Coccygodynia: Evaluation and Management

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Abstract

Coccygodynia is pain in the region of the coccyx. In most cases, abnormal mobility is seen on dynamic standing and seated radiographs, although the cause of pain is unknown in other patients. Bone scans and magnetic resonance imaging may show inflammation and edema, but neither technique is as accurate as dynamic radiography. Treatment for patients with severe pain should begin with injection of local anesthetic and corticosteroid into the painful segment. Coccygeal massage and stretching of the levator ani muscle can help. Coccygectomy is done only when nonsurgical treatment fails, which is infrequent. Coccygectomy usually is successful in carefully selected patients, with the best results in those with radiographically demonstrated abnormalities of coccygeal mobility.

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Coccygodynia, pain in the region of the coccyx, typically is triggered by or occurs while sitting. The intensity of the pain varies and sometimes is aggravated by arising from a seated position. Less severe symptoms may be managed by changing the sitting position or injecting the painful area with local anesthetic and corticosteroids. Orthopaedic surgeons often see patients with more severe and disabling symptoms, which in selected cases can be managed successfully with surgery.

Coccygodynia is five times more prevalent in women than men. Although it can occur over a wide age range, mean age of onset is 40 years. Coccygodynia has many causes, but it may be posttraumatic, beginning after a fracture or contusion or after a difficult vaginal delivery.[1-3] In the largest number of cases, the tip of the coccyx is subluxated or hypermobile, which can be seen on dynamic radiographs taken with the patient standing and seated[1-3] (Fig. 1). The cause of pain is unknown in patients with normal coccygeal mobility.[2]

Anatomy

Five fused sacral and three or four fused coccygeal vertebrae form the terminal end of the spinal column. Primary ossification centers are evident in the 9th to 10th week of gestation in the axial skeleton, but the coccyx does not begin to ossify until after birth. In the sagittal plane, the sacrum is kyphotic and connects the lumbosacral junction to the coccyx. The inferior sacral apex at S5, the sacral cornu, articulates with the coccygeal cornu, a facet-disk complex on the dorsal articulating surface of the coccyx. This articulation can be a symphysis or a synovial joint. The coccyx is a triangular structure comprising three or four coccygeal units that usually are fused, although the first coccygeal segment may not fuse with the second. The sacrococcygeal joint also may be fused. The coccyx provides attachments for the gluteus maximus muscle, coccygeal muscle, and anococcygeal ligament.

There are no significant differences between asymptomatic patients and those with coccygodynia in the number of coccygeal segments or in the incidence of fusions between segments.[4] Symptomatic patients have a slightly higher incidence of sacral coccygeal fusion and a more angular sagittal alignment of the coccyx than asymptomatic patients.[4] No pathologic findings have been noted in the idiopathic or hypermobile segments in patients with coccygodynia. The abnormal subluxation and hypermobility appear to cause pain, but coccygodynia can occur with an immobile coccyx. Only occasionally have posttraumatic nonunion, arthritis, or malunion been found in surgical specimens.

Etiology

The clinical factors associated with coccygeal abnormalities are obesity,

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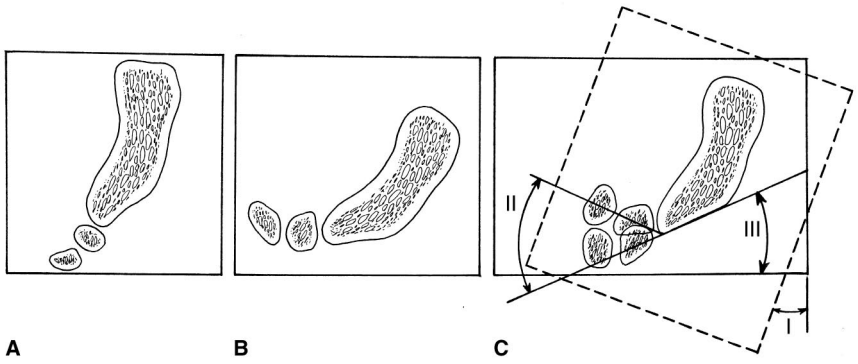


