HYPOTHESIS: IS SACROCOCCYGEAL HYPOMOBILITY RELATED TO CHRONIC LOW BACK PAIN AND STIFFNESS?

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ABSTRACT

The coccyx is considered to be a vestigial structure by most medical and chiropractic physicians[4] and therefore is not considered to have a significant range of motion or dynamic function.

We postulate that optimal coccygeal range of motion is greater than 50 degrees. This study demonstrates that restricted coccygeal range of motion is found in patients with reduced low back flexion and associated low back pain. Changes in low back pain and trunk flexibility follow coccygeal manipulation.

(Key Terms: Coccyx, conus medullaris, dura mater, dural tension, filum terminale, meningismus, sacrococcygeal syndrome.)

INTRODUCTION

For over ten years we have observed what appears to be a direct relationship between sacrococcygeal flexibility and lumbopelvic flexibility. When a select group of patients presented with chronic low back pain and/or stiffness, with or without coccygodynia, 100% tested hypomobile according to our clinically observed norms. An examination was performed to estimate coccygeal range of motion.

It has been observed in over 3 thousand examinations and treatments, when combining those performed by the authors over the past ten years, that maximal range of motion of the coccyx is underestimated. We have consistently observed that maximal coccygeal range of motion is 70-90 degrees for females well into the 7th decade. Optimal range of motion for males is hypothesized to be slightly less at 50-70 degrees into the 7th decade.

ANATOMY

Gray's Anatomy states[4] "Continuous cranially with the medulla oblongata, the spinal cord narrows caudally to a sharp tip, the conus medullaris. From the apex of this the filum terminale, a fine connective tissue filament, descends to the dorsum of the first coccygeal segment." "The filum terminale, a fine filament of connective tissue about 20 cm long, descends from the apex of the conus medullaris. Its cranial 15 cm, the filum terminale internum, is surrounded by tubular extensions of the dural and arachnoid meninges and reaches as far as the lower border of the second sacral vertebrae. Beyond this its final 5 cm, the filum terminale externum, is closely united with the investing sheath of dura mater, descending to an attachment to the dorsum of the first coccygeal vertebral segment." *(figure 1)* A variety of pathological states of the sacrococcygeal complex is found in practice *(figures 2-4)*.

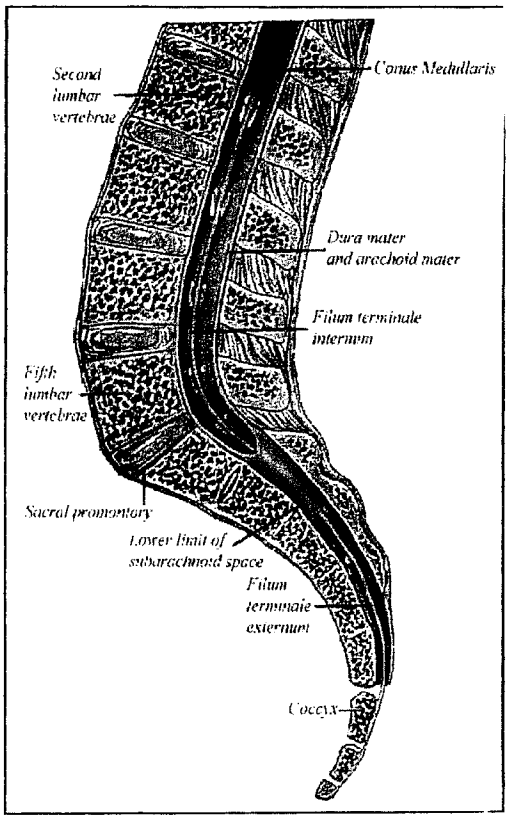

Figure 1.

PATIENT SELECTION

Patients who remained symptomatic after completing medical and/or physiotherapeutic and chiropractic treatment were selected for the study.

The study comprised patients who met one or more of the following criteria:

1. Tested positive for hypomobile coccyx. Females<70 degrees, Males<50

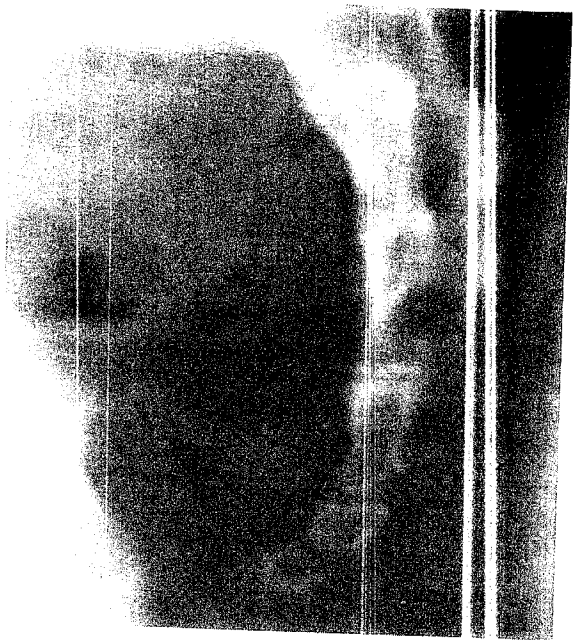

Figure 2. Normal Alignment <30 degrees anterior. Note first and second coccygeal joint spaces are well defined. Distal segments are palpably flexible.

Figure 3. Anterior sub-dislocation. The first coccygeal joint is preserved. The mid and distal segments are fusing.

2. Had reached maximum medical improvement.
3. Presented a history of coccygeal trauma either acute or cumulative microtrauma.
4. Demonstrated evidence of subluxation, dislocation or degenerative changes at the sacrococcygeal joint.

