A MEASUREMENT STUDY, USING AN ILIAC CREST INCLINOMETER, OF HOW THE ATLASPROFILAX METHOD TO CORRECT MALROTATION OF THE ATLAS BONE CHANGES ILIAC FRONTAL PLANE LEVELS IN THE STANDING POSITION.

Voigts MF

Affiliated: Atlasprofilax Academy of Switzerland

General Osteopathic Council, United Kingdom

British Acupuncture Council

ABSTRACT

The frontal plane inclination of the iliac crests of 350 patients, 225 female and 125 male was measured in degrees with an iliac crest inclinometer. The patients in the study requested assessment and subsequent correction of atlas malrotation. The Atlasprofilax procedure developed by Rene Schumperlii was the method employed to correct the atlas malrotations. Patients were examined prior to atlas correction and 100% of the study group were assessed to have functional leg length discrepancy and two common presentations became apparent. 72% of the study group had a shorter left leg with associated left to right inclination of the iliac crests and 23% presented with a shorter right leg and a right to left inclination of the iliac crests. Immediately following the Atlasprofilax procedure over 90% of the study group had level iliac crests. In the author's opinion this indicates that the predominant aetiology of functional leg length discrepancy is malrotation of the atlas bone.

1. Objectives

1. To measure in degrees the frontal plane inclination of the iliac crests before and after the Atlasprofilax Procedure.

2. To show that malrotation of the atlas bone has a direct correlation to the inclination of the iliac crests and therefore sacral base line.

3. To show that frontal plane iliac crest inclinometric evaluation is a useful additional assessment procedure for the Atlasprofilax Method.

2. Introduction

Leg length discrepancy (LLD), or anisomelia can be structural/ anatomical (SLDD) or functional (FLLD).

SLLD is caused by shortening of bony structures. The aetiology of SLLD may be congenital or acquired. Congenital causes include congenital dislocation of the hip. Acquired causes include infections, paralysis, tumour and surgical procedures such as hip replacement. FLLD occurs due to altered biomechanics. In osteopathic literature FLLD is secondary to a torsion of the pelvis and sacral base unlevelling caused by a somatic dysfunction typically at L5 or a sacro-iliac joint.

LLD has been thoroughly reviewed by Gurney B, Gait and Posture, 15 (2002), 195-206.

Practitioners of manual medicine suggest an intimate relationship between LLD and pelvic torsion. Cooperstein and Lew, J of Chiro Med Sep 2009, have reviewed all relevant literature with regard to this and conclude that LLD coincides with a posterior rotation of the innominate on the long leg side and anterior rotation of the innominate on the short leg side. Using an iliac crest inclinometer this reveals a high iliac crest on the long leg side.

The dura mater is the outermost of three meningeal layers that surround the brain and spinal cord.

The dura has been described as 'tough and inflexible' and 'leather-like'. The dura mater has interesting anatomical attachments. In 2011, Scali et al, reported a connection of soft tissue from the rectus capitis posterior major to the cervical dura mater. Various clinical manifestations may be linked to this anatomical relationship such as headaches, trigeminal neuralgia and other symptoms that involved the cervical dura (Spine 2011). The rectus capitis posterior minor has a similar attachment as described by Hack et al in 1995. They described a connective tissue bridge between rectus capitis posterior minor and the dorsal aspect of the spinal dura mater at the atlanto-occipital junction observed in cadaver dissections and clinical MRI scans. They also suggest that the muscle dural bridge may play an important role in the pathogenesis of cervicogenic headaches. Dr Nick Hodgson has reviewed extensively anatomical and physiological research regarding the spinal dura mater. It can be concluded that current knowledge, due to the leaps in scanning technology, shows that the spinal dura is most strongly attached around the foramen magnum and coccyx. There are also firm attachments to the body of c2, to the nuchal ligament at the atlantoaxial level and to the posterior long ligament somewhere between L3 and S3.

3. Method

3.1 Iliac Crest Inclinometer.

An iliac crest inclinometer was used for the purpose of this study. It consists of a horizontal bar with a spirit level located in the middle. Two sliding arms are attached to the horizontal bar either side of the spirit level. The sliding arms are designed to rest on the superior surfaces of the iliac crests. To obtain accurate readings it is important to press firmly with equal pressure from both operators hands at the junction of the sliding arms and horizontal bar. It is also imperative that the sliding arms are equidistant from the spirit level and that the arms are parallel with the ground. The purpose of the Iliac Crest Inclinometer is to measure the inclination or obliquity of the iliac crests to the horizontal in degrees. In this study an inclination from left to right (i.e. the right iliac crest was higher than the left) was recorded in positive

degrees and an inclination from right to left (i.e. the left iliac crest was higher than the right was recorded in negative degrees.) The inclinometer used in this study was of a very similar design used in the study - Reliability of measuring iliac crest level in the standing and sitting position using a new measurement device-

Piva SR,Erhard RE,Childs JD,Hicks G,Al-Abdulmohsin H.