Figure 1 Maigne's technique[1] for comparing positions of sacral and coccygeal vertebrae from lateral standing and seated radiographs. **A,** Standing view. **B,** Seated view. **C,** Superimposed views with the sacrum aligned by rotating the seated view through an angle of sagittal pelvic rotation (I) shows coccygeal angulation and subluxation (II) and the angle at which the coccyx strikes the seat surface (III).

antecedent trauma or childbirth, and exacerbation of pain with arising from sitting. Obesity, which decreases pelvic rotation when the patient sits, is three times more common in patients with coccygodynia than in the normal population.[2] However, the incidence of radiographically demonstrated coccygeal instability is the same regardless of a history of remote trauma, which suggests that only recent trauma (within 3 months) causes coccygodynia. Patients with normal coccygeal mobility have the idiopathic type, which may be associated with pelvic floor spasticity or other anomalies of the midpelvic muscles. Coccygodynia occurring with an immobile coccyx frequently is associated with bursitis of the adventitia at the coccygeal tip. Other suggested etiologies include posttraumatic arthritis of the sacrococcygeal joint and ununited fractures or dislocations of the coccyx. Abnormal psychological states as a cause of coccygodynia have been largely disproved as behavioral testing of these patients reveals personality profiles similar to other patient groups.[5] Other causes of pain in the region of the sacrum and coccyx are lesions of the lumbar disks, arachnoiditis of the lower sacral nerve roots, tumors of the coccyx or sacrum, pilonidal cysts and sinuses, and perirectal abscesses.[4] Low back pain has occurred concurrently with coccygodynia. In one series, 24 of 50 patients (48%) also had lumbar disk herniation or bulge without sciatica or low back pain,[5] so although low back pain is common, it appears to be separate from coccygodynia. In the series of Postacchini and Massobrio,[4] 87% of patients with low back pain at the time of coccygectomy had an excellent or good result. The only poor results were in patients with low back pain and a configuration of the coccyx wherein the first coccygeal segment is partially fused to the sacrum.

Clinical Evaluation

Symptoms

Onset of pain may be insidious, resulting in a possibly long delay from onset to diagnosis. Patients usually present with pain in and around the coccyx without significant low back pain or radiating or referred pain. The pain is localized to the sacrococcygeal joint or mobile segment of the coccyx and may be relieved by sitting on the legs or on either buttock. Chronic pain is that which persists >2 months. Patients may feel a frequent need to defecate or may have pain with defecation. Women with a history of vaginitis, discharge, or associated pelvic pain should be referred for gynecologic consultation. Concomitant constipation should be managed appropriately. If the patient has blood in the stool, a tumor or metastasis should be considered.

Physical Examination

The surrounding skin and soft tissue should be inspected for evidence of pilonidal cysts or fistulas. External palpation or rectal examination may reveal bone spicules, local swelling, or coccygeal masses. The coccyx should be palpated externally, and the distal segment should be manipulated rectally to detect pain generated by motion of the coccygeal segments. Local tenderness may occur on the superficial coccygeal surface or only on manipulation of the coccygeal tip by rectal examination. Tenderness may be greatest at the sacrococcygeal joint rather than at the coccygeal tip.[2] A palpable internal mass (eg, chordoma) on the anterior surface of the coccyx or sacrum may be evident on rectal examination. Every examination should include a stool guaiac to detect occult blood.

Imaging Evaluation

Single-Position Radiographs

Because orthogonal anteroposterior and lateral radiographs of the coccyx seldom show differences between normal individuals and those with coccygodynia, these views are usually not diagnostic.[5] Postacchini and Massobrio[4] reported that, in both healthy and symptomatic patients, 83% to 95% had two or three coccygeal segments. The sacrococcygeal joint was fused in 51% of the patients with idiopathic coccygodynia (26/51), usually the first intercoccygeal joint was mobile, and the second intercoccygeal joint was fused in 49% (25/51).[4] The curvature of the sacrum was flexed or anterior in 68% of

asymptomatic patients and in 31% of patients with coccygodynia. The tip curved forward sharply in 23% and subluxated posteriorly in 22% of patients with coccygodynia.[4]

