

**Coccygectomy has a favorable effect on the intensity, manifestation and characteristics of pain
caused by coccygodynia**

A retrospective evaluation of 34 patients followed for 3-18 years

Levente Gáspár*, Zoltán Jónás*, László Kiss*, György Vereb**, Zoltán Csernátóy*

*Department of Orthopedics, University of Debrecen Medical Health and Science Center, Nagyerdei
krt. 98 Debrecen, Hungary 4012

**Department of Biophysics and Cell Biology, University of Debrecen Medical Health and Science
Center, Nagyerdei krt. 98 Debrecen, Hungary 4012

Correspondence:

Levente Gáspár

E-mail: lgaspar@dote.hu, Tel.: 36-52-415-494, Fax: 36-52-415-494,

NO FUNDS WERE RECEIVED IN SUPPORT OF THIS STUDY!

Abstract

Background Coccygodynia can cause severe pain and disability for the patients. There are contradictions in the literature regarding the final results of coccygectomy for coccygodynia. We evaluated the long-term results of coccygectomy on the intensity, characteristics and manifestation of pain caused by coccygodynia to determine the adequacy of operation among treatment modalities.

Materials and methods 34 patients with coccygodynia were treated by coccygectomy. In 22 cases, trauma, and in one case childbirth was the cause. 11 cases were regarded as idiopathic. The intensity, characteristics of pain, and the most painful activities were evaluated at an average of 7.6 (3-18) years follow-up time.

Results Before the operation, all 34 patients had pain while sitting. Moreover, 26 of them had pain during standing, walking, at night or a combination of these. 21 patients had intolerable or very intensive, mainly acute, sharp or burning pain. 11 patients had dyschesia, 2 had dysuria and 6 had dyspareunia. At follow-up, 7 patients were completely free of pain, 15 others had moderate, 11 medium, and only one patient had severe, but none had intolerable pain. Only 7 patients had acute, sharp or burning pain postoperatively. The decrease of average pain score from 8.0 to 3.2 was significant ($p < 10^{-12}$). The number of the patients with dyschesia and dyspareunia decreased from 11 to 7 and from 6 to 3, respectively. Two patients had dysuria, but their complaints did not change after the operation. One of the two patients who needed reoperation had an excellent final result, while the other remained unchanged. 12 and 16 patients (together 82%) regarded the final result of the operation excellent and good respectively. The condition of 5 others did not change, while one became worse. The patients with younger age, smaller body mass index, and less co-morbidities had better final result. There were no serious complications.

Conclusion Coccygectomy for coccygodynia is a safe method to decrease the intensity of pain and other complaints of the patients. The operation can be the choice of treatment if conservative measures fail.

Key words: coccygodynia, coccygectomy, long term results, pain, retrospective evaluation

Introduction

Pain caused by coccygodynia interferes with the normal daily life of the patients. Several etiological factors can be the cause of coccygeal pain. These are glomus tumor [1,8,9], epineural cyst [3,17], tumor in the spinal canal [13], disc hernia [2], piriformis tunnel syndrome [11], visceral diseases [13,15] and childbirth [4]. The most common one is trauma [17]. However, in a considerable part of the cases, there is no identifiable cause and these are labeled as idiopathic.

Articles published so far dealt with evaluating the ability to decrease the intensity of pain by conservative therapy such as physiotherapy, local anesthetic and steroid injection [5,9,16] or surgery aimed at subperiosteal resection of the coccygeal segments distal from the affected joint [2,7,12,16].

The aim of this study is to evaluate the long-term effect of coccygectomy not only on the intensity, but the characteristics and manifestation of the pain caused by coccygodynia. In order to find the causes of success and failure in this procedure, the correlation between age, co-morbidities, body mass index, and the final result was analyzed.

Patients and methods

34 patients (28 females and 6 males) were treated by coccygectomy. The indication for the operation was intolerable pain localized just to the coccyx, which failed to respond to at least 6 months of conservative treatment (physiotherapy, local anesthetic and steroid injection). The age of the patients was between 9 and 64, with an average of 36.2 years. In 22 cases trauma (fall 18, traffic accident 2, direct blow 1, and horse-riding accident 1), and in one case childbirth was the cause of coccygodynia. 11 cases were regarded as idiopathic.

