Coccygectomy with or without periosteal resection

Serkan Bilgic · Mustafa Kurklu · Yüksel Yurttaş ·
Huseyin Ozkan · Erbil Oguz · Ali Şehirlioglu

Received: 17 March 2009 / Revised: 27 April 2009 / Accepted: 28 April 2009 / Published online: 27 May 2009
© Springer-Verlag 2009

Abstract The purpose of this study was to compare the clinical outcomes and wound complications in coccygectomy with or without subperiosteal resection. This retrospective study included 25 patients who underwent coccygectomy. Resection of all mobile coccygeal segments including the periosteum was performed in 11 patients (group 1) and resection was performed subperiostally sparing the periosteum in the remaining 14 patients (group 2). A visual analogue scale was used for pain assessment before and after the surgery both in sitting and standing positions. A questionnaire to evaluate subjective patient satisfaction was also used. The two groups were statistically similar in terms of age, sex, aetiology, duration of symptoms before surgery and follow-up time. Both surgical techniques resulted in a statistically similar clinical outcome. Overall, 84% of patients who underwent coccygectomy benefited from surgery. We observed four wound infections (two superficial and two deep) that caused delayed wound healing in group 1. The rate of infection in group 1 was statistically higher than in group 2. The results of this study suggest that periosteal preservation and closure are related to low risk of infection.

Introduction

Coccygodynia is defined as pain in the region of the coccyx. Typically, discomfort is felt during sitting and aggravated by arising from a seated position [6, 23]. Although the cause of pain is unknown in the majority of cases, it is frequently associated with antecedent trauma

such as a fracture or after a difficult vaginal delivery [13, 20]. Initial management of coccygodynia includes rest, non-steroidal anti-inflammatory drugs, cushion use, massage, physical therapy and local corticosteroid injections, all of which have been shown to be useful treatment methods [10, 12, 19]. In patients who have persistent pain unresponsive to conservative treatment, coccygectomy can be implemented as a surgical treatment [21–23].

Several studies have reported good or excellent results after coccygectomy [1, 2, 5, 7–9, 11, 15–18, 21–23]. Nevertheless, wound infection is the most important complication of this procedure. In order to minimise the risk of infection, some authors [1, 15, 16] have suggested subperiosteal dissection and preservation of the periosteum during closure instead of total resection together with the periosteum. However, the effect of this closure on the outcomes has not been described in the relevant literature.

The purpose of this retrospective study was to compare the clinical outcomes and wound complications in coccygectomy with or without subperiosteal dissection.

Materials and methods

Patients

From January 2002 to August 2006, 78 consecutive patients were referred to our institution with coccygodynia. All patients were examined with lateral radiographs and/or computed tomography (CT) (Fig. 1). At initial admission all patients were managed conservatively with corticosteroid injections and ‘doughnut’ cushion to provide pressure relief. Patients who did not respond to conservative treatment after at least six months follow-up were offered coccygectomy. The coccygectomy was performed in 25 of

S. Bilgic · M. Kurklu · Y. Yurttaş (✉) · H. Ozkan · E. Oguz ·
A. Şehirlioglu
Department of Orthopaedics, GATA,
Ankara, Turkey
e-mail: yukselmd@yahoo.com

Fig. 1 **a** Lateral X-ray. **b** CT of the coccygeal fracture. Arrows show the unstable segment

78 patients (ten men and 15 women) who were included in this retrospective study. The mean age of the patients at the time of coccygectomy was 26.4 years (range: 20–39). All patients were otherwise healthy subjects having no additional co-morbidities. The average duration of symptoms prior to surgery was ten months (range: 8–13 months). On radiographic examination, a fracture at the coccyx was observed in 17 patients. Eight patients had no radiographically verified fracture but there was instability and pain on bimanual palpation. The mean follow-up after surgery was 20.4 months (range: 12–36).

Operative technique

A low residue diet was prescribed five days before surgery and a fleet enema was used the day before surgery for bowel preparation. Cefazoline sodium 1 g i.v. was administered at induction of anaesthesia and repeated every 8 hours for 48 hours after surgery for infection prophylaxis. The patients were placed prone on bolsters with the operative table flexed at the patient's waist. The surgical technique was similar to the technique described by Key [11]. The cheeks of the buttocks were separated and strapped laterally with adhesive tape for ease of surgical exposure. A median longitudinal incision from the distal end of the sacrum to the tip of the coccyx was used. The incision was carried down to the bone and the posterior surface of the coccyx was exposed by sharp dissection. In group 1 ($n=11$), the dissection then continued bluntly to expose the tip of the coccyx. The anococcygeal ligament was cut and the tip of the coccyx was elevated. The dissection was carried down through the coccygeus and iliococcygeus muscle attachments, which were all cut while protecting the rectum. All mobile coccygeal segments including the periosteum were resected. In group 2 ($n=14$), after exposure of the posterior surface of the coccyx, a subperiosteal plane was developed

on both sides and towards the tip by sharp dissection. Ligamentous and muscular attachments together with the periosteum were left intact. After meticulous haemostasis was ensured, the straps retracting the buttock cheeks were released, and the incision was closed in layers, including the periosteum (group 2 only), subcutaneous tissue and skin with absorbable suture material in both groups. Suction drains were used for two days postoperatively to drain the dead space left after the excision. All operations were performed by the same surgical team.

