"A study to determine the usefulness of the Gonstead Listing System as an indicator of the direction of adjusting the sacroiliac joint in the treatment of sacroiliac syndrome."

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Dissertation submitted in partial compliance with the requirements for the Master's Diploma in Technology in the Department of Chiropractic at the Natal Technikon.

I, Rayne Moorcroft, declare that this dissertation represents my own work.

SIGNED:_____ DATE: 27/8/97

APPROVED FOR FINAL SUBMISSION

_____ 27/8/97.

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Dedication.

This work is dedicated to my parents for giving me the opportunity to enter this noble profession.

Acknowledgments.

My thanks are extended to Dr A. Peers, Dr G. Till and Dr I. Kotze for their involvement in the initiation and completion of this study.

Abstract

PURPOSE:

The purpose of this study is to evaluate the usefulness of the Gonstead Listing System as a reliable indicator of the direction in which to adjust the sacroiliac joint in subjects with sacroiliac joint dysfunction, in terms of their subjective and objective clinical findings. The hypothesis is that the direction of manipulation is clinically insignificant in causing a decrease in the subject's clinical findings. This information is necessary in order for chiropractors to formulate a more cost-effective treatment protocol for their patients.

METHOD:

The study design consisted of a randomized controlled sample of thirty subjects diagnosed with sacroiliac dysfunction. The thirty subjects was divided into a treatment group of fifteen subjects and a control group of fifteen subjects. The control group was adjusted according to the radiographic findings as determined by the Gonstead Listing System. The treatment group were adjusted exactly opposite to the radiographic findings as determined by the Gonstead Listing System.

Subjective measurements included the Numerical Rating Scale 101, the McGill Short Form Pain Questionnaire, and the Oswestry Low Back Pain Disability Questionnaire. Goniometric measurements constituted the objective clinical findings. Measurements were taken after the

initial consultation, after a course of a maximum of nine treatments, and again after a one month follow-up period.

Data analysis consisted of the Wilcoxon's signed rank test for with-in group testing and unpaired t-tests for between group analysis.

RESULTS:

Between group analysis revealed no statically significant difference between the treatment and control groups for any of the measurements taken.

Although slight differences were found in the within group analyses, overall they demonstrated a trend towards improvement during the initial consultation to last treatment, and initial consultation to follow-up intervals, but showed no significant improvement during the last treatment follow-up interval.

CONCLUSIONS:

No statistically significant difference was found between the control and treatment groups, supporting the hypothesis that radiographic marking systems like the Gonstead Listing System are not useful in the diagnosis and treatment of sacroiliac joint dysfunction.

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PSIS	-	POSTERIOR SUPERIOR ILIAC SPINE
LBP	-	LOW BACK PAIN
SI	-	SACROILIAC
GLS	-	GONSTEAD LISTING SYSTEM
AS	-	ANTEROSUPERIOR
PI	-	POSTEROINFERIOR
EX	-	EXTERNAL
IN	-	INTERNAL
AP	-	ANTERIOR TO POSTERIOR
L2	-	SECOND LUMBAR VERTEBRA
L3	-	THIRD LUMBAR VERTEBRA
BROM	-	BACK RANGE OF MOTION INSTRUMENT
IT	-	INITIAL TREATMENT
LT	-	LAST TREATMENT

FU	-	FOLLOW-UP CONSULTATION
STD. DEV	-	STANDARD DEVIATION
C	-	CONTROL GROUP
T	-	TREATMENT GROUP
P	-	PAIRED RESULTS
H1	-	NULL HYPOTHESIS
H0	-	ALTERNATE HYPOTHESIS
NRS	-	NUMERICAL RATING SCALE 101
MCG	-	McGILL SHORT FORM PAIN QUESTIONNAIRE
OSW	-	OSWESTRY LOW BACK PAIN DISABILITY QUESTIONNAIRE

DEFINITION OF TERMS.

1. Adjustment:

"A specific form of direct articular manipulation utilizing a short lever and characterized by a dynamic, forceful, high velocity thrust of controlled amplitude, after appropriate stabilization of other joints has occured and the joint is tractioned. A spinal (joint) adjustment is a passive , manual manoeuvre during which an articular element is suddenly carried beyond the usual, physiological limit of movement without exceeding the boundaries of anatomical integrity. The usual, but not obligate, characteristic of an adjustment is the thrust which is a brief, sudden and carefully controlled minimal dose or impulse of force and amplitude delivered at the end of the normal passive range of movement and which can be accompanied by a cracking noise. " (Bryner 1987: 8-9)

2. Listing:

"A designation, often abbreviated for simplicity, of the spatial orientation of vertebra in relation to adjacent segments, e.g. rotational or flexion malposition." (Bryner 1987: 24-25)

3. Gonstead Technique:

"Gonstead Technique originated by Dr Clarence S. Gonstead. It is based on the theory that change in nerve function at an intervertebral foramen (chronic or acutely inflamed) will determine the 'wedging ' of a disc and thence the reflection of this on x-rays and by motion palpation into lateral flexion. Other distortions are explained according to the 'foundation principle' and lead to a specialized system of techniques for its listing system for position of vertebrae." (Bryner 1987: 20)

4. Listing (Gonstead)

"Every subluxation constitutes a structural derangement between two anatomical parts that would be in direct apposition under normal conditions. The term 'listing' has come to mean the group of letters that represents the direction of travel of a misaligned part." (Herbst 1980).

5. Sacroiliac Syndrome:

"The syndrome presents with pain over one sacroiliac joint in the region of the PSIS. This may be accompanied by referred pain over the buttock, greater trochanter, groin, posterior thigh and knee and occasionally to the postero-lateral calf, ankle and foot." (Kirkaldy-Willis 1988)

1. INTRODUCTION

Between 60% and 80% of the general population will suffer from low back pain at some stage in their lives (Cassidy and Wedge 1988). Anderson (1981) describes low back pain as "one of the most frequent disabling conditions affecting people in their productive years."

Dreyfuss et al (1994) stated that the sacroiliac joint "... is widely, but not universally, accepted as a potential source of low back and buttock pain." Cassidy (1992) says that " The question of the clinical significance of the sacroiliac joints in low back pain, is further complicated by the lack of any objective method of demonstrating their involvement in the disease process." This apart, Kirkaldy-Willis (1988) states that in patients suffering from sacroiliac syndrome, manipulation for three to four days often relieves the pain and restores movement to the joint. Other authors too, have claimed excellent results in the treatment of sacroiliac syndrome by manipulation (Xiaodong and Yonggang, 1994; Schmid, 1984; Herzog, 1995; Hendler et al, 1995; Cassidy, 1992; Bernard and Kirkaldy-Willis, 1987). Herzog (1995) feels that, "...it is quite conceivable (although not proven) that in these latter cases, in which an actual misalignment problem exists before the treatment, spinal manipulative therapies will produce a lasting realignment of vertebral bodies."

Thus we know that manipulation does have a role to play in the management of sacroiliac syndrome, but there is still dispute within the profession as to whether taking a static listing of the innominate bone into account makes any difference to the clinical outcome, whether sacroiliac joint syndrome is in fact a clinically distinct form of low back pain, and what the medium and long term effectiveness of spinal manipulation is with regards to sacroiliac joint dysfunction. Daum (1995) raises the point of the paucity of long term studies

to establish the natural history of the problem. Taylor and Gatterman (1995) feel that radiographic procedures should be reserved for those cases with specific clinical indication, and should not be a routine method of establishing a diagnosis.

The static approach (Gonstead Listing System) relies on palpation and x-ray findings to determine in which way the sacrum and innominate bones have become misaligned and the manipulation aims to return these bones to their normal anatomical positions.

The dynamic approach (Kirkaldy-Willis approach) takes into account the direction in which a bone is not moving in relation to the bone above or below it. The manipulation aims to restore normal movement to that joint irrespective of the relative positions of the bones.

The Gonstead and Kirkaldy-Willis methods of assessing mechanical problems of the sacroiliac joint are commonly used in the field today. Both approaches are taught routinely at most Chiropractic Colleges (The Chiropractic College Directory 1994 - 1995).

Walters (1993) writes this of the Gonstead Listing System:

> "After all other tests have been performed, the radiographic line drawings and listings show the way in which the vertebra and joints have been 'twisted and jammed' (fixated). This then informs the practitioner of the specific contact and the direction of thrust required to reverse the positional dyskinesia and to prevent further ligamentous damage during the thrust."

There is no evidence to suggest that actual ligamentous damage does occur as there is no reference cited, and one can conclude that such a statement is purely speculative. Gatterman

(1995) states that manipulation of an unstable segment is unlikely to cause further instability provided it is applied within the physiological range of the joint. Furthermore, anecdotal evidence would seem to indicate that the direction of the manipulation is immaterial to clinical improvement (Till 1994).

