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Comparison of Three Manual Coccydynia Treatments

A Pilot Study

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Study Design. A prospective pilot study with independent assessment and a 2-year follow-up period was conducted.

Objectives. To compare and assess the efficacy of three manual coccydynia treatments, and to identify factors predictive of a good outcome.

Summary of Background Data. Various manual medicine treatments have been described in the literature. In an open study, the addition of manipulation to injection treatment produced a 25% increase in satisfactory results. Dynamic radiographs of the coccyx allow breakdown of coccydynia into four etiologic groups based on coccygeal mobility: luxation, hypermobility, immobility, and normal mobility. These groups may respond differently to manual treatments.

Methods. The patients were randomized into three groups, each of which received three to four sessions of a different treatment: levator anus massage, joint mobilization, or mild levator stretch. Assessment with a visual analog scale was performed by an independent observer at 7 days, 30 days, 6 months, and 2 years.

Results. The results of the manual treatments were satisfactory for 25.7% of the cases at 6 months, and for 24.3% of the cases at 2 years. The results varied with the cause of the coccydynia. The patients with an immobile coccyx had the poorest results, whereas those with a normally mobile coccyx fared the best. The patients with luxation or hypermobility had results somewhere between these two rates. Levator anus massage and stretch were more effective than joint mobilization, which worked only for patients with a normally mobile coccyx. Pain when patients stood up from sitting and excessive levator tone were associated with a good outcome. However, none of the results was significant because of the low success rate associated with manual treatment.

Conclusions. There is a need for a placebo-controlled study to establish conclusively whether manual treatments are effective. This placebo must be an external treatment. A sample size of 190 patients would be required for 80% confidence in detecting a difference. [Key words: coccydynia, coccygodynia, manual treatment, spinal manipulation] **Spine 2001;26:E479–E484**

Coccydynia is defined as pain in and around the coccyx that does not significantly radiate, which is made worse by sitting or by standing up from the sitting position. Dynamic radiography, with standing radiographs taken in the neutral position and sitting views taken in the painful position, allows an assessment of coccyx mobility. In light of the findings, coccygeal mobility may be classified according to the system proposed by Maigne et al.[5] This classification comprises four groups:

1. luxation: backward displacement of the mobile portion of the coccyx when the patient is sitting down
2. hypermobility: coccygeal flexion exceeding 25° when the patient is in the sitting position
3. immobile coccyx: less than 5° of flexion or extension when the patient is in the sitting position
4. normal mobility: coccygeal mobility between 5° and 25°.

Luxation and hypermobility are abnormal entities in their own right.[6] Absence of mobility is not an abnormal condition. However, coccydynia in patients with an immobile coccyx appears to be associated frequently with bursitis of the coccygeal apex caused by a bony spicule.[4] In patients with a normally mobile coccyx, the cause of the coccydynia is unknown.

Many different treatments have been proposed: physical therapy, injections into the intercoccygeal joints or around the coccyx, coccygectomy, and manual medicine treatments, which are widely practiced. Several techniques have been described. Most of these involve internal contact with the coccyx: levator anus and coccygeus massage,[12] joint mobilization with the coccyx in hyperextension stretching the levator anus,[7,8] and repeated joint mobilization with circumduction of the coccyx, performed in the outpatient clinic[9] or with the patient under general anesthesia.[14] Other techniques use external maneuvers: thrust manipulation applied to the coccyx[10,13] or sacroiliac thrust manipulation.[2]

The different techniques are based on different concepts of what causes the coccydynia. Massage and levator anus stretch are intended to treat the tonic spasm thought to be responsible for the pain.[8,12] Mobilization of the sacrococcygeal and intercoccygeal joints is performed to enhance coccygeal mobility.[9] Thrust manipulation is thought to correct restricted sacroiliac extension[2] or blockage in extreme counternutation, known in osteopathic terminology as "posterior sacrum."[11]

The current pilot study was performed to establish the overall success rate of the manual treatments used, and to determine whether any one technique was more effective than the others. It was thought that the techniques involving a levator anus stretch would be more effective than massage because the latter is considered to be ineffective for other forms of back pain. The authors therefore hypothesized that articular mobilization would produce better results for patients with immobile or normally mobile coccyges than for those with hypermo-

