THE EFFECT OF SACROILIAC DYSFUNCTION ON THE MUSCULOSKELETAL SYSTEM

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INTRODUCTION

THERE HAS BEEN A RESURGENCE OF INTEREST IN THE CONCEPT THAT THE SACROILIAC JOINT IS A SOURCE OF MUSCULOSKELETAL PAIN AND DYSFUNCTION. IN EARLIER PAPERS, I DEMONSTRATED THAT SACROILIAC INSTABILITY THAT FAILS TO RESPOND TO CONSERVATIVE MODALITIES CAN OFTEN BE ALLEVIATED BY PERCUTANEOUS FIXATION WITH OR WITHOUT SUPPLEMENTAL FUSION [40,41].

DESPITE SUCCESSFUL STABILIZATION OF THE SACROILIAC JOINT, A CERTAIN PERCENTAGE OF PATIENTS CONTINUE TO EXPERIENCE PAIN AND DYSFUNCTION.

THIS PAPER REVIEWS THOSE CONDITIONS THAT OCCUR IN ASSOCIATION SACROILIAC JOINT INJURIES, AS WELL AS DEMONSTRATING THOSE MUSCULOSKELETAL CONDITIONS THAT OCCUR AS A RESULT OF CHRONIC SACROILIAC JOINT DYSFUNCTION, BOTH WHICH MAY BE THE CAUSE OF PERSISTENT PROBLEMS POST-OPERATIVELY.

INCIDENCE

BERNARD AND KIRKWALDY- WILLIS [4] SUGGESTED THAT 22.5% OF PATIENTS WITH LOW BACK PAIN HAD SACROILIAC JOINT (SIJ) DYSFUNCTION IN ISOLATION OR AS PART OF THEIR PATHOLOGY.

SCHWARZER ET AL [56], EMPLOYED DIAGNOSTIC INTRA-ARTICULAR BLOCKS IN A POPULATION OF PATIENTS WITH CHRONIC LOW BACK PAIN THAT HAD DEFIED DIAGNOSIS BY CONVENTIONAL MEANS. THEY IDENTIFIED 43 PATIENTS WHO MET THEIR CRITERIA, 13 OF WHOM (30%) SHOWED EVIDENCE OF SIJ PAIN.

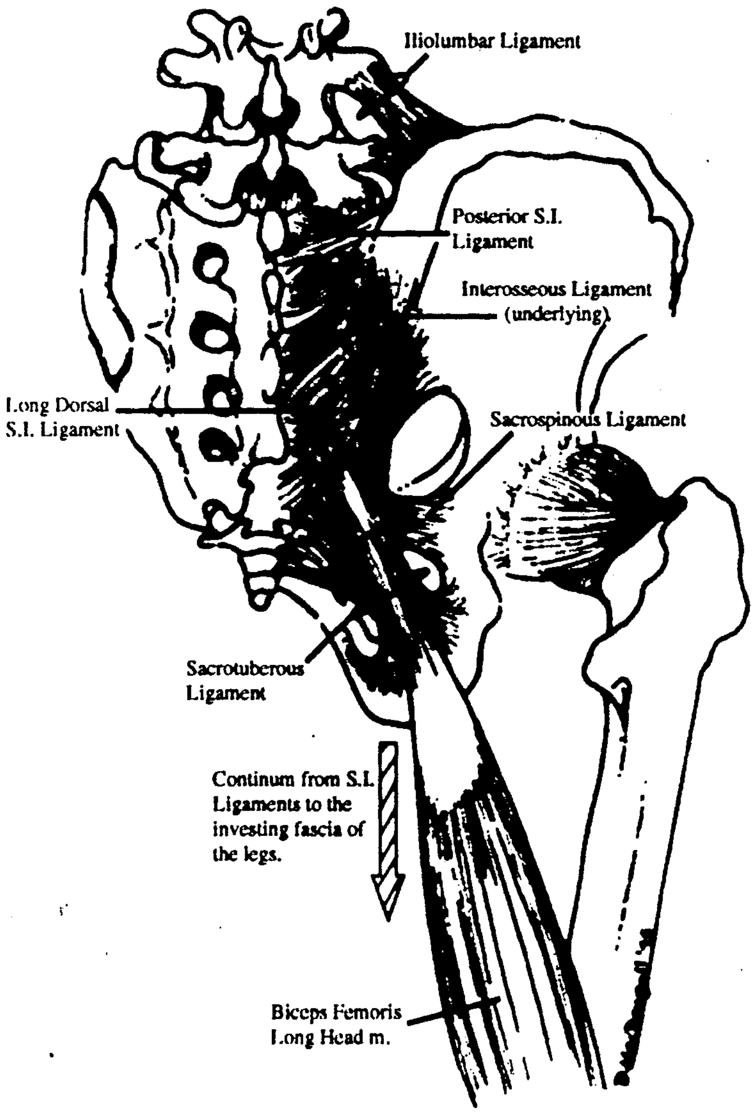
FUNCTIONAL ANATOMY

THE PELVIS CONSISTS OF THE INNOMINATE WHICH IS THE FUSION OF THREE BONES (ISCHIUM, ILIUM, AND PUBIS) AND THREE JOINTS (SYMPHYSIS PUBIS, AND 2 SACROILIAC JOINTS), FORMING AN OPEN RING.

FUNCTIONALLY, EACH INNOMINATE IS CONSIDERED A LOWER EXTREMITY BONE WHEREAS THE SACRUM FUNCTIONS AS PART OF THE VERTEBRAL AXIS.

THE SACRUM IS ATTACHED TO THE LUMBAR SPINE BY A PSEUDO JOINT (THE DISC), TWO SYNOVIAL JOINTS (FACETS), AND LIGAMENTS. THE SACRUM IS SUSPENDED BETWEEN THE INNOMINATES BY THE TRUE PELVIC LIGAMENTS (THE THIN ANTERIOR SACROILIAC LIGAMENTS AND THE STRONG INTEROSSEOUS AND POSTERIOR SACROILIAC LIGAMENTS), AND BY THE ACCESSORY PELVIC LIGAMENTS (THE SACROTUBEROUS, SACROSPINOUS, LONG DORSAL, AND ILIOLUMBAR LIGAMENTS [34].

Figure I
Functional Anatomy



THE INTEROSSEOUS LIGAMENTS ARE AMONG THE STRONGEST IN THE HUMAN BODY, AND WHEN INTACT SEVERELY LIMIT SACROILIAC MOVEMENT IN NON PATHOLOGICAL CONDITIONS. THE AMOUNT OF SACROILIAC JOINT MOTION IS SO SMALL THAT THERE HAS BEEN CONTROVERSY REGARDING ITS VERY EXISTENCE. THE MOTION CONSISTS OF ROTATION AND TRANSLATION, AND DOES NOT OCCUR AROUND A SINGLE AXIS [61].

NUTATION REFERS TO THE FORWARD MOVEMENT OF THE SACRUM IN RELATION TO THE ILIUM WHEREAS COUNTERNUTATION IS THE BACKWARD MOVEMENT OF THE SACRUM IN RELATION TO THE ILIUM.

