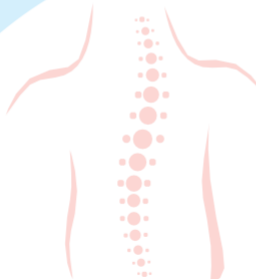


1

Findings of
Scoliosis
Curve



Scoliosis Care

3

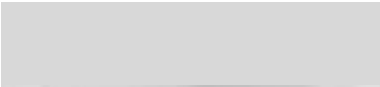
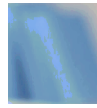
Education
of Brace
Usage



4



Physiotherapy
Exercises
Therapeutic



f



Message towards Parents

Dearest Parents, How much do you know about scoliosis? Do you know how to check whether your dear ones has scoliosis? Some people have a hard time to discover deformations of the body, but if you feel that your child has some sort of hunch, Altered body posture being a bit slanted, or having one shoulder higher than the other, even having the back of hip raised....., This might be signs of scoliosis, Kyphosis or Lordosis, Please CONSULT an orthopedic for poper diagnosis.



Contents

1

Ways to discover scoliosis

What is scoliosis?	2
Ways to discover scoliosis	2
Causes of Scoliosis	3
Will scoliosis worsen?	3
How to treat scoliosis?	4
Principle of brace & it's effects	4

2

Conventional & 3D Casting

Difference between conventional & 3D casted braces	6
Ways of 3D casting	7
Ways of conventional casting	8
TEHLIN scoliosis database in Asia Pacific	9
The purpose of the brace	10

3

Education of brace usage

Proper ways to use brace	11
Brace duration	12
Follow-up	12
When should stop bracing	12

4

Therapeutic exercises

Complete rectification methods of a brace	14
Breathing exercises, positional exercises	14
Segmented adjustment	16
Muscle strengthening exercises	17



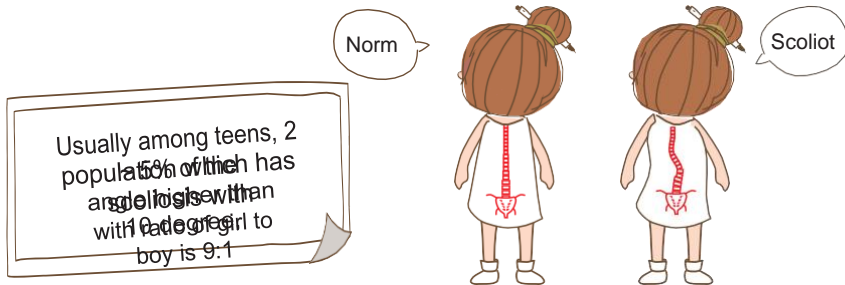
Ways to discover Scoliosis





What is Scoliosis?

Scoliosis is not a disease, but a curvature of the spine with rotation that could vary from mild to severe. The curve is often either S or C-shaped. People with scoliosis may have a difficult time moving in one direction due to the curvature of their spine. Unlike a typical spine that can move from side to side, bend, rotates left and right, and reverting back to the centre.



Scoliosis has effects on overall health, not just in physical appearance, but must probably those affected will experience waist and back pain. If this uneven pressure is left for long periods, the chances of worsening increases immensely, if the Cobb angle becomes too high, it will have effects on the pressure exerted on the heart and viscera abdominal area, The curve will form to both side causing on S-Curve, and causes rotation, When the rib cages are curved, it will cause the sternum to deform, which causes pressure towards the thoracic cavity. Hence, when treating scoliosis, it is necessary to know the cause, age, placement and severity of the scoliosis of the patient.

Ways to Discover Scoliosis



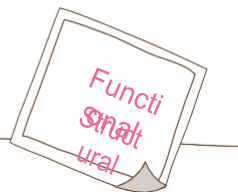
Scoliosis patients tend to have their body slanted to either the left or right. Ask the patient to stand straight with feet together, one of the shoulder of the patient will appear to be slightly higher than the other, or the pelvis not being balanced and slanted to a side, while from posterior view back muscles on one side appears to be more prominent & protrude, hip going inwards, breast not having same height, ribs being deformed; When asking the patient to put the hands together and bend down trying to reach the toes, stand behind the patient and if you see one side of the back protruding outwards. An X-Ray will also



show whether a person is diagnosed with scoliosis.



