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ORIGINAL CONCEPT AND TREATMENT

WITH

3-DIMENSIONAL COUNTER STRAIN (ANTI-TORSION) LIFTING

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CONCEPT

The present day concept of heel lifting on the short leg side has been taught for many years, but has been thought out on a one dimensional plane. The success of lifting is dependent upon a three dimensional plane, and suggests combining both posterior and anterior lifting techniques to counter the torsional stresses that have been imposed upon the body by gravity, congenital abnormalities, trauma or degenerately induced.

To understand the three dimensional concept it is important to visualize mentally the plantar surface of the foot as a "teeter-totter" (figure 1) with the fulcrum at the talus bone and lifting of the anterior foot releasing anterior body stresses of those forces under its control (figure 2) and that vice versa lifting of the heel will release stresses of the forces influenced by the posterior facial planes. Remember, the body in the standing position is under the influence of gravity.

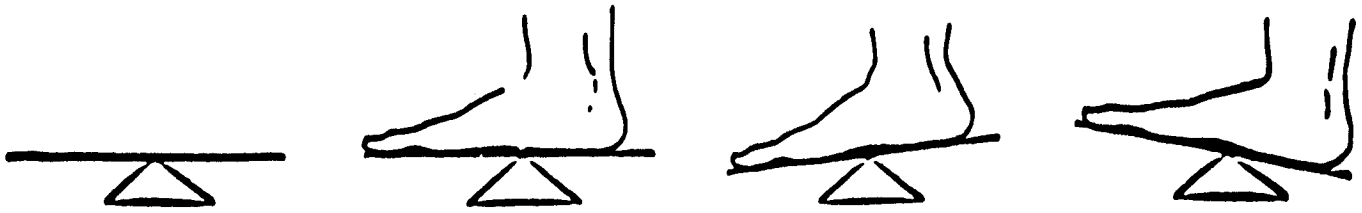
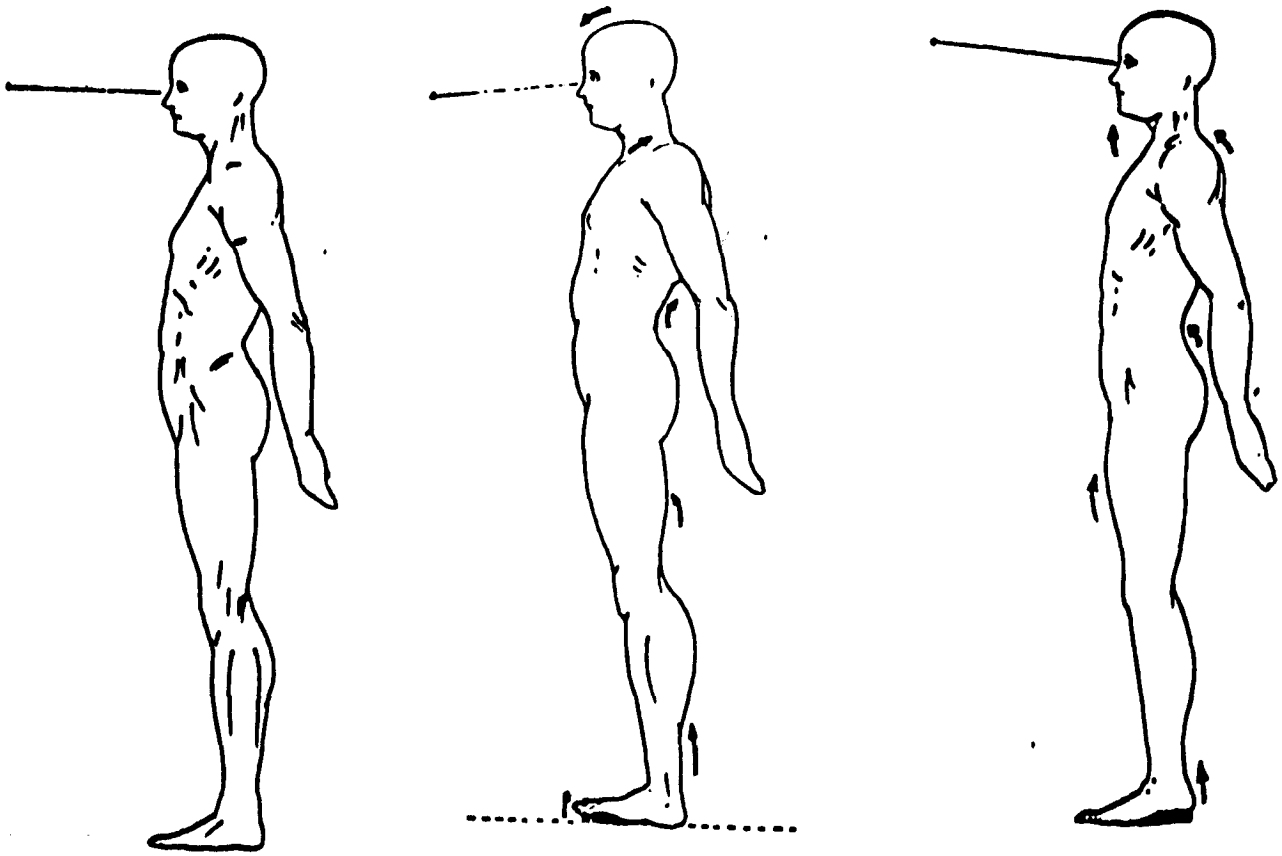