VLEEMING ET AL [65] HAVE DEMONSTRATED THAT THE STABILITY OF THE SIJ DEPENDS ON TWO SYSTEMS:

FORM AND FORCE CLOSURE.

FORCE CLOSURE:

THE STABILITY OF THE SACROILIAC JOINT DUE TO COMPRESSIVE FORCES (LIGAMENTS MUSCLES, BODY WEIGHT)

FORM CLOSURE :

THE STABILITY OF THE SACROILIAC JOINT DUE TO THE ANATOMY OF THE ARTICULAR SURFACES OF THE JOINT. THE CARTILAGINOUS SURFACES CONTAIN COMPLEMENTARY RIDGES AND GROOVES TO INCREASE FRICTION AND PARTIALLY RESIST SHEAR FORCES. THE SELF- LOCKING MECHANISM [61] REFERS TO THE STABILITY OF THE SIJ DUE TO FORCE AND FORM CLOSURE FAILURE OF THE SELF- LOCKING MECHANISM LEADS TO INSTABILITY. THE CHIEF CAUSE OF LOSS OF THE SELF LOCKING MECHANISM IS THE LOSS OF THE LIGAMENTOUS SUPPORT.

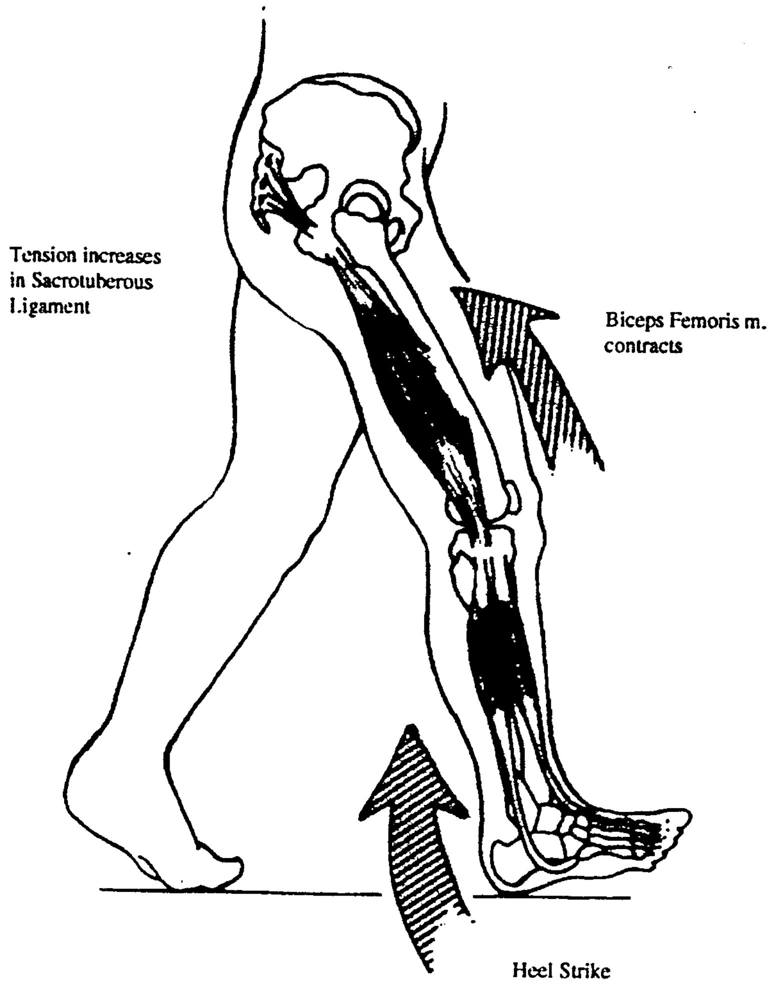
BIOMECHANICS

NORMAL GAIT REQUIRES OPTIMAL SYMMETRIC MOVEMENT OF ALL OF THE LUMBAR VERTEBRA, THE TWO SIJS, AND THE SYMPHYSIS. AS WELL AS MAXIMAL FUNCTIONAL LENGTH AND STRENGTH OF THE PAIRED MUSCLE GROUPS OF THE LOWER EXTREMITY AND TRUNK [23,24].

THE SACROILIAC JOINTS PLAY A KEY ROLE IN COUPLING THE MECHANICAL FORCES OF THE LOWER EXTREMITIES WITH THE AXIAL SKELETON ABOVE .THESE FORCES ARE TRANSMITTED THRU LIVING SOFT TISSUE, AND ANY ATTEMPT TO ANALYZE THE MECHANICS IN A MANNER ANALOGUS TO THAT OF MOVING PARTS AND MACHINERY HAS BEEN UNPRODUCTIVE [61].

A BIOMECHANICAL SYSTEM MUST EXIST FOR ALL VERTEBRATES THAT IS STABLE EVEN WITH FLEXIBLE HINGES, AND THAT IS SELF GENERATING WITH MINIMAL ENERGY EXPENDITURE. LEVIN [36,37] PROPOSES THE TENSIGATORY ICOSAHEDRON TRUSS AS THAT MODE. IT IS OMNIDIRECTIONAL WITH, ALWAYS LOADED TENSION AND COMPRESSION ELEMENTS. IT IS STRUCTURALLY STABLE EVEN WITH FRICTION LESS HINGES AND AT THE

Figure II
Continum Between Sacrotuberous Ligament and Lower Leg During Walking



SAME TIME CAN BE EASILY ALTERED IN SHAPE OR STIFFNESS MERELY BY SHORTENING OR LENGTHENING ONE OR SEVERAL TENSION ELEMENTS. THE INTERNAL STRESSES ARE ALWAYS DISTRIBUTED IN TENSION OR COMPRESSION WITH NO BENDING MOMENTS, AND THEREFORE LOWEST ENERGY COSTS.

IN THE HUMAN, THE BONES OF THE SKELETON ARE COMPRESSIVE ELEMENTS FLOATING IN AN INTEGRATED TENSION NETWORK OF SOFT TISSUES.

ANY ALTERATION IN THE NORMAL MECHANICS OF THE PELVIC GIRDLE WILL HAVE A PROFOUND EFFECT ON THE FUNCTION OF THE ENTIRE MUSCULOSKELETAL AND NERVOUS SYSTEM [26].

IT IS IMPORTANT TO NOTE THAT SINCE THE PATHOLOGICAL CONDITION IS FUNCTIONAL RATHER THAN ANATOMIC, IT CANNOT BE DOCUMENTED WITH RADIOGRAPHIC STUDIES [8].

PATHOLOGICAL CONDITIONS:

SACROILIAC INSTABILITY MAY DEVELOP UNDER THE FOLLOWING CONDITIONS.

MAJOR TRAUMA. THIS IS OBVIOUS AND WELL COVERED IN ANY MAJOR ORTHOPEDIC TRAUMA BOOK.

