COCCYGDYNIA AND PAIN IN THE SUPERIOR GLUTEAL REGION

AND DOWN THE BACK OF THE THIGH:

CAUSATION BY TONIC SPASM OF THE LEVATOR ANI, COCCYGEUS AND PIRIFORMIS MUSCLES

AND RELIEF BY MASSAGE OF THESE MUSCLES

GEORGE H. THIELE, M.D.

KANSAS CITY, MO.

The inefficacy of the treatment of coccygodynia is attested by the numerous forms of therapy which have been tried. Results from rest, physical therapy and sedatives have not been satisfactory. Injections of various solutions into the soft tissues about the coccyx as recommended by Yeomans and Kleckner have been more encouraging. Too often coccygeotomy has resulted only in chagrin for the surgeon and disappointment for the patient. Careful search of the literature appearing since 1859 fails to reveal a concept of coccygodynia which can harmonize the many forms of therapy which have been advised.

In a classic thesis published in 1859, Sir J. Y. Simpson called attention to the fact that, when the coccyx or the coccygeal joints had been injured or when the surrounding tissues were the seat of inflammation, any contraction of the muscles attached to the coccyx would excite the characteristic pain of coccygodynia. That statement is as true today as when Simpson made it, and it is noteworthy that since his time, although he has been quoted by scores of authors, not one has used this fundamental fact as the basis for a study of this crippling symptom.

Simpson did not mention muscle spasm, which attracted my attention in 1934, when I first noted its association with coccygodynia. Continued observation since that time has confirmed the presence of tonic spasm of the levator ani and coccygeus muscles in my own twenty-eight cases of coccygodynia and in Wilson's series of eleven cases, which I have closely followed. Furthermore, it was early noted that a large percentage of patients with coccygodynia complained also of pain in the supragluteal region and/or down the back of the thigh and that in these patients tenderness and tonic spasm of the piriformis muscles were found almost without exception. Freiberg and Vinke and Freiberg have published two excellent papers in which, from an orthopedic point of view, they discuss the relationship of piriformis spasm to sciatica.

In our thirty-nine cases of coccygodynia the pain was often so severe that a history of pain in the supragluteal region or down the back of the thigh was elicited only on questioning. In our other fourteen cases the complaint was of pain limited to the supragluteal region and/or down the back of the thigh.

CLINICAL MATERIAL

The clinical material used as the basis for this study consists of eighty-seven patients encountered in the practice of nine different proctologists. No patients with acute injury such as fracture or dislocation of the coccyx are included. The series consists of all the patients in these practices who complained of pain in the region of the coccyx, in the supragluteal region or down the back of the thigh. For convenience the series is divided into two groups.

Group 1 consists of my own thirty-one cases extending back three years and of Wilson's series of twenty-two cases which began eighteen months ago. Group 2 is composed of the remaining thirty-four cases, which occurred during the past year in the practices of seven other proctologists in various cities of the United States. In the entire series there were thirteen males and seventeen-four females. Their ages varied from 19 to 71 years, with an average of 43.4 years. The duration of symptoms was from three days to thirty-

![Fig. 1—Sagittal section showing the position of the finger during massage of the levator ani, coccygeus and piriformis muscles. The finger sweeps from side to side, massaging lengthwise of the muscle fibers.](http://jama.jamanetwork.com/)

two years, with an average of about two years. Nineteen of the eighty-seven patients gave a history of trauma, which included falls, parturition and long automobile rides. The remaining sixty-eight cases may be placed in a large group classified by other writers as idiopathic. Several patients stated that their symptoms were first noted after a rectal operation. Three patients had had coccygeotomies without relief. In thirty of the entire series of eighty-seven patients the pain was confined to the region of the coccyx; in seventeen it was confined to the supragluteal region or down the back of the thigh, and in the remaining forty coccygodynia was combined with pain either in the supragluteal region or down the back of the thigh.

CLINICAL HISTORIES

It is interesting to note that some of the patients stated that their pain first began as a sense of weight or heaviness which they at first referred to the rectum. This sensation gradually became more severe, and by

Read before the Section on Gastro-Enterology and Proctology at the Eighty-Eighth Annual Session of the American Medical Association, Atlantic City, N. J., June 9, 1937.