Postoperative follow-up

Radiographs were used to confirm complete excision (Fig. 2). Patients were mobilised as soon as they could tolerate, typically on the second postoperative day. Sutures were removed 12 days after surgery. No postoperative cushions were used. Wound samples were taken from any patients experiencing the clinical signs of infection, i.e. increased fluid drainage or purulence, or pus, redness at the

Fig. 2 Radiograph after the coccygectomy

Table 1 Questionnaire for subjective evaluation of the patients

Measure	Outcome
Significant pain relief and improvement in sitting and standing activities	Excellent
Less pain but requires intermittent analgesics	Good
Using the same analgesia as before surgery, only mild or no improvement	Poor

wound edge margins, secondary soft tissue cellulitis adjacent to the wound and increased pain at the site. Sampling was done with aspiration of wound fluids where enough volume existed and wound swabbing. Culture and sensitivities were used for the identification of the causative agent and appropriate antibiotics.

Outcome measures

Patients were assessed at least one year after the surgery. A visual analogue scale (VAS) was used for pain assessment preoperatively and at the final follow-up both in sitting and standing positions. A questionnaire to evaluate subjective patient satisfaction was also used at the final follow-up (Table 1). All complications were recorded.

Statistical analysis

The Mann-Whitney U test was used for comparison of continuous variables, and the chi-square test was used for comparison of categorical variables. A *p* value less than 0.05 was set as significant with 95% confidence interval.

Results

Two groups were statistically similar in terms of age, sex, aetiology, duration of symptoms before surgery and follow-up time. Both surgical techniques resulted in statistically similar clinical outcome regarding VAS and subjective patient rating.

Complications

We observed four wound infections (two superficial and two deep) that caused delayed wound healing in group 1. Cultures from the superficial infection were negative but *Escherichia coli* was isolated from deep infections. The superficial infections were treated with dressing changes for three weeks without antibiotic administration. The deep infections were treated with sensitive antibiotics for six weeks according to the antibiograms and dressing changes for four weeks. All wounds eventually healed completely. The rate of infection in group 1 was statistically higher than in group 2 (*p*=0.014). The summary of data is presented in Table 2.

Table 2 Summary of data

	Group 1	Group 2	Significance
Number of patients	11	14	
Age	25.4±5.2 SD	27.1±5.4 SD	0.727*
Sex	4 M/7 F	6 M/8 F	0.742*
Duration of symptoms before surgery (months)	10.2±1.8 SD	10.0±1.5 SD	0.893*
Aetiology			
Trauma	8	9	0.653**
Instability	3	5	
Follow-up time (months)	19.8±7.7 SD	20.8±6.5 SD	0.647*
VAS sitting before surgery	6.9±1.5 SD	6.8±1.6 SD	0.979*
VAA standing before surgery	5.4±1.0 SD	5.4±1.4 SD	0.936*
VAS standing after surgery	1.5±2.4 SD	0.3±1.0 SD	0.291*
VAS sitting after surgery	2.2±3.3 SD	0.6±1.9 SD	0.202*
Questionnaire: outcome			
Poor	3	1	0.221**
Good	2	1	
Excellent	6	12	
Infection	4	0	0.014**

*Mann-Whitney U test; **chi-square test

Discussion

In this study, we have determined the effect of periosteal resection during coccygectomy on clinical outcomes and wound complications. Overall, our results demonstrated that 84% of patients who underwent coccygectomy benefited from surgery. Similar success rates have been reported in the relevant literature [14, 15, 18, 21, 23]. One of the common complications of coccygectomy is wound infection. Doursounian et al. showed an infection rate of 14.75%, with the most common organism being *Staphylococcus aureus* [5]. Postacchini et al. showed that partial skin necrosis and superficial wound infection were causes of delayed wound healing in more than 50% of patients [17].

Different investigators reported different experiences with postoperative infection and, therefore, suggested various strategies for antibiotic prophylaxis before surgery [1–5, 8, 15, 21]. Bayne et al. reported an infection rate of 16.6%. They did not use any prophylactic antibiotics and recommended that from their experience they should be used [2]. Cebesoy et al. showed no infection with preoperative antibiotic prophylaxis which was continued for five days postoperatively [4]. Pennekamp et al. observed 19% postoperative complications (two superficial and one deep infection), which were all treated with surgical débridement and antibiotics. They recommended a perioperative prophylaxis with antibiotics, given either as a single shot or two to three days after surgery [15]. None of these authors discussed the surgical technique nor did they give details about periosteal resection. Increased cost, side or adverse effects of antibiotherapy and development of resistance of bacteria are among the factors why surgeons limit the use of prophylactic antibiotics. In our study we evaluated this issue from a different standpoint. Rather than antibiotic usage, we propose that performing periosteal resection allows us to achieve a level of no infection with an antibiotic prophylaxis of not more than two days, which had only been possible with five days of prophylaxis in previous studies. We suggest this method for future coccygectomy operations. The question of whether a shorter period of antibiotic prophylaxis along with periosteal resection would also be successful or not is a matter for debate.