Gatterman (1990) queries the accuracy of radiographic measurements in indicating malpositions or misalignments of the spine and states that inter- and intra-examiner reliability in the marking of radiographs alone is very poor. This is in conflict to the findings of Plaugher et al. (1993). She also questions the feasibility of evaluating biomechanical functions of a joint on a static radiograph.

To date it has been established that the marking of these radiographs and the patient positioning for these films is reliable, yet Plaugher et al. (1990) has determined that there is a demonstrable post-treatment change of retrolisthesis only. The question of clinical validity is brought into focus here. This study will provide valuable information in terms of the clinical value of radiographic line drawings and measurements in the diagnosis and treatment of sacroiliac syndrome.

The results of this study would further the profession's understanding of the nature of the syndrome. This information would be useful in chiropractic education in terms of the clinical application, and would lead to a decrease in x-ray costs and radiation dosage to the patient.

The aim of the study is to determine the usefulness of the Gonstead Listing System as a reliable indicator of the direction in which to adjust the sacroiliac joint in subjects with sacroiliac syndrome, in terms of their subjective and objective clinical findings. The objectives of this study are:

1. To determine the clinical outcome of adjusting subjects with sacroiliac syndrome according to the Gonstead Listing system.

2. To determine the clinical outcome of adjusting subjects with sacroiliac syndrome in the opposite direction to that indicated by the Gonstead Listing System.

3. To compare the results obtained from objectives 1. and 2. in order to determine the usefulness of the Gonstead Listing System in indicating the direction in which to adjust the sacroiliac joint in subjects with sacroiliac syndrome.

2. REVIEW OF THE RELATED LITERATURE

The review of the related literature will describe the sacroiliac joint anatomy and biomechanics, the epidemiology and incidence of sacroiliac syndrome in relation to low back pain, the Gonstead Listing System as it pertains to the sacroiliac joint, the sacroiliac syndrome, and will conclude with a brief summary of the main points discussed.

2.1 ANATOMY AND BIOMECHANICS OF THE SACROILIAC JOINT.

The paired sacroiliac joints lie within the pelvic ring and consist of a fibrocartilagenous iliac surface and a thicker sacral joint surface of hyaline cartilage (Grieve 1976). Bernard and Cassidy (1991) state that the sacroiliac joint qualifies as a true synovial joint due to the following four facts:

1. The presence of a joint cavity containing synovial fluid.
2. adjacent bones having ligamentous connections.
3. an outer fibrous joint capsule with an inner synovial lining.
4. cartilagenous surfaces allowing motion.

The size, shape and roughness of the articular surfaces varies greatly, being smooth in childhood and becoming irregular with depressions and elevations during adulthood. (Magee 1992, Hendler et al. 1995) It is these elevations and depressions that add strength to the joint, but may also restrict motion when the congruency of the elevations and

depressions become altered. These non-pathologic irregularities of the articular cartilage begin to develop around puberty, elevations or convexities usually on the iliac side, and depressions or concavities on the sacral side (Vleeming et al. 1990). Degenerative changes usually begin to develop by the third decade (Gatterman, 1990; Cassidy, 1992). Forward movement of the sacral base and the resultant increase in the lumbar lordosis is resisted extrinsically by the abdominal and gluteal musculature and intrinsically by the sacroiliac ligaments (Grieve, 1976).

The sacroiliac ligamentous support system consists of a strong, thick posterior sacroiliac ligament and a less dense extension of the anterior capsule. The interosseous sacroiliac ligaments run between the sacrum and the iliac bones. Bernard and Cassidy (1991) note that anatomically the sacroiliac joint is surrounded by "...some of the largest and most powerful muscles of the body, but none of these have direct influence on joint motion." Gatterman (1995) recognizes the sacroiliac joints as synovial, moving, weight-bearing joints capable of subluxation and joint dysfunction.

Gatterman (1990) describes the sacroiliac joint as being highly controversial in terms of the function of the joint with respect to the pelvic ring, and the movement which takes place within the pelvic ring. Panzer and Gatterman (1995) describe 3-5 degrees of motion having been demonstrated in both cadaveric specimens and living subjects. They also state that translation and rotation are considered as normal motion within the sacroiliac joints. This extra movement is believed to enhance the shock absorbing quality of the joint. Bernard and Cassidy (1991) are of the opinion that sacroiliac joint motion is complex and that movement does not occur around a fixed axis of rotation. They further state that the exact model of movement remains unknown, but that the predominant motion seems to be x-axis rotation

with a degree of z-axis translation. This view is shared by Haldeman (1992) who feels that the biomechanical function of the joint remains largely unknown. In general, he feels that the range of motion is small and decreases with increasing age, that range of motion is greater in females and increases with pregnancy, that motions are coupled and depend on the degree of joint separation, and that the predominant motions are x-axis rotation coupled with some degree of z-axis translation. Jacob and Kissling (1995) feel that," ...the nature and amplitude of movement in the sacroiliac joint is still open to controversy." Using a three dimensional stereophotogrammetric method they established average values for total rotation and translation to be about 1.7 degrees.

Sturesson et al. (1989), also using roentgen stereophotogrammetry, found the mean rotation value to be 2.5 degrees and the mean translation value to be 0.7 mm. Furthermore, they found there to be no significant difference between symptomatic and asymptomatic joints.

2.2 EPIDEMIOLOGY OF LBP AND THE INCIDENCE OF SI SYNDROME.

Gemmell and Jacobson (1990) conducted a study to determine the incidence of sacroiliac joint dysfunction in fit college students. Their results showed that 26.5% indicated a history of low back pain with 19.3% being shown to have uni- or bilateral sacroiliac joint dysfunction. A higher incidence was found amongst females, and white students showed a much higher incidence of low back pain than black students. Fitness level was also found to be directly related to the incidence of low back pain. Within the group indicating low back pain 27.3% were found to have sacroiliac joint dysfunction. 19.3% of the total group were diagnosed with either uni- or bilateral SI joint dysfunction. Interestingly, only 37.5% of those subjects found to have SI joint dysfunction reported having low back pain. The

authors concluded that they could not find an association between sacroiliac joint dysfunction and low back pain in fit college students.

Schmid (1984), who conducted a comprehensive study at Lindhof Hospital from 1978 to 1982, stated an incidence of sacroiliac involvement in 457 out of 1344 patients (34%) admitted to the hospital for low back pain. After a course of therapy, which included manipulation, he claimed an "excellent" to "good" response from 86% of patients.

Bernard and Cassidy (1991), in a study, determined a 45% right sided, 35% left sided, and 20% bilateral sacroiliac joint incidence of involvement. This is in contrast to Xiaodong and Yonggang (1994), who claim that bilateral sacroiliac syndrome never occurs.

Bernard and Kirkaldy-Willis (1987) dealt with 1293 cases of low back pain over a 12 year period. 336 (26%) were diagnosed with sacroiliac joint syndrome and of these 258 (95%) showed excellent to good results following two weeks of spinal manipulation.

2.3 THE GONSTEAD LISTING SYSTEM.

Owing to the paucity of references either refuting or substantiating the Gonstead Technique, the literature for this study is derived mainly from the work of Herbst (1980) and Walters (1993), both Gonstead practitioners.

The Gonstead Listing System is based on the principle that the human body requires a stable foundation to maintain maximum balance and stability in the spinal column (Herbst 1980). According to Gonstead, the body's foundation is formed by the pelvic girdle and the ilium

may become misaligned in four possible directions: anteriorward, posteriorward, medialward and lateralward. This misalignment of the ilium is in relation to the sacrum, and therefore the actual misalignment is said to have taken place in the sacroiliac articulation.

The following is a list of the letters used in the GLS to signify the direction of misalignment:

A - anterior

P - posterior

In - internal

Ex - external

R - right

L - left

I - inferior

S - superior

The radiological method of determining innominate misalignments is as follows: horizontal parallel lines are drawn at the superior aspect of the femoral heads, at the inferior borders of the ischial tuberosities, and at the superior borders of the iliac crests. The parallels at each iliac crest and ischium are drawn separately and are not continuous. The Innominate Measurement is the distance measured between the iliac crest and the corresponding ischium. The shorter measurement denotes an AS ilium, and the longer measurement denotes the PI ilium.

2.3.1 The AS (anterosuperior) ilium.

Due to the orientation of the sacroiliac joint surfaces, when the ilium moves anteriorly, it also moves in a superior direction (no reference cited). When this is found to occur, as indicated by the shorter of the two Innominate Measurements on radiographic analysis, Gonstead ascribes the listing: AS ilium.

