Manipulation of asymptomatic anteriorly subluxated coccyx utilizing an internal rectal approach in a patient with chronic SI and LS pain

By Chris Kemper, D.C.

Abstract

Objective:

To discuss a case of involving severe chronic low back and pelvic pain where asymptomatic subluxation of the coccyx was treated with internal rectal contact coccygeal manipulation utilizing the Wooley-Kemper protocol which resulted in spontaneous relief of chronic lumbar and sacroiliac pain, improved lumbopelvic range of motion and motor strength.

Clinical Features:

A 5'5" 145 lb. 40-year old female property manager who had suffered from 6 years of increasingly severe and frequent episodes of lumbar, sacroiliac and leg pain. She also experienced numbness in her right foot. Pain levels before treatment was 9-10 on the numeric pain scale (NPS). Palpation revealed severe tenderness at the lumbosacral and sacroiliac joints. The lumbar spine and pelvic floor musculature was also hypertonic. Lumbar flexion was severely reduced (Fig. 1).

Minimal tenderness was elicited upon external palpation of the coccyx. Intra-rectal palpation of the coccyx revealed exquisite tenderness and rigidity of the sacrococcygeal segments. X-ray analysis revealed that the coccyx was displaced anteriorly 80 degrees (Fig. 2). The distal coccygeal joint appeared fused.

Fig. 1. Impaired Trunk flexion before manipulation of coccyx. Fingertips fail floor by 9".

Intervention and Outcome:

Chiropractic care was first provided. Then, lumbopelvic and hamstring myofascial stretching was provided to obtain maximum trunk flexion. Trunk flexion was measured (in inches fingertips to floor with the feet together and the knees locked into extension). Motor strength of the internal and external thigh rotators and hamstrings were tested. Informed consent for internal rectal-approach coccyx manipulation was obtained. Then the Kemper-Wooley procedure was provided with excellent results. Immediate increase in coccygeal and lumbar range of motion was measured. Decrease in lumbopelvic muscle hypertonicity and motor weakness was also noted.

Fig. 2. Coccyges are typically poorly visualized on x-ray. Intra-rectal palpation is preferable in assessment of coccygeal motion

Conclusion:

Segmental motion dysfunction of coccyx can cause local or regional pain and stiffness. Reduced coccygeal motion can be treated with internal coccygeal manipulation. The proposed biomechanical and neurologic dysfunction, clinical features and management considerations in treatment of the sacrococcygeal pain syndromes are also discussed.

Introduction:

Coccyx segment motion dysfunction is not uncommon in patients suffering with spinal pain. The coccyx is a vertebra with defined segments and rudimentary disc(s)[1] . The functional coccyx has a range of motion much greater than previously reported[2] (normal coccygeal range of motion is primarily flexion and extension and should be at least 50 degrees in men and 50-70 degrees in women. Coccygeal function and range of motion is infrequently discussed in the literature. The coccyx is the inferior attachment for the anterior and posterior longitutudinal ligaments, inferior origin of the gluteus maximus, inferior medial origin of the sacrospinous ligament, origin of the coccygeus muscle, a myofascial point of attachment of the median raphae and terminal point of attachment for the spinal cord and meninges via the filum terminale externum[3].

Coccydynia, or its associated orthopedic and neurologic clinical features (hereafter referred to as the SacroCoccygeal syndrome or the "S/C" syndrome) can result from hard blows to the buttock but can also be associated with a sedentary employment or lifestyle. Most pelvic floor compression injuries impact the coccyx with a posterior to anterior, or inferior to superior force. Consequently, coccygeal subluxation, angulation or dislocation is usually anterior. After such injury the coccyx can become hypomobile. Symptoms associated with coccygeal dysfunction vary widely. Onset of pain can be sudden or insidious. Severity of pain can range from minimal to severe. Frequency of pain can range from paroxysmal to con-

stant. Occurrence of pain can be idiopathic, positional or activity related[4,5]. Pain can be localized or referred. These widely varying clinical presentations may be responsible for multi-professional and wide-spread tendency of physician, surgeons and therapists to not test for and diagnose coccygeal motion dysfunction. Consequently, manipulation of the coccyx, especially with internal rectal contact may be underutilized. The necessary intra-rectal examination, patient modesty and relative discomfort associated with many coccygeal manipulations may explain doctor and patient reluctance to examine and treat the hypomobile coccyx.