In coccygectomy, the existing incision area is regarded as clean-contaminated tissue. Perineal contamination of the wound due to the difficulties of the patient visualising and caring for the wound and wound dehiscence due to the tension on the incision during sitting are proposed as the major reasons for wound complications [22]. Furthermore, resection of the coccyx forms a surgical dead space that usually cannot be closed thoroughly. However, coccygectomy with subperiosteal dissection and preservation of the periosteum provides a means to close the surgical dead space. Moreover, during subperiosteal dissection coccygeal

attachments with coccygeus and iliococcygeus muscles, and the anococcygeal ligament, are not released which may inhibit haematoma and/or seroma formation. In this study, we observed four wound infections in the group where the periosteum was resected. Therefore, we propose that periosteal resection may be another reason for wound infections. Although periosteal resection does not affect the final clinical outcome, it increases the risk of wound infection.

The small number of cases and the fact that it was a retrospective analysis can be listed as the limitations of this study.

In conclusion, the results of this study suggest that coccygectomy is a relatively safe and effective treatment method for coccygodynia when non-operative treatment methods fail. Secondly, periosteal preservation and closure are related to low risk of infection. Our findings need to be confirmed by larger clinical studies.

References

- Balain B, Eisenstein SM, Alo GO et al (2006) Coccygectomy for coccydynia: case series and review of literature. *Spine* 31(13): E414–E420
- Bayne O, Bateman JE, Cameron HU (1984) The influence of etiology on the results of coccygectomy. *Clin Orthop* 190:266–272
- Capar B, Akpınar N, Kutluay E, Müjde S, Turan A (2007) Coccygectomy in patients with coccydynia (in Turkish). *Acta Orthop Traumatol Turc* 41(4):277–280
- Cebesoy O, Guclu B, Kose KC, Basarir K, Guner D, Us AK (2007) Coccygectomy for coccygodynia: do we really have to wait? *Injury* 38:1183–1188
- Doursounian L, Maigne JY, Faure F et al (2004) Coccygectomy for instability of the coccyx. *Int Orthop* 28:176–179
- Fogel GR, Cunningham PY 3rd, Esses SI (2004) Coccygodynia: evaluation and management. *J Am Acad Orthop Surg* 12(1):49–54
- Grosso NP, van Dam BE (1995) Total coccygectomy for the relief of coccygodynia: a retrospective review. *J Spinal Disord* 8: 328–330
- Hellberg S, Strange-Vognsen HH (1990) Coccygodynia treated by resection of the coccyx. *Acta Orthop Scand* 61:463–465
- Hodges SD, Eck JC, Humphreys SC (2004) A treatment and outcomes analysis of patients with coccydynia. *Spine J* 4(2):138–140
- Kersey PJ (1980) Non-operative management of coccygodynia. *Lancet* 1:318
- Key JA (1937) Operative treatment of coccygodynia. *J Bone Joint Surg Am* 19:759–764
- Maigne JY, Chatellier G (2001) Comparison of three manual coccydynia treatments: a pilot study. *Spine* 26:E479–E484
- Maigne JY, Doursounian L, Chatellier G (2000) Causes and mechanisms of common coccydynia: role of body mass index and coccygeal trauma. *Spine* 25(23):3072–3079
- Maigne JY, Lagauche D, Doursounian L (2000) Instability of the coccyx in coccydynia. *J Bone Joint Surg Br* 82:1038–1041
- Pennekamp PH, Kraft CN, Stütz A et al (2005) Coccygectomy for coccygodynia: does pathogenesis matter? *J Trauma* 59(6):1414–1419

16. Perkins R, Schofferman J, Reynolds J (2003) Coccygectomy for severe refractory sacrococcygeal joint pain. *J Spinal Disord Tech* 16:100–103
17. 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* 65:1116–1124
18. Pyper JB (1957) Excision of the coccyx for coccydynia; a study of the results in twenty-eight cases. *J Bone Joint Surg Br* 39(4):733–737
19. Ramsey ML, Toohey JS, Neidre A et al (2003) Coccygodynia: treatment. *Orthopedics* 26:403–405
20. Richards HJ (1954) Causes of coccydynia. *J Bone Joint Surg Br* 36:142
21. Sehirlioglu A, Ozturk C, Oguz E et al (2007) Coccygectomy in the surgical treatment of traumatic coccygodynia. *Injury* 38(2):182–187
22. Wood KB, Mehbod AA (2004) Operative treatment for coccygodynia. *J Spinal Disord Tech* 17(6):511–515
23. Wray CC, Easom S, Hoskinson J (1991) Coccydynia. Aetiology and treatment. *J Bone Joint Surg Br* 73:335–338