Further radiological changes that are alleged to occur in an AS ilium are a decrease in the diagonal length of the obturator foramen, and an elevation of the femoral head line, assuming that the lower extremities are anatomically similar. Grieve (1976) supports this view stating that "...the ilium and sacral base on the longer leg tends to be shuffled backwards (posterior-inferior) and the pubis upwards ". He does, however, add that this is not evident in all patients. This view is also held by Don Tigny (1985).

In terms of this theory, examination of the patient should reveal a flattening of the normal lumbar lordosis and oedema at the posteroinferior margin of the sacroiliac joint.

2.3.2 The PI (posteroinferior) Ilium.

With a PI misalignment of the ilium, radiological analysis should reveal an increase in the length of the Innominate Measurement, an increase in the diagonal length of the obturator foramen, and a lowering of the femoral head line. On examination, the patient should reveal a hyperlordosis and an oedematous space around the superior margin of the sacroiliac joint.

To determine which side the subluxation is on, i.e. on the left or right, Gonstead says one should take into account rotation of the fifth lumbar vertebra. The side toward which the vertebral body is rotated denotes the potential subluxation. Once again, no reference is cited for this seemingly speculative statement.

2.3.3 Medial and lateral pelvic misalignments.

A line perpendicular to the femoral head line is drawn at the first sacral tubercle. A line drawn through the centre of the pubic symphysis will either lie to the left of, to the right of, or on the perpendicular through the first sacral tubercle. The pubic symphysis rotates toward the side of the internally rotated ilium. Therefore, Gonstead uses the posterior superior iliac spine as the reference point.

Of the four possible ilium misalignments, compound misalignments also occur. These are ASEx, ASIn, PIEx and PIIn. These compound misalignments are 90 degrees apart, therefore it is possible to adjust the joint in the exact opposite direction to that indicated by the Gonstead Listing System.

Plaugher et al. (1993) showed that a patient can be reproducibly positioned for an AP pelvic x-ray after 1 hour and 18-day time intervals, provided that careful attention is paid to technical detail. They also established excellent inter- and intra observer reliability in the analysis of these radiographs using the Gonstead marking system.

However, in another study by Plaugher et al. (1990), the only postmanipulation change shown was a 34% reduction in retrolisthesis. There were no postmanipulation changes

shown in cervical lordosis, sacral base angle, lumbar lordosis, scapular angle or Cobb's angle.

Gatterman (1995) found that full spine x-rays analysed by line drawings and measurements have minimal value in predicting the presence or absence of low back pain.

The evidence would seem to indicate that full spine radiography is not particularly useful in terms of diagnosing sacroiliac syndrome, and further, that it might not be useful in indicating the direction in which to adjust the sacroiliac joint.

2.4 THE SACROILIAC SYNDROME.

Gatterman (1995) describes the sacroiliac subluxation as possibly being a simple "joint locking", with or without compensatory hypermobility of the opposite joint. Daum (1995) defines sacroiliac dysfunction as "...an aquired mechanical instability, with no history of major trauma, which leads to fixed subluxation or hypermobility of the joint." He also states that "...microscopic failure of the posterior ligaments associated with the degenerative process or repetitive trauma is most likely a component in the presentation of sacroiliac joint dysfunction."

It is thought that undue loading of the joint may force the irregularities of the articular cartilages into a new position, where elevation and depression lose their congruency (Dreyfuss et al. 1994; Hendler et al. 1995). The resultant limitation of movement or abnormal movement occurs due to an alteration of the normal axis of rotation.

Frequently the patient will describe a fall or "lifting-twisting" injury as an inciting event prior to the development of the characteristic pain pattern, which is thought to be due to ligament tightening and muscle spasm. This view is supported by Bernard and Cassidy (1991) when they state that "...the sacroiliac joint is more susceptible to axial compression and torsion, that would stress the weaker anterior capsule and ligaments. This type of force would be created by forward bending, lifting and twisting." Sacroiliac sprain has also been quoted in the etiology of sacroiliac joint pain resulting in uni- or bilateral hypermobility without joint locking.

Hendler et al. (1995) distinguishes between sacroiliac strain and sacroiliac dysfunction. Sacroiliac strain is described as a painful stretching of the sacroiliac ligaments, and dysfunction is said to occur when the ilium slips on the sacrum, resulting in wedging of irregular prominences from the two articular surfaces. The pain is usually dull in nature, and is located over the sacroiliac joint and ipsilateral buttock. Classically, the pain is aggravated by sitting, and may radiate posteriorly down the thigh and into the posterior or lateral calf. The pain may also extend round to the ipsilateral groin or adjacent abdomen. The anterior pain is thought to originate from the anterior sacroiliac ligaments, and follows the anterior dermatomal areas of L2 and L3. Ipsilateral hip pain may be due to hypertonicity of the piriformis muscle in an attempt to stabilize a hypermobile joint.

Daum (1995) states that certain activities such as stair climbing and cycling may aggravate the pain of sacroiliac syndrome, and that a symptomatic patient frequently shows sitting intolerance, favouring the uninvolved side.

The efficacy of spinal manipulation has been tested by numerous authors, including Kirkaldy-Willis (1988), who states that in patients suffering from sacroiliac syndrome, manipulation for three to four days often relieves the pain and restores movement to the joint. Other authors have claimed excellent results in the treatment of sacroiliac syndrome by manipulation (Xiaodong and Yonggang, 1994; Schmid, 1984; Herzog, 1995; Hendler et al, 1995; Cassidy, 1992; Bernard and Kirkaldy-Willis, 1987). Herzog (1995) feels that "...it is quite conceivable (although not proven) that in these latter cases, in which an actual misalignment problem exists before the treatment, spinal manipulative therapies will produce a lasting realignment of vertebral bodies."

2.5 TESTS FOR SACROILIAC DYSFUNCTION.

Gatterman (1995) describes four tests as being the most useful in terms of determining sacroiliac joint dysfunction. These include Pelvic Compression, Fabere or Figure of Four Test, the Straight Leg Raise, and Thigh Hyperextension (Yeomann's or Erichson's test). However, she does state that the lesion is best detected through motion palpation.

Dreyfuss et al. (1994) studied three common motion palpation tests used for screening for sacroiliac dysfunction, namely, the standing flexion, seated flexion, and Gillet tests. They found that 20% of 101 asymptomatic individuals had positive findings in one or more of these tests. They do state, however, that the Gillet test is thought to be the most sensitive as it evaluates symmetry of motion.

Herzog et al. (1989) found intra-examiner reliability to be statistically significant for the Gillet motion palpation tests but, interestingly, also concluded that low tester expertise yielded more consistent intra-examiner reliability than did high tester expertise.

Potter and Rothstein (1985), in their study, found 11 of 13 tests for sacroiliac joint dysfunction to have poor (less than 70%) agreement. Only 2 of the 13 tests showed greater than 70% agreement, and these imparted no information on the position or movement of the joint. Gemmell and Jacobson (1990) concluded that they were unable to establish an association between sacroiliac joint dysfunction, as determined by motion palpation ,and low back pain.

Osterbauer et al. (1993) describes iliac compression and pain on distraction tests as being the most reliable in determining sacroiliac joint dysfunction, whereas McCombe et al.(1989) found pain on resisted external hip rotation or on hip flexion had a high inter-examiner reliability, more so than any other sacroiliac orthopaedic test.

Laslett and Williams (1994), state:

> "If subluxations or displacements do occur in the sacroiliac joint, they must be exceedingly small and it is questionable whether they would be palpable. Therefore, examiners using palpation would need to be able to perceive movement of less than 5mm from one extreme range to the other. Two point discrimination of this accuracy may be possible on the finger or thumb, but palpation test rely on the accuracy of perception of movement at the examiners fingers through more than a centimeter of moving tissue. This may explain the lack of reliability of sacroiliac tests that use palpation".

Walker (1992) suggests that the term "play" should be used when referring to the sacroiliac joint, as "...'motion' connotes the idea of a quantity of motion similar to other synovial joints, which does not appear to be the case."

2.6 SUMMARY OF POINTS COVERED.

The sacroiliac joint is a highly controversial joint in terms of it's functions and movements, though most authors agree that it is a true synovial joint, capable of some degree of probably coupled movement, and capable of subluxation or dysfunction.

Sacroiliac dysfunction has been described as a very common and frequently overlooked source of low back pain.

The Gonstead Listing system is a system of radiographic line drawings performed on a full spine x-ray. For the sake of brevity this study dealt only with the sacroiliac joints, and the markings were performed on an AP pelvis x-ray in order to determine which way the ilium had become statically misaligned with respect to the sacrum. This is called a listing and tells the marker exactly in which direction to adjust the sacroiliac joint.