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Table 1. Composition of the Groups

Group	Age (years)	Pain on Standing up From Sitting	Pretherapy Duration of Coccydynia in Months Median (range)*	Body Mass Index	History of Trauma	Visual Analog Scale
Massage (n = 24)	45.2 ± 14.8	14	10 (2–40)	24.4 ± 4.9	7	6.6 ± 1.8
Mobilization (n = 25)	43.3 ± 13.1	9	24 (2–90)	22.8 ± 3.8	5	6.6 ± 1.7
Stretching (n = 25)	47.0 ± 11.3	11	11 (2–65)	25.2 ± 4.6	9	5.6 ± 2.1
Total (n = 74)	45.2 ± 12.9	34	12.5 (2–90)	24.1 ± 4.5	21	6.3 ± 1.9
P†	0.6	0.57	0.06	0.17	0.7	0.1

* Non-Gaussian distribution: median (range) is used instead of means.
† Kruskal-Wallis test.

bile coccyges. The secondary aims of the study were to establish possible predictors of a satisfactory outcome, and to assess the number of patients required for a placebo-controlled study.

■ Methods

The patients enrolled in the study had chronic coccydynia. The condition was considered to be chronic if it had persisted for more than 2 months. Most of the patients had been advised by their physicians to consult the authors' center. Recruitment began in January 1997 and finished in April 1999. The following details were recorded in every case: gender, age, pain transiently exacerbated or triggered in moving from the sitting to the standing position, time from onset of the condition to enrollment in the study, body mass index, and the presence or absence of a causative trauma within the month preceding the onset of the condition (Table 1). Because it became apparent during the study that pelvic tone could affect the results, it was noted in the last 21 patients as either increased (if the internal finger had to pull hard on the levator anus to reach the coccyx) or decreased (if abnormally little force was required) (Figure 1).

Each patient was examined with lateral dynamic radiographs to determine the etiology of the coccydynia (Table 2). Exclusion criteria involved refusal to undergo an intrarectal procedure (6 patients), very low pain threshold, previous manipulation with internal contact irrespective of outcome (10 patients), and excessive anatomic distance of the coccyx from the anus, ruling out any prospect of effective treatment without pain. Of the six patients excluded by this last criterion, five were men. This left 66 women and 9 men (13.5%) available for inclusion in the study. The proportion of men in the coccydynia population overall was reported to be 19%.[4,6]

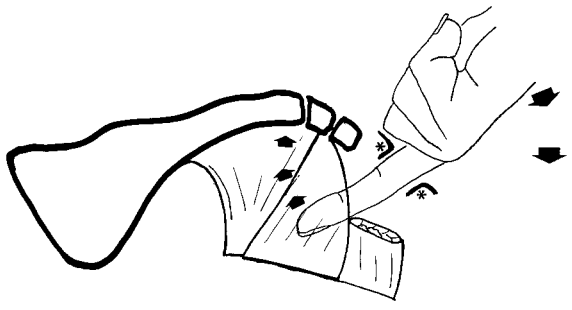

Figure 1. Assessment of pelvic muscle tone. The internal finger is inserted following the axis of the rectum. It then is gradually pushed upward (posteriorly), stretching the pelvic floor, until contact is made with the coccyx, whereupon the pull is released. If the finger is returned immediately to its initial position in the rectum by the patient's muscle tone without any conscious effort by the patient, the muscle tone is considered abnormally high.

All the patients gave their informed consent, after which they were randomized to the three treatment groups. Each patient was given a sealed enveloped that bore his or her enrollment number and contained the treatment to which he or she was randomized. The letter was opened in the presence of the patient.

Three groups of 25 patients each were formed. Group 1 (massage group) was treated with massage of the levator anus and the coccygeus using the technique described by Thiele,[12] with the muscles massaged in the long direction of their fibers on both sides (Figure 2). The procedure was limited to 3 minutes per session, and great care was taken by the operator not to mobilize the coccyx.