For surgical planning the usual lateral preoperative x-ray was taken. The abnormal dislocated segment was identified. The level of the coccygectomy was determined based on the x-ray and physical palpation of the painful mobile segment. The same operation technique was used in all cases. Coccygectomy was performed through the usual longitudinal incision [12]. The affected intervertebral joint was separated first, and then the distal part of the coccyx was removed from cranial to caudal. To prevent bowel injury, subperiosteal coccyx resection was performed. The wound was closed after a

meticulous bleeding control by multilayer sutures. Drain and postoperative antibiotic administration was not used.

All the patients were examined and asked to answer a questionnaire at an average of 7.6 (3-18) years follow-up time. The pain intensity, characteristics and most painful activities before and after the operation were recorded. A 10-degree visual analog scale (VAS) was used for the measurement of pain intensity. VAS scores of 1-4, 5-7, 8-9, and 10 were categorized as moderate, medium, severe, and intolerable pain intensities, respectively.

The evaluation of the final result was based on the subjective opinion of the patients, in which 3 categories, “excellent”, “good” and “unchanged-worse” were established. To have a chance to find the cause of success and failure, the correlation of age, body mass index, and other diseases of the patients with the improvement of VAS pain score, and the distribution of these factors over the 3 groups with excellent, good and unchanged-worse final result were evaluated. The tests used for statistical analysis of normally distributed variables (age, BMI) were Student’s paired t test with correction for unequal variance when necessary (“ST” in results section) and one-way analysis of variance (“ANOVA”), while hypotheses involving non-normally distributed variables (VAS score, VAS score improvement, number of co-morbidities) were analyzed using Spearman rank correlation test (“SP”), Wilcoxon matched paired signed-rank test, and Kruskal-Wallis one-way analysis of variance by ranks (“KW”). Positive or negative correlations of factors with VAS score improvement were followed by analysis of variance among the 3 groups of final result. Exact probability of the difference occurring randomly, without an actual difference in sampling populations is provided for all statistics.

Results

The average time between the onset of pain and surgery was 5.2 years, with a range 0.5-28.

Before the operation, all 34 patients had pain on sitting. Moreover, 26 of the patients had pain during standing, walking, at night or a combination of these. 21 patients had intolerable or severe (VAS score > 8), mainly acute, sharp or burning pain. 11 patients had dyschesia, 2 had dysuria and 6 had dyspareunia. 19 patients had pain in other parts of the spine. 4 patients were treated with different psychiatric diseases (depression 2, neurosis 1 and panic disease 1), while 6 patients regarded

themselves psychologically unstable, but they were not treated. The average number of co-morbidities was 0.82.

12 and 16 patients (together 82%) regarded the final result of the operation excellent and good respectively. The condition of 5 others did not change, while one became worse after a reoperation. (Table 1.)

The 2 patients, who needed reoperation because of the persistent severe pain, were male. The younger patient aged 32 suffered another injury two years after a partial coccygectomy. Total coccygectomy gave an excellent final result. The older patient, aged 64, had idiopathic coccygodynia with dyschesia, dysuria, neurosis, prostatitis and low back pain. Despite of these co-morbidities, the reoperation was indicated after the unsuccessful first operation (a partial coccygectomy) because of constant pain localized just on the remains of the coccyx. The second operation (a total coccygectomy) has not changed the complaints of the patient. The final result was regarded worse.

There were no serious complications (wound infection, bowel hernia or injury) in any of the patients and only 3 of them had a slightly painful scar.

Before the operation, all the patients had VAS score > 5 (medium or worse pain), moreover, 10 of them had intolerable pain (VAS score = 10). At the follow-up, 7 patients were completely free of pain, further 15, 11 and 1 had moderate, medium and severe pain, respectively, but none had intolerable pain.

The improvement of VAS data upon operation was characterized by the VAS score difference. In our cases the average preoperative 8.0 pain score decreased to 3.2. The reduction of pain by the operation was significant (Wilcoxon matched paired signed-rank test, $p < 10^{-12}$).

VAS score improvement was significantly different in the three outcome groups designated excellent (Δ VAS=6.92, n=16), good (Δ VAS=4.38, n=12) and unchanged-worse (Δ VAS=1.83, n=6) based on subjective patient opinion (KW, H=16.19, $p < 0.005$).