Reliability of x-ray standards and intra-marker accuracy have been established, but the usefulness of the system for diagnosing and treating sacroiliac syndrome has, to this authors knowledge, never been tested. The benefits of spinal manipulation for sacroiliac joint dysfunction have been reported by numerous authors (Xiaodong and Yonggang, 1994; Schmid, 1984; Herzog, 1995; Hendler et al, 1995; Cassidy, 1992; Bernard and Kirkaldy-Willis, 1987).

3. MATERIALS AND METHODS

3.1 STUDY DESIGN AND PROTOCOL.

A controlled study of thirty subjects was chosen in order to establish the usefulness of the GLS in the treatment of sacroiliac syndrome. The control group (fifteen subjects) received spinal manipulation of the sacroiliac joint alone, according to the Gonstead listings as determined by radiographic analysis, and the treatment group (fifteen subjects) also received spinal manipulation of the sacroiliac joint alone, but exactly opposite to the direction indicated by the radiographic listings. Subjects were assigned randomly in the following way. Twenty random numbers were generated using Bernoulli trials, ensuring equal probability of being assigned to either the control or treatment group.

Table 3.1 TABLE OF RANDOM NUMBERS

OUTCOME	GROUP
0	CONTROL
0	CONTROL
0	CONTROL
1	TREATMENT
1	TREATMENT
1	TREATMENT
0	CONTROL

0	CONTROL
1	TREATMENT
0	CONTROL
1	TREATMENT
1	TREATMENT
0	CONTROL
0	CONTROL
0	CONTROL
1	TREATMENT
0	CONTROL
1	TREATMENT
1	TREATMENT
1	TREATMENT

The first patient qualifying for the study was assigned to the control group. Thereafter weight, age and sex were considered, and subjects of similar age, weight and sex were assigned to opposite groups.

All potential subjects received the normal medical screening, including a case history (appendix A), physical examination (appendix B), and low back regional examination (appendix C). Thirty subjects diagnosed with sacroiliac syndrome, alone or concomitantly suffering from myofascial pain and dysfunction syndromes of the low back, or gluteal muscles, or lumbar facet syndromes, were admitted to the study. Diagnostic criteria for the diagnosis of sacroiliac syndrome for this study was as follows: tenderness to palpation over the PSIS, detection of motion palpation fixation, and one or more of the following tests positive: Erichson's test, Fabere test, Gaenslen's test, and Ober's test.

The nature of the study was explained to subjects, as well as what would be expected of them, and they required to fill out an informed patient consent form (appendix D).

3.2 SUBJECTS.

Subjects had to be literate in English in order to read, understand, and respond to the subjective assessments that were filled out in the researcher's presence.

Subjects found to have any infection, trauma, disc herniation, spinal fusion, congenital abnormalities, ankylosing spondylitis or neoplastic conditions, as well as those on any medication or currently undergoing other treatment for the condition were delimited from the study.

3.3 ETHICS.

Radiation dosage of a singe radiograph was approved by the resident radiologist of the Technikon Natal Radiography Department (appendix E).

There were no technical, ethical or financial constraints that could have made the study unfeasible.

3.4 INTERVENTIONS (TREATMENT).

Fifteen subjects, assigned to the control group, received sacroiliac manipulation alone, according to the listing determined by the GLS. Fifteen subjects, assigned to the treatment group, also received sacroiliac manipulation alone, exactly opposite to the listings determined by the GLS. Therefore, in the treatment group, a subject with a PIIn listing was adjusted ASEx, and a subject with a PIEx listing was adjusted ASIn and vice versa. Both groups received up to three adjustments per week for a maximum of three weeks. After this period subjects were placed on a one month follow-up programme. If satisfactory improvement (the subject asymptomatic) occured within the three week treatment period, then no further manipulation was administered. The subject was monitored for the balance of the three week interval and then placed on the follow-up programme.The follow-up programme consisted of a once off reassessment of the subjects ojbective and subjective clinical findings, after a period of one month.

Concomitant disorders were not treated as this may have attenuated the results.

3.5 MEASUREMENTS AND OTHER OBSERVATIONS.

An AP pelvis radiograph was taken at the Technikon Natal Radiography Department (appendix E) and, after being reported on by the resident radiologist, was then analysed according to the GLS and the listing determined by the researcher, who had undergone instruction with a qualified Gonstead practitioner. Subjects were then assigned to one of the two study groups.

An assessment of the subject's subjective and objective signs and symptoms was carried out in order to establish a baseline. Subjective measurements included the Numerical Rating Scale 101 (Jensen et al, 1989) (appendix F), the McGill Short Form Pain Questionnaire (Melzack, 1987) (appendix G) and the Oswestry Low Back Pain Disability Questionnaire (appendix H). The Oswestry Low Back Pain Disability Questionnaire was shown by Triano et al. (1993)to "...have sufficient reliability and responsiveness to clinical changes over time " to be used in a randomised clinical trial. It is used to quantify functional disability whereas the McGill Short Form Pain Questionnaire was chosen to quantify the subject's pain experience. (Haas and Nyiendo 1992). The Numerical Rating Scale 101 was chosen because of its practicality. It is very easy to administer and score , and may be responded to in either verbal or written form. These subjective findings were repeated at the end of the treatment period and again after a one month follow-up period, in order to establish short term and medium term effectiveness of the two study groups.

Objective measurements included motion palpation, range of motion testing as recorded by a Back Range of Motion Instrument (BROM) (appendix I), oedema and orthopaedic sacroiliac joint stress tests, including Erichson's or Leg Extension test (Arnold, 1978), Patrick or Fabere test (Murtagh and Kenna, 1989), and Gaenlen's test (Christensen, 1984). The

BROM II instrument was chosen because of its availability at the Technikon Natal Chiropractic Day Clinic, and its reliability has been established by Breum et al. 1995. These tests were performed and the results recorded at each consultation. The BROM readings were also recorded at the end of the treatment period and after a one month follow-up period.

3.6 STATISTICAL ANALYSIS.

The statistical methods used for this study included the two sample unpaired t-test for analysis between groups ,and the Wilcoxon's signed rank test for analysis within groups. The analyses were performed on Statgraphics.

4. RESULTS

4.1 CRITERIA FOR ADMISSIBILITY OF DATA.

Data was accepted:

- if the subject met all the requirements of the study
- from correctly filled out questionnaires
- from subjects whose objective measurements were taken by the researcher
- only from the three questionnaires previously stated and the goniometric readings.

Patients had to undergo all the initial screening procedures including a full case history, physical examination, and low back regional examination. They had to give informed consent to participate in the study. which included an AP pelvis X-ray, and be compliant with all scheduled treatments.

The three questionnaires could either be answered verbally or physically filled out by the patient.

4.2 DATA FOR THIS STUDY.

Four sets of data were collected. Goniometric (BROM) measurements included flexion, extension, left lateral flexion, right lateral flexion, left rotation and right rotation.

Subjective measurements included the Numerical Rating Scale 101 (NRS) (Jensen et al, 1989) (appendix F), the McGill Short Form Pain Questionnaire (MCG) (Melzack, 1987) (appendix G), and the Oswestry Low Back Pain Disability Questionnaire (OSW) (Fairbank et al. 1980) (appendix H). Data collection occurred before the initial treatment (IT), after the last treatment (LT), and after the one month follow-up (FU).

4.3 RESULTS OF BETWEEN GROUP COMPARISONS.

The two-sample unpaired t-test was used to compare the data of the control group with the data collected from the treatment group.

The Null Hypothesis states that there is no significant difference between the control and treatment groups.

The Alternative Hypothesis states that there is a significant difference between the control and treatment groups.

4.3.1 Objective Data.

Table 4.1 RESULTS OF FORWARD FLEXION

READING	IC			LT			FU		
GROUP	C	T	P	C	T	P	C	T	P
MEAN	16.7	15.8	16.2	18.4	17.3	17.8	17.8	17.5	17.7
VARIANCE	22.9	33.6	28.2	23.6	32	27.8	23.4	27.8	25.6
STD. DEV.	4.7	5.7	5.3	4.8	5.6	5.2	4.8	5.2	5
MEDIAN	16	15	16	20	17	19.5	18	18	18

For IC, LT and FU, the 95% confidence interval contains 0, therefore accept the Null hypothesis.

Table 4.2 RESULTS OF EXTENSION

READING	IC			LT			FU		
GROUP	C	T	P	C	T	P	C	T	P
MEAN	6.7	7.0	6.9	6.6	7.0	6.8	6.8	6.5	6.6
VARIANCE	10.3	6.0	8.2	8.8	6.0	7.4	5.1	5.1	5.1
STD. DEV.	3.2	2.4	2.8	2.9	2.4	2.7	2.2	2.2	2.2
MEDIAN	6	7	6.5	6	6	6	6	6	6

For IC, LT and FU, the 95% confidence interval contains 0, therefore accept the Null Hypothesis.

