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Iatrogenic Coccydynia (Coccyx Pain) After Chiropractic Actuator Treatments: Case Report

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Abstract

Coccyx pain (also called coccydynia, or tailbone pain) has a broad range of etiologies, including traumatic and non-traumatic causes. Iatrogenic etiologies of coccydynia are rarely reported. This is the first report of iatrogenic coccydynia due to the use of a chiropractic actuator. An actuator (also known as an activator adjusting instrument) is a spring-loaded hand-held device that delivers a sudden mechanical force to the anatomic site where it is applied. We report a patient whose neck and shoulder pain were assumed to be due to cranio-dural stress syndrome. An actuator was used to deliver forces to the coccyx region in hopes that relieving dural tension at the coccyx might improve her neck pain, which it did not. Upon receiving the actuator treatments to her coccyx, she had immediate onset of coccyx pain, which lasted for many months. The patient had no prior history of coccyx symptoms or trauma. She eventually presented for treatment at our Coccyx Pain Center, on an academic medical school campus. Actuator use at the coccyx should be added to the list of causes of tailbone pain. Patients and clinicians should be aware of this risk.

Introduction

Coccydynia (coccyx pain) has a broad range of etiologies, including traumatic and non-traumatic causes. Iatrogenic etiologies of coccydynia are rarely reported.[1]

Many patients with coccyx pain or other painful musculoskeletal conditions seek manual medicine therapies such as treatment via chiropractic, osteopathic, or physical therapy clinicians. In chiropractic theory, subluxation is defined as “a lesion or dysfunction in a joint or motion segment in which alignment, movement integrity and/or physiological function are altered, although contact between joint surfaces remains intact.”[2] This is in contrast to the medical definition, which defines subluxation as “significant structural displacement, and therefore visible on static imaging studies.”[2] Nevertheless, in the field of chiropractic, it is believed that physical examination findings of subluxation from the chiropractic examination should guide therapeutic treatment in the form of spinal adjustments.[3]

Cranio-dural stress syndrome

One such chiropractic theory that explains spinal subluxation is cranio-dural stress syndrome. The dura mater envelops the brain and spinal cord, with its firmest attachments in the upper cervical spine (at C2-C3) and within the sacrum (at the second sacral vertebral bone, S2).[4, 5] Below S2, the dura mater envelops the filum terminale and passes through the sacral hiatus to anchor at the coccyx where it integrates with the periosteum.[4, 5] The theory proposes that tension within the dura mater can lead to a “globally subluxated” spinal column.

Therefore, this theory (cranio-dural stress syndrome) suggests that neck pain can be secondary to dural tethering at the coccyx, and vice versa.[4, 6] Essentially, this model proposes that pain at the upper part of the spinal column (e.g., at the cervical spine) could actually be originating from a problem at the other end of the spinal column (i.e. down at the coccyx). The reverse would also be true, where coccyx pain could be caused by dural problems up at the cervical spine.

This chiropractic theory has important implications for where treatments should be targeted. Specifically, neck pain may be treated with manual medicine techniques applied at the coccyx region, whereas coccyx pain may be treated with manual medicine techniques applied at the cervical spine. The goal would be to relieve excessive dural tension, in order to relieve symptoms throughout the entire spinal column.[4]

Activator Adjusting Instruments

In 1967, two chiropractors invented the activator adjusting instrument (AAI, also known as an actuator) as a method to produce adjustive thrusts to the spine with less chance of injury to the chiropractor, compared with delivering forces produced by the chiropractor himself/herself.[7, 8] Essentially this is a hand-held device that will, when triggered, deliver a specific mechanical force to a specific targeted location. Interestingly, it was originally derived from a dental impactor.[7] In 2005, the National Board of Chiropractic Examiners showed that approximately 51% of American chiropractors used the technique for patient care.[8, 9]

The actuator is a hand-held instrument that delivers a maximum of 0.3 Joules of kinetic energy in 0.3 milliseconds.[7] A NIH funded project reported that the amount of energy was enough to cause movement of the vertebrae without causing injury.[7] A consensus committee agreed that it was not associated with more risk than manual spinal manipulations.[10]

Biomechanical research on cadavers has shown that it produces 1 degree of rotation and 1 mm of translation when activator thrusts were performed on the T10-T12 area.[11] Research on humans have shown that activator thrusts result in coupled motion, affecting several vertebrae below the target vertebrae. When activator thrusts were made on the spinous processes of T11 to L2, L3 to L4 were displaced in a rotational axis, and L4 and L5 were displaced in an axial and posteroanterior shear axis.[12]

Adverse outcomes with the actuator have been previously reported. These side-effects have include stroke, fatigue, headaches, dizziness, weakness, paresthesias, muscle spasms, neck pain and worsening of existing spinal pain.[7, 13, 14]

In a cohort study where subjects received manual manipulation or instrument (AAI) manipulation, the subjects in the instrument manipulation treatment group reported more adverse effects and higher pain scores, and were more likely to take rescue medication.[13] In 2001, a panel of chiropractic experts concluded that for patients with low back pain, use of instrument manipulation via actuator was clinically substantially less effective than manual manipulation.[15, 16] In combination, these publications indicate that using an actuator may be not only less helpful but also more harmful, as compared with manual manipulation.[8, 13, 14, 15, 16]

Purpose of Our Case Report

The purpose of our case report is to describe a patient with a new-onset of iatrogenic coccydynia after actuator treatments were directed at her coccyx for the treatment of neck pain. The coccyx was targeted as the presumed source of her neck pain based upon the theory of cranio-dural stress syndrome. To our knowledge, there have been no previously reported cases of new-onset coccydynia from use of an activator adjusting instrument (an actuator).