PREGNANCY. THE LIGAMENTS BECOME LAX DUE TO HORMONAL INFLUENCES. IF THE JOINT SHOULD SUBLUX IT CAN BECOME SYMPTOMATIC. POST PARTUM, WITH THE HORMONAL INFLUENCE GONE, IT USUALLY RESOLVES SPONTANEOUSLY, SINCE THE LIGAMENTS THEMSELVES ARE ANATOMICALLY NORMAL

FALL ON THE BUTTOCK.

MOTOR VEHICLES ACCIDENTS. COMING DOWN HARD ON THE BRAKE OR BRACING ONESELF FOR IMPACT, MAY TEAR THE LIGAMENTS AND LEAD TO CHRONIC INSTABILITY.

TWISTING (TORSION) INJURY. THIS IS A COMMON WORK RELATED CAUSE OF SACROILIAC JOINT INSTABILITY, INVOLVING WORKERS LIFTING FROM A FORWARD FLEXED SIDE BENT POSITION.

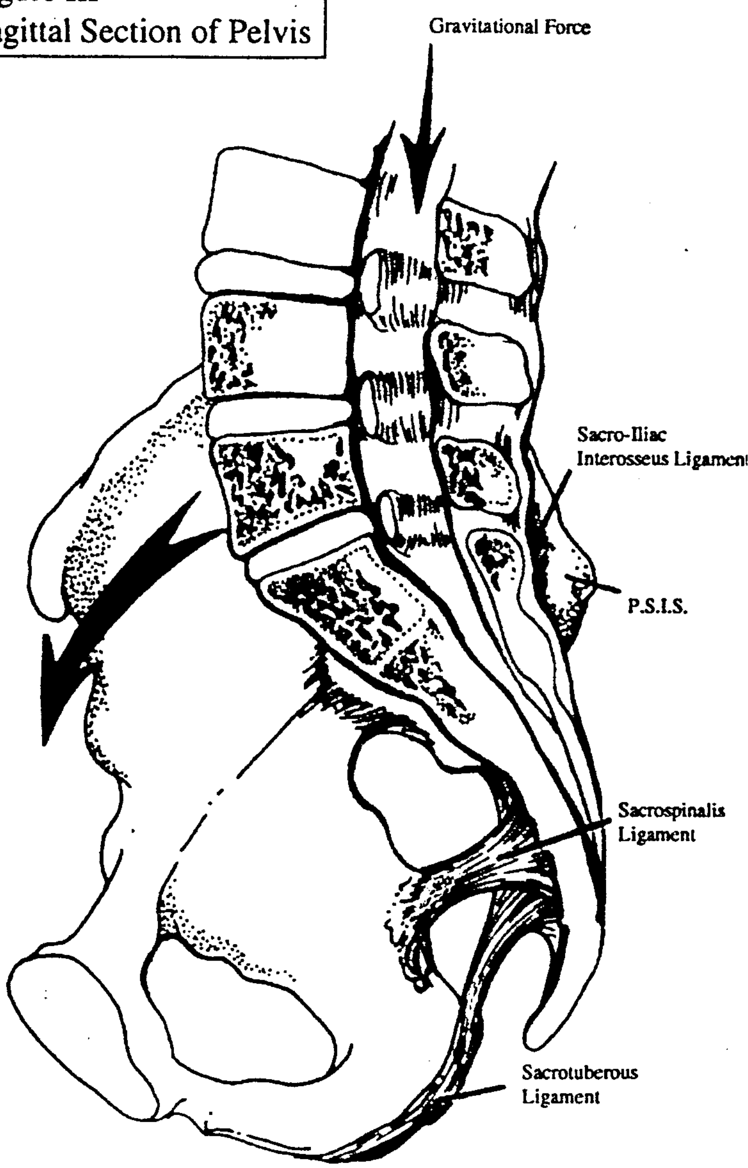
TORSION INJURIES CAN CAUSE DAMAGE TO THE ANNULUS, FACET JOINTS, LAMINA, PEDICLE, AND LIGAMENTS AS WELL AS TO THE SACROILIAC JOINT [13,14,15].

THE EFFECT OF TORSION ON THE THE FACET (ZYGAPOPHYSEAL)

JOINTS WITH FORCED TORSION OR AXIAL ROTATION, THE FACET JOINTS FLEX AND LATERALLY BEND TOWARDS THE SIDE OF ROTATION. ON THE ROTATED SIDE THE INFERIOR FACET IS FORCED AGAINST THE SUPERIOR FACET OF THE VERTEBRA BELOW CRUSHING THE ARTICULAR SURFACES. THIS MAY LEAD TO SUBCHONDRAL FRACTURES.

ON THE SIDE OPPOSITE THE ROTATION, THE JOINT IS DISTRACTED CAUSING CAPSULAR STRAIN OR AVULSION.

Figure III
Sagittal Section of Pelvis



THE FACET JOINT IS THE MAJOR PAIN SOURCE IN 15% OF PATIENTS WITH CHRONIC LOW BACK PAIN [55].

ACUTE FACET JOINT PAIN IS DUE TO SYNOVIAL INFLAMMATION, AND IS BEST TREATED WITH ANTI-INFLAMMATORY MEDICATION OR FLUOROSCOPICALLY CONTROLLED BLOCKS [17,42].

FOR CHRONIC FACET JOINT PAIN, MEDIAL BRANCH NEURECTOMY CAN GIVE 32 TO 75% LONG TERM RELIEF [57]. THE ROLE OF FUSION FOR RELIEF OF INTRACTABLE FACET PAIN REMAINS CONTROVERSIAL [64].

IT IS IMPORTANT TO RECOGNIZE THAT PAIN OF FACET JOINT ORIGIN CAN EXIST WITHOUT ANY OTHER SPINE ABNORMALITIES. AS WELL AS WITH SIJ AND/OR DISCOGENIC DYSFUNCTION.

THE EFFECT OF TORSION ON THE NERVE ROOT

EPSTEIN ET AL [12] REPORTED ON 15 PATIENTS WITH INTENSE SCIATIC PAIN IN WHOM SURGICAL EXPLORATION DISCLOSED NO EVIDENCE OF A HERNIATED NUCLEUS PULPOSIS. BUT IN WHOM THE NERVE ROOT WAS ENTRAPPED IN THE LATERAL RECESS BENEATH THE SUPERIOR ARTICULAR FACET OF THE INFERIOR VERTEBRA. SURGICAL UNROOFING OF THE LATERAL RECESS WITH REMOVAL OF THE OVERHANGING PORTION OF THE SUPERIOR ARTICULAR FACET DECOMPRESSED THE ENTRAPPED ROOT AND RELIEVED SYMPTOMS. THEY COINED THE TERM SUPERIOR FACET SYNDROME. THEY HAD NO GOOD EXPLANATION AS TO THE PATHOGENESIS OF THE CONDITION.

