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Coccydynia

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Abstract Coccydynia is a term that refers to pain in the region of the coccyx. Most cases are associated with abnormal mobility of the coccyx which may trigger a chronic inflammatory process leading to degeneration of this structure. In some patients this instability may be detected on dynamic radiographs. Nonsurgical management remains the gold standard treatment for coccydynia, consisting of decreased sitting, seat cushioning, coccygeal massage, stretching, manipulation, local injection of steroids or anesthetics, and postural adjustments. Those patients who fail these conservative modalities may potentially benefit from coccygectomy. However, surgical intervention is typically reserved for patients with evidence of advanced coccygeal instability (e.g., subluxation or hypermobility) or spicule formation, as this population appears to exhibit the greatest improvement postoperatively.

Keywords Coccydynia · Coccygodynia · Coccygectomy · Coccyx · Management

Introduction

The term coccydynia, first introduced by Simpson in the mid-nineteenth century, refers to symptoms of pain in the region of the coccyx. Although this condition may affect individuals of all ages and of either gender, the mean age of onset has been shown to be 40 years and the prevalence is five times greater in women than in men [1].

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Anatomy

Derived from Greek word for "cuckoo" due to its resemblance to the beak of this bird, the coccyx comprises the most distal aspect of the vertebral column. It consists of three to five rudimentary vertebral units that, with the exception of the first coccygeal segment, are typically fused. The ventral surface of the coccyx is slightly concave with transverse grooves that demarcate the regions where the vestigial coccygeal units had previously fused. The dorsal aspect is slightly convex and displays similar transverse markings as well as multiple paired tubercles known as the coccygeal articular processes, the most superior of which are referred to as the coccygeal cornu. These structures articulate with the sacral cornu of the inferior sacral apex at S5, either as a symphysis or as a true synovial joint; this articulation represents one of the borders of the foramen for the exiting dorsal branch of the fifth sacral nerve root. The coccyx also serves as a site of attachment for the gluteus maximus muscle, the coccygeal muscle, and the anococcygeal ligament.

Postacchini and Massobrio described four types of configuration of the coccyx and designated them type I through type IV. In type I, the coccyx is curved slightly forward with its apex directed downward and caudally. In type II, the forward curvature is more marked and the apex extends straightforward. In type III, the coccyx most sharply angles forward. Finally in type IV, the coccyx is subluxated at the sacrococcygeal or intercoccygeal joint.

Etiology

The majority of cases of coccydynia occur in conjunction with either a subluxated or hypermobile coccyx, and it has

been proposed that this pathologic instability may give rise to chronic inflammatory changes. Many of these patients will report a history of an antecedent traumatic event, which has been shown to be associated with coccygeal instability, particularly posterior subluxation [2]. However, a study conducted by Maigne et al. has suggested that only a traumatic event occurring within 1 month of onset is significant in increasing the risk of instability and subsequent coccydynia [1, 2]. They demonstrated that the proportion of patients who develop instability following a traumatic event before 1 month of onset is nearly equal to the proportion who develop instability without a history of trauma (55 and 53%, respectively) [2] By contrast, the instability rate was found to be 77.1% when the traumatic event was less than a month previously [2].

Body mass index (BMI) appears to influence the prevalence of coccydynia, as obesity is three times more common in patients with coccydynia than in the normal population [1]. In addition, the coccygeal lesion pattern observed in obese, normal-weight, and thin coccydynia patients markedly differs. Obese patients have mainly posterior subluxation, normal-weight patients have mainly hypermobility or radiographically normal coccyges, and thin patients have mainly anterior subluxation and spicules [2]. These findings suggest the following explanation. The coccyx of a leaner patient normally rotates during sitting so that the coccyx is in an optimal position to absorb the forces that are generated during this activity. As the BMI increases, the degree of pelvic rotation with sitting is reduced and the angle of incidence is increased. Consequently, the coccyx in obese patients is more susceptible to sudden elevations in intrapelvic pressure that occur with a fall and repeated sitting down. This increased exposure to pressure places the coccyx at an increased risk of posterior subluxation, which as mentioned previously is the typical post-traumatic lesion [2]. Normal and below-normal weight patients are more likely to develop coccydynia consequent to lesion patterns other than posterior subluxation as their coccyges rotate in a more optimal fashion to lessen forces from falls and sitting [2].

The coccygeal configuration also appears to influence prevalence and causative lesion. Types II, III, and IV are more prone to become painful than those with type I [3]. Anterior subluxation is a rare lesion and tends to occur in type III and type IV patterns. Posterior subluxation is more common in the straighter type I configuration [2].

