



## ■ SPINE

# Corticosteroid injection for coccydynia

A REVIEW OF 241 PATIENTS

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## Aims

We aimed to establish the short- and long-term efficacy of corticosteroid injection for coccydynia, and to determine if betamethasone or triamcinolone has the best effect.

## Methods

During 2009 to 2016, we treated 277 patients with chronic coccydynia with either one 6 mg betamethasone or one 20 mg triamcinolone cortisone injection. A subsequent injection was given to 62 (26%) of the patients. All were reviewed three to four months after injection, and 241 replied to a questionnaire a mean of 36 months (12 to 88) after the last injection. No pain at the early review was considered early success. When the patient had not been subsequently operated on, and indicated on the questionnaire that they were either well or much better, it was considered a long-term success.

## Results

At the three- to four-month review, 22 (9%) reported that they had no pain. The long-term success of one injection was 15% and rose to 29% after a second injection. Logistic regression tests showed that both early success (odds ratio (OR) 5.5, 95% confidence interval (CI) 2.1 to 14.4;  $p = 0.001$ ) and late success (OR 3.7, 95% CI 1.7 to 8.3;  $p = 0.001$ ) was greater with triamcinolone than with betamethasone. Late success was greater for patients with symptoms for less than 12 months (OR 3.0, 95% CI 1.4 to 6.7;  $p = 0.006$ ). We saw no complications of the injections.

## Conclusion

We conclude that the effect of corticosteroid injection for coccygodynia is moderate, possibly because we used modest doses of the drugs. Even so, they seem worthwhile as they are easily and quickly performed, and complications are rare. If the choice is between injections of betamethasone or triamcinolone, the latter should be selected.

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## Introduction

The tailbone was named coccyx (the Greek word for cuckoo) by the physician Herophilus, who was active in Alexandria around 300 BC, presumably because he felt it looked like the head and beak of a cuckoo when seen from the side.<sup>1</sup> In 1859, Simpson<sup>2</sup> first applied the term coccygodynia, or contracted to coccydynia, to non-radiating pain at the distal end of the spine, characteristically induced by sitting. The aetiology is unclear and probably multifactorial, but a high proportion is attributed to trauma and childbirth.<sup>3-5</sup>

Despite numerous studies on aetiology and treatment, a sceptical sentiment seems common among physicians. Hourigan et al<sup>6</sup> surveyed 200 GPs in Devon, UK, and found that 39% believed the condition to be associated with an underlying psychological disorder, 52% believed there was no proven treatment for the condition, and only 22% would consider referring the patient to a secondary care service.

Although the causes of coccydynia are often unclear, patients frequently relate it to a trauma, and it has been reported that successful treatment is more likely if this is the aetiology.<sup>3,5,7</sup> Mitra et al<sup>8</sup> reported that

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**Table I.** Number of results at late review among the 114 patients who had only had injection treatment.

Pain on	Before injection	Completely well	Much better	Someone better	Unchanged	Worse	Success, %*
Sitting	110	17	40	17	30	6	52
Rising	80	23	23	9	22	3	58
Defecation	33	11	8	2	11	1	58
Walking/jogging	51	16	12	4	17	2	55
Public transport	101	10	33	21	25	12	43
Sex (female)§	32/87	11	7	3	11	0	56%
	<b>Before injection</b>	<b>Never</b>	<b>Much less</b>	<b>Somewhat less</b>	<b>Unchanged</b>	<b>More often</b>	<b>Success, %†</b>
Use of a sitting ring/cushion	72	40	8	4	14	6	67
	<b>Respondents</b>	<b>Unlimited</b>	<b>Much longer</b>	<b>Somewhat longer</b>	<b>Unchanged</b>	<b>Shorter</b>	<b>Success, %‡</b>
Duration of pain-free sitting	113	3	49	15	29	7	55

\*Proportion of patients who reported to be completely well or much better.

†Proportion of patients who reported that they never or much less often used a sitting ring.

‡Proportion of patients who reported that pain-free sitting time was unlimited or much longer.

§Pain among females on sexual intercourse.

success is more likely if symptoms have been present for less than six months.

A multitude of treatments have been suggested. Some recent review papers<sup>9,10</sup> agree that if conservative measures fail, patients may benefit from a local corticosteroid injection. The purpose of this study was to evaluate the efficacy of corticosteroid injection as a treatment for coccydynia in the short- and long-term and to compare the effects of triamcinolone and betamethasone.

