THE RELATIONSHIP BETWEEN PELVIC BLOCK PLACEMENT AND RADIOGRAPHIC PELVIC ANALYSIS

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ABSTRACT

Objective: In this current study, radiographs were taken to determine whether pelvic distortions could be demonstrated on x-ray when pelvic blocks were placed under the patient in the prone position.

Methods: One patient was placed prone in a neutral position and radiographs were taken in a neutral position, and then with a pair of pelvic blocks placed under the subject in each of 4 different positions: (Right Short Leg - Category One) left iliac crest, right greater trochanter; (Left short Leg - Category One) right iliac crest, left greater trochanter; (SB+) left and right iliac crests; and (SB-) left and right greater trochanters.

Results: Findings indicated that pelvic block placement could create or affect distortions of the pelvis.

Conclusion: Further studies are indicated correlating radiographic analysis, pain provocation, and muscle strength to determine if a clear pelvic block preference can be determined definitively. (J Chiropr Med 2003;2:102-106)

Key Indexing Terms: Chiropractic; Pelvis; Pain

INTRODUCTION

Padded wedges, sometimes referred to as pelvic wedges or blocks, are used as a form of chiropractic adjusting when placed under the pelvis of the prone or supine-positioned patient. There is limited information regarding the use of these wedges in the chiropractic peer-reviewed literature. However, there are numerous publications, spanning 75 years, which discuss the use of these blocks within the chiropractic technique known as Sacro-Occipital Technique. A recent study by Lisi, Cooperstein and Morschhauser entitled "A pilot study of provocation testing with pelvic wedges: can prone blocking demonstrate a directional preference?" developed a relationship between block placement and pain.

(1) The study was rather straightforward, investigating the placement of blocks in 4 different positions; both blocks in the superior position, both blocks in the inferior position, and 2 diagonal positions. The superior landmark was the ASIS and the inferior landmark the greater trochanter. Pain or a change in pain upon provocation for each placement was noted.

This is a single case study to determine the observable radiographic changes in the pelvic and lumbar regions for each of the 4 block placement positions outlined in the Lisi et.al study. (1)

METHODS

Standard PA plain film x-rays were taken in the prone position at 40 inches film focal distance. The central ray was aligned to the L5 with the collimation opened to the size of the film in order to visualize the pelvis and lumbar spine. The series consisted of 5 prone radiographs: 1) without blocks under pelvis; 2) left block under ASIS and right block under greater trochanter; 3) right block under ASIS and left block under greater trochanter; 4) both blocks under both ASIS; and 5) both blocks under both greater trochanters. The films were marked comparing left and right land marked areas that considered elevation and width changes of 5 locations. These landmarks were as follows: superior aspect of iliac crest, superior aspect of femur head, inferior aspect of the ischial tuberosity, the most medial aspect of the ilium and the most lateral aspect of the ilium.

RESULTS

Table 1 shows the results of the various blocking configurations.

DISCUSSION

The use of pelvic wedges or blocks as a chiropractic adjustment tool is utilized by many practitioners from a variety of technique disciplines. The pelvic blocks, or wedges were introduced by Dr. Major DeJarnette in the development of Sacro-Occipital Technique; their use is indicated by identifying specific criteria, and the positional placement under the pelvis is directed by identifying the short leg. (2) Practitioners of other technique disciplines consider other indicators for placement such

TABLE 1
BLOCK PLACEMENT DISTORTIONS

LANDMARK	NO BLOCKS	RT. LOW	LT. LOW	BOTH HIGH	BOTH LOW
ILIUM	20	21.5	12	18	20
FEMUR HEAD	11.5	14	7.5	11	11.5
ISCHIAL TUBEROSITY	8	10	8	9.5	11.5
RIGHT ILIUM HEIGHT	234	235.5	242	239.5	238
LEFT ILIUM HEIGHT	246	247	246	248	246.5
RIGHT ILIUM WIDTH	89	94	91	90	89
LEFT ILIUM WIDTH	94	88	88.5	94	94

MEASUREMENTS IN MILLIMETERS.

as, but not limited to, shoulder height, pelvic unleveling or lumbar curvature in the standing position, leg length, (3) and pelvic unleveling in the prone/supine position and muscle testing.