Causes of Scoliosis



Scoliosis can be Functional, Structural and Idiopathic

1. Functional Scoliosis

Functional Scoliosis usually come from injuries, sudden spasms, pelvic tilted, limb length discrepancy or knee or foot distortions. Poor posture and body alignment habits are under this category.

2. Structural Scoliosis

Structural Scoliosis is caused by birth defects or diseases.

3. Idiopathic Scoliosis

Idiopathic Scoliosis means there is no specific cause, or run in the families. It is the most common type of scoliosis which makes up nearly 80% of all cases of scoliosis. The chance of getting scoliosis for healthy children is 2.5% which is rather high.

STRUCTURAL	IDIOPATHIC	FUNCTIONAL
Bone deformation	Change in position	
Curve is primary	Curve is for compensation	
Non-invasive treatment	Provide correctional forces	Treatment of source sickness



Mild, Moderate, Severe Scoliosis: What do grades mean?

Mild scoliosis is where the Cobb angle or curvature of the spine is less than 20 degrees. Since it is not so visible, it may not need bracing but require monitoring by your doctor. Therapeutic exercises, joint correction exercises and other non-invasive exercises are helpful.

Moderate scoliosis curvature often needs bracing to stop the spine from developing into severe scoliosis. However, if the curve does not stop curving with a brace, you will probably need a surgery.

Severe scoliosis is a spine curvature between 40 and 45 degrees which is corrected through spinal surgery; a spinal fusion that will straighten out the spine, but it will not make it completely straight.

What happen if Scoliosis is left untreated?

Scoliosis is progressive and will not get straighten on its own. If untreated, the spinal curve especially for children will increase over time. The muscles too will grow unevenly causing asymmetry of the body, which changes the centre of gravity of the body. One will too feel tired and uncomfortable due to muscles tightening.

Not only that, the uneven pressure that applied will increase the chances of uneven formation

of hip, shoulders and chest. Since our spine is the bundle of nerves, the curvature of the spine can stretch, irritate, or squish the nerves causing discomfort, pain and inflammation.

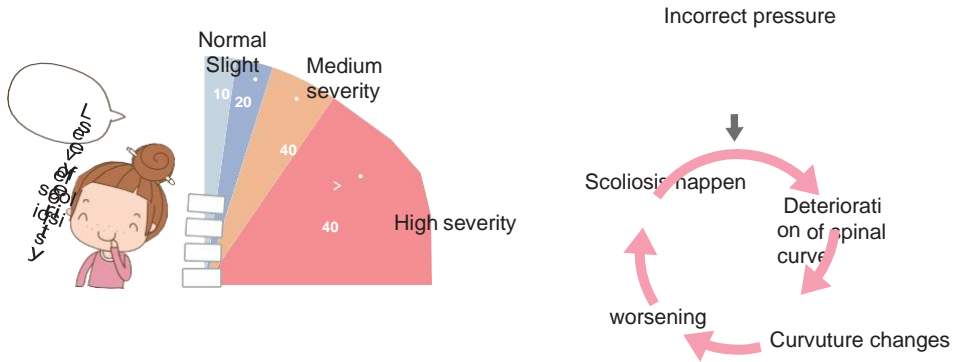
Who gets Scoliosis?

Anyone can get scoliosis. It usually develops in their early adolescence years. Girls are more likely to develop scoliosis than boys, the ratio is 9:1; and girl's condition tends to worsen and require treatment.



When to treat Scoliosis?

Spinal curvature is best dealt during teenage years or before a female's first menstrual cycle. At adolescent, their bones are much softer and not yet matured. Therefore, the success rate in treatment is higher when the body is still growing. .

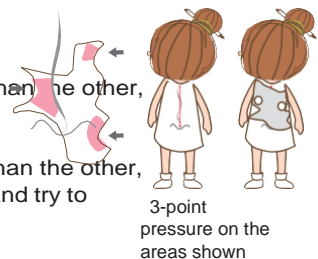


Ways to discover Scoliosis

A. Physical Examination

Firstly, stand straight with both feet together. Next check for any of all the symptoms below:

- Check whether the head is centered over the shoulders
- Check to see if the shoulders are even
- Check for deformation of rib cage when bending forward
- Check for breast asymmetry where one breast is higher than the other,
- Check for uneven hip where it is tilted to one side,
- Check whether one side of the hip is going inward,
- Check whether the back having one side looking higher than the other,
(To check the back, put the hands together, bend down and try to reach the toes.)