Case Report(s)

A 59-year-old female was suffering from neck pain, along with general feeling of muscle spasms in the neck and shoulder region. For evaluation and treatment of her neck pain, she presented to her chiropractor, who felt that the neck pain was due to cranio-dural stress syndrome.

In order to treat her cervical pain, he directed an actuator at her coccyx twice. Immediately afterwards, she felt as if her coccyx had “jutted out, moved up and to the right.” She denied having any coccyx injury, pain, or symptoms whatsoever prior to receiving the actuator treatment to her coccyx.

Due to ongoing coccyx pain, the patient underwent internal manipulation by another chiropractor. (Internal manipulation uses a rectal approach to repeatedly flex and extend the coccyx with the index finger per rectum anterior to the coccyx and thumb externally posterior to the coccyx.[3,17]) However, this provided only minimal relief. A course of physical therapy worsened her pain. Prolotherapy of her cervical spine facet joints and sacrotuberous ligament provided no relief at either the cervical or pelvic regions, respectively. (Prolotherapy is the injection of exogenous agents, most commonly hypertonic dextrose, into joints to attract inflammatory mediators and thus further stimulate an endogenous wound-healing response in the area of injury.[18, 19])

Approximately 5 months after the onset of coccyx pain, she presented to our Coccyx Pain Center for evaluation. She described the coccyx pain as a dull ache that was 6/10 in severity. The coccyx pain was exacerbated by constipation, sitting on soft surfaces, and leaning backwards. It was alleviated by bowel movements. Associated symptoms included abdominal distention, abdominal pain, and constipation. There was no pain with bowel movements. She also experienced pain, numbness and tingling in her bilateral posterolateral lower extremities, right greater than left.

Coccyx radiographs (x-rays) using coned-down views revealed an abnormal C3-C4 joint, with visible signs consistent with joint instability, including an unusually tall joint space height, and 50% anterior-listhesis of C4 relative to C3 (Figure 1). Importantly, when coccyx position was compared after going from standing to sitting, the coccygeal angle changed by 28 degrees (Figures 1-4), which is diagnostic for coccygeal dynamic instability (greater than 20 degrees is considered abnormal).[20] Also noted was a distal coccyx bone spur.

She was treated with a coccyx injection under fluoroscopy guidance, specifically including an anti-inflammatory (corticosteroid) injection at the abnormal joint and the distal coccyx bone spur, as well as a ganglion Impar sympathetic nerve block. She reported initially very good relief and as of one year later she still reported sustained benefit since the

coccyx pain remained substantially improved. However, despite the sustained improvement in coccyx pain she was having some persistent pelvic floor muscular pain, which was being treated by a pelvic floor physical therapist.

Discussion

A prior publication has noted that actuators have been used to treat already-existing coccyx pain.[3] In that study, the actuator was directed at the sacrococcygeal ligament rather than at the coccyx itself. Those authors hypothesized that such treatment may reduce mechanical pressure in the lumbosacral spine, modulate pain through nociceptive inhibition, reduce muscle spasm, and/or decrease joint dysfunction.[3]

Iatrogenic coccydynia has rarely been reported in the literature. Our case report documents what we believe is the first reported case of new-onset coccyx pain caused by use of an actuator at the coccyx region.

Research has shown that the actuator produces a maximum of 0.3 Joules in 3 milliseconds, which was thought to be an impulse small enough to not produce substantial injury.[7] However, research has mostly been done on the thoracolumbar vertebrae which are significantly more massive than coccygeal vertebrae. Since the coccygeal vertebrae are much smaller, the actuator's forces may be more likely to cause harm or injury to the coccygeal bones or joints.

In our patient, we do not know if any coccygeal joint instability preceded the actuator treatments, but if they existed, they were not symptomatic until once the actuator treatment was delivered. Based on the immediate onset of coccyx pain during the actuator treatments, causality seems to clearly indicate that the actuator caused her coccyx pain.

We wonder whether actuators may be more likely to cause bony injury in patients with osteoporosis. There is current controversy about the safety of spinal manipulation on the elderly, especially in those with osteoporosis or compression fractures.[21] Our patient was a postmenopausal female (59 years old) with petite body size (5'6" tall, 95 pounds, resulting in a BMI of just 15.3), but she had no diagnosis of osteopenia or osteoporosis. Also, her imaging did not appear to show any osteoporotic fracture at the coccyx.

Conclusions

We believe that the mechanical forces delivered by actuator treatments can now be added to the list of traumatic causes of tailbone pain. It may be one of the few iatrogenic causes for new-onset coccyx pain. Patients and clinicians should be aware that actuator treatments at the coccygeal region may put the patient at risk for coccyx injury and pain.