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Treatment of the Pain and Dysfunction Associated with Ankylosing Spondylitis by Means of Postural Reconstruction

Case report presented by
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ABSTRACT

In the absence of any other physical treatment, Postural Reconstruction (PR) as a physical therapy approach for the pain and dysfunction attributed to ankylosing spondylitis (AS) was followed by the elimination of the need for pain medication and the restoration of full function for a 28-year old female. Patients with AS suffer pain and stiffness causing often severe functional losses. The management of patients with this disease is largely by medication (analgesics, NSAIDs and corticosteroids), physical therapy, and sometimes radical surgery in severely advanced stages of the disease. This report presents a case study of a patient diagnosed with AS, who was deteriorating over a period of four years while following this conventional approach. The patient showed remarkable improvement in less than one year using the neuromuscular technique of Postural Reconstruction (PR) developed by Françoise Mézières. The field of PR associates pain and dysfunction with muscular imbalance. The existence and significance of this imbalance is determined by trained observation of the patient's morphology/alignment, and treatment seeks to restore alignment and improve imbalance.

KEY WORDS:
ANKYLOSING SPONDYLITIS
POSTURAL RECONSTRUCTION
MEZIERES METHOD
NON-DRUG THERAPY
PHYSICAL THERAPY
PAIN

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1. INTRODUCTION

The compelling purposes for reporting on this case report are twofold: (1) to contribute information in the management of patients diagnosed with AS specifically, and (2) to raise questions about the source of pain and dysfunction in spondyloarthropathy. The case presented is that of a young woman, a university graduate and successful career counselor. Her former vibrant, energetic and athletic recreational life of bicycling, hiking, kayaking, skiing and working out in a gym was restored in a considerably short time following treatment by Postural Reconstruction (PR).

Ankylosing Spondylitis (AS) is a rheumatic disease in which inflammation is developed "at the site of ligamentous insertions into bone."[1] The pertinent clinical features of the disease are pain, inflammation, loss of mobility, potential ankylosis, although rare, and abnormal postures. [1, 2]

Accepted classical or conventional treatments include drug therapies (analgesics, NSAIDs, and corticosteroids), physical treatments (physical therapy and spinal orthosis), and radical surgical therapy in severely advanced stages of the disease. [1, 2, 10, 14]

The objective of conventional physical therapy, as cited overwhelmingly in the literature, is to promote as normal (morphologically aligned) a posture as possible

throughout the course of the disease by means of an individualized exercise and posture program.[1, 2] Regular, **daily**, self- administered exercise/manœuvers, performed over a 4-month period were shown by Kraag, et al.[3] to improve flexibility and function. However, no change in pain, spinal alignment, or sleep disturbance was obtained.

Postural Reconstruction (PR) is a neuro-muscular technique that seeks to normalize excessive tension (hypertonicity) in certain groups of muscles and improve morphological alignment while reducing pain and dysfunction.[4] The principal techniques of PR were originally conceived in 1947, and developed until 1991 by Françoise Mézières who was a French physical therapist. Since, her techniques have been further developed by Michaël Nisand and others at the Université des Sciences Louis Pasteur, Strasbourg, France. In the case presented here, a patient with AS who had severe pain and loss of function over the course of more than four years, experienced a drastic decrease in her pain and a full return of her functional level within a very short time (two months).

2. SUBJECTIVE DATA

2.1. PRESENT HISTORY

The patient is a 28-year old female whose history of musculoskeletal pain began with a sore right hip 8.5 years prior to the initial PR evaluation. Originally, it was thought to be due to a strain of the right groin muscle, possibly suffered during a step aerobic gym routine. It was injected once with cortisone.

It would be approximately five years later that her rheumatologist's diagnosis was that of Ankylosing Spondylitis (AS). This is a considerably longer delay than the average two years between onset of symptoms and diagnosis.[1] The literature cites a lack of viable markers for AS, making diagnosis difficult and usually delayed.[1, 13] In this particular case, there were other complicating factors that resulted in the delay being even further extended. Prior to the onset of the right hip pain, and during the intervening five years before the diagnosis of AS, the patient was involved in five motor vehicle accidents (MVAs) and suffered two episodes of intestinal "infections". Some of her symptoms were possibly inappropriately attributed to these events. The MVAs are detailed in Table I found in the Past Medical History section to follow.

At our first consultation, five major complaints and reasons for consultation emerged (in descending order of severity):

1. Right foot (only) pain and swelling:

   (a) first metatarsophalangeal joint which first became painful in January 1995, or three years prior to our evaluation. This was "very painful" but on an intermittent basis. At rest there was no pain, but immediately upon walking the toe was very painful, limiting her to a walking distance of less than 0.5 km.

   (b) second metatarsophalangeal and interphalangeal joints which first became swollen in 1997.

   (c) Moderate ankle swelling which had begun one year previously and had been more severe.

2. Generalized morning stiffness lasting about one hour (anti-inflammatory medication was taken upon rising).

3. Stiffness in hip, sacro-iliac joints and lumbar area.

4. "Muscle stiffness" in both legs that was "achy", as well as a periodic left leg symptom like "burning".

5. Reduction of overall general strength and endurance in activities of daily living and athletic activities. The patient was much less able to ride her bicycle being unable to ride uphill, and had difficulty climbing stairs.

The combination of all these symptoms represents the patient's impairments causing severe functional limitations and disability. She was unable to participate in any

activity except bicycling (with the limitations already mentioned), swimming, and short walks. She was maintaining this level of limited activity and pain control with three to four Voltaren tablets (50 mg each) per day and glucosamine sulfate. Her overall level of function compared to her past lifestyle was very low even with the help of NSAIDs.

The decision to report on this patient was made approximately halfway through her treatment. The BASFI [8], the Dougados Functional Index[7], and the Disease Activity Index (modified from the Arthritis Impact Measurement Scale)[12] were administered 3 months after the end of the treatment, or about one year following the initial evaluation. The patient responded to these questionnaires separately for the present, and for the past (prior to the initial evaluation) to the best of her ability. The results of the questionnaires appear in **APPENDIX I**. It should be noted that the questionnaires that were used were developed for large sample-group studies, and have been shown to have statistical validity and reliability. In this case, these questionnaires were used for a single subject and serve to quantify and illustrate the patient's perception of her own improvements.

In seeking treatment the patient's goals were to return fully to her former athletic activities and to eliminate the need for prescription medication in order to possibly become pregnant.

2.2. PAST MEDICAL HISTORY

As has already been mentioned, the patient's past medical and traumatic histories are significant and may be contributing factors to the patient's status at the time of the initial evaluation. These are shown in Table 1.