Coccygeal flexion is often tested as a standard part of the chiropractic examination with external pressure. External palpation of the coccygeal joints can only assess flexion since extension of the coccyx can only be palpated with anterior contact. Coccygeal range of motion is primarily flexion and extension. Testing extension of the coccyx is not included in the standard chiropractic, orthopedic or neurologic examinations. At the time of my training at Palmer College in 1978, intra-rectal palpation or manipulation of the coccyx was not part of the clinical requirements needed for graduation. A survey of clinical requirements of 15 chiropractic colleges in the United States confirmed that as of May 1, 2005, internal palpation of the coccyx is still not included as part of the clinical requirements in 13 of the 15 colleges contacted. A local survey[6] of 43 chiropractic offices in northern California revealed that only 3 out of 43 respondents had ever, in their careers, performed coccyx range of motion examinations with internal palpation. This was true even when the coccyx was one of the chief complaints reported by the patient. It is for this reason that a detailed explanation of the Wooley-Kemper examination is provided.

Examining the coccyx:

A significant amount of pressure must be applied to the coccygeal segments in order to properly assess motion. Considerable care must be taken to help insure unnecessary irritation or perforation of the rectal lining (see page 4 “Intervention and Outcome”).

The coccyx can easily be palpated with the taped and gloved digit. The external thumb of the opposite hand is used as a pivot point over which the physician attempts to pry the coccygeal joints into extension. The external thumb is moved from the distal sacrum down to the tip of the coccyx as the examining digit attempts to palpate the degree of extension at each segment. As in all “first tried” physical tests a learning curve is encountered as the examiner performs the examination for the initial several dozen patients. It can take between 5 and 50 lbs or more direct pressure applied to the anterior surface of the coccyx with the physician’s internal digit to determine if the segments are hypomobile. Absent acquired skill it is very easy to slip off the coccyx while applying the pressure necessary to assess coccygeal hypomobility. Even the shortest fingernail or slippage of contact off the coccyx can potentially cause abrasion or perforation to the rectal lining. Kemper and Wooley have performed over 5000 treatments since the early 1980s and have only seen a handful of irritated rectal linings and have never caused a perforation with this method.

Patient tolerance to the examination and treatment vary widely. Some coccyges and surrounding tissues are inflammed and exquisitily tender to ounces of pressure, not to mention pounds of pressure. When extreme sensitivity is encountered upon examination the procedure is not performed and the patient is referred to a medical physician to see if sterioid and local anesthetic or analgesia is appropriate for the patient. Only 10% of patients cannot tolerate manipulation without medical assistance.

Preparation for Treatment of the coccyx:

Before treating the coccyx the following is performed:

1. Patient selection includes:
    a. History of pelvic floor trauma
    b. Coccydynia or regional pain or stiffness that does not resolve with exercise, stretching and standard manipulation
    c. Impaired trunk flexion and/or motor weakness
2. A history is taken to rule out active rectal disease or conditions such as rectal fissures, prolapse, proctitis or bleeding hemorrhoids. Coccygeal fractures are extremely rare and, in reality, are usually coccygeal dislocations. Wooley and Kemper have seen less than 12 true coccygeal fractures in 40 years of combined practice. Interestingly, approximately 1/3 of all patients treated were previously diagnosed as having “fractured” their coccyx.
3. Patient education of the anatomy and physiology of the coccyx is provided in advance of examination and treatment.
4. Informed consent, proper gowning and a gender-specific assistant is recommended.
5. A demonstration of the procedure using a spine model is given. The patient is assured that he or she is in control and the treatment will be stopped immediately upon request if tenderness or pain exceeds the patient’s tolerance. The patient is also assured that the entire procedure takes less than 1-minute and to bear that in mind in hopes of improving the patient’s tolerance to the discomfort of the procedure and to help minimize the number of treatment necessary to restore optimal coccygeal range of motion. Even so, some patients require local or general anesthetics[7] or anti-anxiety medication. If this is the case, certification for manipulation under anesthesia and a malpractice carrier endorsement is necessary and prudent.
6. Documentation of pain with an outcome instrument(s) is always obtained
7. Notation of any motor weakness, that typically exists in the hamstring and/or internal or external thigh rotator group, is made (see Figs. 3. a,b,c).