4. Wilson, F. I. (Kansas City, Mo.): Personal communication to the author.


7. Personal communication to the author by Harry E. Bacon, Philadelphi; H. Terrell, Richmond, Va.; Harry C. Alley, Lexington, Ky.; Harry C. Gauss, Buffalo; Malcolm R. Hill, Los Angeles; E. G. Martin, Detroit, and C. C. Meckling, Pittsburgh.
the time the patient sought relief he was complaining of severe aching or cramping pain referred to the region of the coccyx, which was more noticeable when he was sitting in a hard chair, particularly when sitting was continued, or during the act of arising or sitting down. Inability to lie comfortably on the back was a frequent complaint, the pain being worse in that position. Lying on the side was preferred by the great majority. Periodic attacks of lancinating breath-taking coccygeal pain superimposed on the severe aching pain were frequent.

The pain down the back of the thigh varied from mild aching to the most severe boring aching pain during the presence of which the patient was unable to place the extremity in a comfortable position. There were frequent complaints of tenderness of the gluteus maximus close to its attachment to the coccyx.

![Image](http://jama.jamanetwork.com/)

**Fig. 2.—Anteroposterior view showing the position of the finger during massage of the levator ani, coccygeus and piriformis muscles. Note that only the finger tip reaches the piriformis muscle.**

**PHYSICAL EXAMINATION**

As a class, the patients walked somewhat stiffly and sat down cautiously, generally on one buttock and often close to the edge of the chair. On digital rectal examination with the patient in the Sims position, spasm of the levator and the coccygeus is easily detected by lateroposterior pressure, the spastic muscles being felt stretched tightly from their origin at the arcus tendineus or ischial spine to the side of the coccyx and lower part of the sacrum. Coccygodynia was found to be accompanied by tonic spasm of the levator ani and/or coccygeus muscle in sixty-four of sixty-nine cases reported by nine different observers. Tenderness of these muscles was found in three of the remaining five cases.

The piriformis muscle is felt with the tip of the finger just distal to the sacropinous ligament and lateral to the second, third and fourth sacral vertebrae (figs. 1 and 2). It is most easily felt on the right side when the patient is lying on the left side and vice versa, and with one hand on the buttock one can often palpate it manually.

Spasm of the piriformis is sometimes very difficult to ascertain with certainty, owing to the fact that the muscle is so far from the anus that its palpation is difficult. Shordania, in thirty-seven cases of piriformitis in women with low backache, identified the muscle by its increasing size during external rotation of the extended thigh on the affected side. One can definitely state that many times the piriformis on the affected side feels firmer and offers more resistance to pressure with the finger than on the unaffected side. Freibergh's sign of piriformis spasm, as evidenced by limitation of motion in inward rotation of the fully extended thigh, is often positive. All the thirty-three patients with pain in the supragluteal region or down the back of the thigh seen by Wilson and myself had tenderness over the piriformis, and it was our opinion that thirty-one had piriformis spasm. Reports from seven other observers are incomplete in this respect and are therefore not quoted.

Tenderness of this group of muscles is unmistakable when present, the slightest pressure with the finger provoking cries of pain. Tenderness from bidigital pressure on the coccyx itself is not marked and may even be absent. The tenderness usually described as being present in the coccyx is in reality in the issues just lateral to the bony structures. Movement of the sacrococcygeal joint is most often productive of severe pain; but cases have been observed in which, although the joint could be moved painlessly, nevertheless the levator ani and the coccygeus muscles were extremely tender.

Supragluteal tenderness is present over the distribution of the superior gluteal nerve but is much more marked where the nerve emerges from between the piriformis muscle and the lower border of the gluteus medius (fig. 3).

Tenderness of the sacral nerve is demonstrated in the usual manner by external pressure but is more pronounced when pressure on the nerve is made from within the pelvis.

I am not informed as to the remainder of the series, but, in Wilson's and my fifty-three cases of all types, orthopedic and gynecologic consultation and roentgenographic studies were freely used.

**THE MODE OF PRODUCTION OF SYMPTOMS**

After spasm was found in this group of muscles, an interpretation of the manner in which such spasm might have produced the symptoms observed seemed desirable. First of all one must remember that muscle spasm itself is very painful, and nothing further need be said to explain the pain in some of our cases of coccygodynia.