TABLE I - SUMMARY OF THE SIGNIFICANT MEDICAL AND TRAUMATIC EVENTS IN THE PATIENT'S PAST HISTORY		
Age (years)	**MEDICAL EVENTS**	**TRAUMATIC EVENTS**
16	amoebic dysentery x 3 mos. following a 6 wk trip in S. America - untreated	MVA #1: most severe - damaged nerves in lt. leg - ++swollen lt. leg - PWB on crutches - sensitive, on/off pain since
17	recurrence of above symptoms - diagnosed and treated for salmonella	MVA #2: minor - short term neck and back pain
18	---	MVA #3: minor - short term neck and back pain
20	intestinal problem with diarrhea in S. America - treated at local clinic with unknown substance	---
21	---	MVA #4: minor
23	---	MVA #5: very minor
24	diagnosis of AS	---
25	- ill in Mexico with flu-like symptoms - rash over whole body one month later, lasting ~ one month and treated as a flu-like virus	---
26	- severe pain in lower abdomen-undiagnosed, Ba enema, upper GI normal. Suspected bladder infection and treated. - 3 months later, recurrence of above symptoms	---

The patient's overall poor state of health, general lowered sense of well-being, as well as pain, impairment and dysfunction, forced her to take a temporary medical leave of absence from her employment in May 1997 (at 27 years of age).

Throughout this 12-year period, the patient was monitored by her General Practitioner. Due to an increasing dependence on anti-inflammatory medication, she was referred to a Rheumatologist for a review of all her prescribed medications. The rapport with the specialist was unsatisfactory to the patient however, and she therefore consulted a second Rheumatologist.

Medical treatment consisted of NSAIDs, one cortisone injection in the right hip (1991), and two cortisone injections in the right first toe, all of which had no lasting beneficial effect.

Other treatment prior to our consultation included massage therapy (ongoing), rolfing (eight sessions starting January, 1997 and which were somewhat helpful in reducing the pain in her hips within two sessions), conventional physical therapy (Spring, 1994), and weekly acupuncture and herbal treatments (June 12 to July 24, 1997). The patient considered the acupuncture treatment to be the most helpful in reducing her symptoms of pain. Nevertheless, all these treatments provided only temporary, and not the long-term relief being sought.

3. THERAPEUTIC HYPOTHESIS

3.1. SYMPTOMS

Based on the historical data, this patient presented with:

1. severe pain,
2. loss of strength and endurance,
3. stiffness of joints and limbs, and
4. extreme loss of function.

3.2. CONVENTIONAL PHYSICAL THERAPY

According to conventional reasoning, her pain was attributed to the associated inflammation of AS. The pain caused her to be inactive and may have been the reason for her loss of strength and endurance, resulting in a loss of function. This conventional rationale assumes the root cause of the outlined problems to be the inflammatory process of AS. NSAIDs were applied to control the symptoms and potential deformity of the inflammation.[2] In addition, the conventional physical therapy exercises attempted to manage the physical losses and control postural alignment.[2, 14]

3.3. POSTURAL RECONSTRUCTION

In contrast to conventional physical therapy, the field of Postural Reconstruction is based on the premise that certain groups of muscles form "chains"*. A chain is a set of polyarticular muscles that follow each other and overlap in the same direction like tiles on a roof with no break in continuity, forming a single system.[4] The muscles within a chain and each chain system are found to be interdependent. These muscle chains accumulate tension or *tone**, becoming *hypertonic** simply over time and often as a result of traumatic events. [The term "*tone*" is the physiological level of activity in muscles and in chains of muscles. *Hypertonicity* is an elevation of this *tone*.[4]] Trauma can be toxic (e.g.viral), hormonal, thermal, emotional or physical.[4] *Hypertonicity* causes muscles to be inflexible or tight and shortened. A direct correlation has been observed between pain and an imbalance of *hypertonicity* among the four chains. As *hypertonicity* is balanced and decreases, often so does pain.[4] There are four chain systems[4] in the body as shown in **Figure 1**:

1. Posterior Corporeal chain.
2. Anterior chain of the lumbar area.
3. Anterior chain of the neck
4. Brachial chain

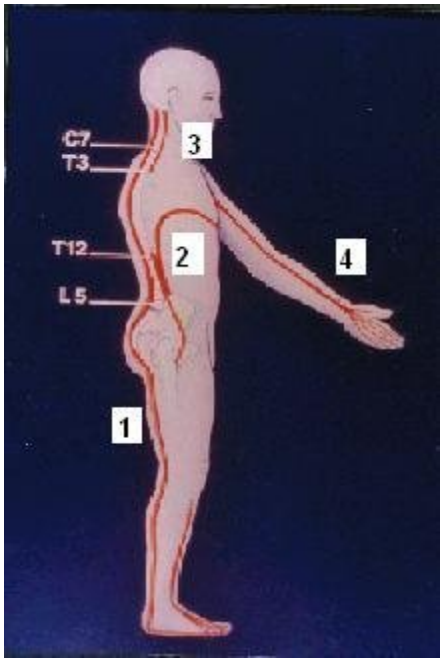

Fig. 1: The four muscle chains[16]

*** an asterisk indicates that the word is included in the Glossary of Terms.**

The most significant of these is the posterior chain which includes the posterior muscles from the occiput, down the posterior trunk, buttocks, and lower extremities to the foot, and up the anterior tibia to the knee.[4]

Because the muscles are interdependent and become too short due to *hypertonicity*, any **localized** action either to shorten or lengthen a part of the system results in an overall shortening of the **whole** system.[4] Therefore, when a full range of motion (ROM) at one particular joint is attempted (inductive manœuvre[15]*), this full ROM is only possible with a shortening somewhere else in the system. These reactions occurring at a distance from an inductive manœuvre are called evoked responses[15](ER's*). For example, executing a pure shoulder abduction, performed in internal rotation to ensure purity, can only be accomplished with an abduction of the ipsilateral scapula. The adductors of the scapula, however, belong to the posterior chain. (Muscles in chains are hypertonic and short). The *hypertonicity* of the scapular adductors will limit the scapular abduction at the level of the scapulo-thoracic joint and in turn cause an ipsilateral convexity of the thoracic spine (ER). Since the posterior chain is also shortened at the level of the thoracic spine, this induced thoracic convexity may trigger another deformation at a greater distance such as abduction and shortening of the contralateral lower extremity (ER). In this way, we see a shoulder manœuvre affecting and reaching the contralateral hip.

The accumulation of *tone* or *hypertonicity* in the muscle chains (which occurs gradually over time or suddenly as with traumatic events) causes the skeletal structure itself to deform.[4] These individual postural deformations make up postural dysmorphisms. For example, the hallux valgus dysmorphism is formed by the following deformations: supination of the first metatarsal and external rotation and adduction of the first metatarsophalangeal joint.