8. Measurement of lumbopelvic flexion is tested by measuring the distance between the fingertips and the floor with a tape ruler. The measurement is taken with the patient's feet together and with the knees locked. This provides for a more accurate measurement before and after treatment. A digital photograph of the patient, attempting to reach the floor before and after the procedure, objectifies any immediate changes in lumbopelvic range of motion. A series of these measurements are taken prior to and after treatment.

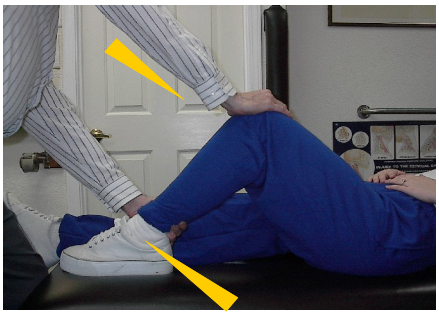

Fig. 3a. Motor Strength testing prior to procedure. Here, hamstrings are assessed.

Home trunk flexion stretching exercises as well as assisted myofascial stretching is prescribed to insure that the patient has achieved maximum flexibility prior to the procedure. This is important for two reasons:

a. So that the patient (and physician) knows that no further increase in trunk flexibility is possible, absent the potential increase typically observed after release of coccygeal fixation.
b. Patients who demonstrate the willingness to stretch as directed prior to treatment tend to continue the routine after the procedure. Consistent pre-treatment stretching improves the physician's ability to release coccygeal fixations and the associated coccyx segment motion dysfunction. Post-treatment stretching also tends to minimizes the number of coccygeal manipulations needed per case. It is prudent to perform as few internal approach coccygeal manipulations as possible. Kemper averages 1-3 coccygeal manipulation per case in his rural family practice. Wooley averages slightly more in his sports medicine practice where professional,

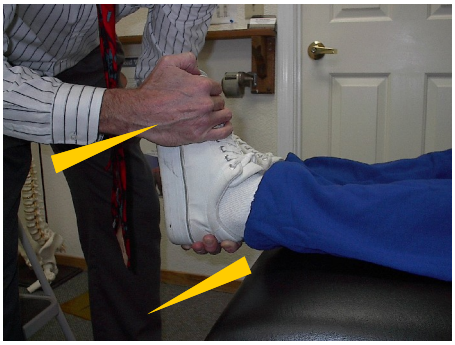

Fig. 3.b. Motor Strength Testing prior to procedure. Here, External thigh rotation was 60% deficient

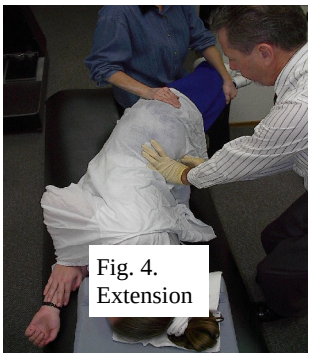

Fig. 4. Extension

Fig. 5 Flexion

amateur and Olympic athletes are more highly motivated to achieve optimal motion.

9. No special patient preparation such as enemas or preparation H is usually needed.

Fig. 3.c. (Above) Motor deficit was also detected in internal rotation . Post-treatment strength showed marked improvement

Treatment of the coccyx:

The coccyx is mobilized with the same preparation and contact described above. Consistent loss of orthopedic flexibility and neurologic weakness, typically associated with hypomobile coccyges, makes for a straight forward patient selection process. Consistently favorable outcomes suggest that benefits of the procedure may be underestimated and/or overlooked.

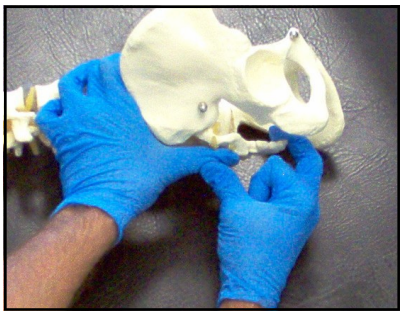

Fig 6. (left) Internal contact with Right 3rd digit. External counter-contact with left thumb reinforced by right thumb.

