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Coccygectomy for instability of the coccyx

Abstract Between 1993 and 2000, 61 patients with in-
stability-related coccygodynia were operated on by a
single surgeon using the same technique. There were 49
women and 12 men, mean age 45.3 (18–72) years.
Twenty-seven patients had hypermobility of the coccyx
and 33 subluxation. In all cases, the unstable portion was
removed through a limited incision directly over the
coccyx. The outcome was assessed using a detailed ques-
tionnaire. Follow-up was between 12 months and more
than 30 months. The outcome was rated excellent or good
in 53 patients, fair in one, and poor in seven. There were
nine patients with infection requiring reoperation.

Résumé Entre 1993 et 2000, 61 malades avec une coc-
cygodynie lié à une instabilité ont été opérés par un seul
chirurgien, en utilisant la même technique. Il y avait 49
femmes et 12 hommes, d'âge moyen âge 45.3 ans (18–
72). Vingt-sept malades avaient une hypermobilité du
coccyx et 33 une subluxation. Dans tous les cas, la portion
instable a été enlevée par une incision limitée, directe-
ment sur le coccyx. Le résultat a été apprécié en utilisant
un questionnaire détaillé. Le suivi était entre 12 mois et
plus de 30 mois. Le résultat a été estimé excellent ou bon
pour 53 malades, moyen pour un, et mauvais pour sept. Il
y avait neuf malades avec une infection qui a nécessité
une réintervention.

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Introduction

The advent of a dynamic radiography technique for the
demonstration of coccygeal instability has provided sur-
geons with a better understanding of coccygodynia and
its treatment. Maigne et al. [6, 7] showed that a com-
parison of sitting and standing radiographs can provide
evidence, on the sitting views, of either coccygeal sub-
luxation or of flexion exceeding 25°, while flexion in
healthy controls did not exceed 20°. These two abnormal
conditions of the coccyx revealed by dynamic radio-
graphs are evidence of coccygeal instability. In the past,
patients with disabling coccygodynia that did not respond
to conservative management would be offered surgery.
Since 1980, several studies involving surgery have been
published [1, 4, 10, 12] (Table 1). While these studies did
not involve the concept of instability, they came out in
favor of coccygeal resection in cases where the pain was
clearly coccygeal in origin. However, since the condition
is rare, and surgery for its treatment is controversial,
patients tend to be skeptical vis-à-vis the idea of
coccygectomy. This attitude is reinforced by the scarcity
of information on the practical aspects as well as on the
outcomes of such surgery. The present study was
performed on 61 patients suffering from instability-
related coccygodynia who were operated on by a single
surgeon using the same technique. It is our hope that the
description of the technique and the report of the
outcomes will improve the state of knowledge concern-
ing coccygectomy.

Material and methods

Between 1993 and 2000, 560 patients presenting with coccygody-
nia were examined by one of the authors (JYM). Coccygodynia was
defined as pain strictly localized to the coccyx without involvement
of neighboring structures and with aggravation in the sitting
position. In all patients, dynamic radiographs of the coccyx were
obtained; coccygeal instability was seen in 52.8% of the cases. The
pattern observed was hypermobility in 29.1% of the cases (Fig. 1)
and subluxation in 23.7% of the cases (Fig. 2). All patients were
managed conservatively with intradiscal injections and/or manip-

Table 1 Results of coccygectomy in four studies published after 1980

Study	Year of publication	Number of cases	Excellent and good results n (%)
Postacchini and Massobrio [10]	1983	36	32 (89)
Bayne et al [1]	1984	48	29 (60)
Hellberg and Strange-Vognsen [4]	1990	55	46 (83)
Wray et al. [12]	1991	23	21 (91)