FARFAN HAS DESCRIBED THE TORSION INJURY, AND ITS EFFECT ON THE LUMBAR SPINE [16,17]. THE MEDIAL PORTION OF THE FACET IS SHORT AND STRONG WHEREAS THE LATERAL PORTION IS LONG AND SLENDER AND EASILY DEFORMED[16]. TORSION CAUSES IMPINGEMENT OF THE FACET ON THE TORSION SIDE WITH THE LONG AND SLENDER LATERAL PORTION OF THE FACET BENT BACKWARDS AND MEDIALLY COMPRESSING THE DURAL SAC AND CORRESPONDING NERVE ROOTS ON THE OPPOSITE SIDE, THE FACET IS DISTRACTED CREATING TENSION. THE PEDICLE ON THE DISTRACTED SIDE IS DISPLACED MEDIALLY AND CAN STRETCH THE NERVE ROOT.

WHEN THE TORSION IS RELEASED, THE DEFORMED NEURAL ARCH SPRINGS BACK TO ITS ORIGINAL SHAPE UNLESS THE STRAIN DEFORMATION IS BEYOND THE LIMITS OF ELASTIC RECOVERY. IF THAT IS THE CASE, THE NEURAL ARCH DEFORMATION MAY PERSIST AND CAN CAUSE BILATERAL NERVE ROOT INVOLVEMENT WITH OR WITHOUT DISC PROTRUSION.

DIAGNOSIS OF ROOT ENTRAPMENT

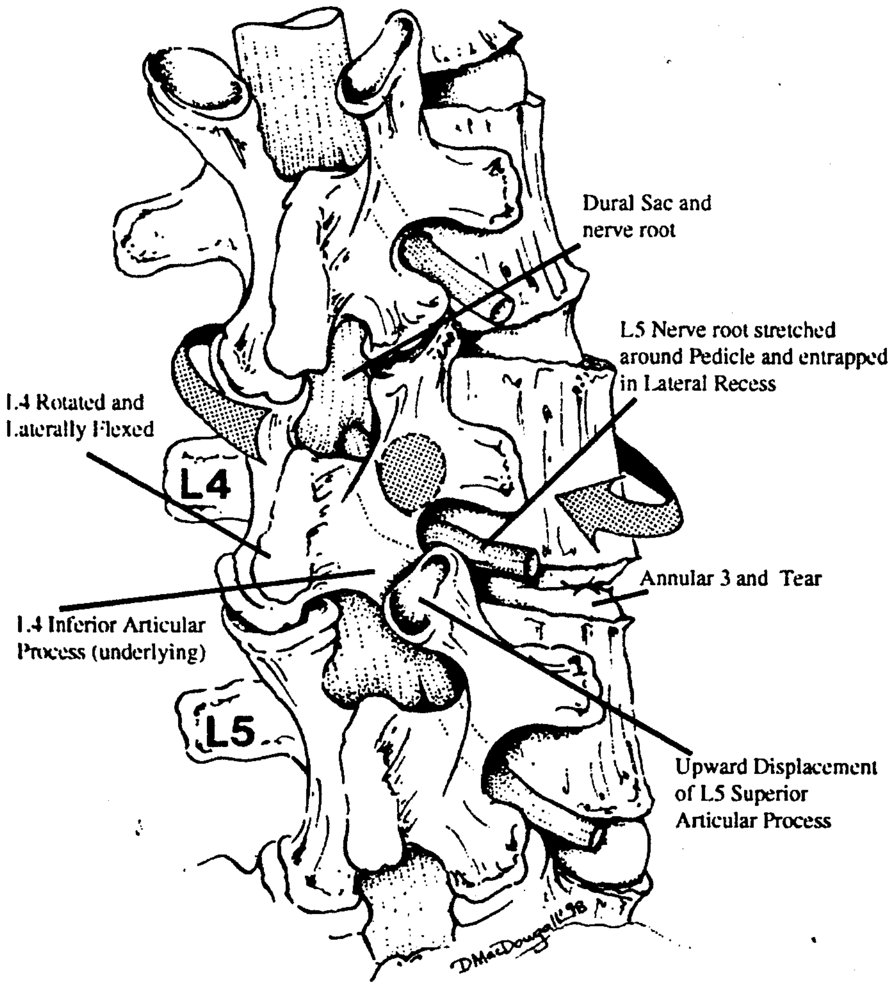
IMAGING STUDIES. A SCALLOPING TYPE DEFECT MAY BE NOTED ON LUMBAR MYELOGRAPHY, WHEREAS MRI AND DISCOGRAPHY ARE OFTEN NEGATIVE [14].

ROOT SLEEVE INJECTIONS. A POSITIVE ROOT SLEEVE INJECTION CAN HELP DETERMINE THE LEVEL OF INVOLVEMENT.

NERVE STUDY. IF THE NERVE STUDY SHOWS NERVE ROOT INVOLVEMENT AT THE SAME LEVEL AS THE POSITIVE ROOT SLEEVE INJECTION, THE DIAGNOSIS IS CONFIRMED.

Figure VII

Torsion Results on Nerve Root



THE EFFECT OF TORSION ON THE DISC

THE FIRST UNCONSTRAINED INTERVERTEBRAL SEGMENT (USUALLY L4-5) IS THE SEGMENT MOST OFTEN AFFECTED BY TORSION INJURY AND THE ONE ASSOCIATED WITH SIJ DYSFUNCTION. THE USUAL INJURY IS AN ANNULAR TEAR WHICH MAY WEAKEN THE ANNULUS. THIS CAN LEAD TO AN ANNULAR BULGE.

AN MRI MAY SHOW A DEGENERATIVE DISC, A BULGING DISC, AND/OR AN ANNULAR TEAR, BUT ONLY DISCOGRAPHY CAN CONFIRM WHETHER OR NOT ALL OR SOME OF THE PAIN IS OF DISCOGENIC ORIGIN. SIMILARLY, FLUOROSCOPICALLY CONTROL I LED SACROILIAC JOINT INJECTION CAN DETERMINE WHETHER OR NOT THE SIJ IS A PAIN SOURCE.

CONDITIONS ASSOCIATED WITH CHRONIC SACROILIAC JOINT DYSFUNCTION

EFFECT ON MUSCLES

JANDA [30] HAS NOTED THAT IN THE PRESENCE OF ARTICULAR DYSFUNCTIONS CERTAIN MUSCLE GROUPS BECOME TIGHTER (POSTURAL MUSCLES). WHILE OTHERS RESPOND BY INHIBITION ATROPHY AND WEAKNESS (PHASIC MUSCLES). ABNORMAL MUSCLE IMBALANCE CAN PERSIST LONG AFTER THE ARTICULAR FUNCTION HAS BEEN RESTORED.

A TIGHT AND SHORTENED MUSCLE WILL NOT LENGTHEN SPONTANEOUSLY. IT NEEDS AN EXTRINSIC FORCE TO LENGTHEN IT. WITH TIME, ADAPTIVE CHANGES ENSUE. THE ADAPTIVE SHORTENING FOSTERS A STRETCH - WEAKNESS OF THE ANTAGONISTS. ABNORMAL MOVEMENT PATTERNS RESULT AND MAY BECOME PERMANENT [38].