Table 4.3 RESULTS OF LEFT ROTATION.

READING	IC			LT			FU		
GROUP	C	T	P	C	T	P	C	T	P
MEAN	30.6	27.2	28.9	32.3	32.6	32.5	32.6	34.7	33.7
VARIANCE	79.3	32.2	55.7	50.8	28.0	39.4	17.3	14.6	16.0
STD. DEV.	8.9	5.6	7.4	7.1	5.3	6.2	4.1	3.8	4.0
MEDIAN	30	25	28	35	30	33.5	30	35	35

For IC, LT and FU, the 95% confidence interval contains 0, therefore accept the Null Hypothesis.

Table 4.4 RESULTS OF RIGHT ROTATION.

READING	IC			LT			FU		
GROUP	C	T	P	C	T	P	C	T	P
MEAN	28.	31.2	29.7	32.8	33.4	33.1	35.7	34.3	35.0
VARIANCE	69.	64.1	66.6	25.3	30.2	27.7	16.0	13.8	14.9
STD. DEV.	8.3	8.0	8.1	5.0	5.5	5.2	4.0	3.7.	3.8
MEDIAN	28	30	30	32	35	33.5	35	35	35

For IC, LT and FU, the 95% confidence interval contains 0, therefore accept the Null Hypothesis.

Table 4.5 RESULTS OF LEFT LATERAL FLEXION

READING	IC			LT			FU		
GROUP	C	T	P	C	T	P	C	T	P
MEAN	26.8	30.2	28.5	31.7	34.8	33.2	33.5	35.1	34.3
VARIANCE	47.9	41.6	44.8	26.6	11.3	18.9	17.2	9.5	13.4
STD. DEV.	6.9	6.4	6.6	5.1	3.3	4.3	4.1	3.0	3.6
MEDIAN	26	30	30	30	35	35	35	35	35

For IC, LT and FU, the 95% confidence interval contains 0, therefore accept the Null Hypothesis.

Table 4.6 RESULTS OF RIGHT LATERAL FLEXION

READING	IC			LT			FU		
GROUP	C	T	P	C	T	P	C	T	P
MEAN	27.2	31.5	29.3	32.9	34.2	33.5	33.4	35	34.2
VARIANCE	24.8	36.8	30.8	27.7	12.4	20.1	24.5	14.2	19.4
STD. DEV.	4.9	6.0	5.5	5.2	3.5	4.4	4.9	3.7	4.4
MEDIAN	26	32	30	35	35	35	35	35	35

For LT and FU, the 95% confidence interval contains 0, therefore accept the Null Hypothesis.

For IC, the 95% confidence interval does not contain 0, therefore reject the Null Hypothesis.

4.3.2 Subjective Data.

Table 4.7 RESULTS OF NRS

READING	IC			LT			FU		
GROUP	C	T	P	C	T	P	C	T	P
MEAN	35.6	37.6	36.6	16.3	15.3	15.8	20.6	17.8	19.2
VARIANCE	320.0	363.9	342.0	105.2	145.8	125.5	202.2	161.3	181.7
STD. DEV.	17.8	19.0	18.4	10.2	12.0	11.2	14.2	12.7	13.4
MEDIAN	30	35	32.5	15	10	12.5	20	20	20

For IC, LT and FU, the 95% confidence interval contains 0, therefore accept the Null Hypothesis.

Table 4.8 RESULTS OF MCG

READING	IC			LT			FU		
GROUP	C	T	P	C	T	P	C	T	P
MEAN	21.8	22.5	22.1	6.3	8.2	7.3	9.7	12.0	10.9
VARIANCE	137.3	346.2	241.7	30.3	49.4	39.9	44.0	132.4	88.2
STD. DEV.	11.7	18.6	15.5	5.5	7.0	6.3	6.6	11.5	9.3
MEDIAN	20	15	16.5	5	6	6	9	6	7.5

For IC, LT and FU, the 95% confidence interval contains 0, therefore accept the Null Hypothesis.

Table 4.9 RESULTS OF OSW

READING	IC			LT			FU		
GROUP	C	T	P	C	T	P	C	T	P
MEAN	13.3	14.4	13.8	4.9	7.2	6.0	7.4	9.2	8.3
VARIANCE	97.5	132.1	114.8	13.6	79.8	46.7	52.2	109.0	80.6
STD. DEV.	9.8	11.4	10.7	3.6	8.9	6.8	7.2	10.4	8.9
MEDIAN	10	10	10	4	4	4	6	4	6

For IC, LT and FU, the 95% confidence interval contains 0, therefore accept the Null Hypothesis.

4.4 RESULTS OF WITHIN GROUP COMPARISONS.

The Wilcoxon's signed rank tests for two related samples was used to analyse the data from the control and treatment groups.

The null hypothesis (H0) states that there is no significant improvement between the first and second readings.

The alternative hypothesis (H1) states that there is a significant improvement between the first and second readings.

4.4.1 Objective Data.

Table 4.10 RESULTS OF FLEXION

READINGS	IC/LT		IC/FU		LT/FU	
GROUP	C	T	C	T	C	T
P-VALUE	0.07	0.38	0.35	0.3	0.11	0.5
ACCEPT HO	YES	YES	YES	YES	YES	YES

Table 4.11 RESULTS OF EXTENSION

READINGS	IC/LT		IC/PU		LT/PU	
GROUP	C	T	C	T	C	T
P-VALUE	0.5	0.21	0.38	0.3	0.15	0.15
ACCEPT HO	YES	YES	YES	YES	YES	YES

Table 4.12 RESULTS OF LEFT ROTATION

READINGS	IC/LT		IC/PU		LT/PU	
GROUP	C	T	C	T	C	T
P-VALUE	0.25	0.002	0.19	0.002	0.38	0.15
ACCEPT HO	YES	NO	YES	NO	YES	YES

Table 4.13 RESULTS OF RIGHT ROTATION

READINGS	IC/LT		IC/PU		LT/PU	
GROUP	C	T	C	T	C	T
P-VALUE	0.01	0.14	0.025	0.056	0.002	0.34
ACCEPT HO	NO	YES	NO	YES	NO	YES

Table 4.14 RESULTS OF LEFT LATERAL FLEXION

READINGS	IC/LT		IC/FU		LT/FU	
GROUP	C	T	C	T	C	T
P-VALUE	0.008	0.021	0.002	0.008	0.09	0.5
ACCEPT HO	NO	NO	NO	NO	YES	YES

Table 4.15 RESULTS OF RIGHT LATERAL FLEXION

READINGS	IC/LT		IC/FU		LT/FU	
GROUP	C	T	C	T	C	T
P-VALUE	0.04	0.1	0.001	0.19	0.5	0.37
ACCEPT HO	NO	YES	NO	YES	YES	YES

4.4.2 Subjective Data.

Table 4.16 RESULTS OF NRS

READINGS	IC/LT		IC/FU		LT/FU	
GROUP	C	T	C	T	C	T
P-VALUE	0.0009	0.0001	0.001	0.0001	0.21	0.5
ACCEPT HO	NO	NO	NO	NO	YES	YES

Table 4.17 RESULTS OF MCG

READINGS	IC/LT		IC/FU		LT/FU	
GROUP	C	T	C	T	C	T
P-VALUE	0.0001	0.0001	0.0002	0.0009	0.06	0.19
ACCEPT HO	NO	NO	NO	NO	YES	YES

Table 4.18 RESULTS OF OSW

READINGS	IC/LT		IC/FU		LT/FU	
GROUP	C	T	C	T	C	T
P-VALUE	0.0004	0.0007	0.0012	0.02	0.11	0.14
ACCEPT HO	NO	NO	NO	NO	YES	YES

5. DISCUSSION

This chapter is concerned with evaluating the results that are shown graphically in chapter 4.

5.1 BETWEEN GROUP RESULTS.

These results evaluate the efficacy of the treatment group therapy in comparison to the control group therapy. They distinguish differences in subjective and objective measurements between the treatment and control groups, to test whether manipulating according to the Gonstead Listing System, in patients with sacroiliac syndrome, is significantly different to manipulating the sacroiliac joint in the opposite direction to that indicated by this system.

The results show that there is no significant difference, in the subjective or objective measurements, between the treatment or control groups.

5.2 WITHIN GROUP MEASUREMENTS.

These results determine the efficacy of the applied therapy for an individual group. A comparison of the measurements of the initial consultation(IC) and the last treatment(LT) will show the efficacy of the applied treatment protocol and, if time is considered, then the rate of improvement can be calculated. A comparison of the LT and the follow-up(FU) measurements will determine the medium-term effectiveness of the prescribed treatment. A comparison of the IC and the FU will give an overall evaluation of the efficacy of the treatment regime.