The characteristics of pain changed favorably as well. While 31 patients had acute, sharp or burning pain before the operation, only 7 patients had these types of pain at the follow-up, while the others had only dull pain. All 34 patients had pain on sitting, moreover, 26 had pain while standing, walking, at

night, or a combinations of these, in the preoperative period. At the follow-up, 27 patients had pain on sitting and only 13 of them had pain during other activities and at night.

The number of patients with dyschesia and dyspareunia decreased from 11 to 7 and from 6 to 3, respectively. Two patients had dysuria, but their complaints did not change after the operation.

Analysis of age, body mass index (BMI), co-morbidities and the preoperative VAS score as possibly influential factors on the difference in improvement after operation in the three groups showed the following results:

Spearman rank correlation test (SP) showed that the probability of an inverse correlation between age and VAS improvement is 79.95%. The 3 outcome groups are significantly different in age from each other (ANOVA, $p=0.024$). A pairwise Student's t test for two samples (corrected for unequal variances where necessary) further clarified that group I (excellent) is significantly younger (average 26.7 years) than either group II (good, ST, $p=0.0032$) or group III (unchanged-worse, ST, $p=0.0621$), while groups II and III belong to the same age population (average ~ 41.6 and 41 years, ST, $p=0.9365$).

The probability of an inverse correlation between BMI and VAS improvement is 73.24% (SP). The BMI of patients in the 3 groups was different from each other at $p=0.0575$ (ANOVA). A pairwise Student's t test for two samples further clarifies that the BMI of group I (excellent, BMI=21.05) was significantly smaller than either that of group II (good, BMI=26.59, $p=0.0123$) or that of group III (unchanged-worse, BMI=25.20, $p=0.0380$), while groups II and III were not significantly different ($p=0.6632$).

The number of co-morbidities was inversely correlated with VAS score improvement (Spearman rank correlation 79.39%). The three groups were significantly different in the number of co-morbidities: group I (excellent) had 0.41, group II (good) had 0.93, group III (unchanged-worse) had 1.33 co-morbidities on average, rendering them all different using Kruskal-Wallis one-way analysis of variance by ranks ($p=0.0062$).

Higher preoperative VAS data were paired with greater improvements. The positive correlation was significant (SP, $p=0.0322$). At the same time, the preoperative VAS data were quite evenly distributed among the three groups (KW, $p>0.2$), so the initial VAS scores of the three outcome groups cannot be

considered as major influencing factors when comparing the effect of the other parameters (age, BMI, additional diseases) on the results.

Discussion

Coccygodynia is a condition characterized by pain and tenderness in the coccyx and the surrounding region.

True coccygodynia consists of pain arising from the sacrococcygeal or the intercoccygeal joints whereas pseudococcygodynia consists of pain related to, but not arising from the coccyx [14,16]. That is why local therapy (either conservative or surgical) can only be effective in true coccygodynia.

During the diagnosis of coccygodynia, the physical examination, the exact localization of pain and - with the administration of local anesthetic - the differentiation between true and pseudococcygodynia play an important role [16].

An a-p and lateral X-ray can give useful anatomic information [17]. According to Postacchini [10] the pathological forward bending of the coccyx can predispose to coccygodynia. Some authors suggest the dynamic x-ray taken laterally in sitting position, with which pathological subluxation can be revealed [6,7], but the normal radiological configuration of the coccyx does not contraindicate surgical treatment [10].

Numerous forms of conservative treatment are known [5]. Some authors only use conservative measures (physiotherapy, local anesthetic and steroid injection), primarily referring to the complications and bad results obtained by coccygectomy [2]. They report good results in 70-90% of cases with conservative treatment combinations [5,9,16].

Most authors, however, agree that if conservative treatment fails, surgical intervention is necessary [2,7,12,16]. Chronic low back pain, depression, hypochondria, chronic diseases of the urogenital tract, mental instability are the relative contraindications for coccygectomy [1,6,10].