Dynamic Radiographs

Maigne and colleagues[1-3,6] compared standing and sitting lateral radiographic views of the coccyx in a total of 582 patients with coccygodynia and reported abnormalities in 70%. The normal coccyx pivots slightly (5° to 25°) either posteriorly or anteriorly with sitting and returns to its original position with standing (Fig. 2, A). Abnormalities of the coccygeal segments in the seated views have anterior hypermobility >25° (Figs. 2, B and 3). Subluxation or posterior displacement of the mobile segment of the coccyx is seen when the patient is seated (Figs. 2, C and 4, A). A spicule of the distal tip (Fig. 2, D) is seen most commonly with an immobile coccyx (<5° of motion with sitting).[2]

Advanced Imaging Modalities

Technetium Tc 99m bone scans may show inflammation in the area of subluxation or hypermobility. Magnetic resonance images also may demonstrate edema in such areas of inflammation (Fig. 4, B). Neither imaging modality can definitively diagnose coccygodynia, nor are they as accurate as the compared standing and seated dynamic radiographs. Provocative tests, such as needling of the painful coccygeal joint to produce pain, and relief with injection of local anesthetic are helpful in diagnosing all patients with subluxation or hypermobility and nearly half of those with normal mobility.[3]

Nonsurgical Management

Nonsurgical management options include nonsteroidal anti-inflammatory and analgesic medications, rest, hot baths, and a cushion to protect the coccygeal region from repetitive trauma. Physical therapy consisting of diathermy and ultrasound may provide temporary relief.

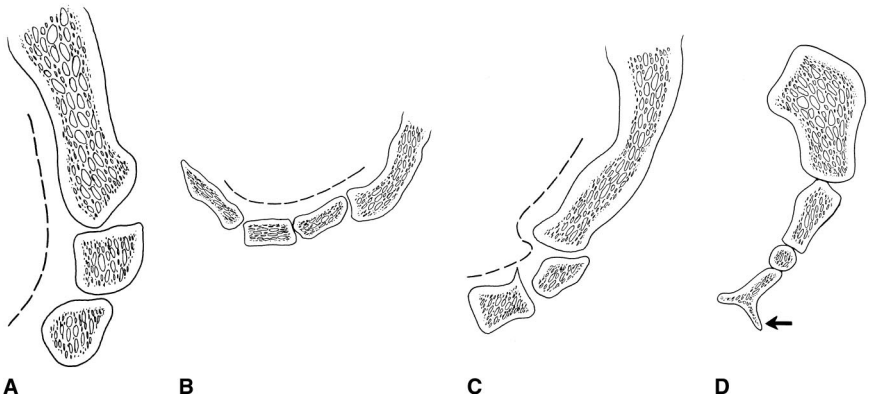


Figure 2 The anatomic signs of coccygodynia.[1] **A,** Normal standing appearance of the coccyx. **B,** Increased flexion mobility of the coccyx when patient is seated. **C,** Posterior subluxation of the coccyx when patient is seated. **D,** Coccygeal spicule (arrow) arising from the dorsal surface of coccygeal segment.

Wray et al[5] used a stepwise treatment, with each step somewhat more invasive than the previous. First, methylprednisolone (40 mg) and bupivacaine (10 mL 0.25%) were injected around the side and tip of the coccyx. With persistent coccygodynia, the coccyx was reinjected and manipulated under general anesthesia by repeatedly flexing and extending it for a minute. If the treatment was successful initially but pain recurred, the injections and manipulations were repeated. If the patient did not respond, a coccygectomy was done 6 weeks later. The cure rate with injection alone was 59% but was 85% with manipulation and injection.[5] Although relapses occurred in the injection group (21%) and the manipulation group (28%), repeat treatment in each group achieved good success. Coccygectomy was done in 20% of patients and had a success rate of 91%.