5.3 OBJECTIVE MEASUREMENTS.

The ranges of flexion and extension showed no significant improvement for either of the three intervals.

Left rotation: the treatment group showed a significant improvement in the IC - LT and IC-FU intervals, but not for the LT-FU interval. The control group showed no significant improvement for any of the intervals.

Right rotation: The control group showed significant improvement for all three intervals, whereas the treatment group showed no significant improvement for all three intervals.

Left lateral flexion: both groups showed significant improvement in the IC-LT and IC-FU intervals, but no significant improvement for the LT-FU interval.

Right lateral flexion: the control group showed significant improvement during the IC-LT and IC-FU intervals, but no significant improvement for the LT-FU interval. The treatment group showed no significant improvement for any interval.

5.4 SUBJECTIVE MEASUREMENTS.

The three questionnaires used all showed similar results. Both treatment and control groups showed significant improvement for the IC-LT and IC-FU intervals, but showed no significant improvement for the LT-FU interval.

The between group analysis shows clearly that there is no statistically significant difference between the control and treatment groups. However, a more obscure picture emerges from the within group analyses. Both subjective and objective measurements for both the treatment and control groups show a tendency toward improvement while the subject was undergoing active treatment, and then showed a tendency toward maintaining, rather than improving, their state of well-being during the follow-up period. This author is not sure as to the reasons why there were such discrepancies in the objective within group results, but operator error and reliability of measuring apparatus cannot be excluded. Other factors which may influence the measurements include: time of day, temperature, and degree of activity prior to taking of measurements.

The results of this study indicate that the use of routine x-rays for marking purposes, in order to determine a listing, are inappropriate. When pathology is suspected radiographs provide a relatively cheap, available source of information. This author supports the view held by Taylor, in Gatterman (1995), that radiographic procedures should be reserved for those cases with specific clinical indication, and should not be a routine method of establishing a diagnosis.

Since this study shows that radiographic marking systems are not useful in either the diagnosis or treatment of sacroiliac dysfunction, and motion and static palpation tests for sacroiliac dysfunction have been shown to be unreliable, more research is required on this controversial joint.

If the direction of manipulation makes no difference to the clinical outcome of sacroiliac syndrome (providing no contra-indication to spinal manipulative therapy), this may explain

the good results claimed by various professions, including physical therapists, osteopaths and chiropractors (Xiaodong and Yonggang, 1994; Schmid, 1984; Herzog, 1995; Hendler et al, 1995; Cassidy, 1992). Furthermore, the need for specific adjusting techniques is brought into focus.

Overall, the results support the hypothesis that the taking of a static radiographic listing of the sacroiliac joint is not useful as an indicator of which direction to adjust the sacroiliac joint in subjects with sacroiliac joint syndrome.

6. CONCLUSIONS AND RECOMMENDATIONS

The results show that there is a significant improvement in both control and treatment groups in terms of the subjective measurements, especially while the subject is actively undergoing treatment, and that spinal manipulative therapy appears to be effective, in the short and medium terms, for patients with sacroiliac dysfunction, and indicating little usefulness of the Gonstead Listing System

Criticism of this research includes the relative inexperience on the part of the researcher in terms of marking technique and adjusting technique.

Future studies in this field should use larger sample sizes to make the research statistically significant. They should be expanded to cover other areas of the spine and not just focus on the sacroiliac joint. Further improvements would be to use a longer follow-up period in order to determine long term effectiveness of the treatment, and the use of pre- and post treatment and follow-up x-rays with strict positioning standards. Greater reliability is required in terms of x-ray standards, marker standards, and objective measuring instruments.

This study does not demonstrate a clear correlation between improved range of motion and a decrease in the patient's perception of pain, following sacroiliac joint manipulation.

This study does not prove the efficacy of manipulation in the treatment of sacroiliac dysfunction. The results do show an improvement in terms of subjective and objective measurements. However, to determine the efficacy of spinal manipulative therapy, one needs to compare this type of therapy with other therapies. This might be the topic of future studies.

This study demonstrates that the routine use of x-rays, for determining sacroiliac joint dysfunction, is not recommended, and that the continued use of such procedures may well be a question of economics.

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APPENDICES

Appendix A:

TECHNIKON NATAL CHIROPRACTIC DAY CLINIC

CASE HISTORY

Patient:_____ Date # _____

File #:_____

X-ray #:_____

Age: _____ Sex:_____ Occupation: _____

Intern: _____ Signature: _____

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Initial visit clinician: Signature:

Case History:

Examination:

Previous: TN Current: TN

Other Other

X-ray Studies:

Previous: TN Current: TN

Other Other

Clinical path. lab.:

Previous: TN Current: TN

Other Other

Case status:

PTT: Conditional: Signed off: Final sign out:

Recommendations:

Intern's case history

1. **Source of history:**

2. **Chief complaint: (patient's own words)**

3. **Present illness:**

   Location

   Onset

   Duration

   Frequency

   Pain (character)

   Progression

   Aggravating factors

   Relieving factors

   Associated S & S

   Previous occurrences

   Past treatment and outcome

4. Other complaints:

5. Past history:

General health status

Childhood illnesses

Adult illnesses

Psychiatric illnesses

Accidents/injuries

Surgery

Hospitalizations

6. Current health status and life-style:
   - Allergies
   - Immunizations
   - Screening tests
   - Environmental hazards
     (home, school, work)
   - Safety measures
     (seat belts, condoms)
   - Exercise and leisure
   - Sleep patterns
   - Diet
   - Current medication
   - Tobacco
   - Alcohol
   - Social drugs

7. Family history:
   - Immediate family:
     - Age
     - Health
     - Cause of death
     - DM
     - Heart disease
     - TB
     - HBP
     - Stroke
     - Kidney disease
     - CA
     - Arthritis
     - Anaemia
     - Headaches
     - Thyroid disease
     - Epilepsy
     - Mental illness
     - Alcoholism
     - Drug addiction
     - Other

8. Psychosocial history:

   Home situation

   Daily life

   Important experiences

   Religious beliefs

9. Review of systems:

   General

   Skin

   Head

   Eyes

   Ears

   Nose/sinuses

   Mouth/throat

   Neck

   Breasts

   Respiratory

   Cardiac

   Gastro-intestinal

   Urinary

Genital

Vascular

Musculoskeletal

Neurologic

Haematologic

Endocrine

Psychiatric.

TECHNIKON NATAL CHIROPRACTIC DAY CLINIC

PHYSICAL EXAMINATION

Underline abnormal findings in RED and elaborate on back of relevant page, if necessary.
Mark "NAD" if normal.

Patient:_____ File #_____

Last name First name

Clinician:_____ Signature:_____

Intern:_____ Signature:_____

Date:_____

Height:_____ Weight:_____ Temp:_____

Rates: Heart:_____ Pulse:_____ Respiration:_____

Blood pressure: Arms: L / R /

Legs: L / R /

General appearance:

STANDING EXAMINATION.

Minor's sign
Skin changes
Posture
  erect
  Adam's
Ranges of motion:

T/L spine: Flexion: 90 Fingers to floor
Extension: 50
R.lat.flex.: 30 Fingers down leg
L.lat.flex.: 30 Fingers down leg
Rot.to R.: 35
Rot.to L.: 35

Flex.

L.Rot. R.Rot.

L.lat flex. R.lat. flex.

Ext.

/ = pain-free limitation; // = painful limitation.

Romberg's sign.
Pronator drift.
Trendelenburg's sign.
Gait.
  rhythm
  balance
  pendulousness
  on toes
  on heels
  tandem
Half squat.
Scapular winging.
Muscle tone.
Spasticity/Rigidity.

Shoulder:
- skin
- symmetry
- ROM - glenohumeral
  - scapulo-thoracic
  - acromioclavicular
  - elbow
  - wrist

Chest measurement
- inspiration
- expiration

Visual acuity

Breast examination:
- Inspection:
  - skin
  - size
  - contour
  - nipples
  - arms overhead
  - hands against hips
  - leaning forward.
- Palpation:
  - axillary lymph nodes.

SEATED EXAMINATION.

