

## Coccygodynia review: coccygectomy case series

Waleed Mohammad Awwad<sup>1</sup> · Munir Saadeddin<sup>1</sup> · Jbreel Nasser Alsager<sup>1</sup> · Fahad Mohammad AlRashed<sup>1</sup>

Received: 7 February 2017 / Accepted: 1 April 2017 / Published online: 6 April 2017  
© Springer-Verlag France 2017

### Abstract

**Background** Coccygodynia is a pain of the coccyx that is typically exaggerated by pressure. Management includes anti-inflammatory medications, physiotherapy, and coccyx manipulation. Coccygectomy is the surgical approach for treating coccygodynia when the conservative management fails. Generally, coccygectomy yields good results. Its most common complication is wound infection.

**Objective** To determine the effectiveness of coccygectomy in patients with coccygodynia.

**Methods** A retrospective review of 70 patients (52 females and 18 males) with coccygodynia at King Khalid University Hospital in Riyadh was carried out, and the outcomes were studied. Twenty patients did not respond to conservative management; therefore, bimanual coccyx manipulation was done. Eleven were identified with instability and did not respond to coccygeal manipulation. Coccygectomy was performed on 8 patients while 3 declined.

**Results** All patients who underwent coccygectomy showed improvement of their symptoms. One case of superficial wound infection and delayed wound healing was encountered.

**Conclusion** Coccygectomy provides effective pain relief to patients not responding to conservative therapies.

**Keywords** Coccygodynia · Coccygectomy · Manipulation · Conservative treatment · Coccyx pain

### Introduction

Coccygodynia was first described by nineteenth-century physician James Simpson as pain within the coccyx in the absence of lower back pain, radiation, and referral. The pain is felt in the seated position and exaggerated with defecation, standing, and sexual intercourse [1]. Many studies [2–4] report a greater prevalence of coccygodynia among females with a female-to-male ratio of 5:1. Risk factors include fusion of the sacrococcygeal joint [2] and a high body mass index (BMI) [3].

### Anatomy

The coccyx is formed by three to five bones attached to the sacrum. It has anterior, posterior, and lateral surfaces to which the sacrococcygeal ligaments, levator ani muscle, sacrosiatic ligaments, and coccygeus muscles attach [5]. Postasshini and Massoprio classified the coccyx into four types. Type I is moderately curved forward, type II is markedly curved forward, type III is sharply angulated forward, and type IV is subluxated [6].

### Aetiology

While there is a lack of knowledge regarding the pathophysiology of coccygodynia, many causative factors were established. The majority of cases were related to trauma,

✉ Jbreel Nasser Alsager  
Jbreel.22@gmail.com

Waleed Mohammad Awwad  
wmawwad@gmail.com

Munir Saadeddin  
msaadeddin@ksu.edu.sa

Fahad Mohammad AlRashed  
fmalrashed@hotmail.com

<sup>1</sup> Orthopedic Department, College of Medicine, King Saud University, Riyadh, Saudi Arabia

mainly falling on the buttocks, childbirth, recent lumbar spine surgery, rectal surgery, epidural injection, or idiopathic in nature [1, 2, 4]. Another important factor is coccygeal instability. Using plain and dynamic X-ray, the diagnosis of a subluxated or hypermobile coccyx is associated with coccygodynia [2, 3]. These patients were noted to usually have a history of a traumatic event [1, 3]. However, Maigne et al. [7] concluded that the risk of developing instability is significant only within the first month of the traumatic event, after which the risk of developing instability is the same as patients without a history of trauma.