Figure 1 "teeter-totter effect"



(A) (B) (C)

Figure 2

(A) normal (B) relief of anterior strain and increased posterior strain
(C) relief of posterior and increased anterior strain

Essential to understanding this three dimensional strain concept is to understand that barriers are being created by severe torque or twist of an uncompensated system and that the anti-torsional lifts to counter this twist or torque have the ability to remove these barriers. This is because the barriers themselves are the greatest source of trauma as the patient continues to challenge these barriers, constantly creating chronic micro-trauma to the point that they become the major obstacle with the system.

An example of a biological torsion would be a degenerative bursitis of the knee capsule (figure 3). As the torsion applys itself to the knee capsule, it tends to screw the joint down tighter and tighter as a jar lid creating a milieu for advanced osteoarthritis and greater degeneration. As the cartilage and bursa within the joint progressively degenerate it will allow for an even tighter twisting than initially and will continue to the point that it is recognized as a degenerative process with periosteal joint rub. To unwind the stresses of this joint capsule by decreasing the twist , unscrewing of the jar lid (figure 4) would result in improved articulation of the dysfunctional joint surfaces (figure 3 and 5) actually returning the joint space to a more normal position and relieving the pain created by the torsional periosteal rub.

Single Joint

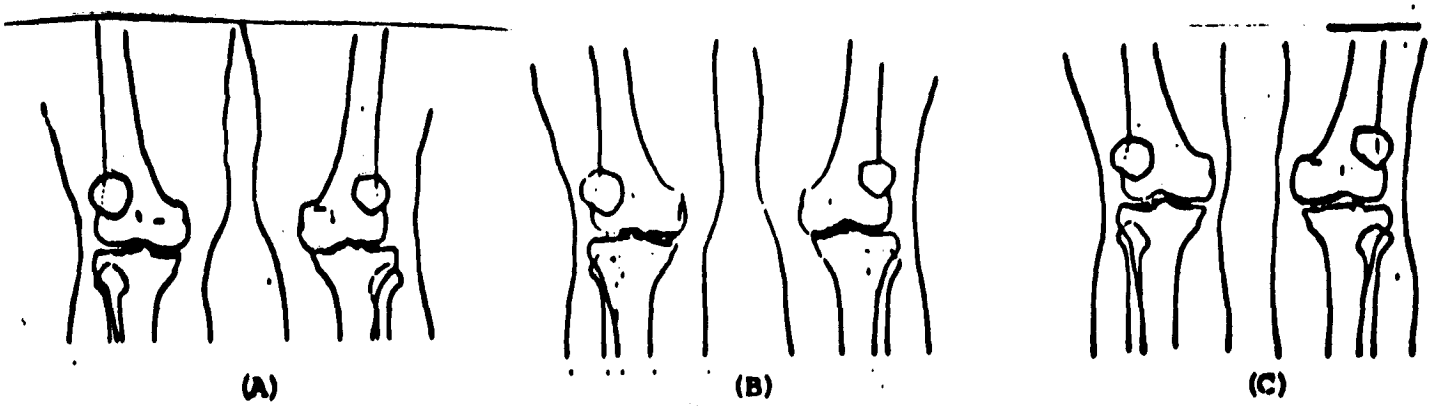
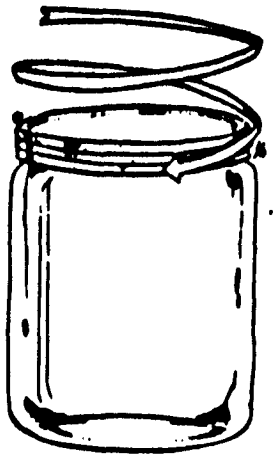