B. X-ray Evaluation

If you have any of the above symptoms, have an X-ray taken. The X-ray will detail the picture of your spine confirming one is diagnosed with scoliosis.

C. Consult A doctor

1. Doctor will advise and specially designed a back brace to try to keep the curve from getting larger as your spine grows. He will also advise the wearing time best for you.
2. Before deciding on the type of brace, the doctor will look into the account of genetics,

age, the curve size, position and severity of the scoliosis. Factors like growth, nutrition, past spinal or joint surgeries, knee or foot distortions, or even head injuries help in getting the best result from bracing.

Note: Treatment of scoliosis is a slow process. Every child is different from one another hence every treatment must be customized and there is no way to predict which patient will have better results.



Conventional & 3D Casting



Differences between Conventional & 3D Costed Braces

Conventional Casting and Modification Techn

1. Conventional casting uses ED Plaster of Paris to wrap patient
2. A cast is transformed to positive model.
3. Trained clinician will modify the model and decide on placement of pads based on patient's X-Ray.

3D Casting And Modification Techniques

1. 3D casting done using a 3D scanner on the patient's body.
2. Modification done by the 3D modification program.
3. Based on the computer generated model, the CNC machine cut's out the model which can be used for draping.

3D Casting (Draping Techniques)

1. CNC cuts out, draping done on model produced.
2. 3D printing.

Advantages of 3D Casting

1. Accurate, comfortable.
2. Computer does modification, highly accurate.
3. Correction of angle as exact, treatment is effective.
4. Modification done can be saved for future reference.
5. 100% body-fitted.

Effectiveness of Bracing using 3D casting

1. With the improvement of skills in producing braces, the effectiveness of brace also increases immensely.
2. The effectiveness of bracing increases from 50% to 70% due to 3D casting, especially RSC system braces.
3. Polio patient's also show improvement when using braces.

Comparison between Convent and 3D Scoliosis Brace

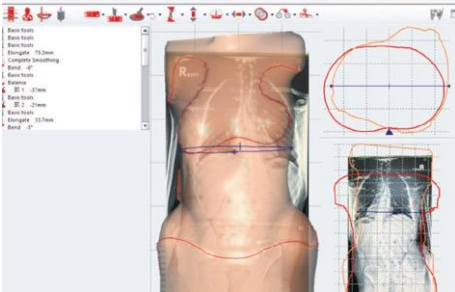
	Conventional Brace	3D Brace
Casting method	Casting using Plaster of Paris (POP)	Casting using scanning device
Modification method	Based on observation of X-ray, modification done by clinician	Accurate calculations done by program, modification done digitally
Fabrication method	Modification done by clinician, draping done by heating material and placing on model	CNC machine generates model, draping done by heating material and placing on generated model

Determination of Correctional Forces	Determined by observation by clinician	Completely precise placement of forces by program
Effectiveness of Brace	50%	70%

That's why physical therapy for scoliosis requires a 3-D approach to address the curve from all angles.



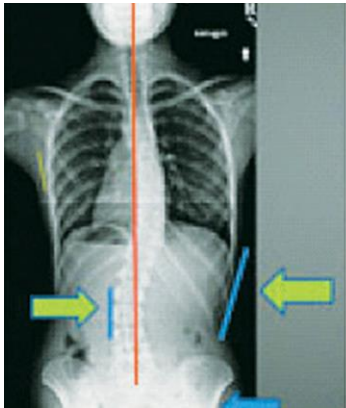
Ways of 3D Casting



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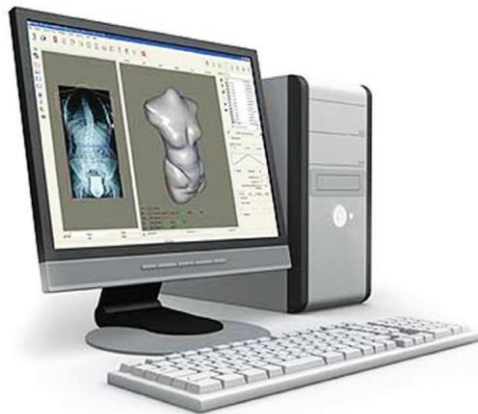