### Diagnosis

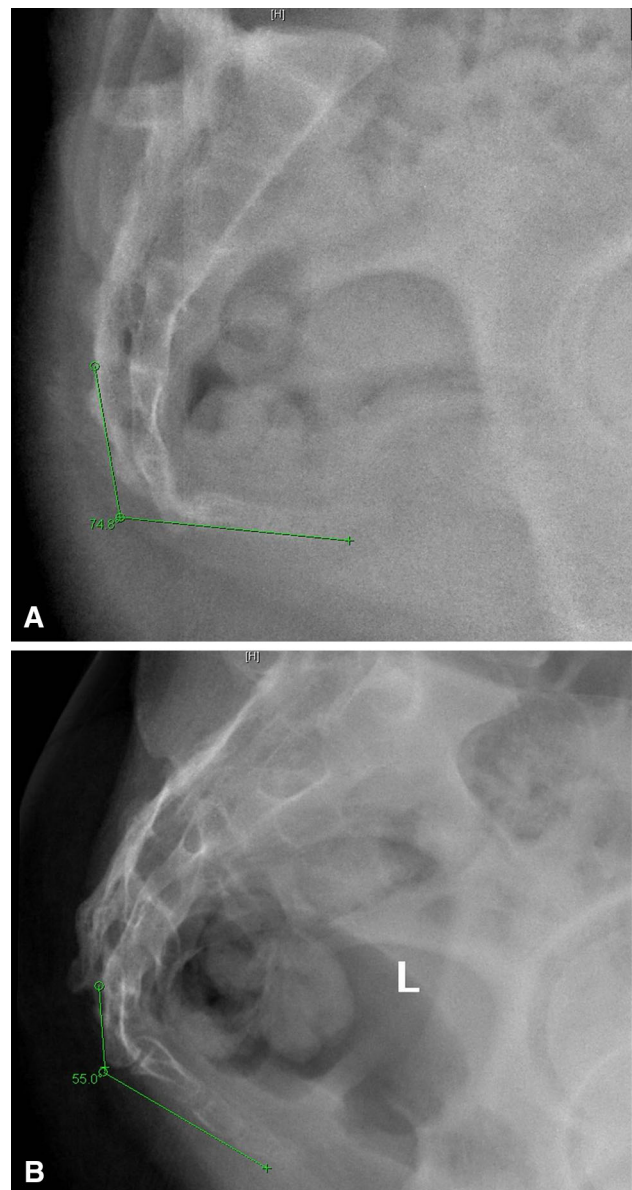
Coccygodynia is diagnosed clinically through history and physical examination. Radiological imaging plays a crucial role in the assessment of patients with coccygeal pain. Dynamic X-ray comparison between standing and sitting positions at lateral views of the coccyx will reveal an abnormality in 70% of the patients. Normally, the coccyx rotates between  $5^{\circ}$  and  $25^{\circ}$  as the patient sits and stands. However, in coccygodynia rotation is  $<5^{\circ}$  (immobility),  $>25^{\circ}$  (hypermobility), or displaced. Surgical treatment yields good to excellent results in those patients (Fig. 1) [2, 3, 8, 9]. Other advanced modalities like magnetic resonance imaging (MRI) should be used to exclude less common aetiologies like tumours or abscesses. Computed tomography (CT) is better for defining bony anatomy, and is therefore recommended in cases of acute pelvic trauma [2].

### Treatment

Initially, coccygodynia is treated conservatively. This includes rest, non-steroidal anti-inflammatory drugs, cushions, local injection, physiotherapy, and coccyx manipulation [4, 10]. Surgery is recommended in patients who fail to respond to conservative treatments [4, 11, 12]. Literature shows that coccygectomy performed by Key's technique exhibits better outcome [2, 4, 13]. On the other hand, only Bayne et al. [2] used Gardner technique and advised against it. Moreover, complete coccygectomy is preferred over partial because the chance of redo operation is lower [2, 4, 9].

### Patients and methods

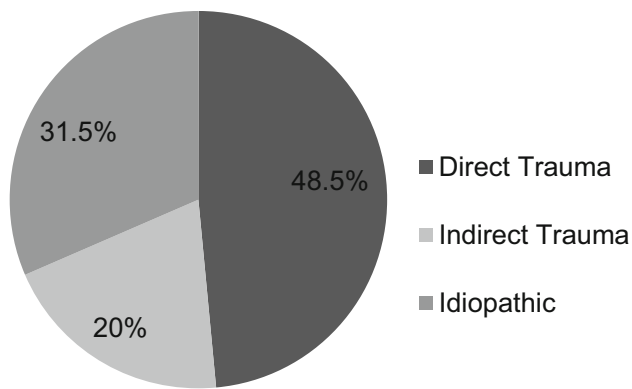
From 1989 to 2015, 70 coccygodynia cases were treated at King Khalid University Hospital in Riyadh, Kingdom of Saudi Arabia. There were 52 females and 18 males, with an average age of 42 (range 16–58) years. Direct