The normalization of the *hypertonicity* is sought by way of *posture*s*. A *posture* is one or a series of manœuvres consisting of sustained or repeated physiological movements performed in the full range of motion (ROM) available, of which at least one produces an aggravation of a deformation at a distance. This aggravation of a pre-existing deformation is produced by the *hypertonicity* in the muscle chain. The *posture* is held for a period of time, during which the patient breathes in a free, regular, and full manner until the *hypertonicity* is reduced at the level of the deformation because of fatigue in the muscle chain at this level. When the *hypertonicity* is reduced, the muscle chains become less tight and more elastic.

In releasing *hypertonicity*, length is restored to the muscles of the chain systems. This occurs with successive treatments and, in time, muscles adapt to a longer length in turn providing morphological improvement. The results of this process generally extend beyond further sessions and thus attest to the lasting results of PR. As treatment progresses, the interval between sessions can be prolonged to several months.

The goal of PR always is to reduce or normalize the *hypertonicity* of the muscle chains. The static postural and dynamic evaluations are used to determine the general dysmorphisms and deformations present in each patient. The treatment is guided by these evaluations and uses postures to bring the structure toward what would be an ideal alignment. Pain, dysfunction and, in time, deformations and dysmorphisms are seen to be reduced by this method. (See **Figure 2**).

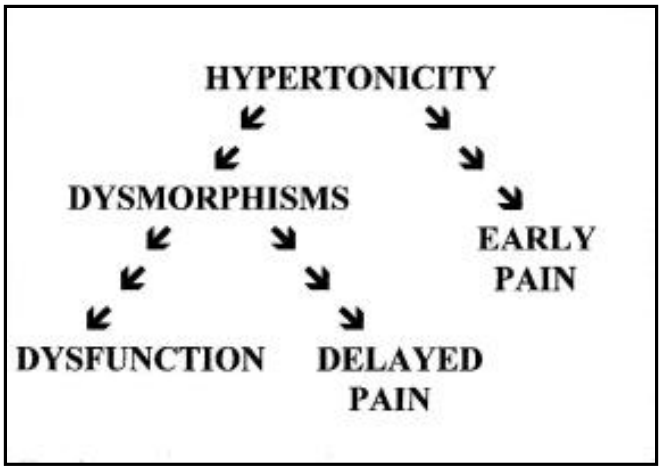

Fig. 2: Hypertonicity and its possible sequelae. [9]

4. OBJECTIVE DATA

4.1. STATIC POSTURAL ASSESSMENT:

4.1.1. General

A static postural evaluation precedes each treatment. A patient is assessed from the anterior, right and left lateral, and posterior views with the feet in as much contact as possible. Bullock-Saxton established that patients exhibit a "comfortable" erect posture that remains constant over periods up to 24 months. Her work found this constancy in the absence of any physical intervention.[11] The deformations and dysmorphisms are observed in relation to an ideal posture. An ideal posture would be shown by a body with an outline formed by straight and oblique lines and having symmetry between the right and left sides. The ideal posture which represents the template for both assessment and treatment in PR is called the paragon*.

4.1.2. Case study patient

Some further examples of the observations made of the patient's static posture at the initial evaluation, and their meanings are shown in Table II.

TABLE II: FEATURES OF THE STATIC POSTURAL EVALUATION: OBSERVATIONS AND THEIR MEANINGS	
OBSERVATIONS	**MEANINGS**
● right^{++++} > left^{++} hallux valgus with right > left first toe external rotation†	● right > left first metatarsal supinated
● right knee semi-flexed with right thigh forward	● pillar/fixed point at right heel and right lumbar lordosis extending to right thigh
● contact of the medial malleoli, calves and full thigh contact with the right medial femoral condyle prominent posteriorly	● internal rotation of the femurs right>left
● right lateral border of the thorax has a deeper axe blow* than the left	● evidence of a left lumbar convexity
● pelvis shifted to the right &/or trunk shifted to the left	● evidence of a spinal curve in lumbar area
● right hip pushed forward with the right ASIS†† more anteriorly tilted than the left	● right hemipelvis more anteriorly tilted than the left
● right lateral buttock hollow and left lateral buttock fuller	● evidence of left lumbar convexity
● long lumbar lordosis extending into the thoracic area to ~ T9-10 with a sharp and deep hollow ~ L3	● deep and long lumbo-thoracic lordosis
● right scapula anteriorly tilted, left scapula winged	● evidence of a left cervico-thoracic convexity of the spine
● exaggerated FHP (fwd head posture) $^{+++}$	● hypertonicity and shortening of the anterior chain of the neck
● flat thoracic spine between scapulæ	● cervical lordosis extends to the thoracic spine (~T7)

† ER - rotation is described relative to an axis of the foot between the first and second rays.
†† ASIS - Anterior superior iliac spine.

4.2. DYNAMIC ASSESSMENT (PR):

4.2.1. General

The dynamic assessment involves a set of manœuvres performed with the patient supine that causes both predictable and unpredictable evoked responses. These responses serve to confirm the observations made in the static evaluation as well as provide more information about specific locations of the hypertonicity (where the chains are working to create deformations). The target is the area furthest from the inductive manœuvre where an evoked response (ER) is observed. In this way, the dynamic evaluation serves to guide the treatment session.

4.2.2. Case Study Patient

The dynamic evaluation confirmed the existence of a scoliotic dysmorphism of the spine: long lumbo-thoracic and cervico-thoracic convexities to the left separated by a relatively shorter mid-thoracic convexity to the right. The left lumbo-thoracic convexity was especially reactive to left arm abduction and the right passive straight leg raise. Other objective findings include, on manual palpation, the right transverse prominences of C1 and C2 more prominent, indicating a possible right cervical convexity at the levels of C1 - C2. The forward bend test, which is executed with feet together and hands on the floor (at a distance from the feet which allows the head to fall between the hands and feet), with legs as straight as possible revealed a hollow at L5 - S1

and a flatness between the scapulæ from T12 up to ~ C7. This indicated stiff lordoses in these two regions of the spine. It also revealed a left lumbo-thoracic paraspinal prominence from ~ L4 - 5 to ~ T9 and a shorter right thoracic paraspinal prominence from ~ T6 - T9 correlating to the lower left and middle right spinal convexities.

