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The Capability of Osteopathic Therapy in correcting Scoliosis: Idiopathic Scoliosis vs Functional Scoliosis

Doctorate of Osteopathy

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Introduction

Osteopathy is a complementary alternative medicine founded by Andrew Taylor Still in the late 1800s. Its key focus is centred on the correction and manipulation of the body's muscles, tissues, and bones in order to manage and treat structural and functional dysfunction.

The Osteopathic Principles are based on the core beliefs that the body is a unit and that most diseases or conditions can be resolved by realigning the body's structures and enhancing the blood supply.

Many Osteopathic practitioners often use their philosophy and beliefs to educate a prospective patient in how Osteopathy can help improve or manage their condition.

In today's current society, most individuals have many postural related health problems (1). These complaints are mainly due to stress and every-day habits that lead to an inadequate posture, such as prolonged computer use mainly with studying or office work, poor ergonomics such incongruent height of a desk and chair, heavy backpacks, and lack of exercise rotation (1).

The most common spinal deformity and perhaps the most controversial seen in practice is Scoliosis (1).

Being in practice for over 11 years now as an Osteopathic Practitioner; the most frequently asked and the most debated question in practice seems to be "Can Osteopathy correct Scoliosis?"

Osteopathy is an effective form of treatment for many postural deformities including Scoliosis.

The effectiveness of Osteopathy Therapy is highly dependent on many factors such as the type of scoliosis, the age of the patient, the type of rehabilitation and treatment programs utilized and patient compliance, amongst many other factors.

So, is Osteopathic Therapy capable of correcting scoliosis?

Scoliosis and the classification

Prior to thoroughly understanding to what extent Osteopathy can correct Scoliosis, it is practical to comprehend the determining factors and classification of Scoliosis.

The term 'Scoliosis' was initially used by Galen (AD 131- 201), and it referred to one or more of the vertebrae slanting sideways and therefore exhibiting a lateral declination and rotation (1).

There are several methods in which scoliosis can be classified; pattern of the skeletal structure of the spinal column, aetiology, angle of curvature, shape and localisation and the age in which the deformity is detected (2).

First and foremost, the primary classification is to distinguish between a structural and functional (also known as non-structural or postural) scoliosis. As the name implies, in functional or non-structural, there is no change in the structure of the spine. It is characterised solely by lateral curvature of the spine without rotation of vertebrae and trunk symmetry (2).

Functional scoliosis can be subclassified as compensatory, postural, and transient. Compensatory when the body is compensating for something else going on, and according to Tachdjian, "the majority of functional scoliosis cases are attributable to compensatory lower limb growth, or compensatory pelvic tilt dysfunctions affecting the lumbosacral junction" (3).

Postural, as a result of bad habits, improper sitting, and muscle imbalance. Postural is claimed to have little clinical importance and ordinarily requires no treatment (3).

Transient functional scoliosis is usually a temporary response to pain caused by an underlying pathology such as a herniated disc. The body naturally adopts an antalgic-type posture leaning away from the pain which can ultimately cause a spinal curve.

Alternatively, structural scoliosis is usually classified by aetiology, which refers to idiopathic, congenital, and paralytic. The most prevalent structural scoliosis is Idiopathic Scoliosis where the aetiology is unknown. Paralytic Scoliosis as a result of muscular or neurological disease (4) seems to be the least common as there are limited studies on this type of scoliosis. Congenital develops when the baby is in the womb and often goes unnoticed initially.

Additional classification to note, is radiographically, the degree of the Cobb angle. The Cobb Angle is the angle formed between the intersecting lines of the upper spine at the superior aspect of the concave spine and the inferior aspect of the curvature (1). Currently a cobb angle above 10 degrees is defined as Scoliosis (5). Essentially, the Cobb method is valuable in identifying progression, therapeutic and orthotic options in the scoliotic patient.