Group 2 (mobilization group) was first treated with Mennell's technique,[9] in which the coccyx is grasped between the external thumb and the internal index finger while flexion, extension, and rotation are applied. This was followed immediately by treatment with Maigne's technique,[7] in which the coccyx is maintained in hyperextension with the index finger applied to the ventral aspect of the inferior sacrum while counterpressure is exerted by the external left hand, the heel of which applies firm and progressively increasing pressure on the superior aspect of the posterior sacral surface (Figure 3). This maneuver places the coccygeal joints in hyperextension and stretches the levator anus. It was applied twice at each session, for approximately 30 seconds each time. The operator took great care to ensure that there would be no direct contact with the levator anus.

Group 3 (stretch group) was treated using a technique devised by the senior author. This technique involves gradual stretching of the levator anus, using the internal index finger, until contact with the coccyx is obtained. On contact with the coccyx, the finger stops moving, and is held in this position for

Table 2. Distribution of Coccygeal Dynamic Patterns in the Groups

Group	Luxation	Hypermobility	Immobile Coccyx	Normal Mobility
Massage (n = 24)	7	5	6	5
Mobilization (n = 25)	4	9	8	5
Stretching (n = 25)	7	6	6	6
Total (n = 74)	18	20	20	16
P = 0.49*				

* Kruskal-Wallis test.

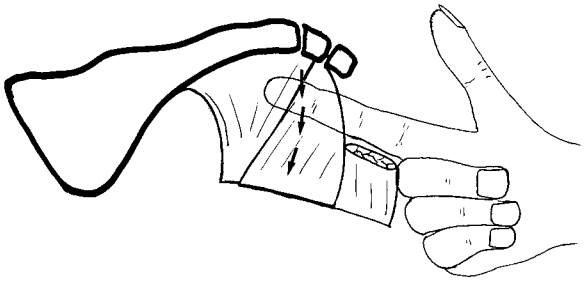

Figure 2. Thiele's[12] technique of massage in the direction of the fibers.

approximately 30 seconds. Therefore, this technique does not involve mobilization of the coccyx and consists merely in mild stretching of the levator (Figure 4). The maneuver was performed three times per session.

In all three groups, the patients were treated in the prone position. Treatment times were identical (≈3 minutes). The same oral message was administered to each patient by the operator, which stressed the importance of treating the contracture of the levator anus. Treatment was scheduled as three sessions over 10 days, with the option of adding a fourth session for patients who were slow in obtaining relief.

For the assessment, a visual analog scale was used. The patient was asked, "Over the past 3 days, how bad, on the average, has your pain been when you were sitting down?" The assessment was performed at enrollment, then 7 days, 30 days, 6 months, and 2 years after the completion of treatment. The posttherapy assessments were performed by an independent observer, who was blinded to the nature of the treatment the patient had received. In light of the results, patients were classified into two outcome groups: good (better than 60% pain relief) and failure (less than 60% pain relief or recurrence of pain). Patients whose treatment had failed were given the option of dropping out without waiting for the next assessment. Most of these patients were treated subsequently with injections or coccygectomy.

Statistical Analysis. Appropriate methods were used after the distribution of each variable had been analyzed. The efficacy of the three treatments was compared using a χ^2 test (categorical variables) and either an F test (Gaussian distribution) or a Kruskal-Wallis test (non-Gaussian distribution). Fisher's exact test was used for 2×2 tables with small sample sizes. The data are presented as means $\pm$ 1 standard deviation (Gaussian distribution), and as median and range (non-Gaussian distributions). All calculations were performed with the StatView statistical software (SAS Institute, Cary, NC). A P value less than 0.05 was considered significant.

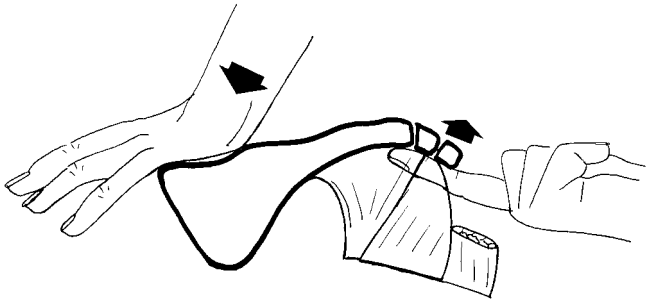

Figure 3. R. Maigne's[8] technique of coccygeal mobilization. The coccyx is kept in hyperextension, which stresses the sacrococcygeal and intercoccygeal joints and stretches the levator anus.