RELATIVE TO THE PELVIC GIRDLE MUSCLES THAT TEND TO TIGHTEN INCLUDE THE PIRIFORMIS, HAMSTRINGS, ADDUCTORS, ILIOPSOAS, AND THE TENSOR FASCHIA LATA. MUSCLES THAT TEND TO WEAKEN INCLUDE THE ABDOMINALS, THE GLUTEI AND THE VASTI.

PIRIFORMIS SYNDROME

THE PIRIFORMIS IS A FLAT PYRAMIDAL MUSCLE ORIGINATING AT THE ANTERIOR SURFACE OF THE SACRUM BETWEEN THE SECOND AND FOURTH SACRAL VERTEBRAE, THE UPPER MARGIN OF THE GREATER SCIATIC FORAMEN, THE MEDIAL EDGE OF THE SACROILIAC JOINT CAPSULE, AND THE SACROTUBEROUS LIGAMENT. IT PASSES THRU THE GREATER SCIATIC NOTCH INSERTING ONTO THE SUPERIOR SURFACE OF THE GREATER TROCHANTER AND INTO THE PIRIFORMIS FOSSA AS A COMMON TENDON WITH THE OBTURATOR INTERNIS.

FUNCTIONS OF THE PIRIFORMIS MUSCLE:

1. STANDING: THE PIRIFORMIS PRODUCES LATERAL (EXTERNAL) ROTATION, FLEXION AND ABDUCTION OF THE HIP.

2. WITH THE HIP FLEXED BELOW 60 DEGREES: THE PIRIFORMIS EXTERNALLY ROTATES THE THIGH.

3. AT 60 DEGREES OF HIP FLEXION: THE PIRIFORMIS IS A PURE ABDUCTOR OF THE THIGH.

4. AFTER 60 DEGREE S: IT ABDUCTS, EXTENDS, AND LATERALLY ROTATES THE THIGH.

5. IT STABILIZES THE FEMORAL HEAD IN THE ACETABULUM.

6. IT TENSES THE SACROILIAC JOINT.

TO COMPENSATE FOR LIGAMENTOUS INCOMPETENCE IN SACROILIAC DYSFUNCTION THE MUSCLES AROUND THE JOINT ARE IN A STATE OF PROLONGED CONTRACTION, AND, OVER TIME, BECOME SHORTENED.

EVEN AFTER SIJ STABILIZATION THEY CAN CONTINUE TO CAUSE PROBLEMS. THE PIRIFORMIS APPEARS TO BE THE MOST ADVERSELY EFFECTED AND SOMETIMES HAS TO BE SURGICALLY RELEASED.

A PIRIFORMIS PROBLEM CAN BE PRESENT WITHOUT SACROILIAC JOINT DYSFUNCTION.

<u>OTHER CAUSES OF PIRIFORMIS SYNDROME:</u> [34]

1. SUDDEN FALL ON THE BUTTOCKS CAUSING MUSCLE BRUISING.

2. OVERSTRETCHING OF THE MUSCLE FIBERS

    A. SLIP AND NEAR FALL

    B. HYPERROTATION (eg. FORCEFUL TURNING OF THE BODY WHILE ONE FOOT IS PLANTED FIRMLY ON THE GROUND, OR, FORCEFUL EXTERNAL ROTATION OF THE HIP WITH THE KNEE FLEXED).

3. SUSTAINED DIRECT PRESSURE ON THE MUSCLE BELLY

    A. PROLONGED SITTING ON A HARD SURFACE (eg. A TOILET SEAT)

    B. PROLONGED SITTING ON A LARGE BILLFOLD

4. INFECTION OR TUMOR

5. PSOAS MUSCLE DYSFUNCTION

6. CONDITIONS AFFECTING THE NERVE ROOTS THAT INNERVATE THE PIRIFORMIS (S1 OR S2) (eg. CARCINOMA OF PELVIC ORGANS, SPINAL STENOSIS COMPRESSING THE CAUDA EQUINA).

7. FOREFOOT ABNORMALITIES

INDIVIDUALS WITH A LONG SECOND METATARSAL (MORTON'S FOOT) TEND TO PRONATE THE AFFECTED FOOT. INTERNALLY ROTATE THE KNEE AND INTERNALLY ROTATE THE HIP DURING THE PUSH- PHASE OF GAIT. THIS MAY LEAD TO A REACTIVE CONTRACTURE OF THE

HIP EXTERNAL ROTATORS AND MAY PRODUCE A PIRIFORMIS SYNDROME [31].

CLASSIFICATION

THERE ARE THREE COMPONENTS OF THE SYNDROME WHICH MAY APPEAR SEPARATELY OR OVERLAP:

MYOFASCIAL TRIGGER POINTS

THESE ARE IN THE MEDIAL AND LATERAL ASPECTS OF THE MUSCLE, BEST FELT IN THE SIDE-LYING POSITION. THESE TRIGGER POINTS APPEAR SECONDARY TO OVERLOAD, PROLONGED SHORTENING, BLUNT TRAUMA, A FAT WALLET IN THE REAR POCKET, AND SITTING IN A SLOUCHED POSITION [26].

NEUROVASCULAR ENTRAPMENT

THE PIRIFORMIS MUSCLE CAN ENTRAP NEUROVASCULAR STRUCTURES THAT ACCOMPANY IT IN THE GREATER SCIATIC FORAMEN. THESE INCLUDE THE SUPERIOR AND INFERIOR GLUTEAL NERVES AND VESSELS, THE SCIATIC AND COMMON PERONEAL NERVES, AND THE PUDENDAL NERVE AND VESSELS.

1. SCIATIC NERVE EVOLVEMENT

PRESSURE ON THE SCIATIC NERVE BY THE PIRIFORMIS MUSCLE ACCOUNTS FOR 6% OF THE CASES OF SCIATICA [49,50]. SCIATICA SECONDARY TO PIRIFORMIS DYSFUNCTION IS NOT ASSOCIATED WITH MUSCLE ATROPHY OR REFLEX CHANGES.

2. PUDENDAL NERVE AND VESSEL EVOLVEMENT

THIS CAN CAUSE PELVIC WALL MYALGIA DISCUSSED LATER IN THIS PAPER.