5. EVOLUTION OF INTERVENTION AND OUTCOMES

5.1. General

Having observed a patient's pre-existing dysmorphisms and deformations caused by the hypertonicity of muscle chains, the overall therapeutic goal of PR then is the normalization of this hypertonicity. The reduction of *tone* is achieved through *postures*. As has already been mentioned, a *posture* must include at least one inductive manoeuvre that aggravates a deformation at a distance (ER) from the inductive manœuvre. This aggravation is caused in part by hypertonicity and is not under conscious or voluntary control. The most effective manœuvre is that which causes an aggravation as far away as possible from the induction. It is believed that the greater the distance between inductive manoeuvre and reaction (ER), the greater the tone can fatigue (lever arm concept). During a *posture*, the patient contracts other muscles to assist the inductive manœuvre and to preserve the hypertonicity. These accessory contractions are called involuntary contractions. They are under voluntary control, but the patient is unaware of their existence. The patient is made aware of them and with the help of the therapist eliminates them as well as possible during a *posture* to increase the efficacy of the induction. The patient is also instructed to breathe with a regular rhythm and to exhale fully and freely. This exhalation attempts to remove involuntary contractions of the diaphragm and to prevent a blockage of the diaphragm on inhalation. The *posture* is maintained until the ER is significantly reduced and can take from a few minutes to as long as 20 minutes.

To summarize, a *posture* involves the following:

1. Inductive manœuvre causing an aggravation of a deformity.
2. Elimination of voluntary and involuntary contractions.
3. Breathing in a regular, free and full manner.
4. Time.

A treatment session in PR is from one to 1½ hours on a once weekly basis to allow for optimum neuromuscular adaptation.

5.2. CASE STUDY PATIENT

5.2.1. Initial Phase of Intervention (five treatments)

The deformations and dysmorphisms observed at the initial evaluation, some of which appear in Table II, indicated the existence of hypertonicity in both the upper and lower blocks*. [The term 'block' is used to denote the functional unit of the upper body above T7 and the functional unit of the lower body below T7]. Therefore, the overall goal was to normalize excessive *tone* in both blocks. However, since the patient's major complaint was the right first toe pain, the primary target was the lower block.

The first treatment consisted of only one *posture*, in supine: left arm abduction. This inductive manœuvre was executed in as much shoulder internal rotation as possible — active by the patient, assisted by the therapist. The shoulder internal rotation was used to control the local compensation of shoulder external rotation which

would decrease more distal deformations or evoked responses (ER's). Therefore, with the shoulder in internal rotation, the patient actively abducted the arm to the maximum range available and maintained this position throughout the *posture*. This manœuvre aggravated the left lumbo-thoracic convexity, the right pelvic shift, and shortened the right lower extremity (ER's). It was held for a period of time actively by the patient, with some assistance by the therapist to maintain the internal rotation. This manœuvre, as with all manœuvres, was executed in as full a ROM as possible and as precisely as possible to efficiently induce a distal aggravation and evoke responses as far away as possible from the induction. The patient breathed in a regular, free, and full manner, and the deformations created at a distance early in the *posture* were significantly reduced.

Immediately following this *posture*, as is routinely done at the end of a treatment session, the patient was again observed standing, in all four views. There was a significant reduction in the pelvic shift to the right, much less tension in the legs and feet, and both hallux valgus deformities were reduced — the left more improved than the right.

It was concluded from this initial treatment session that the upper block manœuvre succeeded in reducing hypertonicity in the lower block; therefore, a second treatment was scheduled 10 days later. (The usual weekly treatment frequency was not observed to accommodate the patient's difficult travelling circumstances of a full day's

travel by car. Treatments were therefore planned as close to one another as the patient's schedule would allow).

At the second treatment, the patient reported having been able to walk for a duration of 40 minutes and kayak for about 1½ hours. Her right more than her left first toes had been "sore all week". Following the standing evaluation, the treatment consisted of two manœuvres targeting the lower block and one manœuvre targeting the upper block. The upper manœuvres chosen based on the findings of the static and dynamic evaluations were left arm abduction again and wrist circumduction. The wrist circumduction inductive manœuvre was also executed in supine. The patient flexed the elbows to 90º and maintained the forearms vertical. The arms were comfortably resting on the floor at ~ 30º from the body. The patient actively rotated the hands at the wrist in as wide a circle as possible. The right hand revolved in a counterclockwise direction from the patient's view, and the left hand simultaneously revolved in a clockwise direction. This manœuvre provoked a significant response of both feet as witnessed by the observation of unconscious movements of the toes and ankles (distal ER).

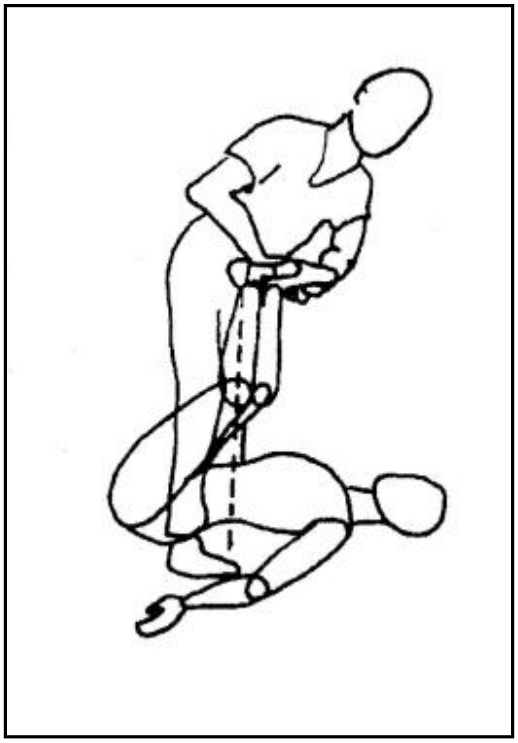

Fig. 3: Alternating DF/PF in supine, legs up.

The lower manœuvre was an alternating dorsiflexion (DF) and plantarflexion (PF) of the ankle executed with the patient

supine. The patient's legs were lifted passively as close as possible to the position where the knees align above the apex of the lumbo-thoracic lordosis. (See **Figure 3**). In order to exaggerate or aggravate pre-existing deformations in the upper block, the proximal deformations of the feet and legs were corrected as well as possible. Therefore the patient externally rotated her hips and extended her knees actively. In this position, the inductive manœuvre of full active DF and PF (alternating) was employed to further increase the *tone* in the upper block and aggravate at least one deformation. As with the execution of any *posture* in PR, the patient continued the manœuvres for a sufficient period of time until the *hypertonicity* in the target area was reduced. Throughout the *posture* the patient breathed in a full, free, and regular manner.

Immediately following the treatment session, the patient was re-examined standing, in all four views. The lateral borders of the thorax were more symmetrical, the right thigh was less forward, and the left chest and breast were less forward than they were at the beginning of this session. Once again, the patient exhibited encouraging morphological change and reduction of excess *tone*. The patient was sufficiently encouraged to schedule a week's holiday very near my clinic. Thus the third and fourth treatments were planned for two weeks later and close together.

At the third session, the patient reported that her feet had been much less painful in the intervening two weeks. She had been able to reduce medication by one 50 mg tablet per day, had resumed attending a gym on a daily basis, and was able to ride a bicycle for 50 minutes. The same manœuvres were repeated and the patient's execution

of the movements was made more precise. Following this treatment, the right hip was less forward and the right lateral border of the thorax was less broken. This signified a reduction of the lumbo-thoracic lordosis.