The right 3rd digit of the right hand is internal. The thumb of the left hand is external and serves as a pivot and fulcrum. Slow, firm prying motion is applied mostly anterior to posterior. Individual coccygeal anatomy and pelvic floor thickness make proper contact variable and critical. Care must be taken to pass proximal to the internal sphincter and to not "telescope the rectum" during treatment. Once proficient, a physician can palpate

Intervention and Outcome

Internal and external contact coccygeal manipulation has been performed with different methods by orthopedists, osteopaths, and chiropractors for many years[6,7]. In this case, the approach used was that practiced by Wooley and Kemper for approximately 20 years. After informed consents are signed, the patient was gowned and placed in lateral recumbency on a treatment table, with their thighs and knees flexed to 45 degrees; a chiropractic assistant provided stabiliztion of the patient while the treating physician applied traction and manipulation according to this protocol.

Note: Risk of rectal lining perforation is real. Extreme care is taken to pad the internal digit with several layers of 1" wide zonus wrapped around the finger, hand and wrist forming a padded and stable hand/digit for the purpose of reducing the liklihood of the lubricated internal digit from slipping off contact with the anterior surface of the coccyx upon manipulation where considerable pressure is applied.

The clinician sits behind the patient directly posterior to the lower buttocks. Wearing latex gloves and using a water-based lubricant, the clinician first inspected the external anal area for abnormalities such as fissures, bleeding, or sores, which are relative contraindications to this treatment. The 3rd digit of the caudad hand was then placed approximately 2 inches into the rectum, with the thumb of the cephalic hand on the outer portion of the coccyx opposite the location of the internal digit (see Figure 6). The physician then applies anterior to posterior pressure to the anterior portion of the coccyx, and anterior pressure to the posterior portion of the coccyx with the external thumb, attempting to slowly move the coccyx into flexion and extension (emphasizing extension) while also applying inferior traction. A considerable amount of force was required to mobilize the coccyx. This process continued for approximately 10-15 seconds for each of the 3 phases of the procedure (neutral, fetal and extension).

The initial procedure provided immediate relief of both lumbar and sacroiliac pain. The second treatment was provided 1 week later, after which lumbar and sacroiliac pain dropped to 0 on the NPS scale. Leg pain and foot numbness completely resolved. Pain-free SLR increased from 60 degrees to 100 degrees bilaterally. Trunk flexion improved from 60 degrees to 110 degrees, equivalent to the fingertips failing the floor by 9 inches before treatment to being able to freely touch the floor after treatment (see Fig. 9). Motor weakness improved from 2/5 to 5/5 at the right internal and external thigh rotators. Interestingly enough, no coccygeal pain existed prior to or after the two manipulations. The patient tested negative for lumbosacral or sacroiliac subluxation after the first sacrococcygeal manipulation. The patient was discharged to PRN 2 weeks after the second sacrococcygeal treatment. One month later the patient was still pain and subluxation free. She demonstrated full lumbar flexion.

Fig. 7. Typical Pre-treatment restriction in SLR (animated)

Fig. 8. Typical minimum improvement n SLR Post-treatment (animated)

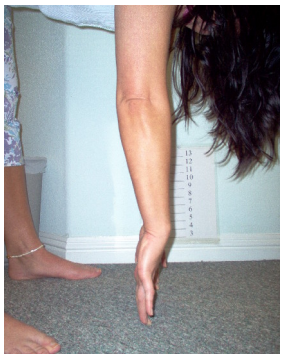

Fig. 9. Post-Treatment Trunk flexion

Hypothesis:

The mechanisms affected in this case study suggest neurologic involvement. The author respectfully suggests the term "SacroCoccygeal Reflex" to describe what could involve both central and local cord processes including the vestibular, arthrokinetic and Golgi tendon responses. Together, the proposed reflex elicits two distinctly different pathological clinical affects and effects:

1. Effect: Hypertonicity of the lumbopelvic anti-gravity musculature and
2. Affect: Hypotonic motor deficit of sacral coccygeal spinal nerves.

1. **Hypertonicity of the lumbopelvic anti-gravity musculature**

   The Vestibular nuclei transmit strong excitatory signals to the antigravity muscles when as little as 1/2 of a degree of head disequilibrium occurs from the precise upright position[6 ibid]. In such an event we know, by studying balance mechanism path ways, inhibition from the medullary reticular nuclei is rapidly overcome by the pontine reticular and vestibulospinal nuclear function[7] excitatory in nature, and necessary for balance. Could an already excited and facilitated anti-gravity erector group, necessary for erect posture be further potentiated by a coccyx dysfunction-induced cord stimuli?