A full discussion of some of the mechanisms involved is contained in a former paper on this subject. Suffice it to say that spasm of both portions of the levator ani exerts forward as well as lateral traction on the coccyx. Unilateral contraction of the coccygeus exerts traction which is more nearly lateral. Thus it may be seen that in the presence of arthritis or trauma of the sacrococcygeal articulation or the coccyx, spasm of either of

---


these muscles would tend to increase the pain. It would seem that in such a case a vicious circle is established; i.e., pain, spasm, more pain and more spasm.

As has been stated, in patients who complained of pain in the supragluteal region and/or down the back of the thigh, the pelvic portion of the piriformis muscle on the affected side was more tender to pressure and its belly firmer to touch than on the unaffected side. This muscle arises from between the first four sacral foramina and also from the grooves leading from the foramina. A few fibers also arise from the anterior surface of the sacrotuberous ligament. If one considers the sacrum as the origin of the piriformis, then some of its lower fibers insert into the inferolateral margin of the great sacrosacral foramen instead of arising there as stated in numerous textbooks on anatomy. This insertion into the inferolateral margin of the great foramen provides an efficient mechanism whereby contraction of the piriformis may squeeze the sciatic nerve against the lower border of the foramen formed by the sharp edge of the sacrotuberous ligament and the upper borders of the gemellus superior and coccygeal muscles (fig. 3).

In recent dissections I have noted that the lower border of the piriformis is somewhat sharp and tendinous in structure. This fact has also been noted by Freiberg.10

The piriformis passes out of the pelvis through the great sacrosacral foramen and is inserted by a rounded tendon into the inner side of the upper border of the great trochanter. By its upper border this muscle is in apposition with the gluteus medius, from which it is separated by the gluteal vessels and the superior gluteal nerve (fig. 3). In the dissecting room, the sciatic nerve was removed from the great sacrosacral foramen. The index finger was then inserted into the space which had been occupied by the nerve, and the thigh was forcibly internally rotated while in extension. This maneuver tightened the piriformis and squeezed the finger between the lower border of the muscle above and the sacrospinal ligament forming the lower edge of the foramen below. Having made this observation, one could not doubt that spasm of the piriformis could cause pressure on the sciatic nerve, particularly in the presence of a spastic coccygeus muscle and/or a shortened sacrospinous ligament. In a like manner it may also squeeze the superior gluteal nerve by pressure against the lower border of the gluteus medius.

In view of these factual and theoretical considerations it seemed desirable to determine whether or not such spasm of the levator ani, coccygeus and piriformis could be overcome by massaging these muscles with the finger through the rectum. Massage has been used by eight different proctologists in eighty of the eighty-seven cases reported in this study.

### TECHNIC OF MASSAGE

Ely11 in 1910 reported on the treatment of coccygodynia by massaging the coccyx and its immediate soft parts between the thumb and forefinger and stated that "usually two or three treatments at intervals of two or three days will suffice to cure." He did not mention muscle spasm nor did he describe massage of the levator ani or coccygeal muscles.

A uniform technique of massage has been used in all cases. With full length insertion of the finger in the rectum, lateroposterior pressure will place its flexor surface horizontally across the surfaces of the levator ani and coccygeous muscles almost at a right angle to its fibers (figs. 1 and 2). The fibers of the piriformis are felt immediately beyond the sacrotuberous ligament and are touched by the finger tip in such a manner that lateral motion of the finger will stroke lengthwise that portion of the belly of the muscle lying within the pelvis.

These muscles are massaged in the long direction of their fibers in the same manner that a strop is stroked by a razor. Massage is begun lightly. This is necessary because one does not wish to traumatize the extremely tender spastic muscles. The sacrospinal ligament is merely pressed on by the finger in a direction vertical to its long axis. As the patient makes subsequent visits, massage is made with increasing pressure. If a reaction evidenced by increased pain is evoked, light massage is again reverted to and pressure is increased as tenderness decreases.

If definite improvement does not result after the first four to six massages over a period of a week or ten days, orthopedic or other indicated consultation should be sought.

---


RESULTS

The patients were given an average of eleven treatments over an average period of eleven weeks by eight different proctologists.

