke2max ergometer placed a lot of alternating strain on the attachment of the trapezius and rhomboid muscles to the spinous processes of T1.

The management of a Clay shoveler's fracture is mainly conservative. In most cases there is non-union due to the continuous traction of the trapezius and rhomboid muscles on the spinous process. In rare cases the pain persists and surgical removal of the bone fragment can be considered.[1,8]

In the case of the paddler the fracture was treated conservatively with complete rest and analgesics until he was pain free. After two weeks he started with indoor cycling. After four weeks he could start with road running and cycling remaining pain free. He started with short swim sets after six weeks with minimal discomfort and by twelve weeks he could return to his normal training program and remain pain free.

With endurance sport such as running there are set injury prevention guidelines with regards to the volume of training per week, the intensity of training as well as the recommended amount of

safe weekly incremental increase in exercise. No such guidelines could be found for long distance multistage paddling. Using the above information and training background the athlete trained as effectively and event-specific as possible. Clay shoveler's fracture is not limited to any specific sport. It should therefore be considered when the symptoms and mechanism of injury are present.

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