2. M**otor deficit triggered by excessive inhibition ed of pelvic floor musculature**

   Much of the pelvic floor musculature's diaphragm-like motion is altered when trauma causes coccygeal angulation, displacement and particularly sacrococcygeal hypomobility and can affect muscle fiber length and tension. Golgi tendon organs are located in the muscle tendons and transmit information about tendon tension or rate of change of tension[8 ibid]. This is true of all skeletal muscles.

   Loss of normal coccygeal motion can severely limit and impede pelvic floor diaphragm-like compression and distension and could logically affect Golgi tendon organ response in regional musculature. Golgi tendon organs respond dynamically through a reflex from dorsal horn to interneuron to anterior horn and back to directly inhibit the individual muscle the Golgi tendon apparatus serves. When tension on muscle (pelvic floor) and therefore on the tendon become extreme, the inhibitory affect from the tendon organ can be so great that it leads to a sudden reaction in the spinal cord that causes instantaneous relaxation of the entire muscle (not just the spindle served by the initiating Golgi). This affect is called the lengthening reaction[8 ibid]. This powerful Golgi tendon reflex, transmitted through the cord, could be the peripheral source for the profound motor hypotonicity, weakness or motor deficit associated with sacrococcygeal hypomobility.

   The proposed SacroCoccygeal reflex therefore, because of the filum's coccygeal anchorage, could anatomically subject regional musculature's Golgi tendon inhibition to a lower threshold. In the presence of sacrococcygeal hypomobility induced cord tension, Golgi tendon inhibition could become "super-facilitated or potentiated". This could explain why muscles with sacral and coccygeal spinal nerve innervation appear to be weakened in the presence of sufficient coccygeal dysfunction. Excessive strain associated with the dysfunctional coccyx, invested within the pelvic floor structure, is further sustained in frequent bipedal axial loading and other intra-pelvic functions that may also be affected by coccyx hypomobility. Under the affects of this strain, associated Golgi response and abnormal dural tension, hypotonicity and weakness may be effected. The further muscles are away from the midline and from the affected pelvic floor, the less prone they would become to potentiation of Golgi tendon response.

Discussion

This case study was prepared because the subjective symptoms and objective clinical findings including chronic pain, loss of spine flexion and thigh motor weakness have been seen by the author in about 1,500 cases. And while reported symtoms can include various combinations of pain in the lower back, pelvis, thighs and lower extremeties, the objective clinical profile associated with impaired coccygeal range of motion, especially extension, are strikingly consistent.

Having performed several thousand procedures over 25 years, the author estimates that most pre-treatment coccygeal range is near zero. 30-60 degrees of motion can usually be restored in otherwise healthy individuals. Restoring this degree of motion is sufficient to achieve long term improvement in many symptom profiles as well as effect improvement in the cited objective signs, most notably improved lumbopelvic flexion and thigh strength.

Further study is needed with fluoroscopy to establish what degree of coccygeal motion is actually occuring with treatment to achieve the reported improvements.

Are outcomes, like the ones reported in this case study, the result of a mechanical factors, a neurologic change or possibly some combination of both?

REFERENCES

1. Maigne JY, Guedj S, Straus. Idiopathic coccygodynia. Spine, 1994; 19: 930-34 9.
2. Wooley J, Kemper C. Hypothesis: Is sacrococcygeal hypomobility related to chronic low back pain and stiffness. J Orthopaedic medicine 1998; 20:17-20.
3. Grays Anatomy. 15th Edition. Williams and Wilkins.
4. Polsdorfer, Ricker. Three case studies: Coccygodynia and orthopaedic rectal examination. Journal of Or thopaedic Medicine, 1992; 14: 1-13.
5. Dorman T, Ravin T. Diagnosis and Injection Techniques in Orthopedic Medicine. Baltimore: Williams and Wilkins, 1991.
6. Kemper C. Survey of 43 northern California chiropractor's utilization of the internal rectal anterior ap proach for management of coccygeal subluxation-dislocation cases. May 2005.
7. Turek S. Orthopaedic Principles and Their Application. 4thed. Philadelphia: Lippincott, 1984: P.1658-59.
8. Guyton and Hall. Textbook of Medical Physiology. WB Saunders Company (An imprint of Elsevier) 2007. Pages 690-96.