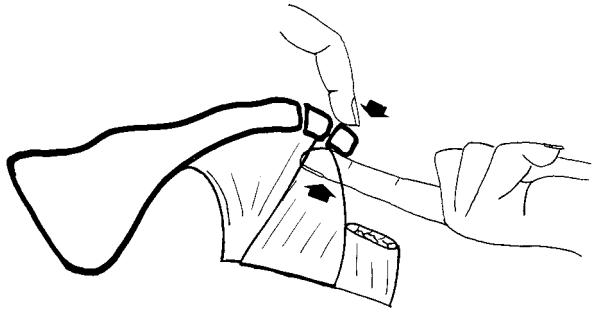

Figure 4. J.Y. Maigne's[7] technique. The internal finger touches, but does not mobilize, the coccyx. The external finger checks to ensure that the coccyx is being kept still. This maneuver results in stretching of the coccygeus, the levator anus, and the external sphincter.

■ Results

One patient in the massage group was lost to follow-up evaluation. This left 74 patients available for analysis. The three groups differed slightly in terms of duration and baseline intensity of the coccydynia (Table 1). Overall, the rate of satisfactory results at 6 months was 25.7%. Patients who had a satisfactory result invariably demonstrated this by the review at 7 days. Four recurrences were manifested at approximately the 1-month mark. The outcome after massage was similar to that of stretching. The respective success rates were 29.2% and 32%. This meant that the patients in these two groups tended to do better than those in the mobilization group, which had a success rate of only 16% (Table 3).

By the 2-year review date, one patient, who did a lot of cycling, had experienced a recurrence. Apart from this one case, the good results had remained stable or actually had improved slightly, with visual analog ratings down from 1.2 $\pm$ 0.7 at 6 months to 0.32 $\pm$ 0.3 at 2 years. Table 4 shows the outcomes as a function of the coccydynia etiology. Patients with normally mobile coccyges fared best (43.8% success rate). Those with an immobile coccyx responded less well to manual treatments (15% success rate). The outcome for patients with luxation or hypermobility of the coccyx was somewhere between these rates. Although clearly discernible trends existed,

Table 3. Outcome at 6 Months as a Function of the Manual Treatment Used

Group	Failure (n (%)	Satisfactory Outcome n (%)
Massage (n = 24)	17 (70.8)	7 (29.2)
Mobilization (n = 25)	21 (84)	4 (16)
Stretching (n = 25)	17 (68)	8 (32)
Total (n = 74)	55 (74.3)	19 (25.7)

$P = 0.4$.

Table 4. Outcome at 6 Months as a Function of the Cause for the Coccydynia

Diagnosis	Failure	Satisfactory Outcome
Luxation (n = 18)	14 (77.8)	4 (22.2)
Hypermobility (n = 20)	15 (75)	5 (25)
Immobile coccyx (n = 20)	17 (85)	3 (15)
Normal mobility (n = 16)	9 (56.2)	7 (43.8)
Total (n = 74)	55 (74.3)	19 (25.7)

$P = 0.26$.

the number of satisfactory results was too small to be significant ($P = 0.16$). The patient who had experienced a recurrence by the 2-year review point had presented with a normally mobile coccyx.

Patients with an immobile coccyx obtained greater relief after massage or stretching than after mobilization ($P = 0.11$). Of the eight patients treated with mobilization, not one had a satisfactory outcome. The trend was similar for patients with luxation ($P = 0.25$). In these two groups, mobilization was invariably associated with treatment failure. However, mobilization appeared superior to the other techniques in patients with a normally mobile coccyx.