Figure 3
Actual tracings of 70 y.o. female's bilateral standing knee x-rays
(A) initial visit without lifts (B) taken 2 weeks later with left posterior heel lift (C) taken 2 weeks after (B) with 3-D lifts anterior left lift and posterior right lift which shows left medial knee joint space

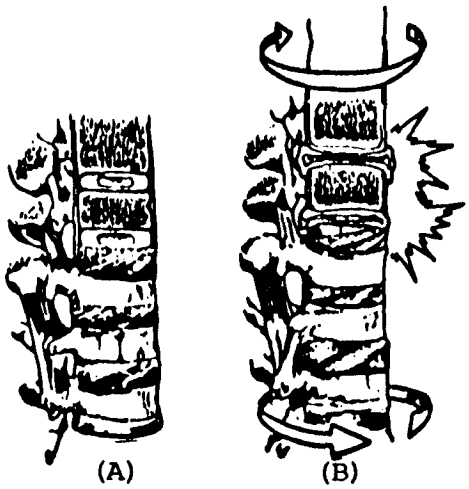
Single Joint



(A)

Figure 4

(A) jar and lid



(A) (B)

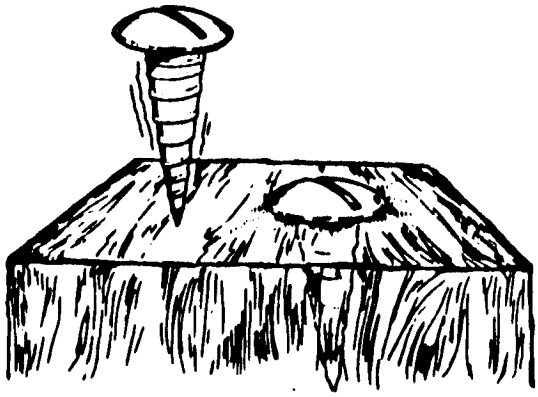
Figure 5

(A) normal vertebral segments without torsion

(B) demonstrates torsion effect on each segment acting as a single joint with disc and capsule

As this same type of mechanism is projected upward the screw deepens, we see the same effect on the pelvic joint capsules which continues into the spinal level and is recognized as degenerative disc disease, vertebral lipping, herniated disc, scoliosis etc... Anatomically the capsule of the inter-vertebral segments with their disc is a reproduction of the same mechanism that we have just described on the knees and could be expected to tighten down and increase the pressure on the disc accelerating the degenerative process to the point of bulging intervertebral discs. The reversal of this process would be to increase the height of the disc and to decrease the excessive weight bearing potential by "unscrewing the screw".

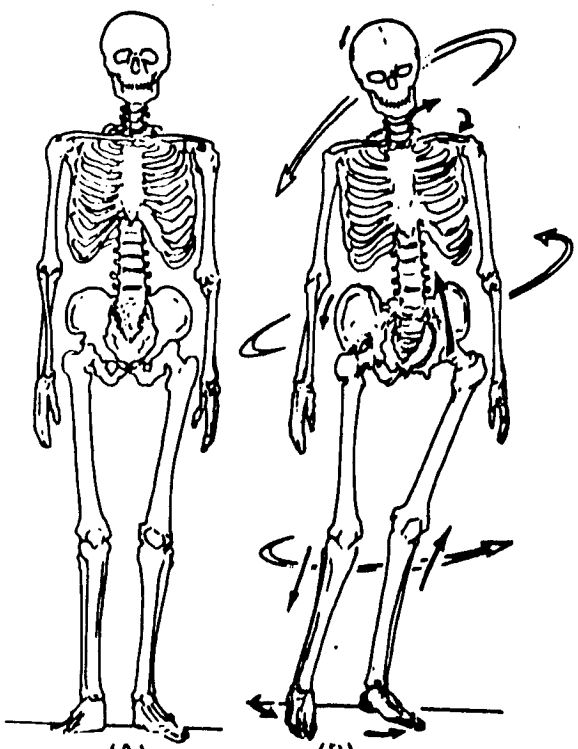
Examples of torsion versus anti-torsion (winding and unwinding) in a non-biological setting is the analogy of screwing down and unscrewing of a simple jar lid (figure 6) representing the heel lift, joint capsule tightening and loosening. The simple wood screw is another example and perhaps more easily visualized as the repetitous screwing down of the wood screw ultimately involving the whole screw within the wood system. This analogy to