**Fig. 1** A lateral X-ray of the coccyx in a non-weight-bearing position with the coccyx lying at  $55^{\circ}$  angled forwards in relation to the distal sacrum (a), a lateral X-ray of coccyx in sitting position shows that the coccyx's inclination in relation to the distal sacrum has increased considerably from  $55^{\circ}$  to  $74.8^{\circ}$  (b). Both findings confirm anterior subluxation

trauma was the causative factor in all the male subjects and 16 of the female subjects. Indirect trauma such as childbirth was the causative factor in 14 female patients. The cause was idiopathic in the remaining 22 female patients (Fig. 2).

All patients were evaluated by thorough medical history, physical examination, anterior–posterior (AP), and lateral X-ray positions. In addition, CT with sagittal reconstruction, MRI, and dual-energy X-ray absorptiometry (DEXA) scans were performed to exclude other causes.



**Fig. 2** Distribution of reported cases of coccygodynia

Initially, all cases were treated with first-line conservative methods such as non-steroidal anti-inflammatory drugs (NSAIDs), avoidance of sitting on hard surfaces, usage of doughnut/U-shaped centrally hollow cushions, and physiotherapy for a minimum of 6 months.

Patients who did not respond to the initial treatment (17 females and 3 males) were offered second-line conservative therapy in the form of bimanual coccyx manipulation under anaesthesia or heavy sedation with a local injection of anaesthesia (bupivacaine 0.5%) and a steroid (40 mg methylprednisolone). This method allows surgeons to identify and localize coccygeal instability whether it was at the sacrococcygeal junction or intercoccygeal segment. Out of the 20 cases treated with bimanual coccygeal manipulation, 11 had coccygeal instability (6 at the intercoccygeal segment and 5 at the sacrococcygeal junction) that did not respond to treatment. As an alternative, they were given the choice of partial or total coccygectomy. Eight patients consented to the surgery while the remaining three declined.

The type of surgery was determined based on the bimanual examination’s findings. Three patients underwent total excision of the coccyx through the sacrococcygeal junction. The rest underwent a partial excision through the intercoccygeal segment (Fig. 3).

**Surgical protocol**

The pre-operative cleansing program protocol started 1 week before the surgery with a semi-solid diet and ended with a liquid-only diet for the last 2 days prior to the actual surgery. Following surgery, patients continue a semi-solid diet for 1 week.

The surgery was performed under general anaesthesia with the patient lying in the prone position. After sterilizing and draping the area of the coccyx, a small midline vertical incision was made directly over the coccyx. Subperiosteal dissection was carefully performed to avoid violating the rectum. Careful hemostasis was achieved with closing the void space that resulted from the removal of the coccyx.

Skin closure was done with interrupted sutures. Pressure dressing was then applied, and patients were instructed to keep it dry. Post-operatively, metronidazole, 500 mg every 8 h, and cefalexin, 500 mg every 6 h, were given orally for 1 week.

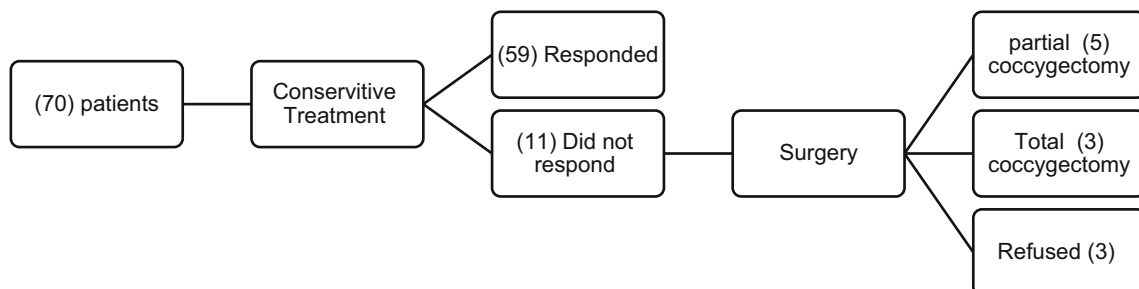
Post-operative follow-up period ranged from 2 to 16 years with a mean of 6 years.

