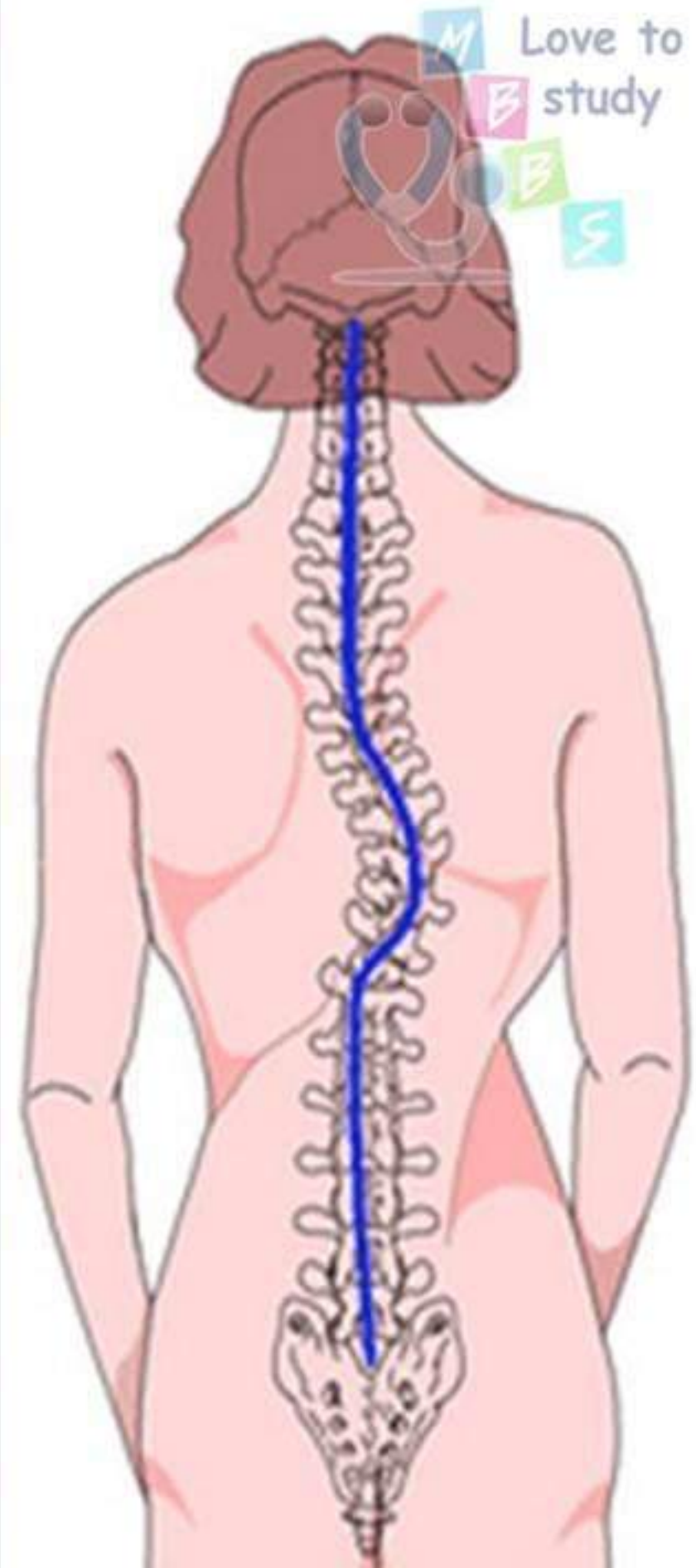


Scoliosis

Scoliosis

- Abnormal lateral & rotational curvature of the spine
- There may be one curve ("c" curve) present or two curve ("s" curve).
- Rotation of the vertebra in thoracic spine ,there is prominence of rib cage (rib hump) .
- Scoliosis is defined as **Lateral curve of the spine greater than 10 degree.**
- **10-20** degree of scoliosis is "Mild"
- **20-40** degree of scoliosis "Moderate"
- Greater than **40** is "Severe"
- There can be –
 - Infantile scoliosis – affect children at birth.
 - Juvenile scoliosis affecting children age b/w 4 & puberty ,
 - Adolescent scoliosis – affect kids from puberty to adult.