Figure 4. Posterior dislocation with anterior gibbous of the distal sacral segment. The mid and distal coccygeal segments are fused.

5. Presented a history of low back pain, stiffness or coccydynia.
6. Lumbar flexion failed to reach the floor with the finger tips, when measured with feet together and knees locked.
7. Demonstrated willingness to perform specific exercises regularly.

Exclusion Criterion: Fusion of the sacro-coccygeal segments.

Patients who did not perform the post treatment exercises or who did not return the post treatment questionnaire were excluded from the analysis.

METHOD

Patients were educated as to our hypothesis that a hypomobile coccyx could adversely affect the spinal cord or thecal sac and result in back pain or stiffness.

Trunk flexibility measurements were made immediately before and after the treatment:

1. Patients were instructed to stand with their feet together and with their knees locked.
2. The knees were assisted to extension, by the examiner, if the patient insisted on bending them.
3. A ruler measured the distance from the floor to the finger tips immediately before and after the procedure.
4. Patients were instructed not to warm up prior to the treatment.

Table 1.

1	33	F	7	2	4	0
2	38	M	2	0	10	0
3	31	F	0	-6	0	0
4	60	M	16	0	5	0
5	61	F	2	-6	8	0
6	22	F	3.5	-4	0	0
7	31	M	15	0	10	1
8	34	M	4	0.5	0	0
9	43	F	2.5	-4	8	2
10	49	M	27	0	10	0
11	43	M	20	0	10	2
12	51	F	5	1	5	2
13	42	F	5	2.5	9	0
14	30	M	12	0	4	0
15	31	F	6	0	9	3
16	30	F	4	-5	8	1
17	37	M	8	0	5	0
18	39	F	0	-6	0	0
19	61	F	6	1.5	0	0
20	43	M	3	0	3	3
21	47	M	6	-4	6	0
22	49	M	10.5	0	6	1
23	50	M	17	0	5	2
24	64	F	1.5	0	4	0
25	49	M	8	0	5	3
26	50	M	15	3	7	1
27	40	F	3	0	0	0
28	46	M	6	-4	7	0
29	50	F	10.5	-3	0	0
30	36	F	0	-6	6	0
31	36	M	2.5	1	4	1
32	24	F	0	-4	8	0
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34	38	M	0	-4	0	0
35	47	F	5	0	0	0
36	42	M	6	0	4	1
37	36	M	12	0	0	0
38	56	F	0	-2	3.5	0
39	28	M	0	-4	7	0
40	42	M	0	-4	2	0
41	46	M	11.5	0	7	5
42	46	F	18	-3	5	3
43	57	M	0	-4	0	0
44	46	F	2	0	6	0
45	60	M	10	0	3	0
46	39	M	0	-2	10	1
47	28	M	0	-3	2	0
48	32	F	0	-4	7	0
49	43	F	0	-3	2	0
50	36	M	0	-3	7	1
Avg	42		5.85	-1.53	4.66	0.66
Change				7.38		4.00

A 0-10 numeric pain scale was completed by the patient before and after the protocol.

The patients were always placed on their left sides during the coccygeal manipulation. Patients were manipulated with or without sedation or light anesthesia depending on levels of anxiety or acute tenderness elicited upon palpation intrarectally. The examiner's right 3rd digit was placed intrarectal and the left thumb was external. Contact was made with the hypomobile coccygeal segments. The thumb served as a counterpressure at the apex of the sacrum to assist in reduction of the coccygeal angle. Coccygeal range of motion was palpated first with gentle pressure, noting the pre-treatment range of motion. The coccyx was then levered with firm pressure through its maximum range. Care was taken not to slip off off the coccyx to prevent irritation to the rectal lining. The assistant helped flex the patient fully into the fetal, neutral and extended positions, while the pressure-counterpressure was performed several times in each position.

SUMMARY OF RESULTS

This paper describes the results of one of two 50 patient studies (JW) where lumbopelvic stiffness and chronic low back complaints were reliably relieved following intra-rectal manipulation of the coccygeal segments.*(Table 1)* Negative values indicate that when standing on a step, the fingertips could reach below the toes. A parallel study yielded similar results (CK). Immediate, gradual or progressive increase in flexibility was observed in all cases. Continued improvement in trunk flexibility occurred using proprioceptive neuromuscular facilitation (PNF) once the coccygeal range of motion was normalized. Typical increases of trunk flexibility averaged 7.38 inches following an average of 3.1 treatments for women and 4.3 treatments for men. Results were achieved with as few as 1 manipulation and as many as 10, spaced at least one week apart.

On the 0-10 pain scale, mean pretreatment pain level was 4.66 falling to 0.66.

Sixteen patients were treated with the assistance of sedation while thirty-four did not receive I.V. sedation. There was no appreciable difference in results obtained in the sedated vs. non-sedated groups. Of the 50 patients treated there were 28 men (56%) and 22 women (44%). Men averaged 4.3 treatments while women averaged 3.1 treatments. Ages ranged from 22 to 61. Average female age was 44 while average male age was 39. Please see Addendum for statistical analysis.

CONCLUSION

These preliminary results are encouraging. It appears that lumbopelvic flexibility is more closely related to coccygeal range of motion than previously thought. Additional research needs to be performed to test "normal" coccygeal range of motion in people without back pain and stiffness. Currently the most thorough study we could find considered coccygeal range of motion over 30 degrees as "hypermobile"[8]. This assumption is contrary to our findings

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