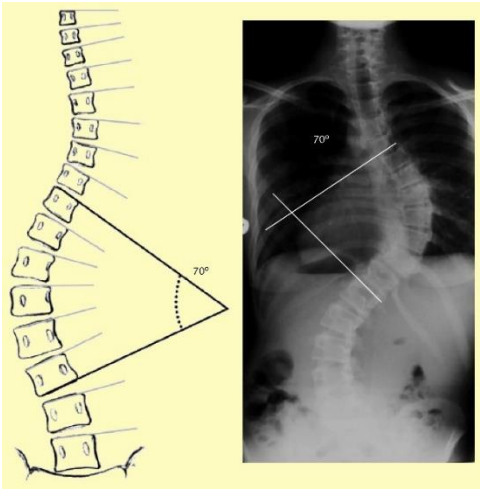

Figure 1

Scoliosis can also be characterised in terms of age and shape. In terms of age idiopathic scoliosis can be infantile (0-3years), adolescent (10-18 years), and adult (over 18 years) (4).

In relation to the shape and localisation, there are 4 different types of scoliotic curve:

1) Thoracic
2) Lumbar
3) Thoracolumbar
4) Double Major Curve (both on the left and right hand side) (4)

Functional Scoliosis

Amongst literature researched, functional scoliosis is identified as the type that is not fixed, with the suggestion that it is easier to correct passively, particularly in body suspension, voluntary contraction of the spine extension muscles, and ultimately has a better prognosis (7). Most commonly in practice, functional scoliosis can be detected during standing observation and orthopaedic tests. In a forward bend test, usually known as Adam's test, the curve will disappear, and a rib hump is not revealed. Additionally, the practitioner would attempt to decipher the cause of the functional scoliosis by checking other postural factors.

According to research, functional scoliosis is seen less common than structural scoliosis. In my opinion, functional scoliosis is just as prevalent as structural scoliosis in practice. I can't stress on how many times I have stumbled on a minor functional scoliosis during a clinical physical examination, mostly due to a leg length discrepancy, pelvic tilt, or postural stress. Further research needs to be done within the Osteopathic practice to truly determine the statistics regarding the number of functional cases compared to structural scoliosis.

The cause of functional scoliosis is multifactorial, and a crucial aspect of treatment and management plan is to determine the cause of each case presented in practice, to ideally treat the cause not the effect. These causes can range from a leg length discrepancy, muscle spasm, congenital hip dislocation, or even pain related to spinal disc herniation leading to an antalgic-type posture (2)

Idiopathic Structural Scoliosis

Structural scoliosis is classified by a bone deformation where there is a change in the structure of the vertebral body. Moreover, it is a lateral curvature of the spine associated with rotation of the spine towards the convexity of the curve [8].

According to research Idiopathic Scoliosis is the least understood but the most interesting form of scoliosis [4]. A remarkable aspect is the speed with which it develops. Once the scoliosis is structural, it becomes harder to influence [4].

Research shows that the type of scoliosis that is most encountered by the general practitioner is idiopathic scoliosis [9]. Mostly idiopathic has an unknown aetiology, which is why it is so important for the Osteopathic practitioner to gain a thorough understanding of the patient's history, radiographs and to perform a comprehensive physical examination. All these details combined are critical in the initial evaluation of the scoliosis and determining if the patient needs additional care [9]

In my practice, some time is spent ruling out more sinister pathology that may have caused the scoliosis such as a space occupying lesion or a bony/structural deformity such as Scheuermann's disease. In addition to this, I like to understand if there is a genetical involvement or any past related trauma that could have triggered a structural change in the spine. Clinically, a lack of understanding regarding any condition that is presented in practice (not just scoliosis) leads to an inadequate treatment plan.

Scoliosis is usually detected by the health care practitioner as soon as they meet the patient. There are certain signs that a skilled practitioner can pinpoint before the consultation has even begun such as shoulder asymmetry and posterior chest wall prominence.