**Results**

One of the three patients who had total excision of the coccyx through the sacrococcygeal junction was found to have a degenerated coccyx—identified microscopically—and showed loss of cartilage and osteophyte formation.

Three days post-operatively, one case developed a superficial wound infection and delayed wound healing; this was managed by repeated wound dressing and flucloxacillin 500 mg every 6 h orally for 10 days.

On follow-up, all cases underwent a coccygeal X-ray to ensure that there were no residual segments or parts of a segment left inside. All cases showed slow improvement reflected by reduction in analgesia use, ability to sit pain-free for two continuous hours and return to baseline daily activity. Furthermore, their symptoms improved significantly after 8 months, with the case of superficial wound



**Fig. 3** A flow chart illustrating the pathway distribution of all treated cases

infection and delayed wound healing being the last to improve.

## Discussion

Coccygodynia is defined as a pain of the coccyx [3]. Pain is exaggerated upon sitting on hard surfaces, defecation, and sexual intercourse [1].

Coccygodynia is diagnosed through clinical history and physical examination. Some authors suggest using plain and dynamic X-rays to diagnose coccygeal instability as these patients show excellent or good outcomes after coccygectomy [2, 3, 8, 9]. MRI and CT help to exclude other possible causes that might present as coccygodynia [2].

Initially, coccygodynia is treated conservatively with non-steroidal anti-inflammatory drugs (NSAIDs), rest, physiotherapy, and cushions. The idea behind the use of cushions is to avoid any pressure on the coccyx while sitting. We recommend the use of U-shaped hollow cushions, which were recently introduced, rather than the centrally hollow cushions (doughnut shape) as we noticed that the patients felt more comfortable with the U-shaped cushions as they do not restrict their movement while sitting. Centrally hollow cushions were not recommended due to concerns of misuse, as they require a specific posture. Some patients avoid using both types of cushions due to social embarrassment.

Other treatment modalities such as CT-guided ganglion impar blockade, fluoroscopic-guided steroid injection, and dextrose prolotherapy all of which have been shown to improve the patients' conditions [1, 14–16]. Coccygectomy is recommended in cases that fail to respond to the above-mentioned therapies [4, 11].

In this retrospective study, 20 patients did not respond to conservative management. They were offered bimanual coccyx manipulation under anaesthesia or heavy sedation with local injection of anaesthesia and steroid. Coccygeal instability was identified either at the intercoccygeal segment ( $n = 6$ ) or at the sacrococcygeal junction ( $n = 5$ ).

Five out of the six patients with instability at the intercoccygeal segment underwent partial coccygectomy. Three out of the five patients with instability at the sacrococcygeal junction underwent total coccygectomy (Fig. 4).

All cases showed significant improvement of their symptoms by a reduction in analgesia use and return to previous daily activity including the cases that underwent partial coccygectomy. This shows a distinct variation between our study and others which report that partial coccygectomy has a higher chance of a redo operation [2, 4].

A case of superficial wound infection and delayed wound healing was encountered and managed with the use



**Fig. 4** A photograph of an excised whole coccyx consisting of two segments. Both of which had instabilities

of repeated wound dressing and oral antibiotic. One paper compared the risk of wound infection after coccygectomy in two groups (one with periosteal resection and the other with periosteal preservation), it showed a lower rate of wound infection in the periosteal preservation group, but they recommended that their findings need to be confirmed by larger clinical studies [17].

The current literature is scarce regarding bimanual coccygeal manipulation and its efficacy in managing coccygodynia. A case report of coccygeal manipulation under anaesthesia showed complete resolution of coccygodynia [18]. Another study of 33 patients who underwent internal coccygeal manipulation with general anaesthesia reported resolution of pain in 28 of their subjects while the remaining 5 required surgery [19]. In our study, 9 out of 20 patients responded to bimanual coccygeal manipulation and did not require surgical intervention. These results show that coccygeal manipulation under anaesthesia can be effective in treating coccygodynia; however, more studies are needed.

In conclusion, our results show an excellent outcome following coccygectomy, which correspond with two systematic review papers of Heum Dai Kwon [2] and Karadimas [4].

The limitation of this study was the inability to compare the surgical cases with the 3 patients that declined surgical intervention, as they did not follow-up.