The surgical treatment is the same in all literature, namely coccygectomy by subperiosteal dissection through a longitudinal midline incision and excision of the coccygeal segments distal from the effected joint and smoothing down any bony prominence at the lower end of the rest [12,16]. Histological examination of the surgically removed specimen from idiopathic coccygodynia patients revealed

normal bony tissue [16]. Severe complications (wound infection, bowel hernia) are mentioned in the literature, but they are quite rare [18].

In our experience, coccygectomy gives good result for the treatment of coccygodynia. The pain can be eliminated or decreased significantly by the procedure. The operation has favorable effects on dyschesia and dyspareunia, on the characteristics of pain and the painful activities as well. The operation did not change the complaints caused by dysuria in our series. Also we did not notice a major difference in the postoperative results of patients with traumatic or idiopathic coccygodynia. Better result can be expected in cases with younger age, smaller body mass index and less co-morbidities. The final subjective result cannot be predicted from the intensity of the preoperative pain. Further investigation is necessary for the reliable treatment of idiopathic coccygodynia of older patients with several other diseases.

References

1. Albrecht S, Hicks MJ, Antalffy B (1994) Intracoccygeal and pericoccygeal glomus bodies and their relationship to coccygodynia. *Surgery* 115:1-6
2. Bayne O, Bateman JE, Cameron HU (1984) The influence of etiology on the results of coccygectomy. *Clin Orthop* 190:266-272
3. Dehaine V, Wechsler B, Ziza JM, de-Gennes C, Robain G, Fohanno D, Metzger J, Godeau P (1990) Coccygodynia disclosing Tarlov's cysts. *Rev Med Interne* 11:280-284
4. Jones ME, Shoaib A, Bircher MD (1997) A case of coccygodynia due to coccygeal fracture secondary to parturition. *Injury* 28:549-550
5. Kersey PJ (1980) Non-operative management of coccygodynia. *Lancet* 1 (8163): 318
6. Maigne JY, Tamalet B (1996) Standardized radiologic protocol for the study of common coccygodynia and characteristics of the lesions observed in the sitting position. Clinical elements differentiating luxation, hypermobility, and normal mobility. *Spine* 21:2588-2593
7. Maigne JY, Lagauche D, Doursounian L (2000) Instability of the coccyx in coccygodynia. *J Bone Joint Surg (Br)* 82:1038-1041

8. Nutz V, Stelzner F (1985) Der Glomustumor als Ursache einer Coccygodynie. *Chirurg* 56: 243-246
9. Polkinghorn BS, Colloca CJ (1999) Chiropractic treatment of coccygodynia via instrumental adjusting procedures using activator methods chiropractic technique. *J Manipulative Physiol Ther* 22:411-416
10. Postacchini F, Massobrio M (1983) Idiopathic coccygodynia. Analysis of fifty-one operative cases and a radiographic study of the normal coccyx. *Bone Joint Surg (Am)* 65: 1116-1124
11. Reichel G, Gaerisch FJr (1988) Das Piriformis-Syndrom. Ein Beitrag zur Differentialdiagnose von Lumbago und Kokzygodynie. *Zentralbl Neurochir* 49:178-184
12. Sehirliglu A, Ozturk C, Oguz E, Emre T, Bek D, Altinmakas M. Coccygectomy in the surgical treatment of traumatic coccygodynia.: *Injury*. 2007 Feb;38(2):182-7.
13. Tilscher H, Kantor H, Gangl W, Bogner G (1986) Die Coccygodynie - ein diagnostisches und therapeutisches Problem der Orthopadie. *Z Orthop Ihre Grenzgeb* 124:628-632
14. Traycoff RB, Crayton H, Dodson R (1989) Sacrococcygeal pain syndromes: diagnosis and treatment. *Orthopedics* 12:1373-1377
15. Wesselmann U, Burnett AL, Heinberg LJ (1997) The urogenital and rectal pain syndromes. *Pain* 73:269-294
16. Wray CC, Easom S, Hoskinson J (1991) Etiology and treatment. *J Bone Joint Surg (Br)* 73:335-338
17. Ziegler DK, Batnitzky S (1984) Coccygodynia caused by perineural cyst. *Neurology* 34: 829-830
18. Zook NL, Zook EG (1997) Repair of a long-standing coccygeal hernia and open wound. *Plast Reconstr Surg* 100: 96-99

Table 1.