Maigne and Chatellier[6] prospectively compared levator ani muscle massage, joint mobilization, and mild

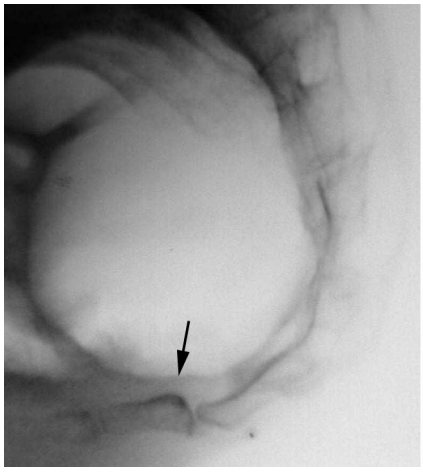
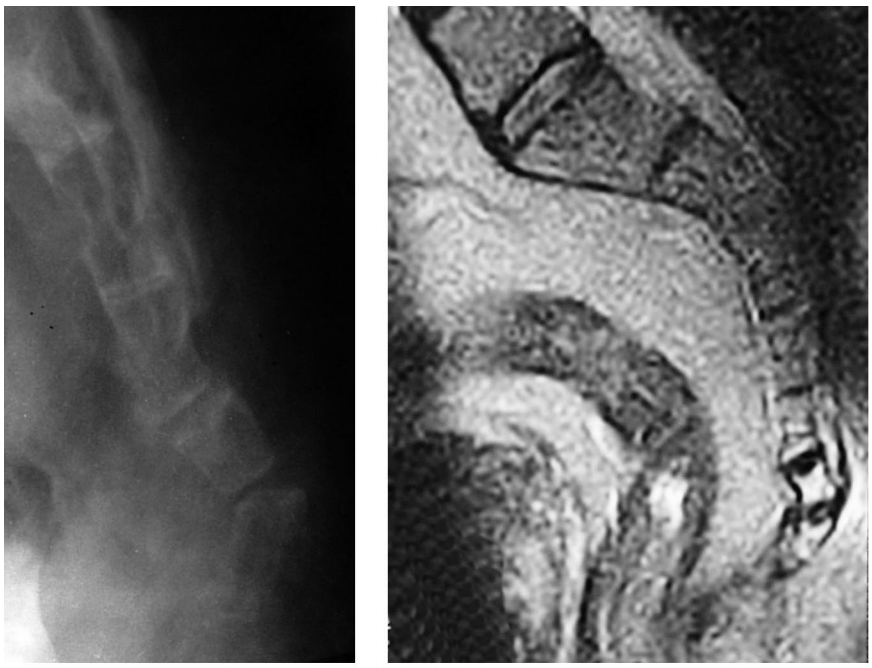


Figure 3 Lateral radiographic seated view of a 45-year-old woman with increased-flexion coccygodynia (arrow). She fell on her buttocks 2.5 years before presentation and had progressive symptoms, including painful bowel movements and inability to sit on a chair. Physical examination revealed a tender and nonmobile coccyx with an exquisitely tender distal coccygeal segment on rectal examination. At 1 year postcoccygectomy, she had complete relief from her symptoms and was able to sit normally. (Courtesy of Paul A. Anderson, MD, Madison, WI.)



A B

Figure 4 A 19-year-old man fell on his buttocks 2 years before presentation and had immediate onset of coccygodynia. His symptoms were chronic and disabling. **A,** Lateral radiograph demonstrates posterior subluxation of the coccygeal mobile segment. **B,** Sagittal T2-weighted spin-echo magnetic resonance image shows edema of the distal coccygeal segments, especially the subluxated coccygeal segment.

stretching of the levator ani, without the addition of injections. At 6 months, successful treatment was 29.2% with massage, 16% with mobilization, and 32% with stretching, for a total of 25.7% overall success. When a patient had a satisfactory result, it was invariably achieved within a week. Good results tended to remain stable. Patients with normal mobility of the coccyx fared the best (43% success at 6 months). Those with an immobile coccyx fared the worst (16%). The outcomes for those with instability subluxation (22.2%) and hypermobility (25%) were modestly successful. Massage and stretching were more effective than manipulation. When therapy failed, patients went on to injections or surgery.