Four days later, the patient arrived for her fourth session. She was discovered jumping up and down in the session room. This was an activity the patient had not been able to do for over three years. In addition to this marked functional improvement, the patient reported having reduced her medication from 3½ tablets to 2½ tablets per day because she was consistently experiencing less pain overall. She especially noted that her morning stiffness was much less severe. (Morning stiffness is commonly used to indicate the degree of inflammation).[2]

In the fourth session, the left arm abduction and the alternating DF and PF manœuvres were again repeated. A new *posture* was introduced to target the lower block in a different way. The patient was brought up passively to a long sitting position and placed as much as possible on her ischeal tuberosities. The forearms were crossed; the elbows grasped and held up at mid chest level. The patient sat as far forward as possible flexing at the hips in order to align the mid back above the centre

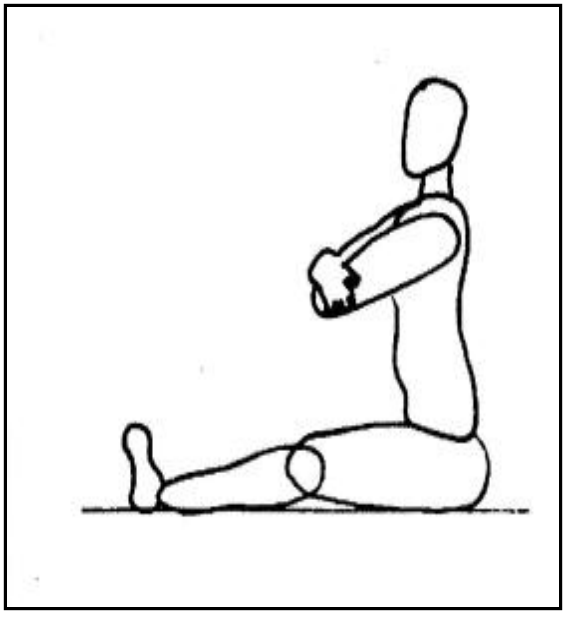

Fig. 4: Basic sitting position

of the pelvis. The inductive manœuvre now possible from this position was the pulling back of the head, pivoting around an axis at approximately the level of T7. This aggravated the lumbar lordosis by attempting alignment of the head, scapulae and middle of the pelvis (as much as possible). (See **Figure 4**). To aggravate the lumbar convexity, the right knee was flexed. This *posture* was maintained statically while the patient breathed fully, freely and regularly. It is a very challenging posture but this patient was able to hold it well in her first attempt for a relatively long time (3 - 5 minutes). Although not conclusive, the patient's ability to correctly hold this position for so long a time was an indicator that the treatments were being very effective. Following this treatment session, the patient's left chest seemed more forward, but the pelvic symmetry was improved and the overall alignment of the head, trunk, pelvis, and legs from the side view was much better. The fifth session was possible one month later.

At the fifth session, the patient reported marked overall improvement, both in her pain and functional level. She was down to taking ½ 50 mg tablet in the mornings and only occasionally taking another ½ tablet in the evening. She was doing very well, having much less generalized stiffness and was able to do "lots of exercise". Upon evaluation of her posture statically, the lower block deformations were now less significant than the upper block deformations; therefore, the treatment consisted of two manoeuvres targeting the upper block and only one targeting the lower block. The upper manoeuvre used was right arm elevation executed in supine. The right shoulder was elevated in supination and external rotation above the head. (See **Figure 5**). The patient

actively protracted the right scapula to prevent its use as a fixed point against the floor (involuntary contraction of the scapular adductors). The shoulder was maintained in external rotation actively to preserve as straight an alignment as possible between the forearm and upper arm, while the arm was held in line with the axis of the hip. (See **Figure 6**).

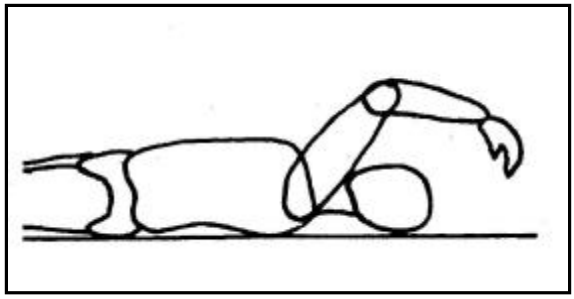

Fig. 5: Arm elevation in supine, lateral view.

The maintenance of external rotation of the shoulder was assisted by the therapist. This produced an aggravation of the patient's lumbar lordosis as well as a generalized increase in *tone* in both lower extremities. This position was held until the excessive *tone* in the lower extremities decreased as shown by an observed decrease in the lumbar lordosis.

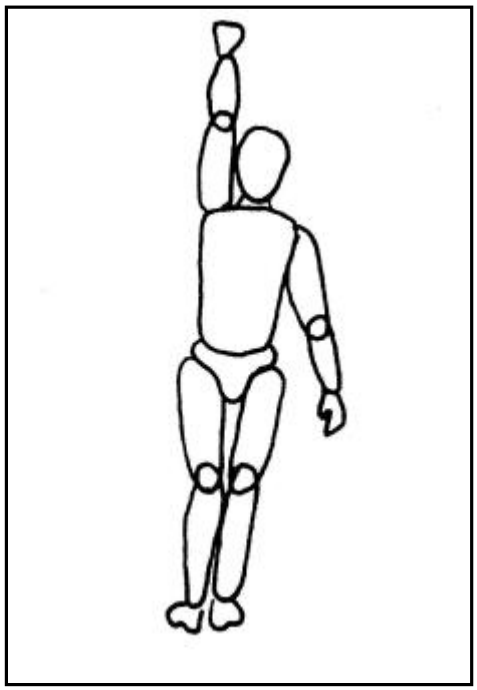

Fig. 6: Arm elevation in supine, aerial view.

The lower manœuvre targeting the upper body was a foot movement executed in sitting. The patient was brought into sitting as previously described. Only the alignment of the mid-thorax with the centre of the pelvis is maintained (i.e. no correction of the head alignment is sought). The patient crossed the arms over the chest grasping the lateral borders of the scapulæ. The right knee was flexed, keeping the knee in line with the centre of the hip joint. The therapist placed her foot over the patient's toes, and placed a hand under the patient's metatarsal heads (to prevent them from pushing into the floor). The inductive manœuvre by the patient was maintained toe extension against the resistance of the therapist's foot.

Upon observation following this treatment, the patient exhibited a reduction both in the forward head posture (FHP) and forwardness of the pelvis. This meant there was a decrease of both upper and lower lordoses in the frontal plane.

5.2.2. Maintenance Phase of Intervention

Following the initial phase of five treatments relatively close together, two follow-up maintenance visits were possible.