(A)

Figure 6

(A) wood screw example...repetitive pressure and torsion to imbed the total screw into the wood



(A) (B)

Figure 7

(A) normal

(B) example...single joint involvement with repetitive pressure of gravity, torsion and time involving the total system

the simple individual joint involvement of the torsion as it is repetitively traumatized and deepened starting at the base and gradually encompassing the

total system as each successive joint twists to accommodate the structures above and in turn creating more barriers until finally it encompasses the total system. The sum total of each and every joint capsule in the body adding it's twist creates the summated or finished torsion pattern. Examples of this mechanism are usually seen first in the lower extremities and then progresses upward.

MECHANICS

Consideration of the skeletal system and its forces (figure 8 and 9), the deep anterior forces begin at the skull from the coronal suture forward is balanced and its weight bearing proceeds downward using the anterior area of the 1st cervical vertebra and on to the sacrum. From the sacrum, the force goes downward to the anterior part of the sacraliliac joint and on a diagonal basis transfers the weight through the arcuate line to the anterior part of the femoral acetabular joint and on downward to the following structures;

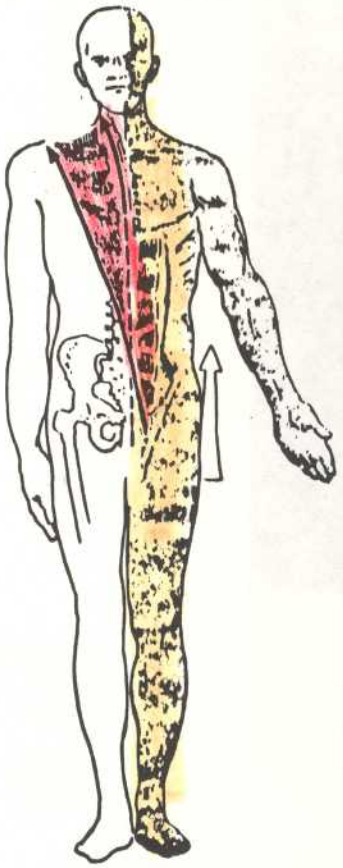


Figure 8
demonstrates three anterior planes of stress: superficial- middle deep

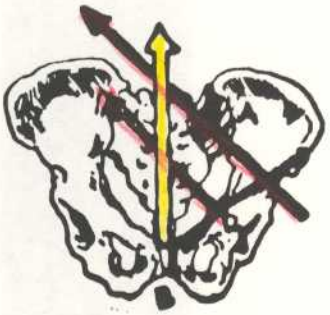


Figure 9
(A) anterior sacraliliac joint (diagonal axis major component)
(B) pubic symphysis (longitudinal component)
(C) inguinal ligament (oblique component)

anterior femur, anterior femoral tibial joint, tibia, talus and then forward through the tarsal bones, metarsals and the phalanges coming to rest on the ball of the foot.

The second anterior force starts from the anterior portion of the skull and proceeds down to the following structures; anterior rib cage, sternum, pubic ramis, through the anterior femur and again ending at the ball of the foot. The main difference between these two anterior forces is that the first vector force is transferred through and dictated by the anterior part of the sacraliliac joint, whereas the second and third vector forces are transferred through and dictated by the pubic ramis.