SIGNS AND SYMPTOMS OF PIRIFORMIS DYSFUNCTION: [52]

1. PAIN IN THE REGION OF THE SIJ, GREATER SCIATIC NOTCH, AND PIRIFORMIS MUSCLE, EXTENDING DOWN THE LEG AND CAUSING DIFFICULTY WALKING

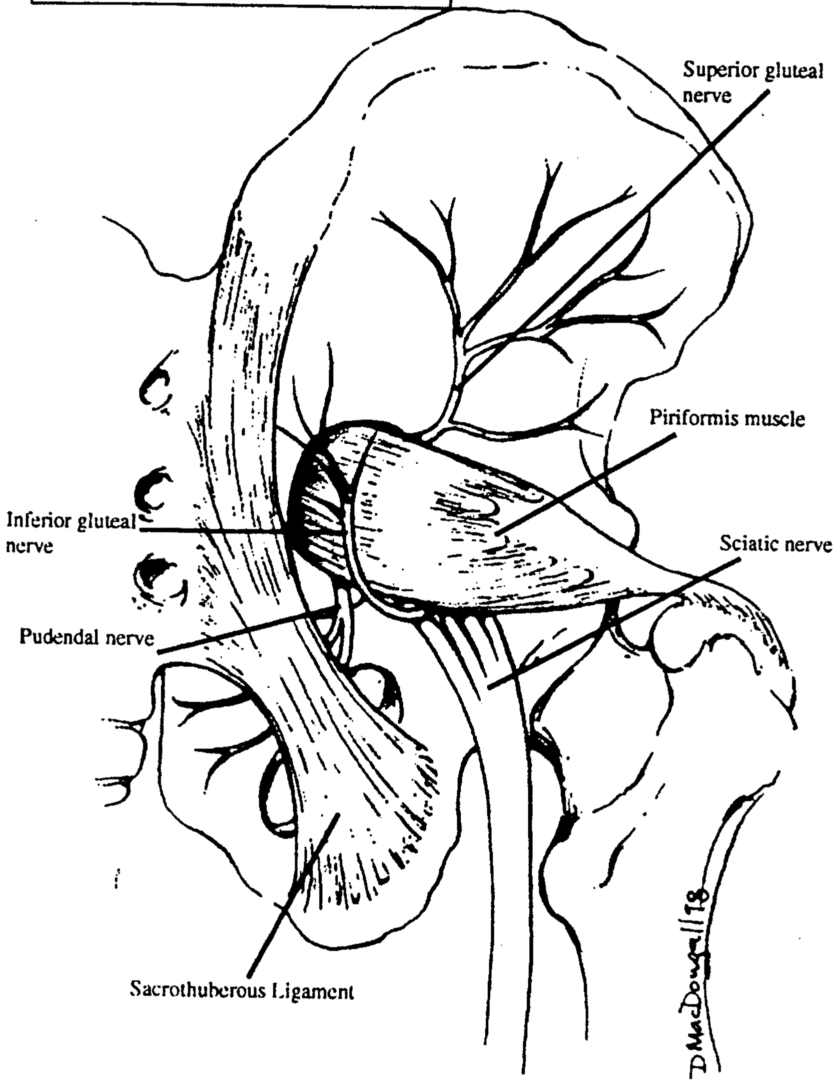
2. ACUTE EXACERBATION OF PAIN BROUGHT ON BY STOOPING OR LIFTING, WHICH IS MODERATELY RELIEVED BY TRACTION

3. PALPABLE SAUSAGE SHAPED MASS OVER THE PIRIFORMIS MUSCLE WHICH IS TENDER TO PALPATION.

4. FREIBERG [19,20] NOTED THE TENDENCY OF THESE PATIENTS TO EXTERNALLY ROTATE THE LEG ON THE SIDE OF THE INVOLVED PIRIFORMIS MUSCLE, THEREBY RELAXING THE MUSCLE.

5. FREIBERG SIGN: EXACERBATION OF PAIN WITH INTERNAL ROTATION OF A STRAIGHT HIP.

Figure IV
Piriformis Syndrome with Associated Anatomy



6. PACE SIGN: WEAKNESS IN RESISTED ABDUCTION AND EXTERNAL ROTATION [47].

7. BEATTY SIGN: WITH THE PATIENT LYING PAINFUL SIDE UP, THE LEG IS FLEXED, WITH THE KNEE RESTING ON THE TABLE, BUTTOCK PAIN IS PRODUCED WHEN THE PATIENT LIFTS AND HOLDS THE KNEE OFF THE TABLE [3].

8.INJECTION OF ANESTHETIC MAY HELP CONFIRM THE DIAGNOSIS. THIS IS BEST DONE VIA A MEDIAL APPROACH [47]. THE PATIENT LIES IN THE LATERAL DECUBITUS POSITION, AFFECTED SIDE UP. THE TENDER AREA IS IDENTIFIED VIA TRANSVAGINAL OR TRANSRECTAL PALPATION. WITH THE OTHER HAND. A SPINAL NEEDLE IS INSERTED THRU THE BUTTOCK TO THE TENDER AREA AND INJECTED. PAIN RELIEVE CAN BE THERAPEUTIC AS WELL AS DIAGNOSTIC.

DIAGNOSTIC STUDIES:

PIRIFORMIS SYNDROME IS PRIMARILY A CLINICAL DIAGNOSIS, BUT:

1.BONE SCAN: MAY SHOW INCREASED UPTAKE OF RADIOACTIVITY IN THE AFFECTED PIRIFORMIS MUSCLE [2].

2. MRI AND CT SCANS: MAY SHOW ATROPHY OR FIBROUS TISSUE REPLACEMENT OF THE PIRIFORMIS MUSCLE IN LONG STANDING CASES [29].

3. ELECTRODIAGNOSTIC STUDIES: A DELAY OF H-REFLEX WITH THE AFFECTED LEG ADDUCED, INTERNALLY ROTATED, AND FLEXED AS COMPARED WITH THE H-REFLEX WITH THE LEG STRAIGHT, SUGGESTS SCIATIC ENTRAPMENT BY THE PIRIFORMIS [18].

TREATMENT

1. TREAT THE PRIMARY CAUSE IF PRESENT - I.E. STABILIZATION OF THE SIJ.

2. STRETCHING

JANDA [12] HAS SHOWN THAT IN THE PRESENCE OF MUSCLE IMBALANCE, IT IS BETTER TO STRETCH TIGHT MUSCLES PRIOR TO STRENGTHENING WEAKENED MUSCLES. ACCORDING TO THE LAWS OF RECIPROCAL INNERVATION, TIGHT MUSCLES ACT IN AN INHIBITORY WAY ON THEIR ANTAGONISTS. OFTEN, AFTER STRETCHING OF THE TIGHT MUSCLE, THE STRENGTH OF THE INHIBITED, WEAKENED ANTAGONIST IMPROVES SPONTANEOUSLY.

3. TRIGGER POINT INJECTIONS

4.SURGERY [28,46,52,59].

SURGICAL RELEASE OF THE TENDINOUS PORTION FROM THE PIRIFORMIS FOSSA IS USUALLY SUFFICIENT EVEN IN THE PRESENCE OF SCIATICA, BUT OCCASIONALLY THE NERVE MUST BE RELEASED UNDER DIRECT OBSERVATION.

PELVIC WALL MYALGIA (LEVATOR ANI SYNDROME, TENSION MYALGIA OF THE PELVIC FLOOR) [53,66]

THIS IS A CONDITION CHARACTERIZED BY BLADDER SYMPTOMS, PERINEAL PAIN, DYSPAREUNIA, CONSTIPATION AND PAINFUL DEFECATION [3,58,62,63].