Ways of Conventional Casting

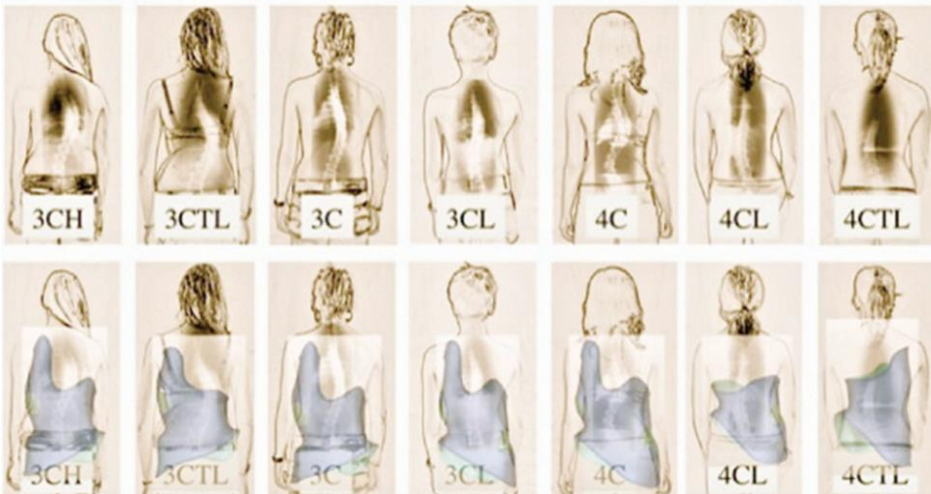


TEK LIN scoliosis database in Asia Pacific

- Divide as 7 types of scoliosis corresponding 9 types of RSC brace or 3 types of GBW brace, according to patient condition to select the most suitable braces.
- To aid in the corrective treatment and not only fabricate for the sake of fabricating.
- Provide the most suitable brace to the patient according to their condition with great skill, Cheneau system which include Rigo System Cheneau (RSC) and Gensingen (GBW) as main part, associated with Milwaukee Brace, Boston Brace and etc, to fulfill the patient's need.



Augmented Lehnert-Schroth (ALS) Classification



The Purpose of Bracing

Bracing treatment has the purpose of using pulling action and the 3-point pressure system produced by the brace, to correct the thoracic and abdominal cavity during breathing. Based on research done by the SRS, using a large sample size, it is found out that the effectiveness of brace on a scoliotic patient in curvature correction is 80% and above.

The screenshot shows the NEJM website interface. The article title is "Effects of Bracing in Adolescents with Idiopathic Scoliosis" by Stuart L. Weinstein, M.D., Lori A. Dolan, Ph.D., James C. Wright, M.D., M.P.H., and Matthew B. Dobbs, M.D. The article is dated October 17, 2013. The abstract states: "The role of bracing in patients with adolescent idiopathic scoliosis who are at risk for curve progression and eventual surgery is controversial." The methods section describes a multicenter study with 242 patients, comparing bracing to observation. The brace group wore the brace for at least 18 hours per day. Primary outcomes were curve progression to 50 degrees or more (treatment failure) and skeletal maturity without this degree of curve progression (treatment success).



The screenshot shows the Japanese website of the Scoliosis Research Society. The header includes the SRS logo and the text "SCOLIOSIS RESEARCH SOCIETY" and "脊柱変形の研究、治療に貢献". The main content area is titled "思春期特発性側弯症治療" (Treatment of Adolescent Idiopathic Scoliosis). It explains that the condition is categorized into three groups based on progression, and that bracing is used to prevent progression in certain cases. It also mentions that surgery is considered for severe cases or those that do not respond to bracing.

The screenshot shows the English website of the Scoliosis Research Society. The header includes the SRS logo and the text "Scoliosis Research Society". The main content area is titled "Patient and Family" (患者及家人). It provides information about the society's mission, the importance of bracing, and the role of the Scoliosis Research Society in research and clinical practice. It also includes a section for "Physiotherapy Scoliosis Specific Exercises" (PSSE).

