Clinical and Radiological Differences between Traumatic and Idiopathic Coccygodynia

Nam Hyun Kim and Kyung Soo Suk

--- Abstract ---

Several reports of coccygodynia have been confined to the causes, the methods of treatment, and the methods of radiological examination. As far as we know, there has been no previous study about the objective measurement of the coccyx. The purpose of this study was to find the possible cause of idiopathic coccygodynia by comparing the clinical and radiological differences between traumatic and idiopathic coccygodynia by innovative objective clinical and radiological measurements. Thirty-two patients with coccygodynia were evaluated retrospectively. We divided the patients into two groups. Group 1 consisted of 19 patients with traumatic coccygodynia and group 2 consisted of 13 patients with idiopathic coccygodynia. We reviewed medical records and checked age, sex distribution, symptoms, and treatment outcome in each group. We also reviewed coccyx AP and lateral views of plain radiological film and measured the number of coccyx segments and the intercoccygeal angle in each group. The intercoccygeal angle devised by the authors was defined as the angle between the first and last segment of the coccyx. We also checked the intercoccygeal angle in a normal control group, which consisted of 18 women and 2 men, to observe the reference value of the intercoccygeal angle. The outcome of treatment was assessed by a visual analogue scale based on the pain score. Statistical analysis was done with Mann-Whitney U test and Chi-square test. Group 1 consisted of 1 male and 18 female patients, while group 2 consisted of 2 male and 11 female patients. There were no statistically significant differences between the traumatic and idiopathic coccygodynia groups in terms of age (38.7 years versus 36.5 years), male/female sex ratio (1/18 versus 2/11), and the number of coccyx segments (2.9 versus 2.7). There were significant differences between the traumatic and idiopathic coccygodynia groups in terms of the pain score (pain on sitting: 82 versus 47, pain on defecation: 39 versus 87), the intercoccygeal angle (47.9 degrees versus 72.2 degrees), and the satisfactory outcome of conservative treatment (47.4% versus 92.3%). The reference value of the intercoccygeal angle in the normal control group was 52.3 degrees, which was significantly different from that of the idiopathic group. In conclusion, the intercoccygeal angle of the idiopathic coccygodynia group was greater than that of the traumatic group and normal control group. Based on the results of this study, the increased intercoccygeal angle can be considered a possible cause of idiopathic coccygodynia. The intercoccygeal angle was a useful radiological measurement to evaluate the forward angulation deformity of the coccyx.

Key Words: Coccygodynia, traumatic, idiopathic, intercoccygeal angle

INTRODUCTION

Coccygodynia was first described by Simpson in 1859. However, descriptions of pain in the terminal portion of the spine date back to at least the 16th and 17th centuries. Coccygodynia is defined as pain in and around the coccyx. The pain can be of varying intensity and related to locomotor activities or defecation. The female coccyx is more prominent than the male coccyx and coccygodynia is about five times more frequent in women than in men. The typical patient is female and tends to have a thin body habitus. Several etiologies are possible, but the most frequent are direct trauma or childbirth or unknown.

Many authors have studied coccygodynia with following observations: Psychologic aspects of coccygodynia have been exaggerated. External palpation as well as a rectal examination were very helpful in localizing pain. There were no statistically significant radiologic differences between coccygodynia and a control group. There has been radiologic classification of coccyges. Grade I was curved slightly forward; grade II was more markedly curved,
with the coccyx pointing straight forward; grade III was sharply angled anteriorly; and grade IV showed subluxation of the sacrococcygeal or intercoccygeal joints. Digital massage was first described and popularized as a treatment method of coccygodynia. If a 2-month trial of nonoperative treatment failed, consideration might be given to surgical excision of the coccyx. Surgery should be performed through a midline, vertical incision with the patient in the prone position. Partial coccygectomy was found to have a higher incidence of surgical failure. Coccygodynia has been associated with luxation or hypermobility of the coccyx. Therefore, a dynamogram of the coccyx in the sitting position was helpful.

Previous study about coccygodynia has concentrated on the cause, diagnostic method, and radiologic classification, as well as the treatment method. But as far as we know, there has been no study about objective measurement of the coccyx. The purpose of this study was to find the possible cause of idiopathic coccygodynia by comparing the clinical and radiological differences between traumatic and idiopathic coccygodynia by clinical findings and radiological measurement.