- Spinal posture
- Head
  - scalp
  - skull
  - face
  - skin
- Eyes
  - conjunctiva
  - sclera
  - eyebrows
  - eyelids
  - lacrimal gland
  - nasolacrimal duct
  - alignment
  - corneal reflex
  - ocular movement

	L			R		
	III	IV	VI	III	IV	VI

  - visual fields
  - accomodation
  - iris
  - pupils
  - red reflex
  - optic disc

vessels
general backgroumd
macula
vitreous
lens

Ears:
auricle
ear canal
drum
auditory acuity
Weber test
Rinne test

Nose:
external
internal
septum
turbinates
olfaction

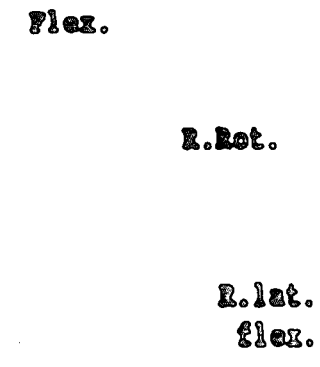
Sinuses (frontal & maxillary):
tenderness
transillumination

Mouth and pharynx:
lips
buccal mucosa
gums and teeth
roof
tongue
inspection
movement
taste
palpation
pharynx
inspection
CN X

Neck:
posture
size
swelling
scars
discoloration
hair line

ROM:

Flexion:	45	chin to larynx chin to sternum
Extension:	55	forehead parallel to floor
L.lat.flex:	40	
R.lat.flex:	40	
L.rot.:	70	
R.rot.:	70	



lymph nodes
trachea
thyroid
carotid arteries (thrills, bruit)
CN V
CN VII
CN VIII (nystagmus)
CN IX
CN XI
TMJ --
  Inspection
    ROM
    deviation
  Palpation
    crepitus
    tenderness

- Neurological:
  - Dermatomes
    - C5
    - C6
    - C7
    - C8
    - T1
  - Tendon reflexes
    - biceps
    - triceps
    - brachioradialis
  - Muscle strength
    - C5
    - C6
    - C7
    - C8
    - T1
  - Coordination:
    - point-to-point
    - dysdiadochokinesia
- Thorax:
  - Chest:
    - Inspection:
      - skin
      - shape
      - respiratory distress
      - rhythm (respiratory)
      - depth "
      - effort "
      - intercostal/supraclavicular retraction
    - Palpation:
      - tenderness
      - masses
      - respiratory expansion
      - tactile fremitus
    - Percussion:
      - lungs (posterior)
      - diaphragmatic excursion
      - kidney punch
    - Auscultation:
      - breath sounds
        - vesicular
        - bronchial
      - adventitious sounds
        - crackles (rales)
        - wheezes (rhonchi)
      - voice sounds
        - broncophony
        - whispered pectoriloquy
        - egophony

Cardiovascular:
auscultation (aortic murmurs)
Allen's test

SUPINE EXAMINATION

JVP
PMI
auscultation heart (L.lat.recumbent)
respiratory excursion
percussion chest (anterior)
breast palpation
The abdomen:
Inspection:
skin
umbilicus
contour
peristalsis
pulsations
hernias (umbilical/incisional)
Auscultation:
bowel sounds
bruit
Percussion:
general
liver
spleen
Palpation:
superficial reflexes
cough
light
rebound tenderness
deep
liver
spleen
kidneys
aorta
intra-/retro-abdominal wall mass
shifting dullness
fluid wave
Acute abdomen:
where pain began and now
cough
tenderness
guarding/rigidity
rebound tenderness
Rovsing's sign
psoas sign
obturator sign
cutaneous hyperaesthaesia
rectal exam
Murphy's sign.

Male genitals and hernias.
Inspection:
skin
prepuce
glans
meatus
nits/lice
scrotum
inguinal/femoral bulges
Palpation:
penis (tenderness/induration)
testes
epididymis
inguinal canal
femoral canal
cremasteric reflex
Auscultation:
scrotal mass.
Peripheral vasculature:
Inspection:
skin
nail beds
pigmentation
hair loss
Palpation:
pulses - radial, brachial, femoral, popliteal, post.tibial, dorsalis pedis
lymph nodes - epitrochlear, femoral (horizontal & vertical)
temperature (feet & legs)
Manual compression test
Retrograde filling (Trendelenburg) test
Arterial insufficiency test

Musculoskeletal:
ROM
hip
flex. 90/120
ext. 15
abd. 45
add. 30
int rot 40
ext rot 45
knee
flex. 130
ext. 0/15
ankle
plantar flex 45
dorsiflex 20
inversion 30
eversion 20
leg length

Neurological:
- dermatomes
  - L1
  - L2
  - L3
  - L4
  - L5
  - S1
- muscle strength
  - hip flexion
  - knee extension
  - ankle dorsiflexion
  - plantar flexion
- tendon relexes
  - patellar
  - Achilles
- plantar reflex

Rectal examination:
- Inspection
  - sacrococcygeal & perianal areas
- Palpation
  - sphincter tone
  - tenderness
  - indura:
  - nodules
  - prostate
  - seminal vesicles

Mental status
- Appearance and behaviour:
  - level of consciousness
  - posture and motor behaviour
  - dress, grooming, personal hygiene
  - facial expression
  - affect
- Speech and language:
  - quantity
  - rate
  - volume
  - fluency
  - aphasia (prn)
- Mood
- Thought processes (logical, relevant, organized)
- Memory and attention:
  - orientation (time, place, person)
  - remote memory
  - recent memory
  - new learning ability
- Higher cognitive functions:
  - information and vocabulary (general & specialised knowledge)
  - abstract thinking.

TECHNIKON NATAL

TECHNIKON NATAL CHIROPRACTIC DAY CLINIC.

REGIONAL EXAMINATION -- LUMBAR SPINE AND PELVIS.

PATIENT:_____

FILE # :_____ DATE:_____

INTERN/RESIDENT:_____

SUPERVISING CLINICIAN :_____

STANDING :

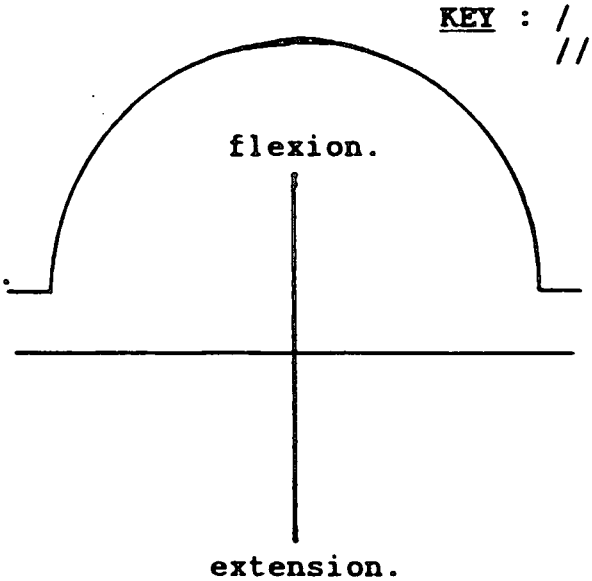
Posture
Minor's Sign
Skin
Scars
Discoloration
Muscle tone
Bony and soft tissue contours

Spinous percussion
Schober's Test (6cm)
Treadmill
Body Type
Attitude

RANGE OF MOTION.

Forward Flexion = 40-60 degrees.(15cm from floor)
Extension = 20-35 degrees.
L/R Rotation = 3-18 degrees.
L/R Lateral flexion = 15-20 degrees.

KEY : / PAINLESS LIMITATION.
// PAINFUL LIMITATION.



SUPINE :

Skin.
Hair.
Nails.

Observe abdomen
Fasciculations
Abdominal reflexes
Auscultate abdomen/groin
Palpate abdomen/groin
Pulses (abdomen)
Pulses (extremities)

SLR
Bowstring
Plantar reflex
Circumference (thigh, calf)
Leg length :
- actual
- apparent

Sciatic notch
Patrick Faber
Gaenslen's Test
Gluteus Maximus Stretch
Hip medial rotation
Psoas Test
Thomas' Test :
- hip joint
- rectus femoris

LATERAL RECUMBENT :

S-I compression
Ober's Test
Femoral nerve stretch
Myotomes :
- QL
- Gluteus Medius

PRONE :

Gluteal skyline
Skin rolling
Iliac crest compression
Facet joint challenge
S-I tenderness
Erichson's Test
Pheasant's Test
Myotomes :
- GluteusMaximus

Active MF Trigger Points:
- QL
- Glut. Med.
- Glut. Max.
- Glut. Min.
- Piriformis
- Hamstrings
- TFL

NON-ORGANIC SIGNS :

Pin Point Pain.
Axial Compression.
Trunk Rotation.
Burn's Bench Test.
Flip Test.
Hoover's Test.
Ankle Dorsiflexion Test.