Scoliosis Research Society

- ▶ A combination of brace and PSSE seems to provide better results in scoliosis treatment
- ▶ There is scientific evidence that PSSE are superior than general or no exercises

The screenshot shows the "SRS Statement on Physiotherapy Scoliosis Specific Exercises" document. It outlines the society's position on the use of PSSE in the treatment of adolescent idiopathic scoliosis. The statement emphasizes that PSSE are a key component of a comprehensive treatment plan, including bracing and surgery. It also mentions that PSSE are supported by scientific evidence and are recommended for all patients with adolescent idiopathic scoliosis.



Brace Education

Proper use of Scoliosis Brace

A professional will teach you how to put on the brace. Initially, you will need a helper to put it on. Eventually, with practice you will become an expert at it.

1. Wear 100% cotton inner shirt. For girls, the bra is worn under the inner shirt. Make sure it is tight fitting without wrinkles and seam. **WRINKLES CAN CAUSE SORES ON YOUR SKIN.**
2. Lean forward from your hips. When wearing the brace, make sure all straps are outside the brace and it is not twisted. Do note that the spine is centered in the brace and the waist pads snug just above the hips and below the lowest rib. Wear the brace lying down if the Cobb angle is more than 40 degree.
3. Secure the Velcro strap as tightly as possible starting from the bottom, top and finally the middle. If you wear the brace loosely, it will move around and cause more skin problems by rubbing.
4. Wear the underpants over the brace so as to prevent skin breakdown around elastic band.
5. Put on your normal clothes. Loose fitting clothes will not reveal the outline of your brace. Pants that are at least one size larger with elastic waistbands or drawstrings may fit more easily.



Note:

- *If there is often skin break down, consult your doctor and do not wear the brace until the skin heals*
- *Brace straps can be released according to need when eating.*
- *The brace should not cause pain or bruising.*

How to take care of Scoliosis Brace

1. Wash the brace every day with soap and water. Then wipe it with a towel and let it to dry by itself.
2. If the brace is needed soon, low temperature dryer can be used to dry up the brace. Be careful, very hot sun or a warm radiator will soften and lose the shape of the brace.
3. Once a week, clean and wipe brace with rubbing alcohol to disinfect the liner. Then rinse with water.
4. See an orthotist to replace straps due to wear and tear.

Daily Skin Care

1. Bathe or shower every day with neutral soap to clean the skin.
2. Check the skin for any sore, red or raw skin. Pay special attention where the brace presses.
3. Simply rub the alcohol with your hands into the skin that the brace covers to toughen the skin and increase blood circulation.
4. Talcum powder or cornstarch flour can be apply to keep the skin dry. However, the sweat will form little "pills" of damp powder which will make you feel uncomfortable.
5. Initially do not use creams, lotions or powders under the brace as they soften the skin.
6. Do not use ointments and wound plasters.
7. If there is skin breakdown, and it occurs for the third time, seek treatment from doctors. Maybe, the brace need modification. Wear the brace again only after the skin is healed.

8. It is normal for the skin colour over the pressure areas like the waist and hips to get darker. It will fade after the bracing is stopped.

Note: Air conditioning often provides extra comfort for brace wearers It is very important to PREVENT SKIN BREAKDOWN It is important to keep the skin dry.



Bracing Treatment

Breaking into Your Orthosis

The first and second week is adaptation period.

First, wear the brace for 2 hours, remove it and check for skin condition. Then, rub the skin with alcohol. If the skin is just pink, wear the brace again for another 2 hours.

Repeat by removing the brace after every two hours and checking the skin condition until you have worn the brace for 6 hours.

Note: For school children, it is best to wear after school and up to bedtime. If your skin is sore and red, wait for 30 minutes then rub with alcohol before wearing for 2 or more hours.

Week 2 or 3 onwards gradually increase the time per day in your brace to 10, 18 and 23 hours a day for maximum result.

Follow-Up Appointments with Doctors

It is important to set appointment with the hospital to have frequent follow-ups.

Visit the doctor on the 1st month, thereafter every 3 months and when necessary.

Sometimes X-ray is necessary to observe the change of spine and the progression of the curve.



Schedule to visit a doctor

Each visit with the doctor, the doctor will observe the pressure area, spine development and the status of your growth condition until the bones become mature.

He will also check and adjust the brace i.e. to check whether the pressure applied areas are correct and the pressure applied is appropriate. The professional will also modify the pads to increase the comfort of wearing the brace.