In my own series of thirty-one cases of coccygodynia with or without associated pain in the supragluteal region or down the back of the thigh, in which massage was the only therapeutic measure, nineteen patients (61.3 per cent) were cured, eleven (35.5 per cent) were definitely improved and one (3.2 per cent) was unimproved. Wilson, using the same technic in twenty-two cases, reported sixteen (72.7 per cent) cured, five (22.7 per cent) definitely improved and one (4.5 per cent) unimproved (table 1, group 1).

Mehling reported seven cases of coccygodynia in all of which he found spasms of the levator ani. All his patients were improved but none were cured. He did not use massage but depended on heat, rest, elimination, forced fluids and occasional Turkish baths. The notable fact concerning Mehling's series is that he found levator spasm in all his cases.

Six other observers reported twenty-seven additional patients with spasms of the pelvic muscles and with symptoms similar to those of our group 1. These twenty-seven patients were all treated by massage. Of this group, thirteen (48 per cent) were cured, eleven (41 per cent) were definitely improved and three (11 per cent) were unimproved (table 1, group 2).

Combining the results of all observers, excluding those in Mehling's patients, who were not treated by massage, one finds that forty-eight (60 per cent) were cured, twenty-seven (33.7 per cent) were definitely improved and five (6.3 per cent) were unimproved.

Results of treatment by massage as regards the various symptoms and observations in Wilson's and my fifty-three cases (group 1) are shown in table 2.

**Table 2.—Detailed Results in Fifty-Three Cases of Coccygodynia:**

<table>
<thead>
<tr>
<th>Symptoms or Observations</th>
<th>Cases</th>
<th>Cured</th>
<th>Improved</th>
<th>Unimproved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain and tenderness limited to coccygeal area…</td>
<td>11…</td>
<td>5 (45.5%)</td>
<td>3 (27.3%)</td>
<td>1 (9.0%)</td>
</tr>
<tr>
<td>Coccygodynia with or without hip and leg symptoms…</td>
<td>39…</td>
<td>25 (64.1%)</td>
<td>15 (38.5%)</td>
<td>4 (10.3%)</td>
</tr>
<tr>
<td>Pain in the thigh…</td>
<td>39…</td>
<td>27 (69.2%)</td>
<td>10 (25.6%)</td>
<td>3 (7.7%)</td>
</tr>
<tr>
<td>Supragluteal pain…</td>
<td>31…</td>
<td>21 (67.7%)</td>
<td>9 (29.0%)</td>
<td>0</td>
</tr>
<tr>
<td>Coccygodynia with or without hip and leg symptoms…</td>
<td>39…</td>
<td>25 (64.1%)</td>
<td>15 (38.5%)</td>
<td>4 (10.3%)</td>
</tr>
<tr>
<td>Supragluteal tenderness…</td>
<td>32…</td>
<td>25 (78.1%)</td>
<td>7 (21.9%)</td>
<td>0</td>
</tr>
<tr>
<td>Tenderness of thigh…</td>
<td>39…</td>
<td>26 (66.7%)</td>
<td>10 (25.6%)</td>
<td>3 (7.7%)</td>
</tr>
<tr>
<td>Tenderness of piriformis…</td>
<td>42…</td>
<td>25 (59.5%)</td>
<td>15 (35.7%)</td>
<td>2 (4.8%)</td>
</tr>
<tr>
<td>Spasm of piriformis…</td>
<td>39…</td>
<td>26 (66.7%)</td>
<td>12 (30.8%)</td>
<td>1 (2.6%)</td>
</tr>
</tbody>
</table>

In a series of eighty patients with coccygodynia or pain in the supragluteal region or down the back of the thigh who were treated by massage by eight different proctologists, 60 per cent were cured, 33.7 per cent were definitely improved and 6.3 per cent were unimproved.