Other factors may be of prognostic significance. Pain on rising from the sitting position was associated with a satisfactory outcome. However, this association was not significant ($P = 0.23$). Similarly, patients with increased pelvic muscle tone tended to have a better outcome. Muscle tone was investigated only for the last 21 patients in the study. However, despite the reduced sample size, the P value was 0.16. On the other hand, the outcome was not affected by either the pretherapy duration of the symptoms or a history of trauma before the onset of the condition.

■ Discussion

Composition of the Groups

By chance, baseline pain intensity was less in the stretch group because the patients had been randomized without any prior stratification. However, this should not have affected the outcome because the data recorded were changes in intensity. Also, the patients in the mobilization group had been experiencing from coccydynia longer than those in the other groups. However, this should not have accounted, even partly, for the fact that, overall, this technique had the least satisfactory outcome. Vertebral pain is considered to be chronic if it has persisted longer than 3 months. Whether the actual duration has been 2 years rather than 1 year will not alter the outlook significantly.

Effectiveness of Manual Treatments

Overall, the effectiveness of the manual treatments used was poor. The 6-month rate of satisfactory results was only 25.7%. This figure was of the same order as that given by Wray et al,[14] whose use of local corticosteroid injections as a first-line measure achieved a success rate of 60%. When this treatment was combined with manipulation, with the patient under general anesthesia, the success rate rose to 85%, a 25% increase. This result was maintained over time.

Contrary to the working hypothesis of the current authors, massage was as effective as stretching, whereas mobilization was less effective, except in the patients with a normally mobile coccyx. It was interesting to observe the very poor response of the immobile coccyges to the manual treatments administered, particularly to mobilization. This may have resulted from the fact that immobile coccyges are associated frequently with inflammation of the overlying tissues.[4] This poor response contrasted with the pattern seen in the coccyges with normal mobility (those with no discernible radiologic abnormalities), which showed the best response to mobilization. In light of their selection criteria, the current authors are convinced that in these patients there was no referred pain of lumbar origin, and that the pain came from the coccyx itself or from the soft tissues attached to this anatomic structure. Because there was no visible evidence of any causative abnormality, the pain may have resulted from the persistence of muscle tension after the spontaneous resolution of a minimal coccygeal lesion, perhaps from a sprain, with a vicious circle of pain–spasm–pain furthering the process. This would account for the observation that manipulation works better in normally mobile coccyges than in those with defined radiologically visible lesions.

The current study did not show whether the manual treatments used were more effective than a placebo. There are three reasons for believing that the manual treatments have an inherent therapeutic action: 1) The results observed were associated with the etiology of the coccydynia and with the manual medicine technique used. 2) The findings show that most of the patients who obtained relief experienced it immediately after completion of treatment instead of improving gradually over the following weeks and months. However, this finding could not be established objectively because the patients were not assessed at the end of treatment. 3) The personal experience of more than 500 patients over 10 years suggests that the placebo effect accounts for approximately 10% of the satisfactory outcomes in patients with coccydynia. It follows that manual treatments may be presumed to possess a therapeutic action in chronic coccydynia.

Mechanism of Manual Treatment Action

In describing their respective techniques, Thiele[12] and Maigne[8] stressed the role of tonic levator anus spasm in coccydynia and the importance of treating this spasm. This mechanism of action (*i.e.*, relief of spasm) is all the more likely because manipulation appears to work better in patients who have pain when they rise from the sitting position. This pain has been attributed to excessive levator anus tone, which manifests itself when the patient

stands up from sitting.[6] Similarly, excessive pelvic muscle tone should be amenable to relief by manipulation. Physiologically, pronounced stretching of a muscle excites the Ib fibers, causing presynaptic inhibition of the other (Ia and II) excitatory afferences.[1] This inhibition also is diffuse. Stretching of the external anal sphincter, the common feature of the different intrarectal manual medicine treatments, may act on the contracture of the levator anus. The sphincter is in continuity with the levator muscle, forming its posterior continuation, and the two structures have a common nerve supply.[3] This is the reason why prolonged stretching of the sphincter may lead to a relaxation of the muscle.