Based on these studies, we have developed an evaluation and treatment algorithm for coccygodynia[5-7] (Fig. 5). When a patient presents with acute coccygodynia (≤2 months' duration), 8 weeks of rest with use of a stool softener, adjustable seating, and nonsteroidal anti-inflammatory medication are prescribed. If this fails to relieve the symptomatic coccygodynia or the patient presents with chronic symptoms (>2 months' duration), a workup is done, including standing and seated radiographs of the coccyx in addition to MRI to evaluate for injury edema, tumor, or other pathology. Stretching, massage, and injection are usually initiated at this time. If these treatments are unsuccessful or if pain recurs, coccygectomy may be offered.

Surgical Management

The indication for coccygectomy is significant, disabling coccygodynia with radiographic subluxation; instability; or a spicule, particularly on the tip of an immobile coccyx.[2,7] Surgery, consisting of complete coccygectomy or simply excision of the mobile segment, should be done only after nonsurgical management fails.[4] Absence of physical findings or significant abnormal psychologic evaluation is a contraindication to surgery. In carefully selected patients, especially those with dynamic radiographic instability or hypermobility, success rates range from 60% to 91%[4,5,7-11] (Table 1). In a patient with normal coccygeal mobility who fails nonsurgical care, coccygectomy may be recommended. However, the surgical result is less predictably favorable than in patients with dynamic radiographic coccygeal instability or hypermobility.

Technique

The patient should take an oral mechanical bowel preparation, such as saline and polyethylene glycol solution (4 L), the day before surgery. Oral neomycin, erythromycin, or metronidazole are given three times the day before surgery. Appropriate prophylactic antibiotics for bowel surgery are given 1 hour before surgery. Postoperatively, most authorities recommend two or three more doses.[12]

Coccygectomy is done with the patient in the prone position with the hips and knees flexed. A vertical incision is made over the coccyx, extending from just above the sacrococcygeal joint into the buttock crease without extending it to the perianal skin. The incision is carried down through the fascia and gluteus maximus muscle with meticulous dissection directly to the bone. Subperiosteal dissection should be done by gradually working side to side. The coccyx then should be elevated either by working from the tip proximally or from the side, under direct vision. All segments must be removed. The tip of the coccyx, which is most likely to be left inadvertently, should be separated sharply from the underlying rectum and dense fascia. With blunt dissection, the rectum and