Cooperstein suggests that pelvic blocks can be used for orthopedic testing. He suggests that the blocks may be used to place the pelvic joints under “stress or potentially de-stressed positions, noting the symptomatological changes and drawing appropriate clinical conclusions.” (4) In a 16-subject pilot study by Unger, the author monitored the strength of 8 muscle groups using a MicroFET hand held dynamometer before and after pelvic block placement, including Sacro-Occipital Technique Category 2 treatment. The testing was performed immediately before and after treatment. Fifteen of the 16 subjects had improvement of muscle strength and “a statistically difference pre and post-treatment was found.” (5)

Leg-length inequality (LLI) and its effects on the pelvis are considered clinically significant factors in low back pain presentations. (3) The effects of LLI on the pelvis are understood to create torsion in the sagittal and/or frontal planes. (6–9) The torsion is created by the movement of the innominate (see figure 1) anterior on the side of the short leg and posterior on the long leg side. (7,10) The effects of pelvic torsion create numerous compensatory changes such as postural scoliosis, concavities in the vertebral body end-plates, asymmetry of lumbosacral facet joint angles, wedging of the 5th lumbar vertebra and traction spurs. (11,12) (Figure 1)

Pelvic torsion or asymmetry as well as excessive pelvic flexion and extension may be induced by other means than a leg-length inequality. Factors such as trauma, long-standing ergonomic factors (i.e. as unlevel sitting surface at a work station) or repetitive micro-trauma insults (i.e. improper lifting techniques) may be the stimulus for creating pelvic asymmetry.

Regardless of the cause of the pelvic torsion or flexion/extension, it would seem to be a logical conclusion that

Ilium
Anterior
Rotation

Ilium
Posterior
Rotation

Figure 1. Anterior and posterior ilium rotations.

creating a counter torquing, flexion or extension force would be one way to correct the pelvic asymmetry. Wedges placed at specific locations under the pelvis should induce just such a counter force. This logic was the basis for investigating the apparent positive findings demonstrated in the Lisi et al. study. (1)

Block placement was consistent with the procedures outlined in the Lisi et al. study (1) and PA radiographs were made to determine if positional changes with respect to torsion, flexion or extension could be determined. X-ray marking of 5 points on each hemipelvis was an effort to determine changes from side to side. Figures 2–6 demonstrate the visual changes from radiographs made from the pelvis with no blocks in place (Figure 2), diagonal placement with the right block in the lower position (Figure 3), diagonal placement with the left block in the lower position (Figure 4), both blocks in the superior position (Figure 5) and both blocks in the inferior position (Figure 6).

While the landmarked elevations and corresponding differentials from side to side offer no specific insight as to anatomical leg length or pelvic position under weight

Figure 2. Radiograph of pelvis without blocks in place.

Figure 3. Diagonal block placement with right block in lower position.

bearing, it does give the visual representation of what is frequently referred to as functional leg-length inequality and the corresponding pelvic torsion representation. Table 1 outlines the data for the measurement differentials of the 7 parameters in question for the five blocking options.

In consideration of what these measurement mean, the assertion is, if any 1 block placement option offers counter forces to those producing pelvic torsion, there

Figure 4. Diagonal block placement with left block in lower position.

should be measurements that represent a movement towards symmetry between the right and left hemipelvis. This symmetry would be noted by elevation differences of the ilium, femur heads and ischial tuberosity moving more toward 0 and the total height and width becoming more equal.

CONCLUSION

The 5 PA lumbopelvic plain film radiographic projections demonstrate changes. This is visible when looking at the pelvis in total. The measurement differentials of the 3 landmarks that determine elevation changes are minor and not what is notable to the eye as much as the overall shape and size of the ilium.