**MATERIALS AND METHODS**

Thirty-two patients with coccygodynia, who were treated at Yonsei University Medical Center from 1980 to 1997 and followed for at least 12 months (mean 39 months), were evaluated retrospectively. We divided the patients into two groups depending on the history. Coccygodynia associated with trauma more than 3 months previously were considered as traumatic coccygodynia and coccygodynia of unknown origin were considered as idiopathic coccygodynia. Group 1 consisted of 19 patients with traumatic coccygodynia. Group 2 consisted of 13 patients with idiopathic coccygodynia. Coccygodynia of known origin, for example, glomus tumor or disc herniation and coccygodynia from acute trauma were excluded in this study. We reviewed medical records and checked age, sex distribution, symptom, and treatment outcome in each group. We also reviewed coccyx AP and lateral views of plain radiological film and measured the number of coccyx segments and the intercoccygeal angle in each group. The intercoccygeal angle devised by the authors was defined as the angle between the first and last segment of the coccyx (Fig. 1). We also checked the intercoccygeal angle in a normal control group, which consisted of 18 women and 2 men, to observe the reference value of the intercoccygeal angle. Conservative treatment was initially performed in all cases for 6 months and if there was no improvement of symptom, then surgical treatment was performed. Operative procedure was as follows: Patients underwent coccygectomy by subperiosteal dissection through a longitudinal midline incision while in a modified knee-chest position. Closure was performed by reapproximating the fascia and closing the subcutaneous layer and the skin primarily with a drain. Symptoms were assessed by visual analogue scale based on the pain score which consisted of pain on defecation, pain when sitting, and pain in changing position from sitting to standing. We compared the symptom before treatment to the symptom after treatment. If there was improvement of symptom of more than 50%, then we considered it as an improvement. Statistical analysis was done with Mann-Whitney U test and

**Fig. 1.** Intercoccygeal angle is the angle between the first coccygeal segment and the last coccygeal segment, which is the objective measurement of forward angulation of the coccyx.
Chi-square test.

RESULTS

Gender and age

The traumatic coccygodynia group 1 consisted of 19 patients with one man and 18 women. The idiopathic coccygodynia group 2 consisted of 13 patients with two men and 11 women. The normal control group consisted of two men and 18 women.

The mean age of group 1 was 38.7 (13–71) years, group 2, 36.5 (15–59) years, and the control group, 34.2 (20–39) years.

Statistical analysis was performed with Chi-square test or Mann-Whitney U test. There were no significant differences between the traumatic and idiopathic groups in terms of gender (p=0.355) and age (p=0.693) (Table 1).

Number of coccygeal vertebra

The mean number of coccygeal vertebra was 2.9 (2–4) in group 1, 2.7 (2–4) in group 2, and 2.9 (2–4) in control group. There were no significant differences between group 1 and group 2 in terms of the number of coccygeal vertebra (p=0.392). There were also no significant differences between group 1 (p=0.742) or group 2 (p=0.345) and the control group (Table 1).

Intercoccygeal angle

The mean intercoccygeal angle was 47.9 (25–88) degrees in group 1, 72.2 (30–90) in group 2, and 52.3 (38–65) in the control group. The intercoccygeal angle of group 2 was significantly greater than that of group 1 (p=0.001). There were no significant differences between group 1 and the normal control group in terms of intercoccygeal angle (p=0.365). However, there were significant differences between group 2 and the normal control group in terms of intercoccygeal angle (p=0.002) (Table 1).

Causes of traumatic coccygodynia

The causes of trauma were slipping injury (9 cases), falling injury (5 cases), and direct blow (5 cases). The traumas resulted in fracture-malunion of coccyges (8 cases), prolonged unreduced dislocation of the sacrococcygeal joint (1 case), subluxation of the sacrococcygeal joint (1 case), and contusion (9 cases).

Outcome of conservative treatment

In group 1, 9 out of 19 patients were improved by conservative treatment within 6 months.

In group 2, 12 out of 13 patients were improved by conservative treatment. The outcome of conservative treatment was significantly better in group 2 than in group 1 (p=0.017) (Table 1).

Outcome of operative treatment

In group 1, 10 patients had surgical treatment because coccygodynia did not improve with conservative treatment. Nine out of 10 (90%) improved. One patient did not improve despite partial resection of the third and fourth coccyx. We recommended total excision of the coccyx, but she refused and the symptom remained.

In group 2, only one patient was not improved despite conservative treatment for 6 months. Therefore, she had surgical treatment and the symptom improved (Table 1).

DIscussion

Previous study about coccygodynia has concentrated on the cause, diagnostic method, radiologic classification, and treatment method. However, there has been no study about objective measurement of the coccyx. In this study, we measured the angle...
between the first segment and last segment of the coccyx. We called it the intercocygeal angle, which was the first objective measurement of the coccyx.