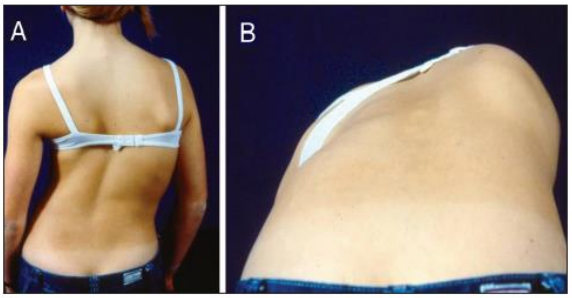

Figure 2 (9)

Unlike functional scoliosis, Adam's test reveals a rib hump *(figure 2)* suggesting a rotational deformity in the spine [9] and thus indicating a structural scoliosis is present.

Osteopathy and Scoliosis

According to the scope of practice in Europe (SOPE), Osteopathy focuses on promoting the ability of the body to recover by itself and thus relies upon the concept of the unity of the individual's structure (anatomy) and function (physiology) [4].

The treatment of uncomplicated scoliosis is a life-long intervention and requires the skill set offered by Osteopathic Medicine [10]. It is not the purpose of Osteopathic Medicine to cure the scoliosis but to treat the patient, and thus many factors need to be considered and close attention needs to be paid to the scoliosis, understanding how it affects the functional status of the otherwise healthy individual, as well as the effects the scoliosis may have on the cardiovascular and pulmonary systems [10].

Prior to determining what treatment plan may or may not be beneficial it is vital to classify the type of scoliosis being presented, functional or structural. In addition to this, Osteopaths need to know more about the aetiology in order to be able to treat as early as possible and to prevent the scoliosis becoming structural [4]. As we know structural scoliosis is harder to influence.

The key factor in functional scoliosis is the reversibility of abnormal curvature by various positions and movements [10].

The most common cause of a functional scoliosis is a leg length discrepancy causing a pelvic obliquity, resulting in a lumbar scoliosis with the convexity directed towards the shorter extremity [11].

Thus, this type of scoliosis regresses totally or partially when the cause is removed. In my practice, many modalities are considered when treating functional scoliosis such as lumbo-sacral mobilisations and adjustments, still technique, rehabilitative exercises, myofascial release and deep tissue techniques as well as an internal shoe lift to correct minor discrepancies (if necessary).

Structural scoliosis is far more challenging to treat. Before, we discuss the treatment that may be implemented, it is useful to analyse current studies that utilised Osteopathy and recognise the results that were achieved.

A non-controlled cohort study performed by Mark Morningstar et al. examined the benefits of combined spinal manipulation, positional traction, and neuromuscular re-education in the treatment of idiopathic scoliosis [12].

A total of 19 participants met the study criteria required for analysis of treatment benefits. After 4-6 weeks of treatment, the group averaged a 17 degrees reduction in their Cobb angle measurements that were taking pre and post study. None of the Cobb angles increased and the study showed the combined treatment modality appeared to significantly reduce the severity of the scoliosis [12].

Another study conducted in 2017 revealed an improvement during 11 osteopathic manipulative treatment (OMT) over 14 months in a patient with progressive infantile idiopathic scoliosis, which was unresponsive to standard orthopaedic treatment alone. Cranial Osteopathy directly addressed the key cranial structure component that leads to compensatory spinal scoliosis [13].

Haser et al, believed that Osteopathy manual interventions on the viscera and locomotor system was a widely used treatment modality for scoliosis and therefore wanted to test the hypothesis that Osteopathy alters the trunk morphology, a prerequisite to unload the concave side of the scoliosis, as well as preventing curve progression [14]. Twenty post-pubertal young women were assessed at pre- and post- intervention, with a 3-month interval. The treatment protocol included patient education on osteopathic principles, history taking, diagnostic osteopathic testing and visceral and parietal manipulations by 2 certified Osteopaths. The results revealed no therapeutic effect on rib hump, lumbar prominence, sagittal profile and global spinal flexibility hence no evidence was found to support the treatment of mild adolescent idiopathic scoliosis [14].

There are limited papers verifying the efficacy of osteopathy in the treatment of idiopathic scoliosis and limited studies been published to date. The majority are experimental studies with poor methodology and inadequate participant size. Based on this, the efficacy of Osteopathy Treatment cannot be reliably evaluated [15].