GAIT :

Rhythm
On toes (standing)
On heels (standing)
Half-squat on one leg

Remarks :_____

_____

_____

_____

NEUROLOGICAL EXAMINATION :

DERMATOMES: Left	Right.	MYOTOMES: Left	Right.	REFLEXES: Left	Right
T12		hip flex		C5	
L1		hip int rot		C6	
L2		hip ext rot		C7	
L3		hip abd			
L4		hip add			
L5		knee flex			
S1		knee ext			
S2		dorsiflex			
S3		plantarflex			
		eversion			
		ext.hall.long			

Tripod
Kemp's Test

COMMENTS:_____

_____

_____

_____

MOTION PALPATION :

Jt.play		Left						Right					Jt.pla	
P/A	Lat	Fle	Ext	LF	AR	PR		Fle	Ext	LF	AR	PR	P/A	La
							T10							
							T11							
							T12							
							L1							
							L2							
							L3							
							L4							
							L5							
					U	L	SI	U	L					

INFORMED CONSENT FORM

(To be completed in duplicate by patient/subject*) *Delete whichever is not applicable.

TITLE OF RESEARCH PROJECT

_____

_____

NAME OF SUPERVISOR

_____

NAME OF RESEARCH STUDENT

_____

PLEASE CIRCLE THE APPROPRIATE ANSWER

1. Have you read the research information sheet? YES/NO

2. Have you had an opportunity to ask questions regarding this study? YES/NO
3. Have you received satisfactory answers to your questions? YES/NO

4. Have you had an opportunity to discuss this study? YES/NO
5. Have you received enough information about this study? YES/NO

6. Who have you spoken to? _____

7. Do you understand the implications of your involvement in this study? YES/NO

8. Do you understand that you are free to withdraw from this study? YES/NO
   a) at any time
   b) without having to give a reason for withdrawing, and
   c) without affecting your future health care.

9. Do you agree to voluntarily participate in this study? YES/NO

PATIENT/SUBJECT* Name_____ Signature_____
(in block letters)

PARENT/GUARDIAN* Name_____ Signature_____
(in block letters)

WITNESS Name_____ Signature_____
(in block letters)

RESEARCH STUDENT Name_____ Signature_____
(in block letters)

TECHNIKON NATAL

MEMORANDUM

TO : Rayne Moorcroft
4th year Chiropractic student

FROM : Miss A L Hesketh
Department of Radiography

DATE : 5 October 1994

ITEM:

Statement of the problem:

The aim of the study is to evaluate 1) the reliability and sensitivity of the Gonstead listing system, as opposed to the Kirkaldy - Willis model, in terms of subjective and objective clinical findings of the sacroiliac joint,and 2) the validity of the Gonstead system as it pertains to the treatment of mechanical problems of the sacroiliac joint.

Your letter requesting X-ray for your patients has reference.

The cost for your project will be:

PA Pelvis R35.00

R35.00 per patient. 40 patients = R1,400.00

The procedure to follow for each patient will be:

1.0 book an appointment with Mrs Trudie Joseph (Ext. 2451)

2.0 request that R35.00 per patient be transferred via an I.J. number into our account 4LRAREV. (NOTE: you can create a number of I.J. numbers prior to your research project commencing).

3.0 complete the X-ray request form and fill in the I.J. number (prior to the X-ray).

4.0 Mrs Joseph will complete the attached form and will request that you sign the form when all of the above procedures are completed.

5.0 Please may we have more details once your proposal has been accepted.

6.0 Please will you keep Dr Quantrill updated and informed on the progress of your patients during 1995.

We wish you every success in your project.

Ann Hesketh
Head of Department

AH/ie/oct94/200

Name:_____.

Date:_____.

Please indicate on the line below the number between 0 and 100 that best descibes the pain of your major problem at this point, when it is at its worst. A zero (0) would mean " no pain at all" and 100 would mean "pain as bad as it could be".
Please write only one number.

0_____100

Please indicate on the line below the number between 0 and 100 that best descibes the pain of your major problem at this point, when it is at its least. A zero (0) would mean " no pain at all" and 100 would mean "pain as bad as it could be".
Please write only one number.

0_____100

SHORT-FORM McGILL PAIN QUESTIONNAIRE.

Patient :_____ **File #:**_____ **Date:**_____

	None	Mild	Moderate	Severe
Throbbing	0)___	1)___	2)___	3)___
Shooting	0)___	1)___	2)___	3)___
Stabbing	0)___	1)___	2)___	3)___
Sharp	0)___	1)___	2)___	3)___
Cramping	0)___	1)___	2)___	3)___
Gnawing	0)___	1)___	2)___	3)___
Hot-Burning	0)___	1)___	2)___	3)___
Aching	0)___	1)___	2)___	3)___
Heavy	0)___	1)___	2)___	3)___
Tender	0)___	1)___	2)___	3)___
Splitting	0)___	1)___	2)___	3)___
Tiring-Exhausting	0)___	1)___	2)___	3)___
Sickening	0)___	1)___	2)___	3)___
Fearful	0)___	1)___	2)___	3)___
Punishing-Cruel	0)___	1)___	2)___	3)___

OSWESTRY BACK DISABILITY INDEX

PATIENT NAME:_____ FILE #:____ DATE:____

This questionnaire has been designed to give the doctor information as to how your back pain has affected your ability to manage in everyday life. Please answer every section and mark in each section only the ONE box which applies to you. We realize you may consider that two of the statements in any one section relate to you, but please just mark the box which most closely describes your problem.

Section 1 - Pain Intensity

- ☐ I have no pain at the moment.
- ☐ The pain is very mild at the moment.
- ☐ The pain is moderate at the moment.
- ☐ The pain is fairly severe at the moment.
- ☐ The pain is very severe at the moment.
- ☐ The pain is the worst imaginable at the moment.

Section 2 - Personal Care (Washing, Dressing etc.)

- ☐ I can look after myself normally without causing extra pain.
- ☐ I can look after myself normally but it causes extra pain.
- ☐ It is painful to look after myself and I am slow and careful.
- ☐ I need some help but manage most of my personal care.
- ☐ I need help every day in most aspects of self care.
- ☐ I do not get dressed, I wash with difficulty and stay in bed.

Section 3 - Lifting

- ☐ I can lift heavy weights without extra pain.
- ☐ I can lift heavy weights but it gives extra pain.
- ☐ Pain prevents me from lifting heavy weights off the floor, but I can manage if they are conveniently positioned, for example on a table.
- ☐ Pain prevents me from lifting heavy weights, but I can manage light to medium weights if they are conveniently positioned.
- ☐ I can lift very light weights.
- ☐ I cannot lift or carry anything at all.

Section 4 - Walking

- ☐ Pain does not prevent me walking any distance.
- ☐ Pain prevents me walking more than 1 mile (2.2 km).
- ☐ Pain prevents me walking more than 1/2 mile (1.1 km).
- ☐ Pain prevents me walking more than 1/4 mile (0.5 km).
- ☐ I can only walk using a stick or crutches.
- ☐ I am in bed most of the time and have to crawl to the toilet.

Section 5 - Sitting

- ☐ I can sit in any chair as long as I like.
- ☐ I can only sit in my favorite chair as long as I like.
- ☐ Pain prevents me from sitting more than 1 hour.
- ☐ Pain prevents me from sitting more than 1/2 hour.
- ☐ Pain prevents me from sitting more than 10 minutes.
- ☐ Pain prevents me from sitting at all.

Section 6 - Standing

- ☐ I can stand as long as I want without extra pain.
- ☐ I can stand as long as I want, but it gives me extra pain.
- ☐ Pain prevents me from standing for more than one hour.
- ☐ Pain prevents me from standing for more than 30 minutes.
- ☐ Pain prevents me from standing for more than 10 minutes.
- ☐ Pain prevents me from standing at all.

Section 7 - Sex Life

- ☐ My sex life is normal and causes no extra pain.
- ☐ My sex life is normal but causes some extra pain.
- ☐ My sex life is nearly normal but it is very painful.
- ☐ My sex life is severely restricted by pain.
- ☐ My sex life is nearly absent because of pain.
- ☐ Pain prevents any sex life at all.

Section 8 - Social Life

- ☐ My social life is normal and gives me no extra pain.
- ☐ My social life is normal but increases the degree of pain.
- ☐ Pain has no significant effect on my social life apart from limiting my more energetic interests, for example, dancing.
- ☐ Pain has restricted my social life and I do not go out as often.
- ☐ Pain has restricted my social life to my home.
- ☐ I have no social life because of pain.

Section 9 - Sleeping

- ☐ I have no trouble sleeping.
- ☐ I can sleep well only by using pills.
- ☐ Even when I take pills I have less than six hours sleep.
- ☐ Even when I take pills I have less than four hours sleep.
- ☐ Even when I take pills I have less than two hours sleep.
- ☐ Pain prevents me from sleeping at all.

Section 10 - Travelling

- ☐ I can travel anywhere without extra pain.
- ☐ I can travel anywhere but it gives me extra pain.
- ☐ Pain is bad but I manage trips over two hours.
- ☐ Pain restricts me to trips of less than one hour.
- ☐ Pain restricts me to trips under 30 minutes.
- ☐ Pain prevents me from travelling, except to the doctor or hospital.