Another aspect which must be dealt with is the musculo-fascial system and the vector forces pertaining to it both anterior and posterior. The deep anterior musculo-fascial system includes; deep anterior muscles and fascia of the spine, psoas muscle and its fascial sheaths. This deep system has the vector force coming down and crossing over to the contralateral anterior sacraliliac joint and its great ligament structure. The vector is then transferred down through the following structures; anterior acetabular-femoral joint and capsule, quadraceps, anterior knee joint and capsule, anterior tibialus and its fascial sheaths, the dorsi flexures of the foot, ending at the distal portions of the toes.

The deep anterior musculo-fascial system and its vector forces consist of; superficial fascial and muscular layers of the anterior face, anterior

lateral neck muscles and fascia, anterior shoulder girdle, rib cage muscles, abdominal muscles (including rectus abdominis and oblique muscles of the abdomen) with their attachments at the pubic symphysis and inquinal ligament. A more superficial system has a diagonal vector from the contralateral shoulder through the pectoralis muscles and their confluency with the contralateral oblique muscles and fascial system which leads to the inquinal ligament. Again, the vector is transferred on a diagonal axis by the anterior part of the sacraliliac joint then downward to the anterior foot.

The most superficial fascial system fibers consist of the superficial fascial itself and the skin with its total anterior body sheath. The former of these attachments is then confluent anteriorally from the top of the head to the lower extremity fascia and ending at the distal toes in an ipsilateral manner. The skin is an anterior body sheath with confluency with the total body.

In summation, the deep fascial vector forces are transferred contralateral from the upper skeleton through the diagonal axis of the anterior sacraliliac joint on through the lower extremities. The middle musculo fascial vector force is on a contralateral trajectory from the contralateral shoulders to the inquinal ligament and crosses diagonally at the sacraliliac joint and

continues on down to the anterior foot. Finally, the most super-ficial fascial layer has a vector running ipsilaterally with its confluency to the super-ficial skin and fascia extending from the same side of the anterior body and being attached and transferred through the pubic ramis.

Dealing now with the posterior skeletal vector forces (figure 10 and 11) should first recognize the force beginning at the posterior portion of the skull and being transferred to the posterior part of the 1st cervical vertebra

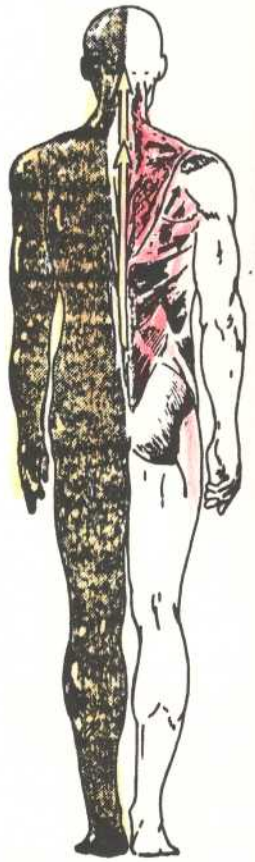


Figure 10
demonstrates posterior planes of stress:
deep and super-ficial
diagonal

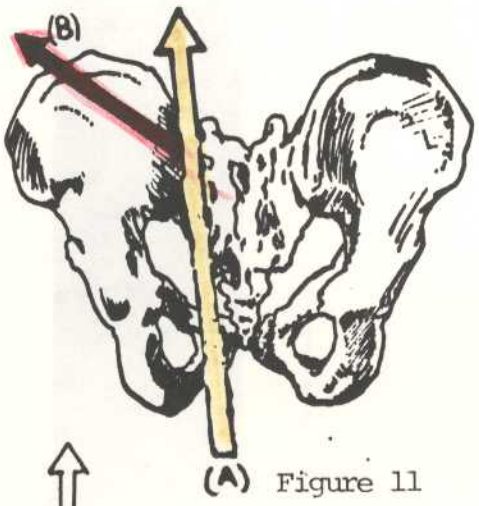


Figure 11

longitudinal major component
diagonal component

and on through the posterior bodies of the vertebra as well as the facet joints. This force continues down to the sacrum and then uses the posterior sacraliliac joints to transfer the force to the ischium and on to the femoral acetabular joint. The force then continues down the following structures; posterior femur, tibia, talo-calcaneal joint and coming to rest on the calcaneal bone.