Treatment

Treatment options for idiopathic scoliosis include bracing, conservative management, and surgical intervention. In clinical practice, the identification of a scoliosis over 20 degrees is indication for an Orthopaedic referral to a consultation who specialises in scoliosis. Surgical correction is considered for curves greater than 45 degrees in younger patients and greater than 50 degrees in older patients [9].

The universal goal for any practitioner that is presented with a scoliotic patient is to prevent the progression of the scoliosis and keep the Cobb angle at a minimum. It is for this reason, that Osteopaths, or any other practitioner must regularly follow-up with patients with curves less than 20 degrees.

a. Bracing

For younger patients, orthotic management is recommended when there is progressing curves between 25 and 50 degrees. There are a variety of different braces ranging from Milwaukee brace, Boston brace and the Charleston bending brace with varying published results [9]. It is reported that bracing does not permanently improve or correct the curve but attempts to prevent progression.

Current research has shown that bracing may cause some psychological stress to the patient at the initiation of treatment and possibly long term [16]. Bracing may impact patient's self-perceptions and may increase feelings of being ashamed of their body. Also, psychological reasons and pain are associated with poor compliance in adolescents treated with a spinal orthosis [17].

Due to the negative psychosocial impact and physical constraints many patients and parents seek for holistic and less harmful approaches within the field of complementary and alternative medicine (CAM) [14].

b. Conservative Treatment

In practice, Osteopathy combined with corrective and therapeutic exercises are a powerful tool in the management of Idiopathic Scoliosis. I use a variety of techniques which focus on improving somatic dysfunction; still technique, cranial-sacral therapy, soft and deep tissue techniques, balanced ligamentous tension, spinal mobilisation and manipulation, myofascial release, muscle energy techniques, strengthening and stretching exercises as well as physical therapy modalities like electrotherapy. As an Osteopath, it is our duty of care to assess all factors that may contribute to the current presentation such as occupational stressors that may place the spine on further strain. An example of this are violinists who adopt a chronic posture that may induce a spinal curvature to the spine.

Research has shown that the combined use of spinal manipulation, postural therapy, rehabilitative exercises, and physiotherapy including degree reversal appear to significantly reduce the severity of the Cobb Angle, whilst improving the range of motion and decreasing the pain and muscle tone.

So, what makes Osteopathy in particular an effective therapeutic choice?

Instead of listing an exhaustive list on the different Osteopathic techniques that can be applied to idiopathic scoliosis, we will concentrate on some possibilities for Osteopathic treatment that have been researched and studied.

"The human body is a unit formed by the permanent continuity of structures. The most striking continuity is that of the fascial system. The other responsible systems for the unity of the body are; the nervous system, the vascular system, the immune system. A dysfunction in the body disrupts the normal physiological functioning of the structure in question and involves a disturbance of the mechanisms, which attempt to maintain normal homeostatic and allostatic equilibrium" (4).

Bearing this in mind, the Osteopathic analysis of a scoliosis is characterized by 5 different applied models (4).

The mechanical model, relating to the musculoskeletal system, the visceral and cranial system. ***The neurological model*** involving a loss of mobility and leads to a disrupted balance between the input and output of the nervous system. ***The respiratory circulatory model***, compromising of the disruption of the respiratory system and the disturbance of blood flow. ***The bioenergetic/metabolic model*** influencing the metabolic processes related to that structure and this is reflected in a decrease in vitality. For example, a decrease in the ability of the neck to move will also indirectly affect metabolism in the thyroid gland (4).

The bio-psychosocial model relates to stress, trauma, and abuse.

These models correlate with the initial philosophies and core beliefs of the Osteopathic practitioner to restore both structure and function through manual therapy and manipulation.

A good example of these models being applied in clinical practice is Cranial Osteopathy.

Stress, being the bio-psychosocial model, can cause an imbalance, which may be the cause of the scoliosis (4). This imbalance which causes scoliosis has a metabolic and respiratory effect on the thorax and functionality of the organs within due to the shape of the scoliotic spine and thorax.