### Compliance with ethical standards

This research was approved by the institutional review board, college of Medicine, King Saud University.

**Conflict of interest** The authors Waleed Mohammad Awwad, Munir Saadeddin, Jbreel Nasser Alsager, and Fahad Mohammad AlRashed declare that they have no conflict of interest.

### References

- Howard PD, Dolan AN, Falco AN, Holland BM, Wilkinson CF, Zink AM (2013) A comparison of conservative interventions and their effectiveness for coccydynia: a systematic review. *J Man Manip Ther* 21(4):213–219
- Kwon HD, Schrot RJ, Kerr EE, Kim KD (2012) Coccygodynia and coccygectomy. *Korean J Spine* 9(4):326–333
- Patel Ravi, Appannagari A, Whang PG (2008) Coccydynia. *Curr Rev Musculoskelet Med* 1:223–226
- Karadimas EJ, Trypsiannis G, Giannoudis PV (2011) Surgical treatment of coccygodynia: an analytic review of the literature. *Eur Spine J* 20(5):698–705
- Nathan ST, Fisher BE, Roberts CS (2010) Coccydynia: a review of pathoanatomy, aetiology, treatment and outcome. *J Bone Joint Surg Br* 92(12):1622–1627. doi:10.1302/0301-620X.92B12.25486
- Postacchini F, Massobrio M (1983) Idiopathic coccygodynia. Analysis of fifty-one operative cases and a radiographic study of the normal coccyx. *J Bone Joint Surg Am* 65(8):1116–1124
- Maigne JY, Doursounian L, Chatellier G (2000) Causes and mechanisms of common coccydynia: role of body mass index and coccygeal trauma. *Spine (Phila Pa 1976)* 25(23):3072–3079
- Maigne JY, Lagache D, Doursounian L (2000) Instability of the coccyx in coccydynia. *J Bone Joint Surg Br* 82(7):1038–1041
- Ramieri A, Domenicucci M, Cellocco P, Miscusi M, Costanzo G (2013) Acute traumatic instability of the coccyx: results in 28 consecutive coccygectomies. *Eur Spine J* 22(Suppl 6):939–944. doi:10.1007/s00586-013-3010-3
- Zeev Feldbrin MD, Menachem Singer MD, Ori Keynam MD, Valentine Rzetelny MD, David Hendel MD (2005) Coccygectomy for intractable coccygodynia. *IMAJ* 7:160–162
- Cheng SW, Chen QY, Lin ZQ, Wang W, Zhang W, Kou DQ, Shen Y, Ying XZ, Cheng XJ, Lü CZ, Peng L (2011) Coccygectomy for stubborn coccydynia. *Chin J Traumatol* 14(1):25–28
- Trollegaard AM, Aarby NS, Hellberg S (2010) Coccygectomy: an effective treatment option for chronic coccydynia—retrospective results in 41 consecutive patients. *J Bone Joint Surg Br* 92(2):242–245
- Doursounian L, Maigne JY, Faure F, Chatellier G (2004) Coccygectomy for instability of the coccyx. *Int Orthop* 28(3):176–179
- Mitra R, Cheung L, Perry P (2007) Efficacy of fluoroscopically guided steroid injections in the management of coccydynia. *Pain Physician* 10:775–778
- Datir A, Connell D (2010) CT-guided injection for ganglion impar blockade: a radiological approach to the management of coccydynia. *Clin Radiol* 65:21–25
- Khan SA, Kumar A, Varshney MK, Trikha V, Yadav CS (2008) Dextrose prolotherapy for recalcitrant coccygodynia. *J Orthop Surg (Hong Kong)* 16:27–29
- Bilgic S, Kurklu M, Yurttaş Y, Ozkan H, Oguz E, Şehirlioglu A (2010) Coccygectomy with or without periosteal resection. *Int Orthop* 34(4):537–541. doi:10.1007/s00264-009-0805-2
- Emerson SS, Speece AJ III (2012) Manipulation of the coccyx with anesthesia for the management of coccydynia. *J Am Osteopath Assoc* 112(12):805–807
- Wray CC, Easom S, Hoskinson J (1991) Coccydynia: aetiology and treatment. *J Bone Joint Surg Br* 73(2):335–338