## Methods

In all, 277 patients with chronic coccydynia were treated with corticosteroid injection for coccydynia in our department during 2009 to 2016. The diagnosis of coccydynia was made by a senior spinal surgical consultant (RGK) based on a thorough medical history, clinical examination, and imaging with either radiographs, magnetic resonance imaging (MRI), or both of the coccyx.

Betamethasone 1 ml (Celeston Chronodose 6 mg; Schering-Plough, Kenilworth, New Jersey, USA) was used during the first part of the study period and mainly triamcinolone 1 ml (Lederspan 20 mg; Meda, Solna, Sweden) during the latter. The corticosteroid used was thus not random. Both were mixed with 1 ml 1% lignocaine before injection. We used the method described by Kersey<sup>11</sup> of direct injection in the most painful level of the coccyx, usually the sacrococcygeal or Co1 to Co2 level, under digital intrarectal control without fluoroscopic imaging (Figure 1).

Patients were first reviewed three to four months after injection, and we recorded the effect of the injections. Those who had improved partially or temporarily were offered a second injection. This was given to 69 (25%) patients, and a third injection to ten (4%).

Patients who still complained of severe symptoms at the end of the course of injections were offered operative coccygectomy. The follow-up with regard to surgery was extended to the present with the aid of the hospital records. For geographical reasons, as our hospital is the only one in a large area that performs this type of surgery, it is highly unlikely that they would have been operated elsewhere. All those who eventually were operated were automatically considered failures of injection therapy.

All patients were followed up with mailed questionnaires a minimum of 12 months after the last injection. Those who had not responded to the questionnaires after six weeks were contacted by telephone as a reminder and received new questionnaires if they wished.

At this late review, general coccydynia symptoms and symptoms in various aspects of daily life (Table I) were scored as completely well, much better, somewhat better, unchanged, or worse. We regarded the patients who reported that they were completely well, or much better, at late follow-up as successfully treated. If the patients were either somewhat better, unchanged, or worse, they were regarded as treatment failures.

Overall, 250 patients (90%) responded to the follow-up questionnaire. In nine cases, the type of corticosteroid used had not been recorded and these patients were excluded from further consideration. There were 196 (81%) women among the remaining 241 patients. Their mean age at the first outpatient visit was 40 years (11 to 75). At the time of referral, they reported to have had symptoms of coccydynia for a mean of 37 months (2 to 348). A total of 144 (59%) ascribed their condition to a trauma, 42 (17%) to childbirth, ten (4%) to pronounced weight loss, while 50 (21%) knew of no cause. A few gave more than one reason.

**Table II.** General results of one injection with either betamethasone or triamcinolone.

Variable	Betamethasone	Triamcinolone	p-value*
Number of patients	173	68	
Pain free three to four months after injection, n (%)	8 (5)	14 (21)	0.000
Subsequent injection, n (%)	51 (29)	11 (16)	0.033
Number operated, n (%)	103 (61)	29 (44)	0.018
Success of one injection, n (%)	17 (10)	18 (26)	0.001

Success was defined as those who had not been operated and replied at late review that they were well or much better.

\*Chi squared test.

The time between last injection and the questionnaire at late follow-up was 39 months (12 to 88) for the 173 patients who had had a betamethasone injection as their first injection, and 28 months (14 to 53) among the 68 where triamcinolone had been given as the first injection. With regard to surgery, this was extended by use of the hospital records to 82 months (42 to 139) for the former group of patients, and to 72 months (44 to 103) for the latter.

**Statistical analysis.** The statistical evaluation of the data was with the chi squared test and stepwise logistic regression. The study protocol was considered by the regional committee for medical and health research ethics (2016/460), who found that it did not need their approval.

## Results

At the time of the early review at three to four months after the first injection, 22 (9%) of the patients reported that they were pain-free, and 56 (23%) that they were improved. The patients with one triamcinolone injection significantly more often reported that they were well at this early review, compared to patients injected with betamethasone (Table II). They were also significantly less likely to need a subsequent injection or surgery.

A total of 136 patients went on to surgery. At late review, 35 of the non-operated patients who had only had one injection reported that they were well or much better, indicating a long-term success rate of one injection of 15%.

In all, 62 patients had a subsequent injection. There were 51 among those who had originally had a betamethasone injection, and 11 who had had a triamcinolone injection, as their first injection ( $p = 0.033$ , chi squared test; Table II). This second injection increased the overall late success rate (not subsequently operated and well or much better at late review) to 29%.

Among the 114 patients who had only received injection treatment the mean pain scale rating for pain (0 to 10) during the last week before late review was 3.6 (standard deviation (SD) 2.7). The rate of late success among these patients was 53% and fairly evenly distributed among the various domains of daily activities investigated (Table I).