Fig 1A–B Lateral radiograph in the standing position (**A**) and in the sitting position (**B**) demonstrating the pattern of hypermobility
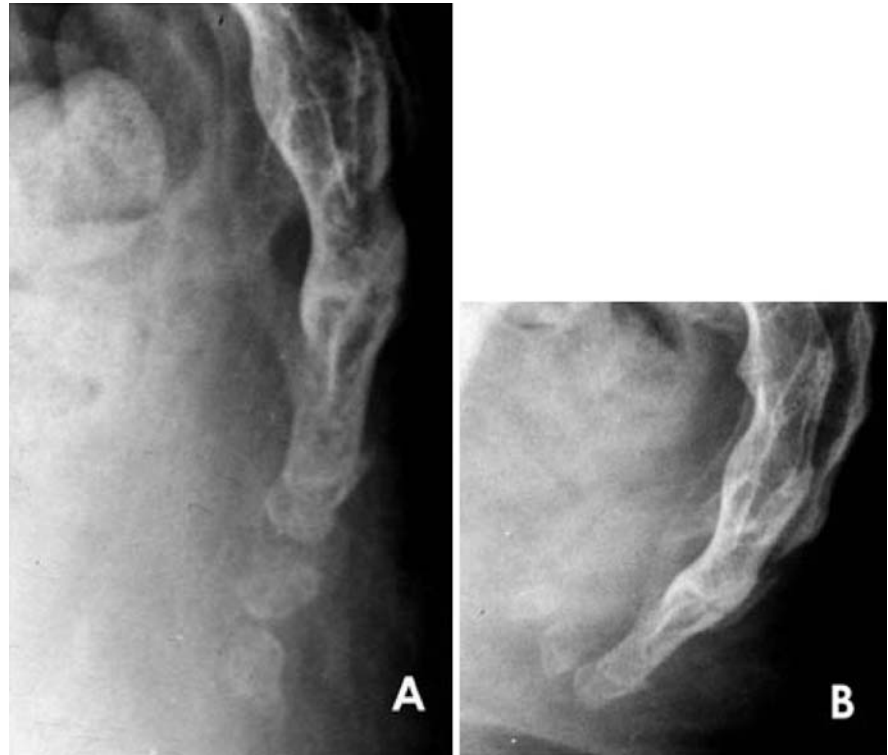
ulation. Patients who did not gain relief were offered surgery. Seventy-one consecutive patients were operated on for instability-related coccygodynia that had failed to respond to conservative management. Ten patients were excluded from the study. Of these, nine were involved in litigation, while one was lost to follow-up. This left 61 patients available for analysis. The mean duration of pain prior to surgery was 30 (2–28) months. All patients were operated on by the same surgeon (LD). There were 49 women and 12 men; the mean age at surgery was 45.3 (18–72) years. Twenty-seven patients had hypermobility of the coccyx, 33 had coccygeal subluxation, while one had a mixed pattern. Two patients had a history of lumbar fusion; four patients had previously suffered from depression.

Operative technique

All the patients were managed with the same surgical technique. The coccyx was approached through a small incision directly to its posterior aspect with dissection through the disc between the sound and the mobile segment and anterior release as described by Key [5]. In the first 30 cases, the wound was closed in layers; in the subsequent 31 cases, only the skin was closed. The wound was always closed over a suction drain. Forty-eight patients received second-generation cephalosporin for a period of 48 h while 12 patients received a single dose intraoperatively.

Follow-up

The patients were followed by the operating surgeon for the first year; thereafter, they were contacted by an independent observer. Twenty-two patients were followed up for more than 30 months: 31 for between 24 and 30 months, four for between 18 and 24 month,; and four for between 12 and 18 months. The outcome analysis involved only functional criteria.

All the patients were given a questionnaire asking them to quantitate four factors: (1) pain relief as compared with the severity of the pain before surgery (four levels); (2) improvement in quality of life (four levels); (3) intensity of pain in the sitting position over the preceding ten days using a visual analog scale (VAS) with 0 for no pain and 100 for very severe pain; and (4) pain during activities of daily living (ADLs) using a ten-point score.

Four outcome categories were established. For an excellent outcome, the following criteria had to be met: better than 75% pain relief, greater than 75% improvement in quality of life, less than 20% VAS-rated pain in the sitting position over the preceding 10 days, and a score of ADL-associated pain of between 0 and 2. The criteria for a good outcome were better than 50% pain relief, greater than 50% improvement in quality of life, between 20% and 30% VAS-rated pain in the sitting position over the preceding 10 days, and a score of ADL-associated pain of between 1 and 3. The outcome was rated fair if pain relief was between 25% and 50% regardless of the other results reported by the patient. A poor outcome was defined as one involving less than 25% pain relief regardless of the other results reported by the patient.

Fig 2A–B Lateral radiograph
in the standing position (**A**) and
in the sitting position (**B**)
demonstrating the pattern of
subluxation

Results

Thirty-seven patients had an excellent outcome, 16 had a good outcome, one had a fair outcome, while in seven cases the outcome was poor. Thus, in 53/61 cases, the outcome was excellent or good. All the patients were satisfied with their scar.

In all the patients who were relieved by surgery, the definitive result was obtained gradually. The usual pattern was one of steady improvement over time. The only exception was seen in six patients who had temporary worsening of their pain around the third postoperative week without any evidence of infection. The definitive result in the patients who were improved was obtained between the first and the twelfth month after surgery. The mean time to stabilization was 6 months. The two patients with a history of lumbar fusion had an excellent outcome.