Considering the posterior musculo-fascial system, the deep middle and super-ficial layers must again be considered. The deep fascial layer and its vector starts at the superior nuchal line and is directed downward. This force goes down the following structures; dura, posterior ligaments of the spine, deep paravertebral muscles, while extending down to the posterior sacraliliac attachments to the medial gluteus maximus, posterior femoral acetabular ligaments, deep thigh muscles, until ending at the distal insertions of the toes.

The middle musculo fascial layer begins at the sub occiput and extends downward through the great paravertebral muscle system in a longitudinal manner with superimposed trianglelated muscle and fascial sheath from the trapezius and latissimus dorsi with their lumbodorsal fascia and the great fascia of the trapezius to the crest of the ilium with the extension through the gluteal muscles, hamstrings, claf muscles and plantar muscles of the foot ending at the toes. The most superfiscial layer would consist of the super-

fiscial fascia itself as a body sheath beginning at the superior portion of the skull with the great ligament of gala through its superfiscial layer, the great ligament nuchal, supraspinous ligament, sacral coccyx ligament, sacro-tuberous ligament and then blending into the super-ficial fascial sheath of the lower extremity and eventually to the plantar fascia and again ending at the plantar portion of the toes. The skin is also included in the superfiscial layer but is a total body sheath confluent both posterior and anterior and movable with its subcutaneous fat layer unless there is a surgical scar or abnormality.

In summary, the deep and superficial posterior musculo-fascial system make up a final ipsilateral vector in contrast to the anterior musculo-fascial system which has both a diagonal and an ipsilateral vector with the ipsilateral vector being of most importance.

RELIEF FROM MECHANICAL ABNORMALITIES BY THE USE OF ANT. & POST. HEEL LIFTS

Relief of strain by reversal of the mechanical forces can be explained by the following section. (Referring back to mechanics may be necessary). Relief of anterior structures by an anterior lift will relieve strain in both the superfiscial and deeper musculo-fascial systems. The superficial layer is relieved strarting from the dorsum of the foot as the dorsi flexion of the foot responds most superficially with the relief of the most superficial layers of the anterior fascial and musculature. This relief of force uses a trajectory which is first ipsilateral by using the pubic ramis and its' attachment to the most superficial fascial layer as well as the rectus abdominis. From here the trajectory is transferred upward through the anterior portion of the body and face to the coronal suture of the cranium.

The anterior deeper musculo-fascial system (and the greatest force) will be relieved by relieving the strain on ligamentous structures of the anterior joints starting at the ankle joint up through the knee joint. From here the relieving froce continues up through the following structures; hip joint, anterior part of the sacraliliac joint (where it then takes a diagonal course), transferring relief through the anterior ligaments of the pelvis, iliopsoas, ipsilateral diaphragm. Continuing relief of the diagonal trajectory includes the obliques and their confluency with the pectoralis muscles of the contra-

lateral chest wall and attaching at the lateral shoulder girdle including the humerus and clavicle. This relieving of the diagonal force allows internal rotation of the ipsilateral ilium and external rotation of the contralateral shoulder and cervical forces.

Relief of posterior structures by a posterior heel lift will relieve the posterior forces of the ipsilateral side of the body by decreasing the force (musculo-fascial) on the calcaneal bone. The relief will be transferred posteriorally through the tibia, femur, posterior ilium and causing an anterior rotation of the post ilium and thus giving relief to the deep paravertebral muscles as well as the diagonal muscles on the same side. The superficial fascia is also relieved because of the relaxation of the vector forces starting from the plantar surface of the toes and extending through the cranium by the attachment of the ligament of gala and parietal area as well as the posterior shoulder causing anterior rotation of the ipsilateral shoulder and slight upper extension of the head.

In summation, tortional injuries require the need for the combined use of the anterior and posterior heel lifts in order to complement each other and create an anti-torsional three dimensional effect that cannot be realized by uni-lateral lifting alone.

SOME EXPECTED SYSTEMIC CHANGES

NEUROLOGICAL SYSTEM

Improved cerebral spinal fluid transport with improved cranial sacral mechanism which had been locked in the strain torsion pattern. Decreased anxiety states improved cranial sacral motion, decreased pain created by the chronic strain and the relief of fascial nerve entrapment syndromes, decrease in the chronic strain placed on the symphathetic chain ganglion effecting the autonomic nervous sustem and reduction of the somatic viseral and viseral somatic reflex created by the torsion of the neuromuscular system.