Cranial Osteopathy (the mechanical model) is applied to balance the right and left hemispheres via an induction technique through the balance point fulcrum shift principle [4].

Furthermore, according to research the "spinal fluid drive" (aka the CSF) is an important technique in the treatment of scoliosis [4].

Both temporals are fixed in external rotation and the occiput puts an emphasis on the extension phase in which CSF is "pushed" into the spinal channel. According to Grimes [19], CSF circulation plays a role in the development of idiopathic scoliosis [19] and applying cranial therapy is an effective tool in providing equilibrium.

The idea of Osteopathy manipulative therapy when treating scoliosis is to attempt to encourage the spine back in alignment as well as providing rehabilitation to any underlying postural and neurological imbalances or dysfunction. Hence "in order to treat scoliosis, it is necessary to adjust spinal rotation, push the spine towards the opposite direction of its abnormal bending to align the vertebrae correctly, and balance the muscles around the spine that have developed asymmetrically" [1].

Morningstar's study included the following treatment protocol to achieve a reduction of the Cobb Angle:

1. An upper cervical adjustment was applied to mobilize the atlanto-occipital joint only in those patients who demonstrated atlanto-occipital flexion.
2. An anterior thoracic adjustment was administered with the patient's thoracic cage rotated opposite to the rotational displacement
3. Side posture lumbopelvic adjustments were delivered bilaterally to correct the rotational component of the pelvic misalignment. These side-posture manipulations were performed on a 30°-incline bench to help pre-stress the spine out of its existing scoliotic curvatures.
4. Certain traction procedures were also employed.
5. Rehabilitative exercises and specific balancing exercises. It was believed that repeated performance of a postural alteration induces a long-term motor memory for achieving that novel postural position [12].

Due to the results found in this study it was established that spinal manipulation and postural therapy combined appear to significantly reduce the severity of idiopathic scoliosis.

c. Myofascial Release

Myofascial release is a common treatment technique applied by Manual Osteopathic practitioners. It uses gentle pressure and stretching to facilitate the release of fascial restrictions caused by accidents, injury, stress, repetitive use, and traumatic or surgical scarring [20].

It is understandable why the fascia plays such an imperative role in the Osteopath's treatment plan, considering the anatomy of the fascia surrounding and supporting the muscular, skeletal and organ components of the body. Fascia acts as connective tissue and any restrictions can exert pressure and stress on the body causing dysfunction [20].

An interesting study was performed to assess the effectiveness of myofascial release on adult idiopathic scoliosis. One 18-year-old female subject underwent 6 weeks of myofascial release treatment consisting of two sessions each week for 60 minutes. A few of the techniques applied were:

- Diaphragm release for 5 minutes (Figure 3)
- Sustained pressure release of psoas 5 minutes
- Bilateral rib/sternum compression and rotation for 3 minutes
- Caudal release on sternum with cervical traction for 4 minutes
- Sustained pressure release of quadratus lumborum for 4 minutes
- Thoracic spine release with caudal pressure for 4 minutes (20)

Figure 3 (4)

As one of the significant aspects of scoliosis is the unilateral displacement of the sub-diaphragmatic organs, thus causing a displacement of fascial connections and effecting the mobility of respiratory diaphragm (4), working on the diaphragm can be particularly valuable in the treatment of scoliosis.

The results indicated that subject improved in most measures, especially with pain, combined thoracic and lumbar rotation, and posture. Pain levels improved significantly, as did quality of-life measures and pulmonary function (20)

d. Exercise Therapy

A large component of scoliosis management is exercise. Typically, when looking at exercise therapy in practice, the curve must be accurately reviewed to determine where the concavities and convexities lye. Most of the research focuses on exercises such as the Schroth, Dobosiewich and side-shift methods (18)

Personally, in practice, I utilise a significant amount of Swiss ball, foam roller exercises (figure 4) as well as side shift methods to attempt to place the spine in the correct alignment.

