Instability of the coccyx in coccydynia

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Coccygectomy is a controversial operation. Some authors have reported good results, but others advise against the procedure. The criteria for selection are ill-defined. We describe a study to validate an objective criterion for patient selection, namely radiological instability of the coccyx as judged by intermittent subluxation or hypermobility seen on lateral dynamic radiographs when sitting.

We enrolled prospectively 37 patients with chronic pain because of coccygeal instability unrelieved by conservative treatment who were not involved in litigation. The operation was performed by the same surgeon. Patients were followed up for a minimum of two years after coccygectomy, with independent assessment at two years. There were 23 excellent, 11 good and three poor results. The mean time to definitive improvement was four to eight months. Coccygectomy gave good results in this group of patients.

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Surgical excision of the coccyx may be used to treat coccydynia, a chronic and disabling condition of the lowest part of the spine. Several authors¹⁻⁷ have reported excellent or good results in 60% to 90% of the cases treated by operation (Table I), but these studies are retrospective, and the criteria for selection of the patients are ill-defined. Howorth⁸ suggested that excision was advisable when there was a clear indication, such as a stiff coccyx in a badly deformed position or a diseased bone. Bayne et al¹ found better results in patients with a clear history of trauma. Others^{2,9} thought that surgery should be considered if

conservative measures had failed. There is agreement in the literature that operation should not be performed in the absence of well-defined local symptoms,^{5,6} in patients who do not have sufficient mental stability,¹ or in those suffering from depression or hypochondria.⁶ Several authors^{1,5} had poor results in patients with chronic lower back pain or after lumbar fusion. A number⁹⁻¹¹ have advised against coccygectomy for a variety of reasons, one being the suspected 'hysterical' origin of the disorder. Some of the aversion to coccygectomy may stem from poor and unpublished results.

Generally, however, the consensus is as stated by Kersey¹¹ that "there is no constant factor in the history, no reliable physical sign, and no specific radiological change that can be regarded as a definite pointer in advising operation". This statement prompted our study, since we felt that there are radiological changes which can help to select suitable candidates.

Radiological appearances of instability of the coccyx. Lateral stress radiographs of the coccyx can show an organic lesion which affects coccygeal mobility, in almost 50% of patients with coccydynia.^{12,13} The first radiograph is taken after the patient has been standing for ten minutes to ensure that the coccyx is in the neutral position. The patient is then asked to sit on a stool, with the back straight, thighs horizontal, and feet placed on a footrest. If there is no pain in this position, the patient is asked to change the position of the pelvis, by gradually leaning backwards until the familiar pain is felt. The second radiograph is then taken in this painful position.

There are two patterns: 1) posterior subluxation of the

Table I. Results of coccygectomy in published studies

Study	Year of publication	Number of cases	Excellent and good results	
			Number	%
Bayne et al ¹	1984	48	29	60
Grosso and Van Dam ²	1995	9	8	89
Hellberg and Strange-Vognsen ³	1990	55	46	83
Key ⁴	1937	15	12	80
Postacchini and Massobrio ⁵	1983	36	32	89
Pyper ⁶	1957	28	25	89
Wray et al ⁷	1991	23	21	91

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Fig. 1a

Fig. 1b

Radiographs showing a) the normal pattern of the coccyx in the standing subject and b) subluxation when the subject is sitting.

Fig. 2a

Fig. 2b

Radiographs showing a) the normal pattern of the coccyx in the standing subject and b) coccygeal flexion greater than 25° in the sitting position with loss of joint space in the hypermobile articulation and bone-to-bone contact, which may be causing pain.

coccyx when sitting, with reduction when standing (Fig. 1); and 2) flexion of the coccyx exceeding 25° when sitting, indicating hypermobility (Fig. 2). In a control group the mean value for flexion was $7.4 \pm 5.7^\circ$.¹² These two lesions provide evidence of coccygeal instability, which manifests itself when load is applied to the coccyx in the sitting position. They differ in the circumstances under which they occur. Subluxation is typically seen in a fairly straight, short, and vertical coccyx. It would appear that it is the increase in intrapelvic pressure rather than contact with the seat which pushes the subluxing portion backwards. Patients with this pattern tend to have a high body mass index (BMI) (mean value: 28.8 ± 4.5), and do not pivot the pelvis appreciably when sitting.¹⁴ Hypermobility is observed in a coccyx which is curved and often longer than the average. It may then align itself parallel to the seat when the subject is in the sitting position. In this pattern,

the movement of the coccyx into flexion is brought about by pressure from the seat. Patients with hypermobility have a mean BMI of 24.2 ± 4.2 , and tend to pivot the pelvis when sitting down.

We describe a prospective study of the results of this surgical treatment in a group of patients with chronic coccydynia.

Patients and Methods

Patients. Between 1993 and mid-1997, 272 patients were referred to us with coccydynia. We define coccydynia as pain which is confined to the coccyx, without significantly affecting other structures; it is exacerbated by sitting. All the patients were examined by stress radiography. The films showed 85 (31.2%) with intermittent subluxation, and 57 (21%) with hypermobility of the coccyx giving 142 patients

Fig. 3

Breakdown of patients in the study.

with coccygeal instability. They were managed conservatively by intradiscal injections and/or manipulation. The results of this treatment are shown in Figure 3. We offered surgery to 51 patients who did not obtain relief from conservative management. Nine of these declined, four in the first year of the study when information on the long-term outcome was not yet available, four because of concern over possible postoperative complications, and one girl who was a minor. Of the 42 who agreed to have surgery five had had an occupational accident or were involved in litigation. These were excluded from the study leaving 37 available for analysis.