ENDOCRINE SYSTEM

Improvement of the function, particular of the pitutary gland as the sphenobasilar symphysis is activated with better cranial mechanism and the improvement in the overall circulatory and lymphatic transportation system.

LYMPHATIC SYSTEM

Improved lymphatic drainage.The lymphatic system has several modes of circulation, aided by muscle contraction, arterial pulsations, compression of tissue from external sources, interstitual pressure and the cranial motion. Without adequate cranial sacral motion it is difficult to maintain adequate drainage with an active cranial sacral system. The pump and the cranial sacral motion reduces the lymphedema in the extremities and improves general lymphatic status.

CIRCULATORY SYSTEM

Improved vascular system by the release of the fascial and soft tissue stresses requiring greater pressure for adequate circulation, better venous drainage again for the same reason. Increased cardiac function with decrease in the symphathetic outflow from the cranial as well as the segmental relief of somatic dysfunction and strain on the autonomic system.

URINARY SYSTEM

Improved autonomic outflow, the decrease in the pelvic diaphragm strain and better blood flow to the organs.

GI SYSTEM

Same as urinary system.

RESPIRATORY SYSTEM

Improvement in respiratory function with improved rib cage function with the derotation of the rib cage and unwinding of the abdominal diaphragms, the cervical pectoral diaphragm and relief of the phrenic reflex.

SINUSES

Improved sinus drainage with relief of strain and freedom of the sphenoid to increase the sinus pump and promote drainage. Other head and neck benefits include the restoration of bilateral cervical symmetry, decreasing the cervical strain.

APPLICATION OF 3-DIMENSIONAL (ANTI-TORSION) LIFTING

Cranial motion testing was chosen as a method of applying and monitoring lift therapy since it allows the body to account for abnormalities and interference fields that are not alwys visible to the naked eye such as; congenital abnormalities, scars, previous injuries etc...Therefore, it requires a thorough knowledge of neuromuscular anatomy, physiology, kinesiology, physics, the osteopathic concept both in the axial skeletal and in the cranial sacral system along with a close working knowledge of the patients clinical problem . It should begin with a good history, biomechanical status, clinical data, x-rays, lab, etc... to assess the individuals status and needs. X-rays, AP standing and lateral pelvis and bilateral standing clavicle are of great help. Standing polaroid photographs of the patient before and after applying the lifts as well as at some later date and repeat x-rays will be of great assistance in assessing the changes and improvements to actual skeletal and fascial systems. Next, a variety of lifts should be available ranging from 1/8" through 1/2" and of increments of at least 1/8".

When applying this method, the patient should stand erect with toes placed on a line to prevent an uneven stance and should look straight ahead with glasses on (if the patient wears glasses). The physician then stands to the patient's side facing him in an erect balanced position with his eyes open

and with his head facing the patient. using one hand, place the thumb and third finger on both the right and left greater wing of the sphenoid to monitor its motion. The other hand in a like manner, should be positioned on the occiput just inferior and lateral to the greater protuberance with care not to be on the mastoid process or suture in an effort to monitor the occipital motion. Once the cranial motion can be felt and monitored the physician may then progress to the next step. The greater wing of the sphenoid will be felt to be distinctively higher on one side than the other in its motion. Starting with small increments, heel lifts should be inserted under the ball of the contralateral foot by an assistant while the physician continues to monitor the motion of the sphenoid. The addition of the increments will increase until the physician feels a leveling or balancing of the sphenoid bone. Initially, this seems to be awkward and contradicting until the operator remembers the corssover pattern of the anterior sacraliliac joint. Following the balancing of the sphenoid, the operator then turns his attention to monitoring the occipital motion and will feel a distinct inferior motion of the occiput as it attempts to go into a flexion pattern. Increments of lifts should then be applied by the assistant to the side of the inferior occiput until balance is restored to the occiput. If this has occured, the proper