A Swiss ball/foam roller are particularly useful when laying on the side of the convex curve to prevent progression and to try and bring the spine back into neutral.

Figure 4

As mentioned before, every patient is unique and must be considered on an individual basis. One individual's scoliosis won't be the same as another individual.

After reviewing the patient's scoliosis and identifying where the convex curves and concave curves are, it is then the Osteopathic practitioner can deduce the status of the associated paraspinal and intercostal muscles.

Most often, the concave curve houses shortened and contracted muscles. Whereas the convex curve accommodates lengthened and overpulled muscles (Figure 5). Once this is distinguished, an exercise plan can be formulated to lengthen and stretch the shortened muscles and strengthen and shorten the lengthened muscles as well as reversing any associated side bending and rotational forces present.

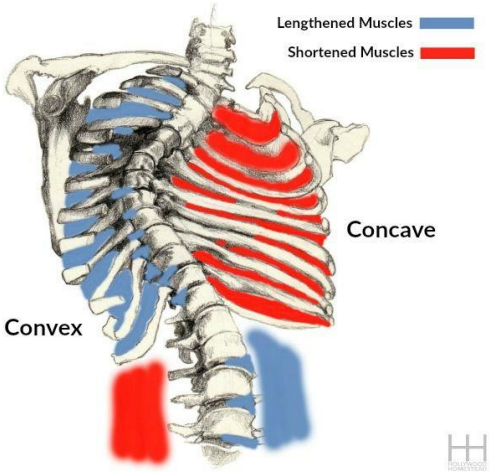

Figure 5
Pinterest

Exercises cannot be overlooked when creating a treatment plan for scoliosis. Studies show that strengthening and balancing the state of muscles on either side of the spine, was effective in prevention and treatment of scoliosis and improving the Cobb angle, muscular strength, and muscular endurance (1).

This, however, is dependent on the degree and severity of scoliosis (1) as a severe scoliosis is unlikely to be influenced much by exercise and would require surgical interventions.

Conclusion

After reviewing the literature, there definitely needs to be more studies regarding Osteopathy and the capability of treating scoliosis. During my clinical practice, I can say I have seen real improvement in patients that present with idiopathic scoliosis, and this is not just taking into consideration the scoliosis but also their pain, structural and functional limitations, and range of movement. I truly believe a combined treatment approach of cranial, visceral and structural osteopathy as well as therapeutic and postural exercises and re-education can be very beneficial in managing scoliosis and preventing progression. That being said, there are many other factors that need to be considered when attempting to determine the effectiveness of Osteopathy Manual Therapy in scoliosis. These factors include the extent of the curve at the time of diagnosis, the age of the patient, aetiology, the patient's stage of bone growth, patient compliance, and the amount of pain and deformity they present with. For example, it is unlikely, that manual therapy alone would help an elderly patient with severe degenerative structural scoliosis. It is my clinical opinion that the severity of the scoliosis has a significant part to play in prognosis and each patient's scoliosis is unique and personal to them.

Treatment consistency and compliance are also imperative. How often are treatments given and for how long? Are patient's listening and understanding and implementing the exercise and postural advice provided to them? A perfect example is the study by Morningstar et al, where the attending physician treated each patient 3 times per week for the first 4-6 weeks and a specific home care exercise program was taught to each patient to perform on a daily basis [12] . These terms (compliance and consistency) alongside the treatment provided resulted in every patient making at least a 25% improvement, the average starting Cobb angle was found to be 28 degrees, whilst the post intervention angle was measured at just 11 degrees. Those who did not comply were simply removed from the study to prevent the results from being altered in any way.

To summarise Osteopathic Therapy is a beneficial conservative treatment tool in the management of both functional and structural scoliosis. It is the obligation of the Osteopathic practitioner to not only manage expectations of each patient depending on their own presentation but to educate their patients regarding the condition and the rehabilitation programme chosen. As a greater understanding of the treatment approach and exercises will allow for greater compliance from the patient and therefore better treatment results.

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