When patients were divided according to duration of symptoms for less or more than 12 months, it was



**Fig. 1**

Method of corticosteroid injection.

found that the outcome after one injection was significantly better among those who had had symptoms for the shorter period (Table III). The need for surgery was also lower in this group of patients. Both observations were mainly due to a particularly favourable outcome among those who had received a triamcinolone injection.

There was a trend towards less surgery among patients who felt that the reason for their coccydynia was either a trauma or childbirth than among those who cited pronounced weight loss or did not know of any reason ( $p = 0.094$ , chi squared test). This applied to both the group as a whole and to those who had received a triamcinolone injection.

Logistic regression with early success (pain free at the three- to four-month review) after one injection as the dependent variable and sex, age, traumatic aetiology, type of corticosteroid injection, and duration of symptoms for more or less than 12 months as independent variables, showed that only the type of corticosteroid used was significant. The odds ratio (OR) for triamcinolone to be better than betamethasone at this point was 5.5 (95% confidence interval (CI) 2.1 to 14.4;  $p = 0.001$ , logistic regression).

The same test with late success (not operated and well or much better at late review) as the dependent variable showed that sex and age were without significance and that trauma was borderline. However, the OR for a better outcome with triamcinolone and with symptoms for less than one year were both more than three (Table IV).

**Table III.** Results when duration of symptoms had been less or more than one year on success of treatment (not operated and well or much better at late review) of the first injection and on the need for surgery.

Variable	Number	Success, n (%)	Surgery, n (%)
<b>Betamethasone</b>			
Less than one year	63	10 (16)	33 (52)
More than one year	110	8 (7), $p = 0.074^*$	72 (65), $p = 0.090^*$
<b>Triamcinolone</b>			
Less than one year	18	9 (50)	3 (15)
More than one year	50	9 (18), $p = 0.008^*$	27 (54), $p = 0.006^*$
<b>All patients</b>			
Less than one year	81	19 (23)	36 (44)
More than one year	160	17 (11), $p = 0.008^*$	99 (62), $p = 0.010^*$

\*Chi squared test.



**Fig. 2**

Skin atrophy after corticosteroid injection of a patient not included in the present series.

No patient reported spontaneously that they had noticed any lasting discomfort or blanching of the skin in the injected area.

## Discussion

Traditionally, injection therapy has been aimed at the most painful points on the patients' coccyx, often the sacro-coccygeal or Co1 to Co2 levels. However, an increasing number of papers report on injection with corticosteroid and local anaesthetic into the ganglion impar, also known as the ganglion of Walther, which is located in the midline anterior to the sacrococcygeal junction.<sup>12,13</sup> Others have reported on prolotherapy where a larger volume of liquid is injected around the dorsal aspect of the coccyx with the aim of causing fibrosis of the soft tissues.<sup>14</sup> We do not have any experience of either of these treatment methods.

Although traditional corticosteroid injection seems to have become an established therapeutic option among those who treat coccydynia,<sup>9,15,16</sup> we have been able to

**Table IV.** Results of stepwise logistic regression analysis of late success (not operated and well, or much better at late review) after one corticosteroid injection.

Variable	p-value*	Odds ratio	95% CI
Traumatic aetiology	0.076	0.48	0.22 to 1.08
Triamcinolone	0.001	3.74	1.70 to 8.25
Symptoms < 12 months	0.006	3.03	1.37 to 6.71

\*Logistic regression test.  
CI, confidence interval.

identify only a few papers that describe first-hand experiences with its use. This contrasts with the considerable number of papers reporting on the more controversial coccygectomy. Wray et al,<sup>17</sup> in their seminal prospective study of 120 patients, found that 17 of the 29 patients (60%) who had only had an injection were improved after injection with 40 mg methylprednisolone and local anaesthetic. The follow-up period was on average two years and nine months. Perkins et al<sup>18</sup> reported that 62 of 77 patients had been successfully treated with injection with long acting corticosteroid and local anaesthetic. The remainder were operated on. Mitra et al<sup>8</sup> reported on 14 patients injected with 80 mg triamcinolone and a local anaesthetic and found that seven were improved at follow-up after three weeks. Yaganeh et al<sup>19</sup> treated 30 patients with an injection of 40 mg methylprednisolone and local anaesthetic. The mean pain scores were 5.9 before injection and 2.1 after two months. Kodumuri et al<sup>5</sup> injected 201 coccydynia patients with 40 mg triamcinolone and local anaesthetic, and found that 80% were cured at the six-week review.