THE CHARACTER OF PAIN IS SIMILAR TO THAT OF GYNECOLOGIC PAIN , EVEN IN TERMS OF BEING EFFECTED BY HORMONAL CHANGES SUCH AS OCCUR DURING MENSTRUATION AND PREGNANCY. THESE WOMEN OFTEN UNDERGO LAPAROSCOPIC EVALUATION WITH NORMAL FINDINGS [51].

WALLACE [46] DIVIDES PELVIC FLOOR DYSFUNCTIONS INTO FOUR CATEGORIES:

I. DISUSE

II. SUPPORTIVE

III. HYPERTONUS

IV. INCOORDINATION

ONLY HYPERTONUS DYSFUNCTION IS RELEVANT TO OUR DISCUSSION. THERE ARE TWO POSSIBLE ETIOLOGIES FOR THIS MISUNDERSTOOD CONDITION:

1. DYSFUNCTION OF THE PUBIC SYMPHYSIS OR SACROILIAC JOINTS , ESPECIALLY AN ASYMMETRIC RELATIONSHIP BETWEEN THE TWO INNOMINATES PLACES ASYMMETRIC TENSIONS ON THE PELVIC AND UROGENITAL DIAPHRAGM.

2. ENTRAPMENT OF THE PUDENDAL NERVE AND VESSELS BY A TIGHT PIRIFORM1S MUSCLE [51].

THE PUDENDAL NERVE AND ITS BRANCHES PROVIDES THE MAJOR SENSORY INNERVATION TO THE PERINEAL SKIN AND THE MOTOR INNERVATION OF MUCH OF THE EXTERNAL GENETALIA.

TREATMENT MUST BE DIRECTED TOWARDS THE PRIMARY PROBLEM. (i.e.. REDUCE AND STABILIZE THE SACROILIAC JOINT AND/OR TREAT THE TIGHT PIRIFORMIS MUSCLE [39].

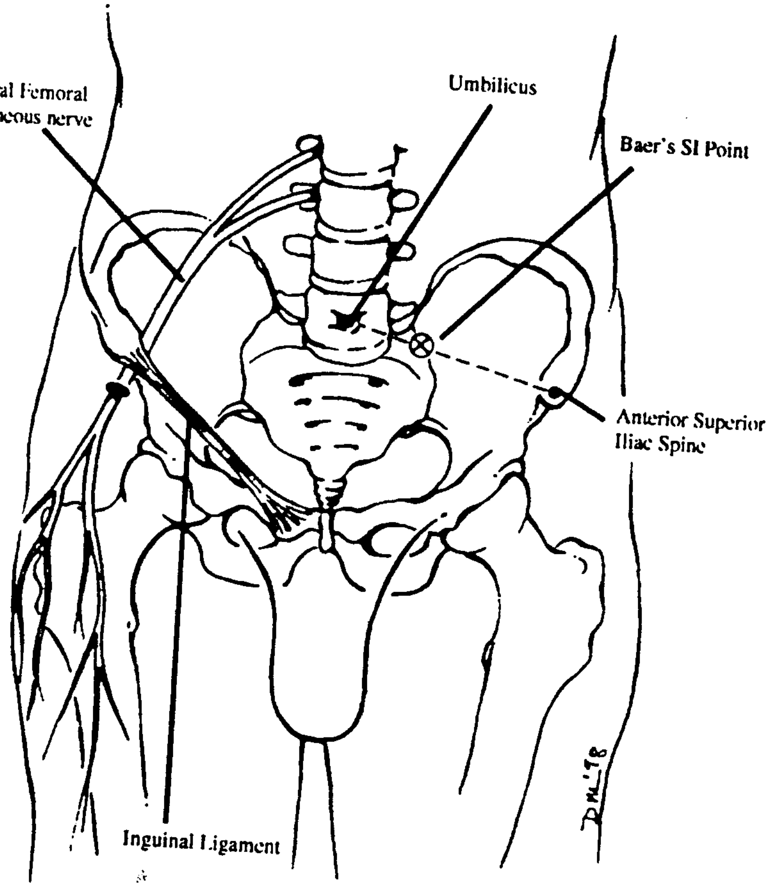
POSTURE CORRECTION AND MASSAGE [33,58] DIRECT MANUAL MASSAGE [48], AND BIOFEEDBACK [46].

NERVE PROBLEMS

MERALGIA PARETHESTHETICA

MERALGIA PARESTHETICA IS AN ENTRAPMENT OF THE LATERAL FEMORAL CUTANEOUS NERVE (L2-L3) AS IT ENTERS THE THIGH THROUGH OR UNDER THE SUPEROLATERAL END OF THE INGUINAL LIGAMENT JUST MEDIAL TO THE ANTERIOR SUPERIOR ILIAC SPINE [10,44,60].

Figure V
Meralgia Paresthetica



SYMPTOMS CONSIST OF NUMBNESS, BURNING, PARESTHESIA, OR DYSAESTHESIAS OVER THE ANTEROLATERAL THIGH.

ETIOLOGIES:

1. DIRECT OR REPETITIVE TRAUMA (eg. SEAT BELTS, TIGHT JEANS) [5]

2. A PROTUBERANT ABDOMEN [7]

3. IATROGENICALLY FROM HARVESTING ANTERIOR ILIAC BONE GRAFT [67].

4. LEG LENGTH DISCREPANCY [22].

5. IDIOPATHIC [43].

6. SECONDARY TO SACROILIAC DYSFUNCTION

ANATOMY

EDELSON AND NATHAN [11] HAVE POINTED OUT THAT AS THE NERVE PASSES FROM THE PELVIS TO THE THIGH, IT UNDERGOES A MARKED ANGULATION. THIS WOULD EXPLAIN WHY THE NERVE WOULD BE SUSCEPTIBLE TO INJURY VIA INCREASED TENSION AND FRICTION WITH CERTAIN CHANGES IN ANATOMIC POSITIONING SUCH AS OCCURS WITH SACROILIAC SUBLUXATION.

DIAGNOSIS

1. SYMPTOMATIC RELIEF BY BLOCKING THE LATERAL FEMORAL CUTANEOUS NERVE.

2. DELAYED NERVE CONDUCTION OF THE LATERAL FEMORAL CUTANEOUS NERVE [54].

TREATMENT

1. CORRECTION OF THE SACROILIAC DYSFUNCTION (IF PRESENT) THIS RESULTS IN SPONTANEOUS RESOLUTION OF THE MERALGIA IN APPROXIMATELY 1/2 THE CASES.

2. NEUROLYSIS OR NEURECTOMY OF THE LATERAL FEMORAL CUTANEOUS NERVE [68].

SUPERIOR GLUTEAL NERVE ENTRAPMENT

THE SUPERIOR GLUTEAL NERVE PASSES THROUGH THE GREATER SCIATIC NOTCH, USUALLY LYING ON THE VENTRAL SURFACE OF THE PIRIFORMIS AND CAN BECOME ENTRAPPED BY

THE PIRIFORMIS MUSCLE. SURGICAL RELEASE OF THE PIRIFORMIS IS THE TREATMENT OF CHOICE [27].