The first follow-up session occurred three months after the fifth treatment. The patient reported still requiring only ½ - 1 50mg tablet per day for pain, most frequently in the morning (½ tablet) and sometimes requiring another ½ tablet in the evening. She stated that her feet had "been very good", with no symptoms at all in the

right second toe. She felt the right first toe was "straighter" (i.e. in less valgus). She complained of some different symptomatic areas involving the medial aspects of both knees and the left olecranon.

Having taken photographs in all four views at the initial evaluation and having completed the initial phase of treatment, a second set of photographs was taken prior to this sixth treatment. Significant and lasting (at this point up to four months) symptomatic change warranted a review of any morphological change that may have occurred along with the degree of normalization of hypertonicity in the muscle chains. (See **APPENDIX II** for photographs and descriptions).

The static postural evaluation at this time revealed improved alignment overall, less internal rotation of the lower extremities (femurs and tibiæ), and a decrease in both hallux valgus dysmorphisms.

The *postures* were chosen to target both the upper and lower blocks. The upper block manœuvres were left arm abduction and pulling the head back into alignment with the pelvis in long sitting. The lower block manœuvre was alternating DF and PF in supine with the legs up. All *postures* were executed in the usual manner and held for as long as necessary while the patient breathed fully, freely, and regularly. Following this treatment session, bilateral leg tension was reduced and less knee semi-flexion was observed. The interscapular lordosis was less hollow.

The second follow-up maintenance session was possible five months later, again due to the distance needed to be traveled by the patient, her schedule, and it was also indicative of the lasting relief of her symptoms. This session was then eight months after the initial five treatments.

At this time the patient reported that she required, at most, ½ tablet per day of pain medication, and could sometimes refrain from taking any medication for up to several days at a time. Furthermore, when the medication was taken, it was for occasional left elbow symptoms, rather than the leg and foot symptoms. She reported a great reduction of pain in both legs and her right foot, and was as fully active athletically as she had been some four years before.

The *postures* were chosen to target the upper and lower blocks. First, the alternate DF/PF manœuvre with the patient supine - legs up, was used to target the upper block. The second *posture* involved the brachial chain in both upper extremities targeting therapeutically the lower block. This inductive manœuvre was executed in supine with the arms at ~ 90º shoulder abduction. The shoulders were again actively assisted into internal rotation to control the local compensation of shoulder external rotation. With this internal rotation maintained as well as possible, the patient actively supinated the forearms, with the wrist neutral, fingers extended and together, and thumbs abducted. Following this, the fingers were flexed maximally at the interphalangeal and

metacarpophalangeal joints, while the tips of the flexed thumbs rested on the mid phalanx of the index fingers. The patient flexed the wrists and continued to supinate both forearms as much as possible.

Each *posture* was conducted as usual, being maintained until evidence of a reduction of *tone* was observed. During this time, the patient also breathed in a full, free, and regular manner.

Following this session, the left chest bump (prominence) was reduced and the right side of the abdomen was no longer seen forward, indicating a reduction in both the upper and lower lordoses.

6. RESULTS

These various observed changes in the patient's morphology (alignment) are explained by a normalization of the accumulated hypertonicity in the muscle chains. In the absence of any other treatments, the morphological changes and the decreased hypertonicity resulted in significant symptomatic and functional changes for the patient. Within eight months the patient was participating again in all the athletic activities she desired, and she was taking substantially less medication. One year following the introduction of PR, the patient reported having been able to eliminate all prescription medications for pain. Four years of regular, daily, and sometimes heavy medication use had ceased and the patient was able to become pregnant. The self-reported functional improvements as indicated by the BASFI[8], Dougados Functional Index[7], and Disease Activity Index[12] are shown in **APPENDIX I**.

7. DISCUSSION

In the absence of any other physical treatment, Postural Reconstruction as a physical therapy approach for the pain and dysfunction attributed to AS, was followed by the elimination of the need for pain medication and the restoration of full function for a 28 year old female.

Pain, inflammation, stiffness, potential postural abnormalities and functional losses are the main clinical problems for which AS patients seek medical or therapeutic treatment. Management of these symptoms until now has largely come from the prescription of NSAIDs and conventional physical therapy. While these approaches rely on the treatment of the patient's presenting symptoms, my patient saw very little success with this approach over the course of more than three years. As a result of the apparent limitations of these conventional means to deal with the accepted clinical symptoms of AS; PR was sought and explored for the possibility of dealing with these complaints from a different perspective. This perspective is a neuromuscular approach using the presenting morphological findings to guide the intervention, rather than using solely the systemic findings of this particular inflammatory process - i.e. AS. The result of lasting and significant reduction of pain and restoration of function within one year following the application of the morphological approach of PR clearly casts doubt on the use of a solely classical or conventional approach for the treatment of the pain and dysfunction associated with AS.

Classical physical therapy would likely treat functional losses, such as: stiffness and the inability to climb stairs with stretching and strengthening exercises, respectively. I practiced these approaches for over six years and this rationale produced limited and unpredictable results, in my experience. The techniques of PR, in contrast, associate pain and dysfunction with an accumulation of tone, i.e. shortening, in muscle chains. The existence of this hypertonicity is determined by trained observation of the patient's morphology. By normalizing the existing excess of tone, reduction of pain and restoration of function are seen to follow. Françoise Mézières once said, "Restore the form to regain the function". [4]

8. CONCLUSION

PR deals with the whole body at once. It also deals with musculoskeletal conditions seemingly through a neurological path because of the therapeutic effect seen at a distance. PR addresses the precursor to a loss of flexibility, strength, and endurance. Compared to more conventional physical therapy techniques, I have found the techniques of PR to be more consistently effective in a variety of patients for the treatment of pain and dysfunction resulting from conditions in which inflammation, mechanical disturbance, and trauma is a factor. Results are more permanent and reliable and as such PR techniques should be integral to any physical rehabilitation program.

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10. GLOSSARY OF TERMS*

* Axe blow: the notch observed in the lateral border of the thorax.

* Evoked responses (ER): abnormal and temporary reactions due to the hypertonicity in the chains and prompted at a distance by an inductive manoeuvre.

* *Hypertonicity* is an elevation of *tone*.

* Inductive manoeuvre: a physiological movement that due to the hypertonicity in the muscle chains will cause evoked responses at a distance.

* Involuntary contraction: an accessory contraction which may accompany an inductive manoeuvre. The patient is often unaware of its existence, but voluntarily able to relax when made aware.

* Morphology: alignment.

* Muscle chains: a set of polyarticular muscles that follow each other and overlap in the same direction like tiles on a roof with no break in continuity, forming a single system.

* Paragon: an ideal posture shown by an outline of the body having straight and oblique lines and having symmetry between right and left sides.