When to change a new Brace

The patient will feel uncomfortable wearing it as it no longer fit. The patient could have increase in height or the size of the body changes.

Reducing Bracing Time Progressively

When the Cobb angle increases less than 1cm per year

When To Stop Bracing



- When the spine stops growing or bones are matured
- There is no change occur to scoliosis after being confirmed by an X-ray
- Upon reaching complete puberty

After Removing The Brace

Continue with therapeutic under the instruction of the professional.

4 Therapeutic Exercise

Long term having scoliosis can deteriorate the body's appearance. & feelings of proper body movement.. Scoliotic patients have a hard time figuring out the body midline and are unable to balance their body. Even though the body is straight, they will feel it does not feel right and want to change the position to the prior wrong position.

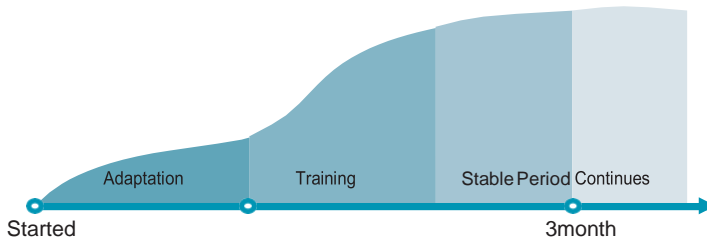
In therapeutic exercise treatment, the brain and muscle will receive a re-education on what is correct. It is very vital. This includes learning to recognize good body posture. Every patient should be treated differently, using the brace while performing therapeutic exercises enhances the effectiveness of the treatment. This helps decrease the effects of bracing such as muscle weakness, stiffness of muscles and lack of confidence just to name a few.



Complete Rectification Methods of a Brace



Adjustment of spine can be divided as outer body support and inner muscle change by bracing. The spine/ torso is fixed to the correct position while at the same time muscle training is carried out to strengthen the muscle. The spine is like a messy wire. We sorted out the coiled wires and turned them back while straightening and reversing the interface of each problem back through scoliosis treatment.



Adaptation Period	Accept Learning	Adapt to bracing as soon as possible, to serve as basic of correction. When breathing, adjust the stability of spine to improve heart and lungs function.
Training Period	Recuperation	Strong opposite direction side bending exercise, improve spine's bad habit.
Stable Period	Stable Period	Training Create strong core muscle, stabilize correction effect.
Continues Period	Continues	Maintain stability of spine in healthy position and change the brace when needed.

Breathing Exercises, Positional Correction

Certain exercises and breathing technique can help to relieve pain. Use a mirror to help you to know your own posture. It is important to be mindful and aware of the structure of your spine and its related position. Nevertheless, certain exercise can worsen the pain so consult a doctor before embarking in any exercises.

Breathing exercises

Breathing exercises can improve the thoracic cavity's motion and flexibility. It decreases the side effects due to rib cage's deterioration. It also increases body awareness as body awareness is the basic for improving body position.

Movement and breathing should be synchronized through training and applied through daily life. Consistent breathing exercise can improve patient's heart and lungs function.

1. Lie on your back in bed or on the floor with a pillow under your head. Bend your knees and the feet touching the floor.
2. Place one hand on your belly and the other hand on your chest.
3. Relax your body. Breathe in deeply through your nose and feel the belly fill with air rise. As you breathe out through your nose, feel your belly lower.
4. Repeat multiple times with full deep breaths and feel the stretch and movement of the diaphragm.



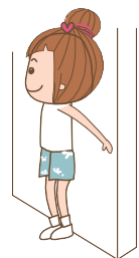
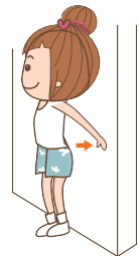
Lay down with back flat exercise (hip positioning training, strengthen muscle & body control)

1. Lay flat on the bed with knees bent and shoulders flat on the bed.
2. Bring in your back and pelvic region, contract your buttocks and breathe normally.
3. Push your lower back area down towards the bed, letting your back fully touch the bed, count to 5 then slowly relax your muscle, repeat the exercise 10 times.
4. Once the exercise is familiarized, change the exercise with both leg straight.