1132 Professional Building.

**ABSTRACT OF DISCUSSION**

**Dr. Fernando J. Wilson, Kansas City, Mo.:** I am indebted to Dr. Thiele for pointing out that some patients with coccygodynia and pain in the superior gluteal region with or without pain down the thighs may have spasms of such muscles as the levator ani, coccygeus and piriformis muscles or some combination of these three groups and that massage of this group of muscles will relieve pain in these cases. I have reported twenty-two cases by massage as described by Dr. Thiele. In eight of these cases, in addition to massage, an oil soluble anesthetic was injected into the spastic muscles. The latter procedure has now been discontinued not only on account of uncertainty and danger because it was almost always necessary to continue the massage in order to give complete relief from pain. At the present time, if these patients have no iatrogenic condition of the anus, I instruct them to pass a rectal dilator twice daily. This procedure will relax the sphincter muscle and the levator ani muscles will be likewise affected. The relaxation thus produced will render massage much easier and less painful. Considerable experience is necessary in order to estimate properly the amount of massage present in one or more of this group of muscles or perform the massage properly. One eventually learns, however, the proper amount of pressure to apply and also just where this pressure is most needed. Dr. Thiele has pointed out "that spasm of muscles is in itself productive of most severe pain." He does not explain, however, the cause of spasm in this group of muscles. I have observed spasms of one or more of these muscles with its resulting pain in four types of cases: 1. Cases which followed an anal operation. 2. Cases in which there was anal disorder (fissure, cryptitis) and no disturbance of the sacro-ilac or lumbosacral joints. 3. Cases in which sacro-iliac or lumbosacral disease was present and no anal disorder. 4. Cases in which anal disease or disease of the lumbosacral or sacro-iliac joints was not present. In cases considered due primarily to anal disorder it is often advisable to relieve the spasm in one or more of this group of muscles under discussion by massage before removing the anal condition. This procedure will decrease postoperative distress and often eliminate high rectal pain, which is often wrongly considered due to postoperative proctitis. I believe there are many patients who have pain in the lower abdominal quadrant due to spasm of the piriformis muscle on the affected side. Eight of the twenty-two patients in my series complained of pain in the lower abdominal quadrant. In every instance this pain followed the course of the iliopygapatic and the illo-inguinal nerve and could be exaggerated by pressure on the piriformis muscle near its origin on the affected side. Six of this group of eight cases have been relieved by massage of the piriformis muscle alone. The remaining two cases were cured by a combination of anal operation and massage.

**Dr. Edward G. Martin, Detroit:** I wish Dr. Thiele would elaborate on the technic of massage and particularly as to how long at each treatment; also suggest how it is possible for this massage to relieve the symptoms permanently and often with so few treatments. In one of the two case records which I contributed there was a surprising and amusing experience. The man was athletic and played hand ball at the university club. He was referred to me after a urologist had excluded the urologic field as a factor. My examination was negative, and with some hesitation I suggested that we might try massage of the piriformis muscle. One treatment was followed by two others at periods of four or five days; then he stopped coming. After a month or two I mentioned this to the urologist who had referred him to me and suggested that probably I should not have given him these treatments. His reply was "He thinks you are marvelous, and the reason he has not returned is that he was entirely relieved of his pain."
Dr. E. H. Terrell, Richmond, Va.: Dr. Thiele read a paper along the same lines at the meeting of the American Proctologic Society at Kansas City last year. Since hearing his paper a year ago, I have seen eight patients with symptoms as described by him, in whom definite contractions or spasms of the levator ani or of the piriformis muscles were found. In some cases both muscles seemed to be involved. These patients have been completely relieved or decidedly benefited by massage of these spastic muscles. I think Dr. Thiele has not stressed enough the rectal pain often associated with spasms of these muscles. Most of my patients had considerable pain in the rectum which seemed to be more or less relieved following bowel movements. Many of them also suffered with low backache and in two women there were in addition complaints of painful sensations in one or both sides of the vagina. An interesting case in this series was that of a man who complained solely of pain in the rectum occurring most frequently in the middle of the night. Often he would be awakened by a sharp, constant aching pain in the rectum which sometimes would last for several days. Examination disclosed that he had a decided spasm of the levator ani muscle on the left. Massage of this muscle would give him complete relief for several weeks. There have been a number of recurrences, however, but in each instance relief has been obtained by massage of the muscle.