Coccydynia may be observed in subjects with radiographically normal coccygeal motion. In these cases, symptoms may arise secondary to tumor, infection, bursitis of the coccygeal adventitia, or post-traumatic arthritis of the sacrococcygeal joint (Fig. 1) [4]. Idiopathic coccydynia has been described in the absence of any obvious pathologic changes involving the coccyx, although this is considered a diagnosis of exclusion; in these patients the pain may actually result from spasticity or other abnormalities affecting the musculature of the pelvic floor.

Clinical evaluation

Signs and symptoms

Patients with coccydynia most often present with complaints of pain in and around the coccyx without significant low back pain or pain radiation or referral [1]. Nevertheless, the incidence of concomitant low back pain is known

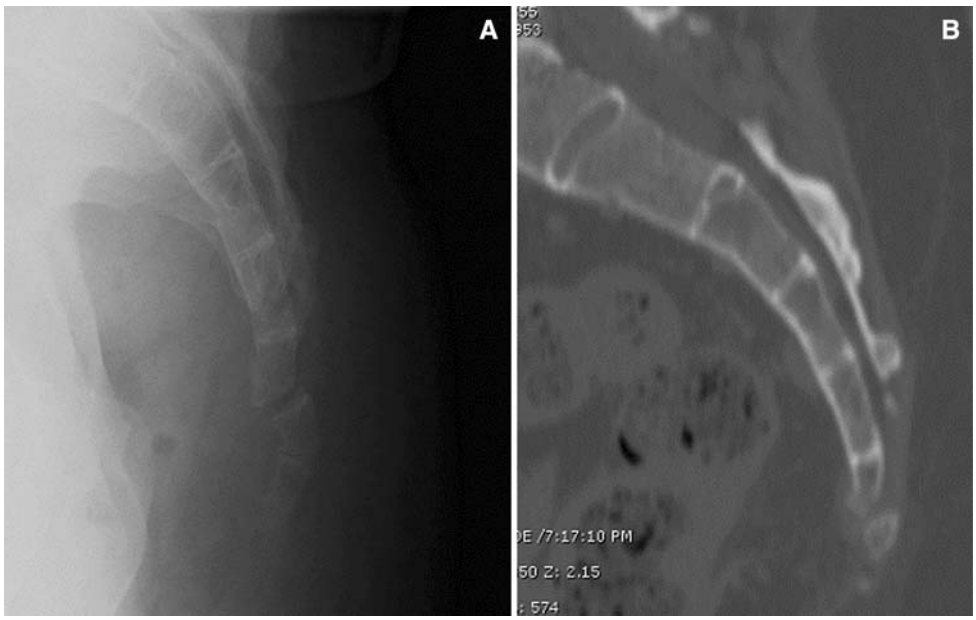

Fig. 1 Lateral radiograph (**a**) and sagittal CT reconstruction (**b**) demonstrating a fractured coccyx in a patient who was diagnosed with coccydynia following a ground-level fall 6 months earlier

to be higher in individuals with coccydynia compared to the general population, particularly those with certain anatomic variants such as a coccyx that is curved forward with an apex pointed caudally or straightforward [3]. Classically, this pain is associated with sitting and is exacerbated when rising from a seated position [1]. Many patients will also feel a frequent need to defecate or pain with defecation [1]. Others may report relief of their pain when they sit on their legs or on one buttock.

Physical exam

The soft tissues overlying the sacrococcygeal region should be inspected for the presence of pilonidal cysts, which represent potentially painful ingrowths of one or more hair follicles. Palpation of this region may often reveal localized tenderness and swelling. In addition, a mass may occasionally be palpated, such as representing a bone spicule or causative tumor. In most cases of coccydynia, rectal manipulation of the coccygeal segments or sacrococcygeal joint will elicit pain. A stool guaiac test for occult blood should be performed to assess for GI pathology.

Diagnostic and imaging studies

Although coccydynia is a clinical diagnosis, imaging studies are valuable in evaluation and assessment. Single-postition radiographs seldom demonstrate any definitive morphologic differences between normal individuals and patients with coccydynia; hence these views are not diagnositic [3]. Dynamic radiographs obtained in both the sitting and standing positions may be more useful than static X-rays because they allow for measurement of the sagittal rotation of the pelvis and the coccygeal angle of incidence. A comparison of sitting and standing films will yield radiographic abnormalities in up to 70% of symptomatic coccydynia cases [1]. A coccyx normally pivots between 5 and 25° when the patient sits and returns to its original angle once the subject stands. In contrast, individuals with coccydynia frequently exhibit coccygeal displacement, immobility (<5° motion) or hypermobility (>25° of motion) [1].