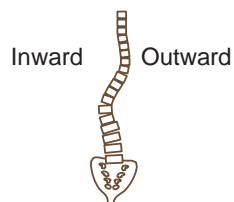
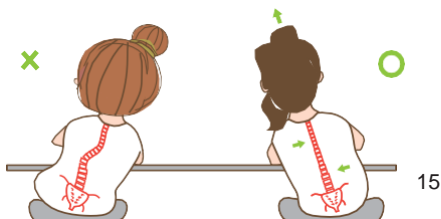
Stand straight against the wall

1. Stand with your back to the wall and your feet roughly 20cm in front of you. Knees slightly bent. Head and shoulders pressed against the wall behind you to maintain stability,.
2. Contract your abdominal region, pelvic area moves out and hip moves forward so that your spine feels a pull towards the bottom.
3. Chin-up, look forward, head touch the wall and feel like a string pulling your spine straight.
4. Without moving your upper body or shoulders, hold this position for few seconds. Take a few deep breaths, relax and repeat this exercise 5 times.
5. Once exercise is familiarized, slowly raise both hands maintain the back and hip close to the wall, raise hands as high as possible to touch the wall (Try this exercise only when the your back is able to lean against the wall.)



Sitting exercise

1. Sit down with both hands on the table and pressed hard on the table. The side curving in should lean towards the centre of gravity. This will reduce pressure on side which curves outwards.
2. Tilt the chin back to generate more energy for strengthening the spine.
3. For the lower half of the body, place the side of leg where the hip is lower across the side which is higher, fixing the hip.



Wrong posture
posture

Practice

High
er
pelvis

Low
er
pelvis

Hand raises

Stand with legs shoulder length apart, raise your hands with palms facing each other, stretch your body and pull. Hold the position for 10 seconds, relax and repeat 5 times.



Breathing exercises with brace on

1. Start from sitting position and slowly progress to a standing position, slow down your breathing, exhale all air from your body before restarting the exercise.
2. Straighten your spine, have your head feel like it is raised.
3. When breathing in, thoracic cavity should be leaned towards the brace.
4. When breathing out, spine which are on pressure area should be moved away from pressure points and repeat the

Segmented Adjustments



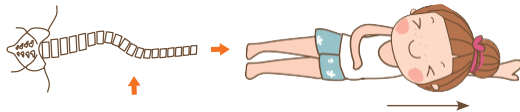
If scoliosis is corrected segments by segments, it does increase the flexibility of the spine. It also allows segments which are not correctable to be flat. By doing these exercises, patients are able to improve the flexibility of the spine and strengthening the core.

Scoliosis usually has imbalanced muscle on both sides of the backbone. The curved in muscle is usually overused unlike the muscle that curved outwards which is weak and not being used. Hence, the overused spine muscle must be fixed or corrected

If the patient has an S-Curve, stretch one side of the curve to fix. However, need to practice caution not to overstretch as over flexibility might cause the position of the spine to change.

Laying on the curved segment

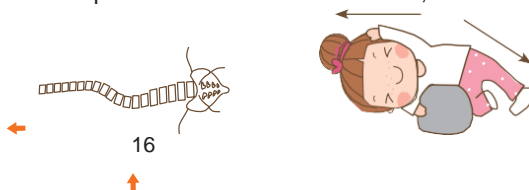
Lie down on your side on a mat. If the curved segment is on the left as described in the diagram, extend your left hand straight and rest your right hand at your abdomen. facing the bed. If the The right hand can hold bed for stability. Maintain this position for 2 minutes



or more. Then repeat.

Laying on treatment/ exercise ball

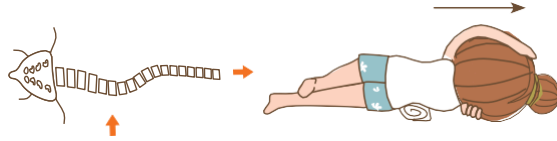
Lie down on your side with the treatment ball or a folded pillow supporting your upper torso depending on which side of the spine is curved in. For instance, if the left side of



your spine is curved in, your right side of the torso will rest on the ball. Then straighten both your left hand and leg ensuring your body is straight. Try to extend them as far as possible. Hold this pose for 15 to 20 seconds. Repeat this 5 times.