Dr. George Henry Thiele, Kansas City, Mo.: Dr. Wilson mentioned the cause of pain. I am frank to confess I cannot answer that, but I believe that in the postoperative rectal cases the pain is due to a subconscous effort on the part of the patient to return to the anus so that it will not be hurt by the chair, and that in the subconscous act he probably subconsciously produces a spastic state of the levator ani muscle, which is productive of his pain. I feel sure that this is the proper explanation in one of my cases. Another cause may be rectal disease. I would say that possibly from 40 to 50 per cent of my patients on operation were already suffering from the time I saw them, or that I operated on them, having been unable to get permanent relief by massage alone. Shordmania of Germany states that piriformitis was found in 20 per cent of 450 cases of pelvic disease in women who complained of lower backache. I have seen several cases in which the pain appeared during pregnancy before the descent of the head into the pelvis, and I believe there must be a reflex there about which nothing is known at present. Dr. Martin has asked about the duration of the massage. My cases were treated on an average of eleven times over an average period of eleven weeks. Each massage lasts not to exceed one or two minutes. Treatments are at first given every other day, and the interval is lengthened as relief is obtained. Dr. Terrell mentioned the fact that rectal pain with defecation is relieved by massage. I think that this relief can be explained by the fact that during active defecation the muscles relax and then contract to pull the anal canal up into normal position. Massage, by relieving the tonic spasm of the levator ani, relieves the pain of the act of defecation. Vaginal pain is easily explained on the basis of levator ani spasm. I have seen several such cases. The night pain referred to is caused, I believe, by an acute spasm of the levator ani or coccygeus muscle. Such pain can often be duplicated in the office by making excessive pressure on the spastic muscles, and is stabbing or lancinating in character.

Antivivisection's Weakest Point.—Herein, it seems to me, lies the weakest point in the opposition to experimentation on the basis of cruelty—namely, that the animals whose preservation is desirable benefit from these investigations as greatly as man. There is no more notable example of this than the case of man's companion, the dog. Through the deserved attachment which has grown out of this companionship, a sentiment has arisen which would exempt the canine species from experimentation. But had such a law been put on the statutes, Cope- ward Against the Bacterial Cause of Distemper, and of a successful method of inoculation against this most fatal and distressing canine disease, would have been impossible.—Cushing, Harvey: Consecratio Medici and Other Papers, Boston, Little, Brown & Co., 1928.

Clinical Notes, Suggestions and New Instruments

GONOCOCIC SEPTICEMIA—HAZEL AND SNOW

GONOCOCIC SEPTICEMIA WITH PURPUR A AND ARTHRITIS SUCCESSFULLY TREATED BY HYPERTERMIA

Onis George Hazel, M.D., and William Benham Snow, M.D.
New York

In a study of the literature we do not find a reported case in which gonococic septicemia was successfully treated by hypertermia. We feel that the reporting of any new and safe type of therapy in such a serious complication is warranted.

Many cases of gonococic septicemia have been reported, but relatively few have yielded positive blood cultures. The septicemia may be of very short duration and be followed by localization in a joint or joints or in a tendon sheath. The gonococic septicemia that persists may or may not involve the endocardium. The prognosis of any case presenting endocarditis is not good. Thayer, in an extensive autopsy study of endocar¬ ditis, found that 11 per cent of the cases were due to gono¬ cocci. Friedberg has recently reported four cases of gonococic septicemia that have come under his care. Three patients recovered without heart damage and the fourth suffered severe heart damage. All his patients gave positive blood cultures.

The actual reason why septicemia develops in some cases of gonorrhea and not in others is not well established. Some feel that instrumentation and self treatment are contributing causes. Some workers feel that the virulence of the organism and the resistance of the patient determine whether or not the infection will remain localized or become generalized.

Weeler and Cornell have distinguished two types of gonococic septicemia: that which yields consistently positive and that which intermittently yields positive blood cultures. They feel that patients with endocarditis are more likely to yield consistently positive blood cultures.

The criteria for a diagnosis of gonococic septicemia rests on the finding of a preexisting focus followed by chills, fever, leukocytosis and constitutional symptoms or by the more direct method of demonstrating the gonococcus in blood cultures. The presence of endocarditis may be evidenced by emboli in the artery of an extremity, in the lungs, brain, liver, spleen or kidney, or on the sudden development and alteration of the heart murmurs.

The improved laboratory technic has contributed to the reporting of a larger number of cases of gonococic septicemia in which there are positive blood cultures. The organism is not easily grown and one or two negative cultures should not be accepted as conclusive evidence against septicemia. Since chills and high fever always accompany this disease, it is best to take cultures just before or after the peak temperature.

Reud before the first International Conference on Fever Therapy, New York, March 31, 1937.

From the Medical Service of the Presbyterian Hospital and the College of Physicians and Surgeons, Columbia University.