Source

Department of Physical Therapy, School of Health and Rehabilitation Sciences, University of Pittsburgh, Room 6035 Forbes Tower, Pittsburgh, PA 15260, USA

3.2 Measurements

During the course of the author's practise over 2.5 years the obliquity of patients iliac crests were recorded in degrees whilst in their natural standing position pre- and post- atlas correction using the atlasprofilax procedure. A leg length discrepancy test using the protocol taught at the Atlasprofilax Academy of Switzerland was used to record apparent differences in leg length. For the purpose of this study patients who presented with a possibility of SLLD were omitted.

A high percentage of patients was re-checked within two weeks of the procedure and a smaller percentage was checked again over larger intervals.

4.Results

Data collected from patient examinations was tabled as below. Each patient's age and gender was tabled with their respective presenting short leg in cm. Inclinometer readings were recorded in number of degrees and an incline from left to right was denoted as a positive incline and an incline from right to left as a negative incline. The inclinometer readings were recorded before and immediately after the Atlasprofilax procedure. In most cases 2nd visits occurred and inclinometer readings were recorded. In a small percentage of the sample 3rd and even 4th checks occurred at various time intervals recorded as number of days.

Age	Gender	Lt leg short	Rt leg short	Illia incline Pre-(Lt to Rt)	Illia incline Post(Lt to Rt)	2nd	no/ of days	3rd	no/ of days2	4th
31	M	1		1	0	0	13	0	29	0
46	F	0.75		1	0	0	7	0	15	
53	F	0.5		2	0	0	15	0	29	
48	F		0.75	3	0	0	14			
52	F	1		-1	0	0	14			
34	F	1		1	0					
61	F	1		1	0	0	16			
24	F	0.66		1	0.5	0.5	6	0.5	15	
58	F		1	-0.5	0	0	6	0	17	0
45	F	1		2.5	0	0	1			
54	F		0.75	-1	0	0	2			
59	M	0.75		1	0	0	42			
65	F	1		3	0	0	30	0	37	0
37	F	1		1	0	0	37			
48	F	1		2	0					
69	F	1.5		1	0	0	8			
40	M	0.75		-1	0	0	32			
26	F		1	1	0	0	3	0	10	
37	F	1		-1	0	0	7			
74	M	1		2	0.25	0.25	8	0.25	15	
38	M	2		-2	0	0	7	0	18	
53	M	1		2	0	0	6	0	13	
69	F	0.5		1.5	0	0	7	0	15	0
28	M		0.5	-1	0					
37	M	1		1	0	0	14			
53	M		1	-1	0	0	14	0	21	
25	F	1		3	0					
57	M		0.75	-1.5	0	0	14			
23	F	0.75		1	0	0	21	0	35	
44	F		0.75	-1	0	0	3	0	9	
62	F	0.5		2	0	0	14			
47	M		1	-1	0	0	8	0	25	0
68	F		1	-3	0	0	7			
42	F	1		1	0					
33	M	0.5		1	0	0	21			
27	M	1		1.5	0					

Age	Gender	Lt leg short	Rt leg short	Illia incline Pre-(Lt to Rt)	Illia incline Post(Lt to Rt)	2nd	no/ of days	3rd	no/ of days2	4th
49	F		0.5	-1	0	0	90			
38	M	0.75		1	0					
27	F	2		1	0	0	59			
46	F	1		1	0	0	14			
40	F	1		1	0					
34	F	0.5		0.75	0	0	7			
32	F	1		2	0	0	34			
44	F	0.75		1	0	0	14			
35	F	0.5		0.5	0					
51	F	0.5		1.5	0	0	28			
27	F		1	-1.5	0	0	28			
32	F	0.5		1	0	0	7			
48	F		1	-1	0					
61	F	1		-1	0	0	14			
41	M	0.5		1	0	0	14			
36	F	1		0.5	0					
38	F		0.5	-0.75	0	0	14			
38	F	0.75		-0.75	0	0	120			
35	F	0.5		1	0	0	220			
49	M	0.75		1.5	0					
28	F	1		0.5	0	0	28			
32	F	0.5		-0.75	0	0	49			
29	M	1		1	0	0	14			
36	F	0.75		0.75	0					
29	F	1		1	0	0	700			
60	M	1		1	0	0	370			
52	M		0.5	-0.5	0	0	42			
30	F		1	-1.5	0	0	21			
31	M	0.5		1	0	0	49			
46	F	1		2.5	0					
20	M		0.5	-0.75	0	0	24			
54	F		0.75	-1	0	0	21			
47	F	0.25		1	0	0	21			
59	F	1		2	1	1	21			
47	M	1		1	0					
29	F		2	-2.5	0	0	14			
51	F		1	-1.5	0	0	14			
42	F	1		2	0	0	21			
41	M	1		1	0	0	21			
28	M		0.75	-1	0	0	14			
35	M	0.5		1	0					
30	M		0.75	-0.5	0					
45	M	0.5		0.5	0	0	56			
26	F	1		3	0	0	63			
61	F	1		3	0	0	14			
32	F		1	-1	0					
35	F	1		1	0					
36	F	0.75		3	0					