What seems oddly inconsistent is the difference between the x-ray findings as compared to the observed change on the patient when the blocks are placed under the patient's pelvis. The prone patient's leg lengths were checked by comparing the inferior aspect of medial malleolus of both legs with slight traction and dorsiflexion of the ankle. When blocking in the diagonal option where the low block is placed under what is the apparent short leg (in this case the right leg) the right leg after 30 seconds became equal in length to the left leg. When testing in the opposite diagonal position and the low

Figure 5. Both blocks in superior position.

block was placed under the left leg (long leg) the leg became even longer. Leg length in the both high and both blocks low positions appeared essentially unchanged at the inferior malleolus of each ankle.

This would lead someone to suspect the elevations at the level of the femur head would have reduced to near 0 when compared to the unblocked films in the right leg low-block procedure and increased in the left low-block procedure. The measurements from the films demonstrated just the opposite to be the case. However, the overall appearance of the right versus left ilium that was most notable when viewing the films demonstrated equally inconsistent measurements. The near reversal of measurements in width and height when the low block was placed under the right side would suggest a change that may have had an influence on pelvic torsion.

Drawing any conclusions, even preliminary ideas from the data are not possible. It does demonstrate that some type of change is taking place but what that change is cannot be determined.

This study was to see if a change could be noticed. To that extent it seems logical to conclude the block placement creates some changes in the position of the pelvic innominate as they relate to each other from side to side. However, the nature of plain film projections cre-

Figure 6. Both blocks in the inferior position.

ates some inherent problems, which may produce results that could completely negate the apparent findings determined herein.

Plain film x-rays are simply a 2-dimensional shadow of a 3-dimensional object. Film focal distance (FFD) and film object distance (FOD) are components of x-ray imagery that produce consistent distortions. The introduction of blocks between the film and the object provides for a greater shadow dimension that can only be minimized by increasing the FFD (moving the tube further away from the film). Block placement was the only variable introduced in this study. The image change one would expect from changing FOD was not consistent with the measurements observed so while this study offers no conclusions as to what the changes mean, it can however be concluded that there were identifiable changes.

It might be more useful to consider a similar study using imagery that considers three-dimensional evaluation or determine if MR scan studies can produce 3D-type imagery and a calculating method to determine what positional changes are occurring in the pelvis and lumbar spine.

REFERENCES

1. Lisi AJ, Cooperstein R. A pilot study of provocation testing with pelvic wedges: Can prone blocking demonstrate a directional preference? Proceedings of the ACC Conference IX. J Chiropr Ed 2002;16:30-1

2. DeJarnette MB. Sacro occipital technic. Nebraska City, NB; Privately Published 1984, p. 1-23
3. Mannelo DM. Leg length inequality. *J Manipulative Physiol Ther* 1992;15: 576-90
4. Cooperstein R. Padded wedges for lumbopelvic mechanical analysis. *J Am chiropr Assoc* 2000. p. 24-6
5. Unger JF. The effect of a pelvic blocking procedure upon muscle strength: a pilot study. *Chiropr Technique* 1999;10:150-5
6. Cooperstein R, Lisi A. Pelvic torsion: anatomic considerations, construct validity, and chiropractic examination procedures. *Top Clin Chiro* 2000;7: 38-49
7. Cummings G, Scholz JP, Barnes K. The effects of imposed leg length difference on pelvic bone symmetry. *Spine* 1993;18:368-73
8. Walsh M, Connolly P, Jenkinson A, O'Brien T. Leg length discrepancy—an experimental study of compensatory changes in three dimensions using gait analysis. *Gait Posture* 2000;12:156-61
9. McCaw ST, Bates BT. Biomechanical implications of mild leg length inequality. *Br J Sports Med* 1991;25:10-13
10. Young RS, Andrew PD, Cummings GS. Effects of stimulating leg length inequality on pelvic torsion and trunk mobility. *Gait Posture* 2000;1: 217-23
11. Giles LGF. Lumbosacral facet 'joint angles' associated with leg length inequality. *Rheumatol Rehabil* 1981;20:233-8
12. Giles LGF, Taylor RJ. Lumbar spine structural changes associated with leg length inequality. *Spine* 1982;7:159-62