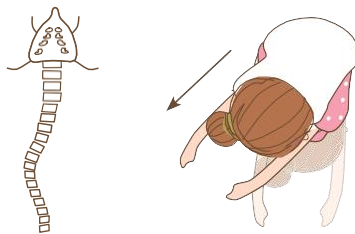
Laying down to the side with towel

Lie on your side with the towel below the waist. The side where the spine curved outward or a C- curved should face the floor. Straighten the leg on the floor and bend slightly the leg that is above. Place one arm below your head and extend the other arm over your head and stretch. Breathe deeply and stay in that position for 5 minutes and switch side.



Prostrate position

1. Stand straight with arms straight and feet hip-distance apart. Keep your back flat, lower your torso to lower both your hands toward your foot and stretch. Return to the center. Repeat 10 times.
2. Let the patient's hand move from the curve inward direction to curve outward direction to bend the torso. Both hands to the right to stretch left side torso as much as possible. Body forward curve outward part until the limit.
3. Clockwise direction is for reversion of C and S shape. Anticlockwise is for C and S shaped spine. Every action should maintain at least 15 to 20 seconds as 1 turn, 3 turns should be done.

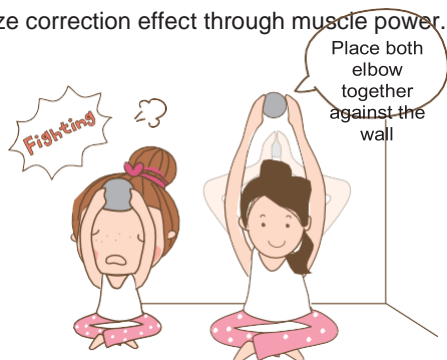


Muscle Strengthening Exercises

Train deep inner muscle to stabilize correction effect through muscle power.

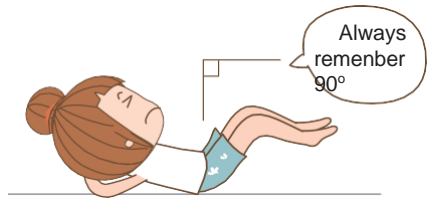
Leaning the wall and roll the ball (back muscles training)

Sitting with legs crossing each other, back against the wall, hold the ball with both hands and raise it over the head. Keep the hands and elbows straight against the wall. Repeat 5 times.



Leg raises / sit up

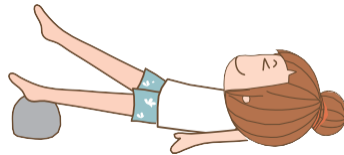
Lie on your back with both hands gently placed below your head. Lift both the legs up with knees bent at a 90-degree angle. Lift the legs up until the butt comes off the floor. Slowly lower your legs back to the original position. Use the strength of the abdomen instead of the neck when lifting.



Repeat this 10 times.

Lifting legs with bouncy ball

Lie on the floor with arms beside and put the calves on the bouncy ball. Raise one leg up without arching your back. Breathe in when lifting your leg and exhale when returning to original position. Lift each leg 8 to 10 times. Repeat 3 to 5 sets.



Laying on the ball and lift up the body

Lie on the ball with the body in a table-top position. Both hands hold onto the ball, knees bent, maintain the back straight and the whole body stable.

Breath naturally, pelvis to the back, more both scapula near to the spine, and raises the upper body part upwards. 10 ~ 15 times, repeat 3 ~5 sets,



Centre of gravity shifting

Position both your hands and legs on the floor. Keep your knees under your hips, hands under the shoulders, maintain the body in straight position, the waist does not curve inside too much and head look in front. Breathe out through your mouth and gradually extend your left arm while using your right arm to support yourself. Hold this position, and gradually extend your right leg behind you. Relax and then do the same with the opposite limbs. Repeat this five times..



Gluteal

Lie on one side. Keep the bottom leg and hand straight on the mat. Keep your hips stable and back straight then lift your top leg up and hold for 2 minutes. Most importantly, your whole body must be aligned. Breathe in and out. Switch sides and repeat 3 ~ 5 sets.



Sit up

Lie with the back on the floor. Bend knees, extend the arms down to the sides and place feet firmly on the mat. Lift up your upper body. Hands try to touch the knee. Lower your upper body back to the starting position.



Superman's exercise

Lay face down on the mat with arms stretched backwards. At the same time lift your head and look forward. Raise your hands and legs off the ground keeping them straight for 5 seconds. Repeat 10 to 15 times.