Age	Gender	Lt leg short	Rt leg short	Illia incline Pre-(Lt to Rt)	Illia incline Post(Lt to Rt)	2nd	no/ of days	3rd	no/ of days2	4th
35	F	1		2	0					
65	F	1		1.5	0	0	21			
42	M	0.75		3	0	0	14			
65	F		0.75	-1	0	0	14			
42	M	0.5		1	0	0	28			
43	F	0.75		3	1	1	14			
51	M	1.5		2	0					
36	M	1		3	0					
41	F	1		1	0	0	14			
47	F	1		2	0	0	28	0	90	
42	M		0.75	-1	0					
45	F		1	-1.5	0					
42	F		0.5	-1	0	0	21			
63	M	0.75		3	2					
20	M	0.5		2	0					
39	F	1		2	0					
32	F	1		1	0	0.5	21	0	42	
56	M	1		2	0	1	14	0	28	
43	F	1		1	0	0	14			
44	F	1		0.5	0	0	14			
42	F	1		2	0					
37	F		0.75	-2	1	0	28			
39	M	2		2	0	2	21	0	49	
22	F		1	-1	0	0	35			
57	M	1		2	0	0	21			
40	F	1		1		0	14	0	224	
32	F		1	-1		1	21	0	562	
27	F	0.75		2		0.5	77	0	84	
63	F	1		1.5	0					
43	F	0.75		3	0					
36	M		1	-1	0					
23	F	1		1	0	0	14			
15	M	1		2	0	0	14			
44	M	0.5		3	0					
59	F	1		0.75	0	0	14			
27	F	1		1	0					
48	F	1		3	0	0	14			
67	M		1	-1	0	0	14			
44	F	0.5		0.5	0	0	35			
71	F		2	-5	2.5	2.5	21			
34	M	1		1	0	0	28			
29	M	1	2		0	0	14			
31	M	1		3	0					
15	F	1		2	0					
44	M	0.75		1	0					
74	M	1		3	1	0	14			
28	M		0.66	-1	0					
46	M	1		1	0	0	14			

Age	Gender	Lt leg short	Rt leg short	Illia incline Pre-(Lt to Rt)	Illia incline Post(Lt to Rt)	2nd	no/ of days	3rd	no/ of days2	4th
50	F	1		4	0					
48	F	1		1.5	0					
30	M		0.5	-1	0					
40	F		1	-2	0	0	28			
32	M	1		13	4	4	14			
39	M	1		2	0	0	14			
37	F	0.5		0.75	0	0	35			
32	M	1		1	0	0	14			
48	M	1		1	0	0	7	0	14	
40	M	0.5		1	0	0	14			
60	F		1	-0.5	0	0	14			
47	F	1		3.5	0	0	21			
32	F	0.5		1	0					
47	F		1	-2	0	0	21			
52	F	1		1.75	0	0	7			
29	F	0.75		3	0	0	14			
44	M	0.75		1.5	0					
52	F	1		-1.5	0	0	28			
46	F	0.75		0.75	0					
48	M	1		2	0					
74	F	1.5		2.5	1					
46	F	0.5		1	0	0	14			
40	F	1.5		2.5	0.5	0.66	7			
33	M	1		0.75	0					
58	F		0.75	-1	1	0	14			
34	F	1		-1	0					
38	M		1	-1	0					
62	F	1		1	0					
53	M		1	-1	0					
43	M	1		1	0					
33	F	1		1	0					
56	F	0.75		-1	0					
42	M		1	-1	0.5					
49	M	1.5		1	0					
48	M	1		2	0	0	14			
46	M	1		1	0	0	7	0	340	
28	F	1.5		2	0					
32	F	0.5		2	0	0	21			
31	F	0.75		2	0					
38	M		0.5	-1	0	0	28			
30	F		0.5	-2	0					
37	F	1		1	0					
22	M	0.75		0.5	0	0	21			
61	F	1		1	0	0	28			
29	F	0.5		1.25	1	1	28			
65	M	1		2	1	0.5	7			
45	M	0.75		0.5	0	0	14			
55	F		0.5	-2	1	1	14	0	28	