The only complication was infection. Nine patients had an infection during the postoperative period. Most of the infections manifested themselves by a discharge from the proximal part of the scar. All patients were reoperated and received long-term antibiotics guided by cultures and sensitivity results. The most frequently found pathogen was *Staphylococcus aureus* (five cases). The eventual outcome in the patients who had suffered infection was excellent in seven cases and poor in two.

Discussion

The Key [5] technique used in this study differs from the one described by Gardner [2], which involves dissecting the coccyx off the rectum from distal to proximal, starting at the tip of the coccyx. This latter technique appears to be more cumbersome and is hazardous since the surgeon is working blindly.

More often than not, the instability is produced by a very mobile, or completely slack, distal coccygeal segment. Proximal to the unstable zone (usually between the first and the second coccygeal vertebra), the proximal part of the coccyx will be found to be fused or firmly attached to the sacrum. Where proximal to the unstable first intercoccygeal disc space finger palpation shows sacro-coccygeal mobility, it is the authors' policy routinely to resect the first coccygeal vertebra to be on the safe side.

The postoperative infection rates quoted in the literature [1, 4, 8, 10] range from 6% [4] to 16% [1]. In the present study, the infection rate was 14%, which is higher than the rate of 8% observed in the first study of 37 patients [8]. The sudden rise in the number of infections prompted an inquiry in which the following factors were considered: (1) a premature return of patients to previous activities, (2) a change in the patient recruitment pattern, (3) poor dressing technique, and (4) a change in the prophylactic antibiotic regimen.

While coccygectomy does not enter the alimentary tract, the incision is close to the anus, and the procedure may therefore be considered to be a class II/clean-contaminated operation in which the tissues are entered under controlled conditions and without unusual contamination [3, 11]. Protocols for the prevention of surgical-site infection recommend antimicrobial prophylaxis that is administered in such a way as to maintain therapeutic levels of the antimicrobial agent in both serum and tissues

until, at most, a few hours after the incision is closed in the operating room [9]. In the literature, the question of antimicrobial prophylaxis in the context of coccygectomy has been dealt with only by Bayne et al. [1] who did not use prophylactic antibiotics in their study but recommended prophylactic antibiotic therapy in light of a 16.6% incidence of infection. The results reported by Bayne et al. differ from the ones in the present study in that these authors found gram-negative organisms and that only one of the ten infected patients had a satisfactory result [1].

The present study suggests that prophylactic antibiotics administered over a period of 48 h postoperatively would be the most appropriate regimen in this type of surgery, although there is no evidence that the single-dose regimen was the only factor responsible for the increased incidence of infection.

At reoperation, only the skin was closed so as not to leave any foreign material in the infected tissues. Clinical monitoring and the subsequent follow-up showed the postoperative course of the reoperated patients to be identical to that of the noninfected patients. It was, therefore, felt that absorbable sutures in the subcutaneous tissues were unnecessary and could even act as foci of infection. These sutures were consequently abandoned.

Following that series of postoperative infections, the coccygectomy wound closure protocol was modified along the following lines: skin closure only, prophylactic antibiotics for 48 h, removal of drain after 3 days, initial dressing applied by the operating surgeon who also supervised the dressing change on the first 3 days after surgery, inpatient stay of 1 week, and instructions to the patient to avoid all activities for the first week following discharge. Whilst it is impossible to tell which of these items of the protocol has or have had a crucial effect, the incidence of infection decreased dramatically since the introduction of the modified protocol 3 years ago. The infection rate since the end of the study has been one out of 19 cases.

The first study [8] concluded that coccygectomy gave good results in the treatment of coccygeal instability. The rate of 86% of excellent and good outcomes in the present study bears out this conclusion and is in line with the success rates published in the literature over the past 20 years [1, 4, 8, 10, 12]. It should be noted that, in the present study, only one patient was lost to follow-up, whereas Hellberg and Strange-Vognsen [4] had ten patients, Bayne et al., [1] had 12, and Postacchini and Massobrio [10] had ten who could not be followed up.

The time to pain relief after surgery varied greatly but tended to be prolonged. Patients are warned about this. In the few cases where the pain got worse after 3 weeks, a premature return to previous activities was, in all prob-

ability, the causative factor. These episodes did not affect the eventual outcome.

The detailed questionnaire showed only one fair outcome. The patients were either satisfied or dissatisfied with their operation. In the group of satisfactory outcomes, two thirds had more than 75% pain relief and one third more than 50% improvement in their quality of life.

The present study confirmed the utility of coccygectomy in the management of coccygeal-instability-related coccygodynia that is refractory to conservative management in patients who are not involved in litigation. The use of a direct and limited approach and strict observance of the rules of surgical-site infection prevention make this a straightforward procedure with predictable outcomes. The only complication encountered (infection) did not prevent a good outcome.

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