Advanced imaging modalities may be also be utilized to establish a diagnosis of coccydynia, although these techniques may not be as accurate as dynamic radiographs [1]. Magnetic resonance imaging (MRI) and technetium Tc-99m bone scans may demonstrate inflammation of the sacrococcygeal area indicative of coccygeal hypermobility [1]. Advanced imaging techniques can be used to exclude certain forms of underlying pathology such as chordoma. Provocative testing of the coccyx, such as pressing on the region with a blunted needle to elicit pain, and pain relief with the injection of local anesthetic under fluoroscopic guidance may also be useful in diagnosis as well [1].

Nonoperative management

Nonsurgical strategies remain the gold standard treatment for coccydynia, consisting of medications such as nonsteroidal anti-inflammatory agents (NSAIDs) and other analgesics, reduced sitting, donut pillow use and other postural adjustments, and physical therapy [1]. Maigne and Chattelier [5] evaluated the efficacies of levator ani massage, levator ani stretching, and sacrococcygeal joint mobilization as the initial modalities for addressing coccydynia. In this investigation, the 6-month success rates were 29.2% for massage, 32% with stretching, and 16% following joint mobilization; collectively, the overall success rate observed with these conservative approaches was 25.7%. Individuals with normal coccygeal mobility responded best to these treatments (43% success rate) while those with an immobile coccyx exhibited the poorest clinical outcomes (16% success rate). Patients with hypermobility or subluxation demonstrated only moderate improvement of their symptoms (25 and 22.2%, respectively). A success rate comparison to the traditional initial standard treatment of simple unloading and use of NSAID medication was not made.

Aside from their diagnostic value, local injections into the region of the coccyx represent another therapeutic approach for managing coccydynia refractory to these other nonoperative techniques. Wray et al. [6] recommended administering a mixture of steroid (40 mg methylprednisone) and long-acting anesthetic (10 ml 0.25% bupivicane) which may be repeated if necessary. For patients with persistent symptoms, a third injection was performed in conjunction with coccygeal manipulation under general anesthetic. The manipulation was performed with the patient in the left lateral position, using the index finger per rectum and the thumb overlying the coccyx. The coccyx was repeatedly flexed and extended for approximately 1 min. The basis for this recommendation was the reported study success rates of 59% with injections alone and 85% for the combination of injections and manipulation. Although 21% of the patients receiving injections and 28% of those undergoing injections with concurrent manipulation experienced recurrent symptoms, many of the subjects in both groups were successfully managed with a prolonged course of therapy.

Fogel et al. [1] proposed the following therapeutic protocol for acute coccydynia (i.e., pain less than 2 months). The first line of treatment should include at least 8 weeks of rest, stool softeners, adjustments in sitting position, and NSAIDs. Acute coccydynia refractory to

these therapies or chronic symptoms lasting greater than 2 months should be further evaluated with dynamic radiographs and MRI of the coccyx. Additional nonoperative modalities such as massage, stretching, or injections may also be incorporated at this time. Nevertheless, patients who fail to respond to these conservative therapies may be considered to be reasonable candidates for surgical intervention.

Surgical management

Surgery may be warranted for select individuals who continue to complain of disabling coccygeal pain despite the implementation of various nonoperative treatment strategies. In most instances, surgical management generally involves either excision of the mobile segment or a total coccygectomy. These procedures are ideally reserved for patients with evidence of advanced degeneration such as coccygeal instability (e.g., subluxation or hypermobility) or spicule formation since this population appears to exhibit the greatest improvement postoperatively, with published success rates between 60 and 91% [7, 8]. While coccygectomy may also be attempted in subjects with normal coccygeal mobility, it is important to note that the clinical outcomes of this particular group tend to be less favorable after surgery.

The most frequent complication of coccygectomy is wound infection, which has been shown to occur in up to 22% of these operative cases [1]. The relatively high incidence of postoperative infections has been attributed to the presence of abundant perineal skin flora resulting in local contamination, inability to perform proper wound care because of difficulties visualizing the surgical site, and excessive wound tension brought about by sitting [4].

Summary

The majority of cases of symptomatic coccydynia are associated with the development of progressive coccygeal instability, a finding which is often present on dynamic radiographs. The mainstay of treatment for this condition involves a variety of nonoperative measures such as NSAIDs, changes in sitting position, use of donut pillows, therapy (e.g., massage, stretching, or manipulation), and local injections. Coccygectomy may be indicated for patients who have failed conservative management, particularly those with radiographic evidence of hypermobility or subluxation as they appear to exhibit the greatest improvement following this procedure. Surgical intervention may also be performed in individuals with normal coccygeal mobility, although the postoperative clinical outcomes are generally less predictable in this population.

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