Age	Gender	Lt leg short	Rt leg short	Illia incline Pre-(Lt to Rt)	Illia incline Post(Lt to Rt)	2nd	no/ of days	3rd	no/ of days2	4th
48	M	0.75		1	0	0	28			
48	M	1		1	0	0	14	0	42	
62	F	1		1	0	0	7			
38	F	0.5		1	0	0	14			
46	F	1		1	0	0	7			
32	F	1		1	0	0	14			
56	F	0.75		1	0	0	28			
34	M	1		2	0					
42	M		0.75	-0.75	0	0	7			
45	F	1		1	0	0	14	0	70	
48	F	0.5		1	0	0	21			
42	M	0.5		0.75	0	0	7			
36	F	0.5		1	0	0	14			
49	M		0.75	-2	0	0	14			
48	F		1.5	-0.5	0	0	21			
45	F	1.5		1	0	0	14			
41	M	1		1	0					
21	M		0.75	-1	0					
45	M	1		1	0					
36	F	0.5		2	0	0	14	0	21	
38	F	0.5		1	0	0	14			
38	F	0.5		1	0	0	28			
42	F	0.75		1	0	0	28			
32	F	0.75		1	0	0	28			
26	F	0.5		2	0	0	7			
55	F	1		1	0	0	28			
58	F	0.75		2.5	0	0	21			
37	M	0.5		1	0	0	28	0	35	
49	M	1		2	0	0.75	14	0	21	
54	F		0.5	-1	0					
29	M	1		2	0					
48	M	1		1	0	0	14	0	21	
49	M		0.75	-1	0	0	14	0	28	
40	F	1		0.5	0	0	7			
73	M	0.75		1	0	0	14			
27	F	0.75		1	0					
74	F	1		3	0					
34	F	0.75		0.5	0	0	7			
45	F		1	-3	0	0	21			
51	F		0.5	-1.5	0	0	7			
36	F		0.5	-0.5	0	0	14			
52	F	0.75		0.75	0	0	14			
35	F	1		2	0	0	21			
39	F	1		1	0					
44	M	0.5		0.75	0	0	7	0	500	
46	M	0.75		1	0	0	7			
36	M	0.5		1	0	0	28			
41	F	0.75		1	0	0	21			

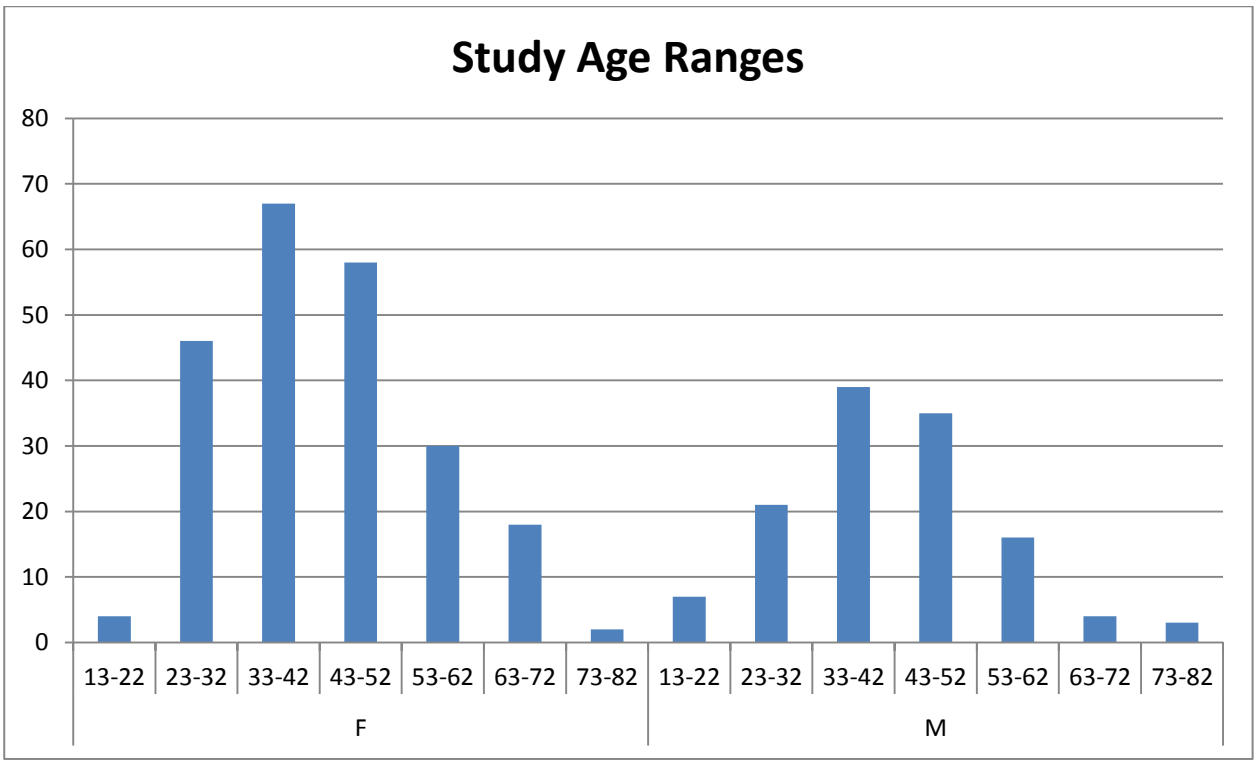
Age	Gender	Lt leg short	Rt leg short	Illia incline Pre-(Lt to Rt)	Illia incline Post(Lt to Rt)	2nd	no/ of days	3rd	no/ of days2	4th
40	M	0.5		1	0	0	21			
36	F	0.5		0.5	0	0	14	0	35	
33	M	0.75		1	0	0	28			
32	M	0.25		1	0	0	28			
68	F	1		3	0	0	14			
37	F	0.75		1.5	0	0	14			
44	F	1		1	0	0	14			
46	M	1		1.5	0	0	56			
56	M	0.25		1	0	0	14			
33	F		1	-2	0	0	77			
46	F	1.5		1	0	0	14	0	200	
43	F		1	-1	0	0	14	0	560	
44	M		0.75	-1	0	0	21			
59	M		1	-1.5	0	0	42			
13	M		1	-1	0	0	14			
17	M		0.75	-0.75	0	0	21			
47	F	1		2.5	0	0	14			
67	M		0.5	-0.75	0	0	14			
46	F	1		1	0					
38	F	1		1	0	0	14	0	77	
30	F	1		2	0	0	7			
30	F	0.5		2	0					
23	M		1	-2	0	0	180			
42	M	1		1	0	0	42			
26	F	1		2	0					
48	F	0.5		1	0	0	7			
34	F	1		1	0					
37	F	0.5		1	0	0	14			
29	F		2	-0.5	0					
33	F	0.5		2	0					
37	M	1		1.5	0	0	7			
63	F	0.5		2	0					
36	F	1		1.5	0					
44	M	0.5		0.5	0	0	21			
43	F	0.5		4	0					
33	F	1		2	0	0	7			
39	F	0.5		0.5	0	0	14			
37	F	1		2	0.5	0.5	14			
53	F	0.5		1	0					
35	F	0.5		1	0	0	63			
34	F	1		3	0	0	14			
38	F	0.5		0.5	0	0	21			
51	F		1	-1.5	0	0	14			
27	F	0.5		1	0					
30	F		1	-1.5	0	0	14			
29	F		0.75	-1	0	0	14			
47	M	1		1	0					
34	M		0.5	-1	0	0	14			