Clinical data of all patients

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	R
1	9	2	3	1	6	11.1	1		1	0	5	0				1
2	32	1	1	0.5	3	26.3	1		1	0	7	0	1			1
3	33	1	1	1	6	17.9	1	3	1+2	1	8	2				1
4	27	2	1	1	10	23.1	1		1+2+3+4	0	10	0		1		1
5	18	2	3	1	8	20.3	3		1	0	6	0				1
6	30	2	1	0.5	9	19.9	1	3	1	1	9	2		1		1
7	46	2	1	17	13	24.4	1		1+2+4	0	9	0	3			1
8	18	2	3	1	3	17.8	1	3	1+2	1	7	1	1			1
9	28	2	1	1	10	24.2	1	3	1+2	1	8	2	1	1		1
10	34	2	1	15	16	19.2	1	3	1+2	1	9	3	1	1+2	1	1
11	25	1	1	4	6	25.4	1		1+4	0	8	0				1
12	20	2	1	1	4	23.1	1		1	0	5	0				1
13	51	1	1	1	7	38.4	1	3	1+2+3+4	1+2+3+4	10	6	1	1+2	1+2	2
14	49	2	1	1	11	34.9	1	3	1+2+4	1+3	10	4	1			2
15	27	2	1	1	5	21.3	1	3	1+2+4	1+3	6	4	1			2
16	18	2	3	1	3	35.2	1	3	1+2	1	10	5	1+2			2
17	58	2	3	2	8	19.2	1	3	1+2+3+4	1+2+3+4	8	2		2		2
18	49	2	1	12	4	30.1	1	3	1+2+3+4	1	10	1	1			2
19	13	2	1	0.5	3	18.0	2	3	1+3+4	1+4	8	2		1		2
20	60	2	3	2	18	27.3	3	3	1+2	1+4	10	7	1			2
21	51	2	3	5	9	23.7	1	3	1+2	1	10	3	1+2			2
22	52	2	2	18	10	19.6	2	3	1+2+3	1+3	9	6	1+2	1+2	1	2
23	51	2	3	2	6	33.2	2	3	1+3+4	1+4	10	5	1+2			2
24	38	2	1	2	4	36.0	1	1	1+3	1	6	3	1	1	1	2
25	46	2	1	2	8	27.1	1	1	1+2+3+4	1+2+3+4	10	7	1+2			2
26	55	2	1	28	13	21.6	1	3	1+4	1	7	6	2	2+3	2+3	2
27	20	2	3	5	5	19.5	3	3	1	1	6	1	2			2
28	28	2	1	7	15	19.8	1	1	1+4	1	6	2				2
29	57	2	1	15	12	27.9	1	1	1+2+3+4	1+2+3+4	10	5	1+2+3			3
30	48	2	1	13	5	21.9	1	3	1+2+3+4	1+2+3+4	8	8	1+2	1+2	1+2	3
31	20	2	1	11	4	18.8	1	1	1	1	5	2				3
32	36	2	3	3	5	31.9	1	1	1	1	8	5	1			3
33	21	1	1	1	3	21.6	1	1	1+2+3+4	1+2+3+4	7	7		1	1	3
34	64	1	3	1	5	25.3	2	2	1+2+4	1+2+4	7	7	1+2+4	1+3	1+3	4

A Case	I Characteristics of pain (postop.)	N Co-morbidities I.
B Age	1 acute, sharp	1 low back pain
C Sex	2 burning	2 psychological disease
1 male	3 dull	3 gynecological disease
2 female	J Painful activities (preop.)	4 prostatitis
D Etiology	0 none	O Co-morbidities II. preop.
1 trauma	1 sitting	1 dyschesia
2 childbirth	2 standing	2 dyspareunia
3 idiopathic	3 walking	3 dysuria
E Time elapsed from onset to surgery (years)	4 night pain	P Co-morbidities II. postop.
F Follow-up time (years)	K Painful activities (postop.)	1 dyschesia
G Body mass index	1 sitting	2 dyspareunia
H Characteristics of pain (preop.)	2 standing	3 dysuria
1 acute, sharp	3 walking	R Final result
2 burning	4 night pain	1 excellent
3 dull	L VAS score (preop.)	2 good
	M VAS score (postop.)	3 unchanged
		4 worse