There were 28 women and nine men with a mean age of 46.5 ± 11 years (30 to 64). Two had undergone lumbar fusion three and ten years, respectively, before being operated on at our centre. Intermittent subluxation was demonstrated in 24 (65%) and hypermobility in 13 (35%). The mean duration of pain was 31 ± 28 months.

Operative technique. The unstable part of the coccyx was excised under general anaesthesia. A mid-line skin incision was made in the natal cleft 6 cm long, finishing 4 cm from the anus. The incision was carried down to the posterior surface of the coccyx, using electrocautery. The unstable segment of the coccyx was identified by palpation and the posterior and lateral surfaces of the segment were exposed by electrocautery, keeping close to the bone. In order to expose the anterior surface safely, without damaging the rectum, the dissection was carried through the abnormal disc space, releasing the soft tissues a little at a time, allowing safe removal of the distal mobile segment. If the residual part of the coccyx was excessively prominent, it was trimmed using a rongeur. The incision was closed in three layers, over a suction drain. The dressing was applied in order to separate the surgical scar from the anal margin. The drain was removed on the second day after operation.

Follow-up. We reviewed the patients at one and two years after surgery. Those who had been operated on more than 30 months previously were contacted by telephone for a third review. The assessments were carried out by an independent observer (DL). After one year, following clinical examination, the patient completed a 100 mm visual

analogue scale for assessment of pain on sitting and standing, and a questionnaire, which was designed to establish the time after which the pain occurred when the patient was sitting and whether it increased or remained at the same level of intensity. After two years the questionnaire was sent to the patients, who were then contacted over the telephone; a clinical examination was performed only if requested by them. The results obtained were graded as excellent (relief of pain greater than 90%), good (75% to 89%), fair (50% to 74%), and poor (<50% improvement).

Results

Pain relief. We reviewed 27 of the patients at between 24 and 30 months; the other ten were followed up for over 30 months. Improvement was slow, with definitive results achieved by four to eight months after operation. The results of the clinical reviews at one year, at two years, and beyond, were almost identical, suggesting that those achieved at one year will not change subsequently. At two years, the results were excellent in 23 patients (62%), good in 11 (30%), and poor in three (8%). Seven patients who had been rated excellent still reported slight discomfort on sitting for longer than two hours, but this was different from the pain which they had experienced before surgery. Of the 11 patients who had good results, six still had the type of pain which was present before operation, but of much reduced intensity. The other five had discomfort on sitting for an hour and a half, but this sensation was different from the pain before surgery.

Early complications. Three patients had postoperative infection, with a septic discharge tracking through the healing scar, towards the end of the first week after operation. These were managed by further surgery and with appropriate antibiotics. The infected cavity was curetted and washed out after which the wound was closed in a single layer over a suction drain, which was not removed until drainage had ceased.

Risk factors for failure of surgery. There were no clinical or radiological features on the strength of which the three failures encountered in our study could have been pre-

Table II. Clinical features suggestive of coccygeal instability (luxation or hypermobility)

Sharp pain while passing from the sitting to the standing position
History of local trauma sustained less than one month previously
Occurrence after childbirth
Body mass index > 27 (subluxation only)
Maximum tenderness over the sacrococcygeal or intercoccygeal joints, rather than over the coccygeal apex

dicted. Two of the three patients had mild hypermobility (30 to 33°), and the third had subluxation. The two patients with previous lumbar fusion did very well, as did the three in whom infection developed after surgery.

Discussion

Our study was performed in order to validate an objective means of selecting patients for coccygectomy. By confining surgery to patients with painful instability of the coccyx who had not responded to conservative management, excellent or good results were achieved in 92%.

Instability of the coccyx can only be confirmed on stress radiographs, but a number of clinical features have been established which are highly suggestive of instability¹³ (Table II). Hypermobility of between 25° and 30° may be a variant of the normal, especially in women with very lax ligaments. In such cases, the finding on the radiograph taken in the sitting position of loss of joint space of the hypermobile articulation, with bone-to-bone contact on the anterior aspect of the two coccygeal vertebrae concerned (Fig. 2), is of note.

Coccygectomy may be confined to the excision of the mobile distal segment, as suggested by Postacchini and Massobrio.⁵ The surgical technique must be meticulous. Even with careful surgery and prophylactic antibiotics, infection may occur, but this did not affect the long-term outcome in our patients. They should be warned that, after surgery, they will have pain while sitting, for between two and four weeks, and that complete relief will not be obtained for several months.⁴ We agree with the opinions of earlier authors¹⁻⁹ that patients with pain radiating beyond the coccyx, those with associated low back pain and those

suffering from depression or psychological problems will have a poor outcome after conservative treatment of whatever type. We do not consider such patients to be suitable for coccygectomy.

Subluxation or hypermobility of the coccyx can be shown on stress radiographs of some patients with coccydynia, providing objective evidence of an organic lesion. By confining surgery to this subset, we were able to obtain either complete relief from pain or very marked improvement in 92% of patients. Improved selection of patients will give better results from operation in patients with coccydynia.

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