JOINT PROBLEMS

PUBIC SYMPHYSIS INSTABILITY (OSTEITIS PUBIS)

THE NORMAL PUBIC SYMPHYSIS COMPRISES OF THE TWO PUBIC BONES AND A FIBROCARTILAGINOUS DISC.

THERE IS A NORMAL AMOUNT OF UPWARD AND DOWNWARD GLIDING (VERTICAL SHEAR), UPWARD GLIDING ON THE SINGLE LEG WEIGHT BEARING SIDE.(< 2MM.) A SMALL AMOUNT OF ROTATION OF ONE PUBIC BONE AROUND THE OTHER ALSO OCCURS THIS ALLOWS COUNTERROTATION OF THE INNOMINATES WHICH IS AN IMPORTANT PART OF THE NORMAL WALKING CYCLE [23]. INTERFERENCE WITH THESE MOVEMENTS IMPACTS ADVERSELY WITH THE NORMAL WALKING CYCLE.

OSTEITIS PUBIS IS A DISORDER OF THE PUBIC SYMPHYSIS CHARACTERIZED BY PUBIC PAIN AND JOINT DISRUPTION [21,35]. IT DEVELOPS SECONDARILY TO INAPPROPRIATE BIOMECHANICAL FORCES INCLUDING STRESS AND SHEAR.

INSTABILITY OF THE SACROILIAC JOINT(S) APPEARS TO BE A MAJOR CAUSE OF SECONDARY INSTABILITY OF THE PUBIC SYMPHYSIS. OTHER CAUSES INCLUDE ANKYLOSING SPONDYLITIS, JUVENILE RHEUMATOID ARTHRITIS, REITER'S SYNDROME, PROSTATITIS, TRAUMATIC PELVIC RING DISRUPTION, AND INFECTION.

CLINICAL SIGNS

1.TENDERNESS OF THE SYMPHYSIS PUBIS, THE ILIOINGUINAL LIGAMENT AND/OR THE ADDUCTOR LONGUS OR GRACILIS MUSCLES

2. ASYMMETRY OF THE PUBIC TUBEROLES(PUBIC UPSLIP)

3. TENSION IN THE INGUINAL LIGAMENTS AND HIP ADDUCTORS ON THE UPSLIP SIDE.

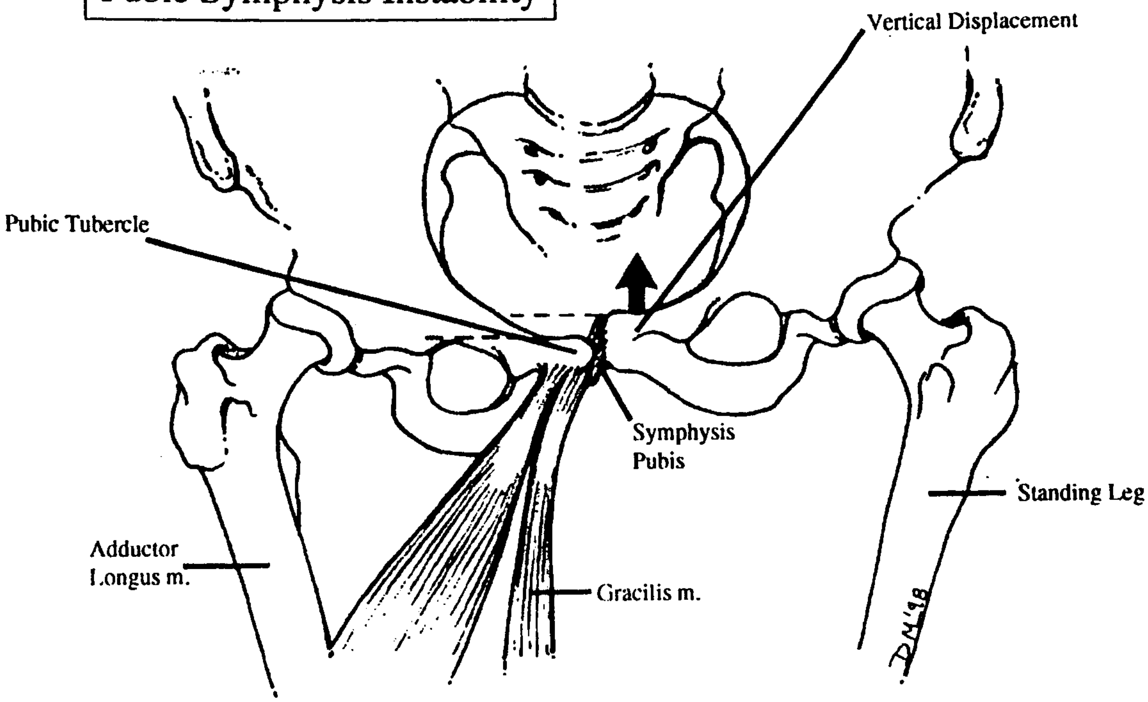
4. LEG LENGTH DISCREPANCY

UNLIKE SACROILIAC INSTABILITY, OSTEITIS PUBIS CAN BE DETECTED RADIOGRAPHICALLY. A VERTICAL DISPLACEMENT OF >2mm. ON AN AP VIEW OF THE SYMPHYSIS PUBIS WHILE THE PATIENT STANDS ON ONE LEG WITH THE OTHER HANGING FREELY (FLAMINGO VIEW) IS PATHOGNOMONIC OF INSTABILITY [54]. OTHER RADIOGRAPHIC SIGNS MAY INCLUDE EROSIONS, CYSTS AND SCLEROSIS.

IN A BRITISH RADIOLOGIC SURVEY 76% OF PROFESSIONAL SOCCER PLAYERS AND 45% OF YOUNG MALE CONTROL SUBJECTS SHOWED RADIOGRAPHIC CHANGES OF OSTEITIS PUBIS [25].

IF INSTABILITY PERSISTS DESPITE POSTERIOR STABILIZATION, ANTERIOR PLATING MAY BE NECESSARY.

Figure VI
Pubic Symphysis Instability



CONCLUSION

SACROILIAC DYSFUNCTION IS FINALLY BEING RECOGNIZED AS A LEADING CAUSE OF CHRONIC BACK PAIN THAT IS NOT EASILY EXPLAINED BY CONVENTIONAL MEANS. MANY PATIENTS WITH THIS CONDITION HAVE SPENT YEARS IN PAIN. THEIR SYMPTOMS ALL TOO OFTEN ASCRIBED TO PSYCHIATRIC, ECONOMIC OR IDIOPATHIC ETIOLOGIES. TO FURTHER COMPLICATE THE ISSUE, OTHER CONDITIONS ARE PRESENT AS A RESULT OF CHRONIC SACROILIAC DYSFUNCTION, OR IN ASSOCIATION WITH IT. THIS PAPER HAS ATTEMPTED TO EXPLAIN THOSE CONDITIONS.

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