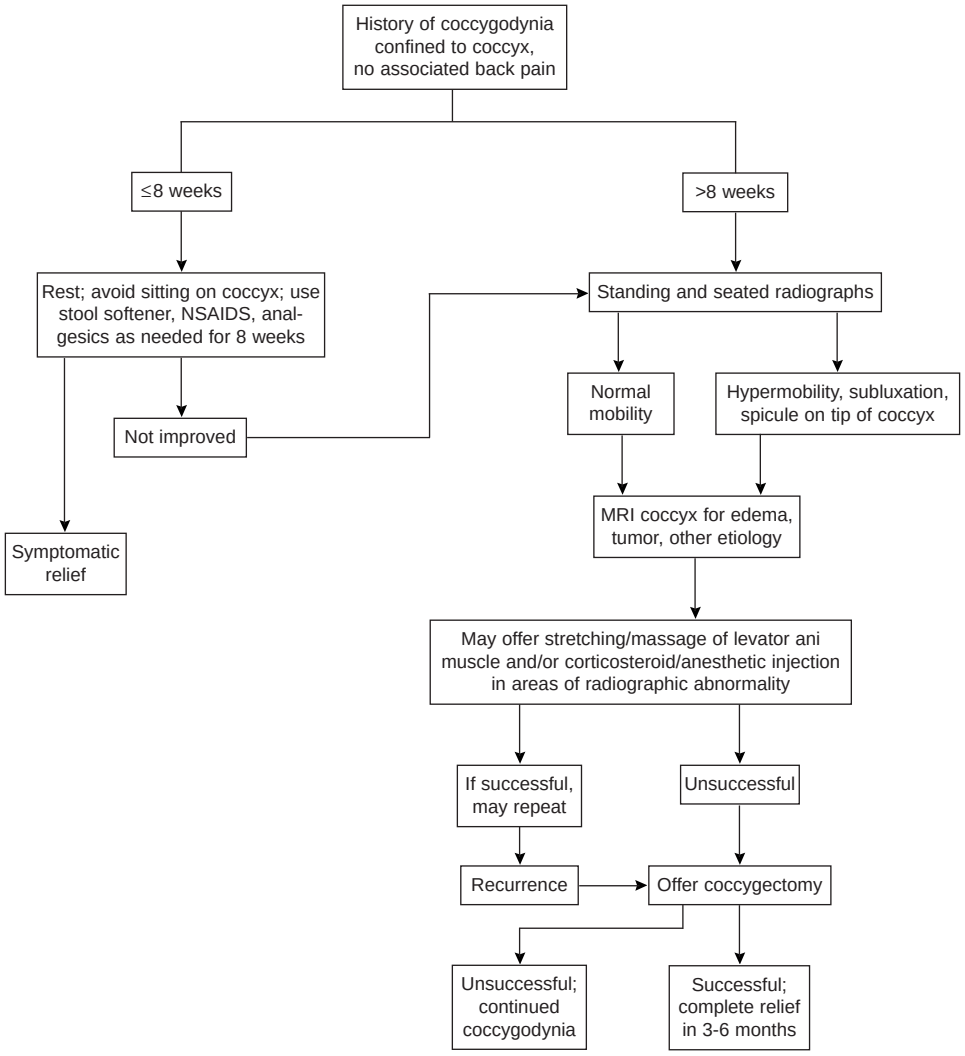


Figure 5 Evaluation and management of coccygodynia.

dense fascia then are freed to the level of the sacrococcygeal joint. This joint then may be transected and the coccyx removed.

The wound bed should be closely examined and palpated for any remaining segments of bone. Radiographs generally are not necessary. The end of the sacrum may be smoothed by rasp, rongeur, or burr. Bleeding from the hemorrhoidal venous complex of the rectum may require ligation. Meticulous hemostasis and a tight layered closure to obliterate dead space should be done. This technique should decrease fragmentation of the coccygeal specimen and limit damage to the rectum and its venous drainage, which can decrease postoperative drainage and increase the risk of infection.

Complications

The primary complication is perineal contamination of the wound. Usually a wound infection is superficial or is a simple wound dehiscence and will heal with intravenous antibiotics and local wound care. Deep infection must be débrided and drained. Antibiotics should be given. Even with healing by secondary intention, the result may be successful. Wound infection and delayed wound healing rates range from 2% to 22%.[4,5,7-10] In a very thin patient with a kyphotic sacrum, the remaining end of the sacrum may be prominent and be a source of continued pain that is not easily managed.

Summary

Dynamic radiographs can help identify causative abnormalities in most patients with coccygodynia, and those with normal coccygeal mobil-

Table 1
Outcomes From Coccygectomy

Study	No. Patients	Follow-up (yrs)	Outcome
Postacchini and Massobrio[4]	36	7.8 (mean)	12 excellent, 20 good, 2 fair, 2 poor
Wray et al[5]	23	2.75 (mean)	21 excellent
Maigne et al[7]	37	2 (minimum)	23 excellent, 11 good, 3 poor
Hellberg and Strange-Vognsen[8]	55	15 (mean)	32 cured, 13 improved, 5 slightly improved, 5 dissatisfied
Grosso and van Dam[9]	9	4.7 (mean)	3 complete, 5 partial, 1 slight relief
Eng et al[10]	27	1.5 (minimum)	9 cured, 9 improved, 6 slightly improved, 3 not improved
Bayne et al[11]	48	7 (mean)	29 acceptable

ity also may be successfully treated. Corticosteroid and anesthetic injections combined with massage or stretching of the levator ani muscle are successful in most patients. When nonsurgical management fails, coccygectomy is usually successful in carefully selected patients with dynamic instability. Coccygectomy may be recommended in patients with normal coccygeal mobility who fail nonsurgical care, but results are less predictably favorable than in patients with dynamic radiographic coccygeal instability or hypermobility.

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