Maigne's[8] maneuver places the coccyx in hyperextension on the sacrum. This stresses the sacrococcygeal and intercoccygeal joints, which may account for the poor results from this technique in patients with luxation, a lesion triggered or made worse by extension of the coccyx, and in patients with an immobile coccyx, in which a hyperextension stress is adverse. On the other hand, this hyperextension may be beneficial in the treatment of patients with a normally mobile coccyx. Stretching, the authors' technique used in this study, had been designed originally as a placebo technique because it does not involve any coccygeal movement. However, it soon became evident that this technique could not be regarded as a dummy treatment because it effects posterior stretching of the levator anus and stretches the external sphincter more than massage does. This mechanism may account for a therapeutic action of the technique.

Design of a Placebo-Controlled Study

Because the internal treatments appear to have an inherent therapeutic action, the control treatment to be used would need to be external (*e.g.*, low-power electrotherapy). Classification of the patients into four etiologic groups (luxation, hypermobility, immobile coccyx, normally mobile coccyx) inevitably means splitting up the patient material into smaller lots. However, doing so may improve the outcome because the current study suggests that patients with an immobile coccyx do not respond well to manual treatments, whereas those with luxation are not improved by hyperextension maneuvers. These maneuvers appear to be better suited to patients with a normally mobile coccyx.

The data from the current study suggest that to detect a difference between a group without treatment, whose expected recovery rate is 10% according to personal data, and a group receiving treatment that increases the recovery rate to 25%, 190 patients would be required for 80% confidence in detecting such a difference.

■ Key Points

- In patients with chronic coccydynia, manual treatments produced satisfactory outcomes at a rate of 25.7% in 6 months and 24.3% in 2 years.
- Patients with normally mobile coccyges appeared to respond better than those with immobile coccyges or luxation.
- Massage and levator anus stretch appeared to be more effective than sacrococcygeal mobilization.
- To detect a difference between manual treatments and placebo, a study involving 190 patients would be required.

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Point of View

Philip M. Bernini, MD

Idiopathic coccygodynia, termed thus by Simpson in 1861,[5] by definition does not identify an unequivocal pathologic condition leading to this symptom complex of pain in and around the sacrococcygeal joint, made worse with sitting and by the postural change of rising from a sitting position. The literature suggests a patient profile most susceptible to idiopathic coccydynia: a woman[1,2,4,6] with an elevated body mass index[2] demonstrating on static and dynamic radiographs a subluxed or hypermobile coccyx.[2,3,4] Importantly, however, the orientation or dynamic function and the cause of coccydynia can be suggested only cautiously. Indeed, a normally oriented coccyx with nontraumatically precipitated symptoms can be as bothersome as a traumatically luxated coccyx. More subjective observations and hypotheses such as those implicating associated low back pain, psychological disorders, spasm of supportive muscles, increased resting tone, chronic inflammation, anomalies of the soft tissues, arthritides, and increasing stresses at open coccygeal joints all have been used to explain the success or failure of various nonoperative and operative therapeutic modalities.

To focus on several manual treatments for idiopathic coccydynia in randomized patients, who then are categorized into groups defined by their estimated susceptibility to idiopathic coccydynia may be reasonable, but difficult to realize with reproducible success. Indeed, although the operator took great care to apply some element of stretch, massage, or manipulation, anatomic limitations and patient compliance and relaxation at the time of treatment make the application of a specific manual therapy somewhat unreliable.

In summary, it seem intuitive that manipulation of a normally oriented and dynamically functional coccyx may be rewarding, whereas use of the same technique for a malaligned and either hyper- or hypomobile coccyx may be counterproductive. It is curious, however, that Wray et al[7] increased their success in the nonoperative treatment of idiopathic coccydynia by 25% when manipulation was given in conjunction with injection, for an overall success rate of 85%. The manipulative efforts of Maigne and his associates manipulative efforts achieved a favorable response of 25% as an isolated treatment. Randomizing a statistically significant number of patients to an external treatment group, not simply a control group as suggested, and using low-power electrotherapy as a placebo in conjunction with ultrasound or injection along with manual efforts using the same roentgenographic functional groups would be a welcome and important contribution to the treatment of this bothersome disorder. I compliment the authors on their efforts.

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