Age	Gender	Lt leg short	Rt leg short	Illia incline Pre-(Lt to Rt)	Illia incline Post(Lt to Rt)	2nd	no/ of days	3rd	no/ of days2	4th
23	F	1		0.25	0					
37	F	0.5		2	0	0	21			
44	M	1		1	0					
35	M	0.5		0.5	0	0	14			
64	F	1		1	0	0	14			
37	F	0.75		1	0	0	21			
38	F		0.75	-1	0	0	14			
53	F	1		0.75	0	0	14			
54	M	1		2	0					
37	M	1		1	0	0	334			
37	F		0.75	-1	0	0	14			
44	F		0.25	-0.5						
68	F	1.5		1	0	0	35			
34	F	1		1	0	0	21			
32	M	0.75		0.5	0	0	14			
53	M	0.75		0.5	0	0	21	0	154	
24	F	0.75		1	0					
30	F	0.5		1	0	0	14			
41	F	1		1	0	0	7			
31	M	1		1	0					
37	F	0.5		0.5	0	0	21			
26	F	1		1	0	0	21			
47	F	0.75		1	0	0	21			
40	F	0.5		2	0					
37	F		0.5	-1	0	0	7			
28	F	0.75		1	0					
55	F		1	-1	0					
46	M	1		0.75	0	0	14			
70	F		0.5	-0.75	0	0	7			
55	M		0.75	-1	0	0	7			
36	M	1		1.5	0	0	21			
33	M	1		1.5	0					
38	F	1.5		0.5	0	0	14			
37	F	1		0.5	0	0	35			
60	M	1		1	0					
32	F	0.5		1	0	0	21			
54	M	1		0.5	0	0	28			
27	F	1		0.25	0	0	7			
58	F	2		2.5	0					
22	F	0.75		1	0					
48	F	2		1	0	0	35			
38	M	0.5		1	0	0	7	0	14	
26	M		0.75	-3	0	0	42			
61	F	0.25		1	0					
58	M	0.75		2	1	1	35	0	70	
24	F		0.5	-1	0	0	28			
32	M	1		0.5	0	0	14			
33	M		1	-2	0	0	14			