Fig. 2A-B. (A) Preoperative radiography of a 36-year-old woman with traumatic coccygodynia. The intercocygeal angle was 36 degrees. (B) Postoperative radiography of a 36-year-old woman with traumatic coccygodynia. The second, third, and last coccygeal segments were resected.

Fig. 3. Radiography of a 32-year-old woman with idiopathic coccygodynia. The intercocygeal angle was 88 degrees.

Fig. 4. Radiography of a 29-year-old woman with idiopathic coccygodynia shows scoliosis of the coccyx.

In an earlier study by Duncan, there had been no radiological differences between a coccygodynia group and a normal control group, but Duncan did not divide the coccygodynia patients into traumatic and idiopathic groups. In this study, the intercocygeal angle of the idiopathic group was larger than the normal control group, which was compatible with the
results of Postacchini and Massobrio's study. They compared the radiologic findings of coccygodynia patients to those of a normal control group. They classified the morphology of the coccyx according to lateral coccyx radiographs. Grades 3 or 4 were more common in coccygodynia patients than in the normal control group. However, their classification did not depend on exact measurement but rather on description. By contrast, we measured the angle between the long axis of the first and last coccygeal vertebrae, which was expressed as an objective, exact and continuous measurement. We measured the intercoccygeal angle in the normal control group to determine the normal reference value. The intercoccygeal angle of the normal control group was 52.3 degrees, which was not significantly different from the angle of the traumatic group, but it was significantly different from that of the idiopathic group. Therefore, we thought that an increased intercoccygeal angle might be a possible cause of idiopathic coccygodynia. Scoliotic deformity of the coccyx was also found, which had not previously been reported, and this could be a possible cause of idiopathic coccygodynia. In other words, morphological abnormality of the coccyx, including scoliosis and an increased intercoccygeal angle, might be possible causes of idiopathic coccygodynia (Fig. 3 and 4). At the beginning of this study, we had expected that the intercoccygeal angle in the traumatic group would be greater than in the idiopathic group. By contrast, the intercoccygeal angle in the traumatic group was less than in the idiopathic group. We could interpret this fact as follows: Traumatic coccygodynia was prone to occur by slipping injury in patients with a thin body habitus and small intercoccygeal angle because they had bone to skin in the coccygeal area. The idiopathic coccygodynia group responded well to conservative treatment like a hot packs, ultrasound, form pads, medication, avoiding hard seats, and so on. However, 10 cases (56%) in the traumatic coccygodynia group were not improved by conservative treatment, therefore, coccygectomy was performed and the symptom was improved in 90% (Fig. 2). Our success rate (90%) matches the results of other series. If nonoperative treatment fails, consideration may be given to surgical excision of the coccyx. Powers and Key felt that a 2-month trial of nonoperative therapy was adequate, while others have recommended 3 to 8 months. In this study we performed conservative treatment for 6 months. Why was coccygectomy performed more frequently in the traumatic group? We hypothesized two causes. First, abrupt localized anatomical change of the coccyx in relation to adjacent bone and soft tissue caused by trauma may have elicited pain. Second, the intercoccygeal angle was relatively small in the traumatic group, which may have caused localized compression of the skin and soft tissue on the posterior aspect of the coccyx just above the anus, especially in thin patients in a sitting position. By contrast, the intercoccygeal angle of the idiopathic group increased and pain on defecation was the chief complaint due to compression of the rectum by the tip of the coccyx. Therefore, treatment of constipation by diet control and stool laxatives was sufficient to relieve pain and discomfort.

In summary we compared idiopathic coccygodynia to traumatic coccygodynia in terms of age, sex, number of coccygeal vertebra, intercoccygeal angle, and treatment. And the results were as follows:

1) There were no statistically significant differences in terms of age, sex, and number of coccygeal vertebra.

2) The intercoccygeal angle was greater in the idiopathic group than in the traumatic group.

3) The outcome of conservative treatment was better in the idiopathic group than in the traumatic group.

4) The outcome of coccygectomy was good in patients who were not improved by conservative treatment, and most of them belonged to the traumatic group.

5) The intercoccygeal angle was a useful radiological measurement, which could accurately assess the increased angular deformity of the coccyx.

Based on the results of this study, we formulated that an increased intercoccygeal angle was a possible cause of idiopathic coccygodynia and that the intercoccygeal angle was a useful radiological measurement which could accurately assess the increased angular deformity of the coccyx. We also thought that most cases of idiopathic coccygodynia could be treated conservatively, however a considerable number of cases of traumatic coccygodynia still required operative treatment.
REFERENCES