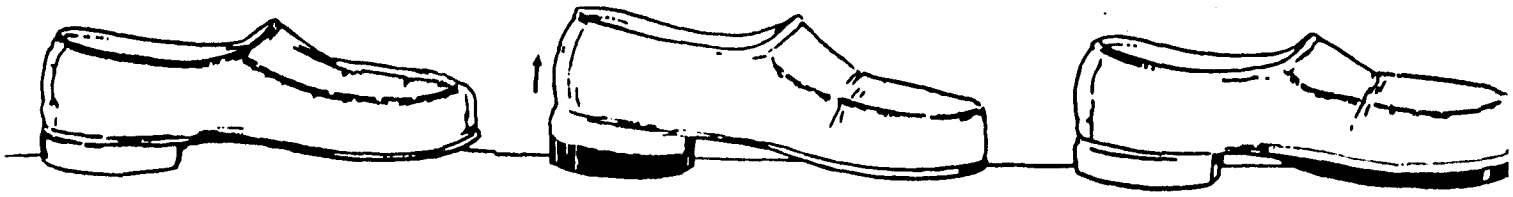
lift sequence has been obtained and should be established as the patient's anti-torsional need at that point. In the event of other abnormalities, adhesive scars causing interference fields, etc..; the need to use lifts in any dimension to attain proper balancing of the sphenoid and occiput should be used and established as that patient's pattern at that time.

The body may have suffered multiple traumatic events, each event having its own basic unwinding pattern which may be stacked, or superimposed upon more recent injuries and therefore dictates an order for unwinding that is known only to that individuals system. Initially this order may seem to the operator an illogical one and the temptation to override this system based on x-ray findings, etc...may be quite tempting. Attempts to override this system will end in failure. Frequent treatment and monitoring allows the physician to change this pattern as the unwinding from one trauma is complete and the need for unwinding of the next trauma begins. The patient will eventually establish a pattern that does not change and where there is good balance and function and can then be considered as the permanent pattern for that patient. This should be explained to the patient so that he may be comfortable with his changing needs.

The patient should wear comfortable well built shoes to be lifted and

the cobbler should be aware of your program. Anterior lift (figure 12) is what is commonly known as a half sole applied unilaterally to constitute an anterior lift. The anterior portion of this half sole should be rounded off to prevent stumbling or catching the toe since the actual lift is not accomplished at the distal toe but rather the ball of the foot. Posterior lift is simply an un-opposed unilateral elevation of the shoes heel. Obvious problems if not throughly explained to the patient can be disconcerting since changing lifts frequently if patient posseses multiple pairs of shoes can be rather costly. If the patient has a need for orthodics, they should be tailor-fitted and worn as inserts in the shoes. However, these too may change as the patient changes his balance points. Temporary lifts placed inside the shoes as inserts create multiple problems. The most common problem is the anterior lift since the average shoe does not allow adequate room to prevent the rub of the anterior foot and toes. Failure to understand this will result in the patient not wearing the lifts or even worse having the patient remove only the anterior lift and continuing to wear the posterior lift, this creating an even greater problem. Temporary lifts, however, may be inserted on a very temporary basis in tennis shoes with adequate toe room in the male by possibly getting a pair of shoes one size too big and in the case of the female buying a pair

of boys tennis shoes which have increased toe room. The tennis shoe must have a removable insole to prevent the lifts from sliding and from falling out and the patient not remembering where the lifts belong. This application should be emphasized as only a very temporary solution and will never be as comfortable as those placed externally.



(A) (B) (C)

Figure 12

(A) regular shoe (B) show with posterior heel lift (C) shoe with anterior lift (half sole)

Patient is fitted before treatment to estimate the degree of torsion involved in the injury, but <u>treatment of obvious somatic dysfunctions ie: cranial</u> patterns, pelvic lesions etc... <u>Before</u> you balance the sphenoid and occiput with the shoe lifts to be worn, frequent treatment and lift re-evaluation must be done during early phase of treatment program.

CONCLUSION

In conclusion, proper evaluation and diagnosis of uncompensated torsional strains and sprains both acute and chronic will benefit significantly from their proper application of three dimensional anti-torsional lifting and will be supportive of any other therapies applied in conjunction with (cranial sacral and fascial release techniques). The use of the concept and lifts will improve the physician's understanding of torsion and the dysfunctions that they create.

Major objections and failures of this system will be common among those physicians who fail to have the proper background skills. Assessment of the patient's dysfunctions and failure to anticipate limitations and make proper adjustments when necessary for ongoing improvement.

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