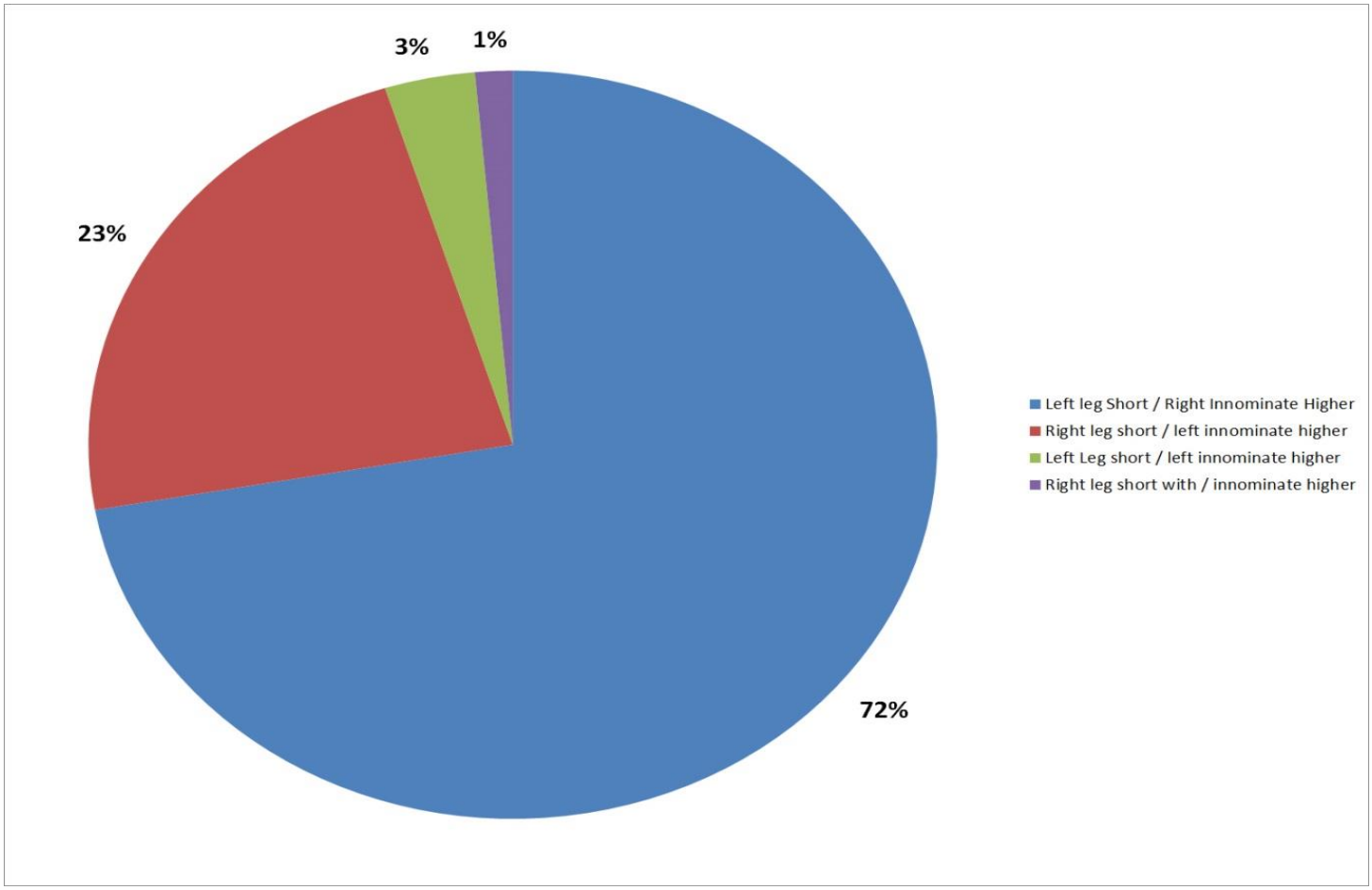
Age	Gender	Lt leg short	Rt leg short	Illia incline Pre-(Lt to Rt)	Illia incline Post(Lt to Rt)	2nd	no/ of days	3rd	no/ of days2	4th
41	F	1		3	0	0	28			
43	F		1	-1	0					
43	F		1	-1	0	0	28			
54	F		1	0.75	0	0	21			
48	F	1		2	0	1	21			
69	F	0.75		1	0	0	21			
57	F	1		1	0	0	35			
66	F	1		-2	0	0	21			
50	M	1		2	0					
59	F	0.75		3	1.5					
64	F		1	3	0					
37	M		1	2	0	0	21			
45	F	1		1	0					
46	F	1		1	0	0	35			
32	M	1		1	0	0	14			
54	F	1		3	2	1	14			
46	F		0.5	-1	0					
69	F	1		-1	0					
51	F	0.5		1	0					
40	F	1		1	0	0	14			
49	F		0.75	-1	0	0	14			
63	F	0.66		2	0	0	14			
51	F	1		1	0					
21	F	1		1	0					
45	M	0.5		2	0.5					
52	M		0.5	-1	0	0	14			

350 patients details (225 female and 125 male) were used for this study. They attended the author's clinic requesting the Atlasprofilax procedure. Data was collected over a 2.5 year period. The table below describes the age data.