* Postural Dysmorphisms: postural disorders.
    - deformations: pre-existing and/or induced distortions of the body.

* *Posture*: one or a group of maintained manoeuvres which includs at least one manoeuvre causing an aggravation of a deformation.

* Thoraco-brachial space: the space occurring between the arm and the lateral border of the thorax.

* *Tone*: the level of contraction present in a muscle at rest.

* Upper and lower blocks: functional units of the body.
    - upper: above T7.
    - lower: below T7.

11. APPENDICES

11. 1. APPENDIX I - QUESTIONNAIRES

11.1.1. DOUGADOS FUNCTIONAL INDEX [7]

11.1.1.1. Responses for the past, prior to treatment:

	0	1	2
	Answers		
	Yes, with no difficulty	Yes, but with difficulty	No
Can you			
Put on your shoes		√	
Pull on your trousers		√	
Pull on a pullover		√	
Get onto a bathtub		√	
Remain standing ten minutes		√	
Climb one flight of stairs		√	
Run			√
Sit down	√		
Get up from a chair		√	
Bend over to pick up an object		√	
Crouch			√
Lie down		√	
Turn in bed		√	
Get out of bed		√	
Sleep on your back	√		
Sleep on your stomach		√	
Do your job or housework		√	
Cough or sneeze		√	
Breathe easily		√	
TOTAL SCORE	**0**	**15**	**4 = 19**

11.1.1.2. Responses for the present, following seven treatments:

	0	1	2
		Answers	
	Yes, with no difficulty	Yes, but with difficulty	No
Can you			
Put on your shoes	√		
Pull on your trousers	√		
Pull on a pullover	√		
Get onto a bathtub	√		
Remain standing ten minutes	√		
Climb one flight of stairs		√	
Run		√	
Sit down	√		
Get up from a chair	√		
Bend over to pick up an object	√		
Crouch	√		
Lie down	√		
Turn in bed	√		
Get out of bed	√		
Sleep on your back	√		
Sleep on your stomach	√		
Do your job or housework	√		
Cough or sneeze	√		
Breathe easily		√	
TOTAL SCORE	**0**	**3**	**0 = 3**

11.1.2. DISEASE ACTIVITY INDEX [12]

11.1.2.1. Responses for the past, prior to treatment:

Questions:

1) During the past month, how would you describe the ankylosing spondylitis pain you usually have?

Very severe	6
Severe √	**5**
Moderate	4
Mild	3
Very mild	2
None	1

2) During the past month, how often have you had severe pain from your ankylosing spondylitis?

Always √	**6**
Very often	5
Fairly often	4
Sometimes	3
Almost never	2
Never	1

3) During the past month, how active has your AS been?

Very active √	**4**
Moderately active	3
Mildly active	2
Not at all active	1

4) Considering all the ways your AS affects you, mark (X) on the scale for how well you are doing.

0	2.5	5.0	**7.5**	10.0
			X	
very well	well	fair	poor	very poor

TOTAL SCORE: 22.5

11.1.2.2. Responses for the present, following seven treatments:

Questions:

1) During the past month, how would you describe the ankylosing spondylitis pain you usually have?

Very severe	6
Severe	5
Moderate	4
Mild	3
Very mild √.....	**2**
None	1

2) During the past month, how often have you had severe pain from your ankylosing spondylitis?

Always 6	
Very often	5
Fairly often	4
Sometimes	3
Almost never √.....	**2**
Never	1

3) During the past month, how active has your AS been?

Very active	4
Moderately active	3
Mildly active √.....	**2**
Not at all active	1

4) Considering all the ways your AS affects you, mark (X) on the scale for how well you are doing.

0	**2.5**	5.0	7.5	10.0
	X			
very well	well	fair	poor	very poor

TOTAL SCORE: 8.5

11.1.3. BATH ANKYLOSING SPONDYLITIS FUNCTIONAL INDEX (BASFI)[8]

11.1.3.1. Responses for the past, prior to treatment:

PLEASE DRAW A MARK ON EACH LINE BELOW TO INDICATE YOUR LEVEL OF ABILITY WITH EACH OF THE FOLLOWING ACTIVITIES DURING THE LAST WEEK:

N.B. An aid is a piece of equipment which helps you to perform an action or movement

EXAMPLE:

EASY_____X_____IMPOSSIBLE

1) Putting on your socks or tights without help or aids (e.g. sock aid)

EASY_____X_____IMPOSSIBLE 8.5

2) Bending forward from the waist to pick up a pen from the floor without an aid

EASY_____X___IMPOSSIBLE 9.7

3) Reaching up to a high shelf without help or aids (e.g. helping hand)

EASY_____ X_____IMPOSSIBLE 6.2

4) Getting up out of an arm-less dining room chair without using your hands or any other help

EASY_____X_____IMPOSSIBLE 8.5

5) Getting up off the floor without help from lying on your back

EASY_____X_____IMPOSSIBLE 8.5

6) Standing unsupported for 10 minutes without discomfort

EASY_____X_____IMPOSSIBLE 8.0

7) Climbing 12 - 15 steps without using a handrail or walking aid. **One foot on each step**

EASY_____X_IMPOSSIBLE 9.8

8) Looking over your shoulder without turning your body

EASY_____X_____IMPOSSIBLE 6.6

9) Doing physically demanding activities (e.g. physiotherapy exercises, gardening or sports)

EASY_____X_____IMPOSSIBLE 8.4

10) Doing a full day's activities whether it be at home or at work

EASY_____X___IMPOSSIBLE 9.1

TOTAL MEAN: 8.3

11.1.3.2. Responses for the present, following seven treatments:

PLEASE DRAW A MARK ON EACH LINE BELOW TO INDICATE YOUR LEVEL OF ABILITY WITH EACH OF THE FOLLOWING ACTIVITIES DURING THE LAST WEEK:

N.B. An aid is a piece of equipment which helps you to perform an action or movement

EXAMPLE:

EASY_____X_____IMPOSSIBLE

1) Putting on your socks or tights without help or aids (e.g. sock aid)

EASY_X_____IMPOSSIBLE 0.2

2) Bending forward from the waist to pick up a pen from the floor without an aid

EASY____X_____IMPOSSIBLE 1.1

3) Reaching up to a high shelf without help or aids (e.g. helping hand)

EASY_____X_____IMPOSSIBLE 1.9

4) Getting up out of an arm-less dining room chair without using your hands or any other help

EASY__X_____IMPOSSIBLE 0.4

5) Getting up off the floor without help from lying on your back

EASY__X_____IMPOSSIBLE 0.3

6) Standing unsupported for 10 minutes without discomfort

EASY_____X_____IMPOSSIBLE 1.9

7) Climbing 12 - 15 steps without using a handrail or walking aid. **One foot on each step**