Our own overall results are not nearly as good as in these studies. Some of them are small, however, and it is also unclear what these authors consider "improvement", "cured" or a "satisfactory result". We have defined our successful outcome of injection therapy stringently and found that 15% of patients have a successful long-term outcome after one injection and around twice that number after two injections. Furthermore, in most of the cited studies the observation period was extremely short. It seems possible that their results would not have been as good in the longer term. Finally, it is perhaps noteworthy that we have used a relatively small dose of corticosteroid; it is possible that our results would have been better with a higher dosage.

We have performed the injections in the manner described by Kersey<sup>11</sup> with the patient lying in the right lateral or prone position and the physician's left index finger palpating the front of the coccyx from the rectum (Figure 1). We have had no difficulties injecting the sacro-coccygeal joint or any other particularly painful area as determined by the clinical examination. We have not found any need for fluoroscopic control or radiograph guidance in order to avoid perforating the rectum.<sup>5,8,14</sup>

Mitra et al<sup>8</sup> reported that those who had had symptoms for less than six months responded better to treatment than those with a longer duration of symptoms. We had very few patients with a duration of symptoms as short as this and chose 12 months as the cut-off point. Results were significantly better in those with the shorter duration of symptoms. It is not certain that this is due to the injection. Some with short duration of symptoms may have improved spontaneously. Lirette et al<sup>10</sup> point out that many cases of coccydynia resolve without medical treatment.

Some authors<sup>3,5,7</sup> report that traumatic aetiology indicated a more favourable result of coccygectomy, while Trollegaard et al<sup>4</sup> found that the outcome was similar whether the symptoms were traumatically induced or idiopathic in origin. There was a trend for a better result after trauma or parturition among our injected patients, but the difference did not reach statistical significance.

The beneficial action of corticosteroids is presumed to be due to its anti-inflammatory effect. Betamethasone is around five-times as potent in this respect as triamcinolone. Even when the smaller dose of betamethasone is taken into account, our betamethasone injection is around 50% more potent than our dose of triamcinolone. It is therefore somewhat surprising that triamcinolone should prove to be significantly more effective than betamethasone with regard to early results, late results, and the need for surgery.

However, triamcinolone is reported to have led to local calcification after injection into a lumbar disc,<sup>20,21</sup> and Maigne<sup>15</sup> reported calcifications in four patients injected with cortivazol into a coccygeal disk. We did not observe this complication in any of our patients, but we rarely obtained radiographs or MRI studies after the original work-up.

Skin and soft tissue atrophy at the site of injection may occur occasionally with long-acting corticosteroids such as triamcinolone (Figure 2).<sup>22,23</sup> This is noted as a painless blanching of the skin and usually resolves after some months.<sup>22</sup> We did not record this systematically, and none of our patients reported it spontaneously, possibly because it is difficult to inspect one's own coccyx area. Brinks et al<sup>23</sup> reviewed the literature from 1956 to 2010 and found 87 papers reporting on complications after extra-articular injection of corticosteroid. They concluded that major complications, including skin atrophy, are "relatively rare" and that these injections are "relatively safe".

An additional benefit from injections with local anaesthetics is that they may help to confirm the diagnosis. Although we did not record this systematically, we found that very many patients experienced relief from their symptoms for the few hours that the 1 ml of local analgesic was active, thus confirming the diagnosis of coccydynia.<sup>9,19</sup>

Although far from all coccydynia patients benefit substantially from corticosteroid injections, we still feel that they are well worth performing. The procedure is easy, takes little time, and has few complications. Other non-operative treatment methods do not seem as well supported by evidence of efficacy.

We conclude that around 15% of coccydynia patients are satisfied in the long-term with one corticosteroid injection. This rises to around 29% after a second injection. Duration of symptoms of less than one year increases the rate of success. If the choice is between injections of betamethasone or triamcinolone in the treatment of coccydynia, the latter should be selected. Improvement is earlier, fewer patients will need a second injection, and fewer patients will need surgery.



### Take home message

- In the long-term, 15% of patients are relieved of symptoms after one injection and 29% after two injections.
- Duration of symptoms of less than one year increases the rate of success of injections.
- Triamcinolone injections work better than betamethasone for coccydynia.

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**Author contributions:**

- V. Finsen: Planned the study, Analyzed the data, Wrote the manuscript.
- A. M. Kalstad: Planning the study, Collected and analyzed the data, Wrote the manuscript.
- R. G. Knobloch: Planned the study, Collected the data, Reviewed the manuscript.

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