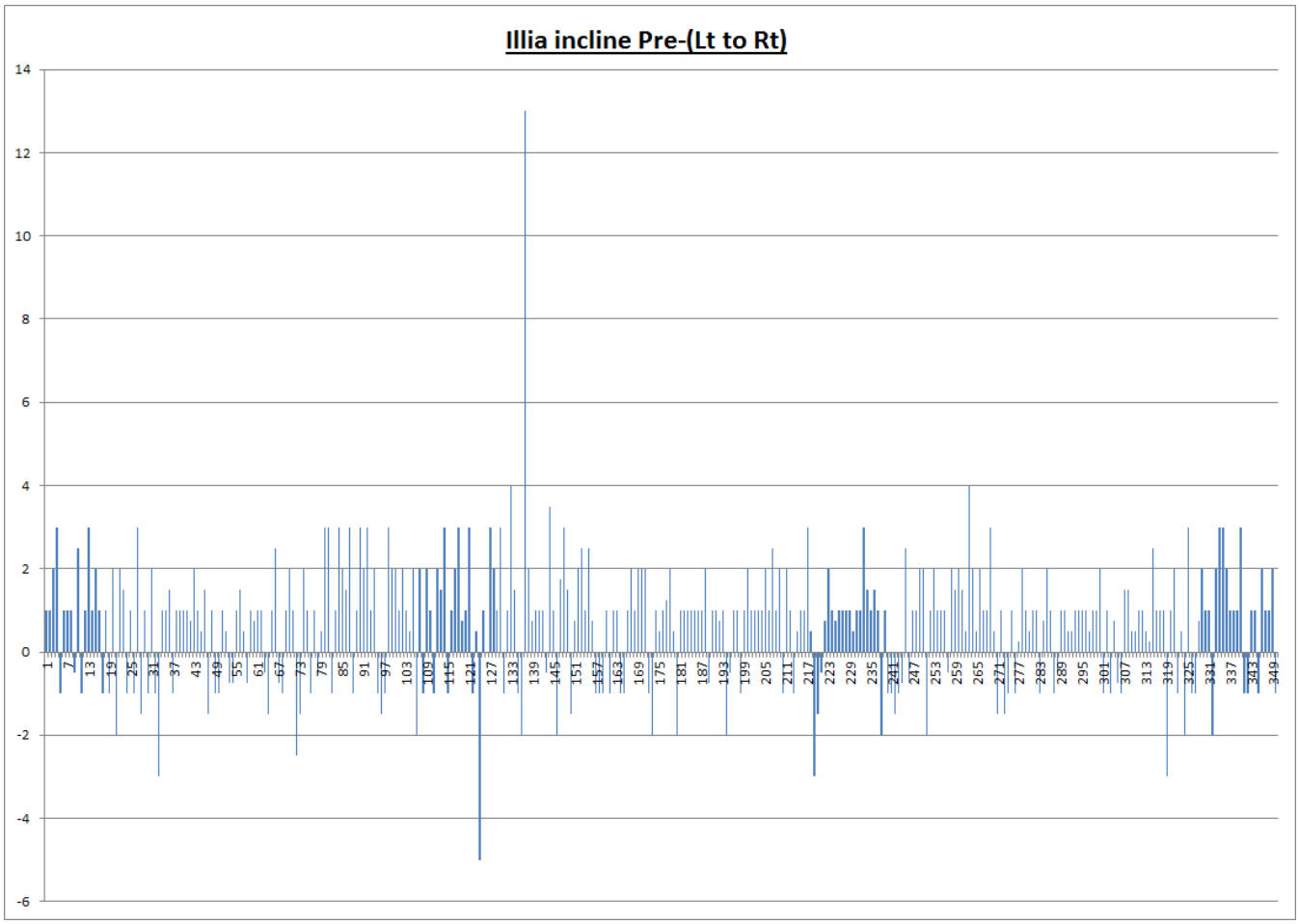
Gender	Count	Min Age	MaxAge	Average Age	StdDev Age
F	225	15	74	43.00	12.47
M	125	13	74	41.94	12.02
Total	**350**	**13**	**74**	**42.62**	**12.30**