EASY_____X_____IMPOSSIBLE 7.6

8) Looking over your shoulder without turning your body

EASY_X_____IMPOSSIBLE 0.2

9) Doing physically demanding activities (e.g. physiotherapy exercises, gardening or sports)

EASY_____X_____IMPOSSIBLE 2.1

10) Doing a full day's activities whether it be at home or at work

EASY_____X_____IMPOSSIBLE 2.1

TOTAL MEAN: 1.78

11. 2. APPENDIX II - PHOTOGRAPHS

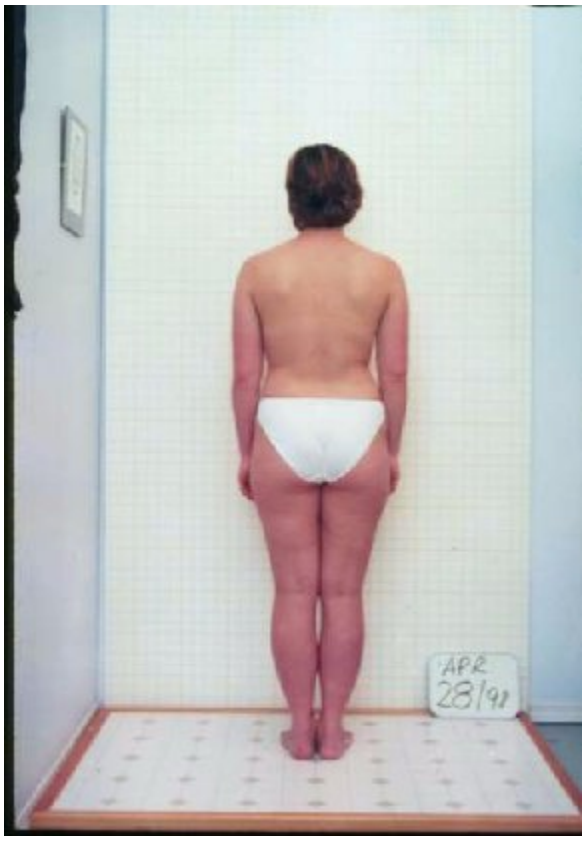

Figure 7: Posterior view, prior to treatment

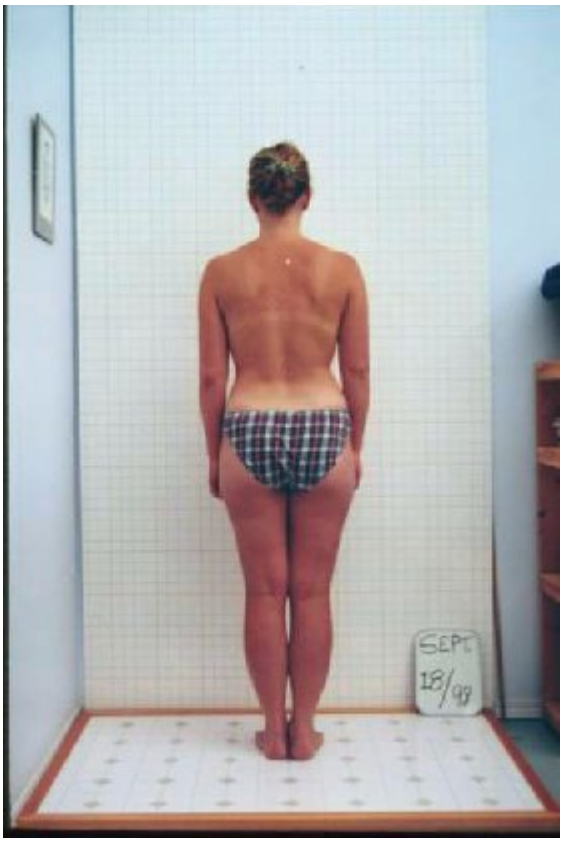

Figure 8: Posterior view, following five PR treatments

Observations:

- Thoraco-brachial spaces* (spaces between upper extremities and lateral borders of the thorax) are more symmetrical, noting that the right axe blow at the waist is less deep than prior to treatment.
- Shoulder heights and shapes are more symmetrical.
- General decreased tension of the scapulae.
- Decreased internal rotation of the right upper extremity along with decreased anterior tilt of the right scapula.
- Improved orientation of the right shoulder girdle complex. Decreased lower buttocks creases, along with less prominent medial femoral condyles (right > left) and less convex lateral calf borders.

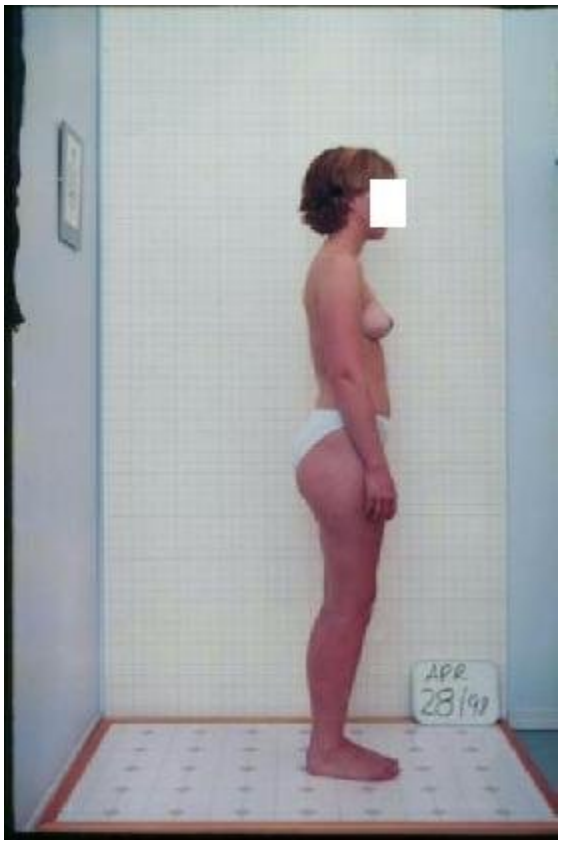

Fig. 9: Right lateral view, prior to treatment

Fig. 10: Right lateral view, following five PR treatments

Observations:

- Decreased FHP (forward head posture).
- Right upper extremity appears more relaxed and less internally rotated.
- Angle of the chest line is higher (less depressed).
- Anterior line of the abdomen is less forward implying a decreased lumbar lordosis.
- Decreased anterior tilt of the right scapula as seen by the reduced prominence of the inferior angle of the scapula posteriorily.

Fig. 11: Left lateral view, prior to treatment

Fig. 12: Left lateral view, following five PR treatments

Fig. 13: Anterior view, prior to treatment

Fig. 14: Anterior view, following five PR treatments

Observations:

- Lower extremities are less internally rotated (right femur and tibia > left)
- Lateral borders of the calves are less convex (right > left).