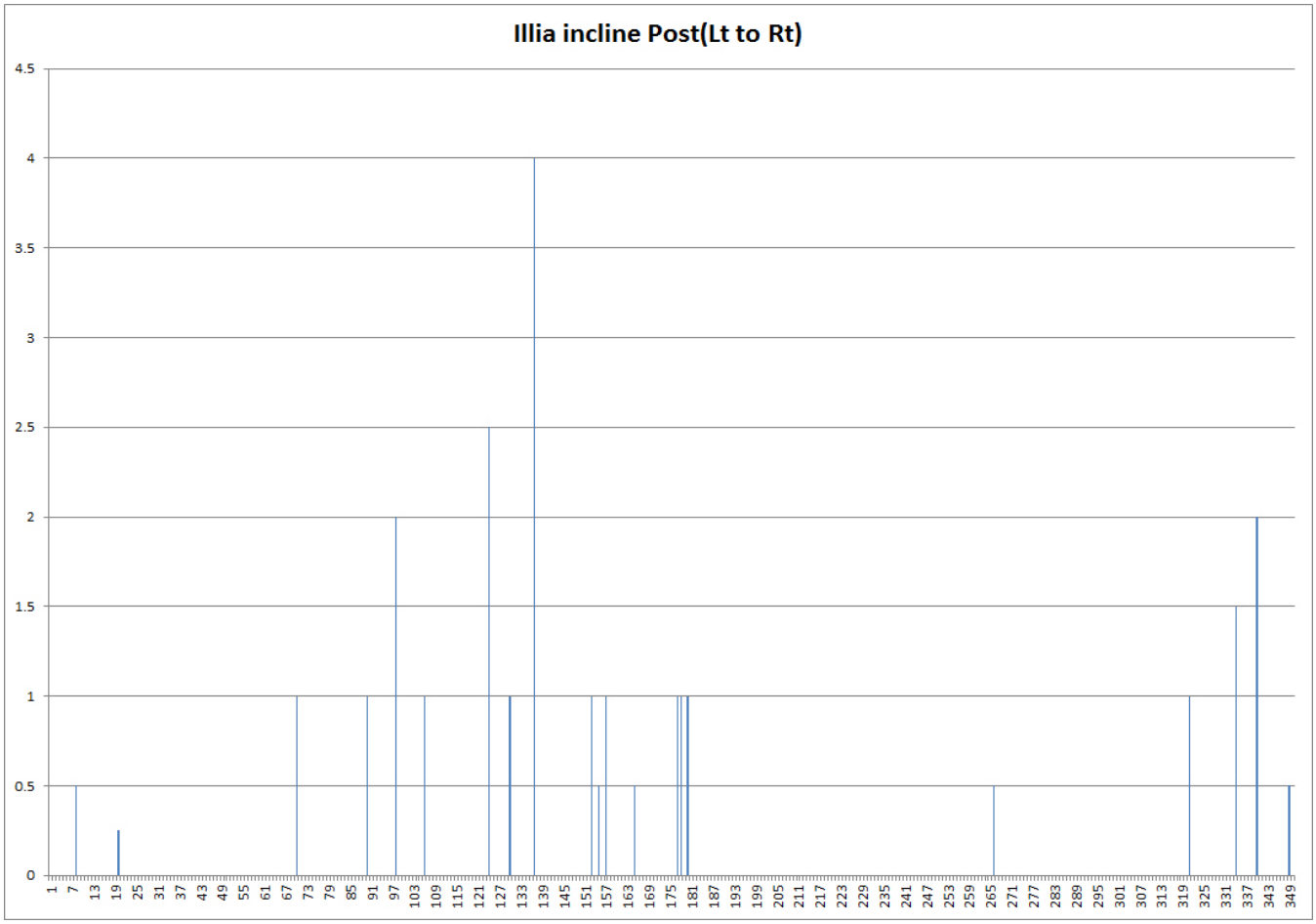
The Pie chart below highlights that two patient presentations were most common. By far the most common presentation was a functional short left leg with associated iliac incline from left to right.



The chart below highlights the fact that a positive incline was much more common than a negative incline prior to Atlasprofilax.



The chart below indicates that over 90% of patients post Atlasprofilax had level iliac crests. Furthermore most patients that continued to have some pelvic obliquity showed an improvement in incline.



5. Discussion

The Atlaspofilax procedure involves strategic mechanical pressure and vibration to the muscles of the suboccipital region. This treatment appears to relax the muscles and fascia at a deep level enabling the atlas to relocate itself to its neutral position. The results of this study suggest that the Atlasprofilax procedure creates a mechanism by which the sacral base becomes level, which in turn corrects pelvic torsion and FLLD. The author proposes that the dura mater may play a role in this mechanism. As mentioned in the introduction much research has been undertaken with regard to the anatomy of this tissue. The coincidental fact that the dura mater invaginates the suboccipiatl region and its strongest attachments occur in this region and at the sacral region may be the key to why the Atlasprofilax procedure creates an immediate effect on the sacral base. The dura mater is flexible but is resistant to torque. Atlas malrotation may create torque in the dura mater and therefore it is feasible that this torque causes sacral base unlevelling which results in FLLD. The Atlasprofilax procedure provides the mechanism whereby torque in the dura mater is released. The author has also observed that in cases where pelvic obliquity is improved but not totally resolved a coexisting sacro-iliac joint dysfunction usually is present. Osteopathic manipulation directed at the sacro-iliac joint usually resolves this issue and the iliac crests then become level.

6.Conclusion

The author proposes that malrotation of the Atlas is the primary somatic dysfunction and this situation is present in a very high proportion of humans with as yet an undetermined aetiology. This malrotation induces spinal dural torque which has secondary effects. Inferiorly at the sacrum the dural torque creates unlevelling of

the sacral base which in turn causes pelvic torsion and subsequently FLLD. Superiorly this dural torque ascends creating cranial dural stress. Most importantly this paper indicates that on correcting the malrotated atlas dural torque is immediately reduced or nullified which immediately corrects pelvic torsion and FLLD.

References

Frank Scali, Eric S.Marili, Matt E. Pontell. 'Anatomical Connection Between the Rectus Capitis Posterior Major and the Dura Mater'. Spine 2011

Gary D. Hack, Peter Ratui, John p. Kerr, Gwendolyn F. dunn, Mi Young Toh. 'Visualisation of the Muscle-Dural Bridge in the Visible Human Data Set'. The Visible Human Project, National Library of Medicine.

Dr Nick Hodgson 2006 www.torquerelease.com.au The Role of the Spinal Dura Mater in spinal Subluxation.

Piva SR,Erhard RE,Childs JD,Hicks G,Al-Abdulmohsin H. Reliability of measuring iliac crest level in the standing and sitting position using a new measurement device.Source:Department of Physical Therapy, School of Health and Rehabilitation Sciences, University of Pittsburgh, Room 6035 Forbes Tower, Pittsburgh, PA 15260, USA