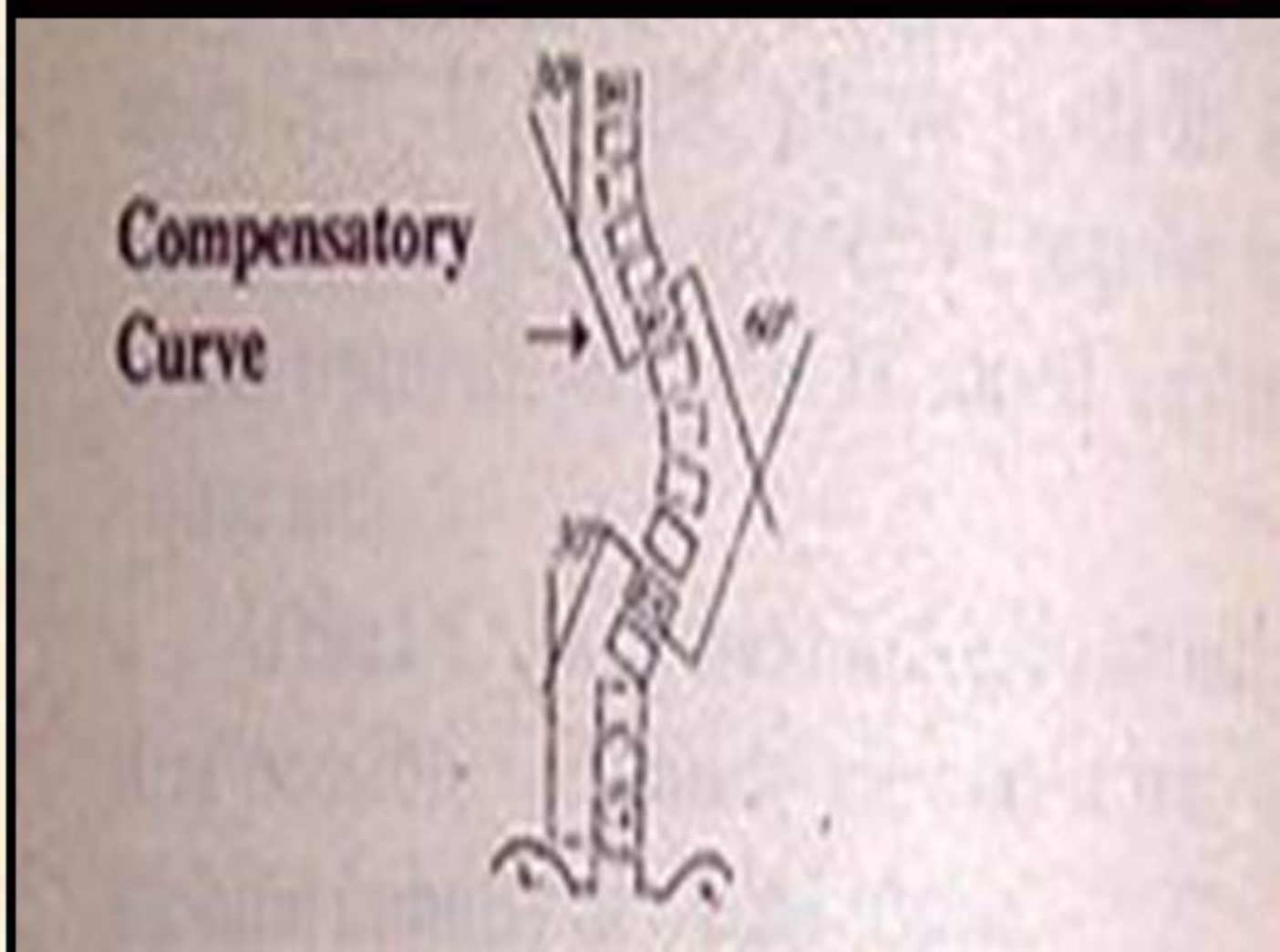
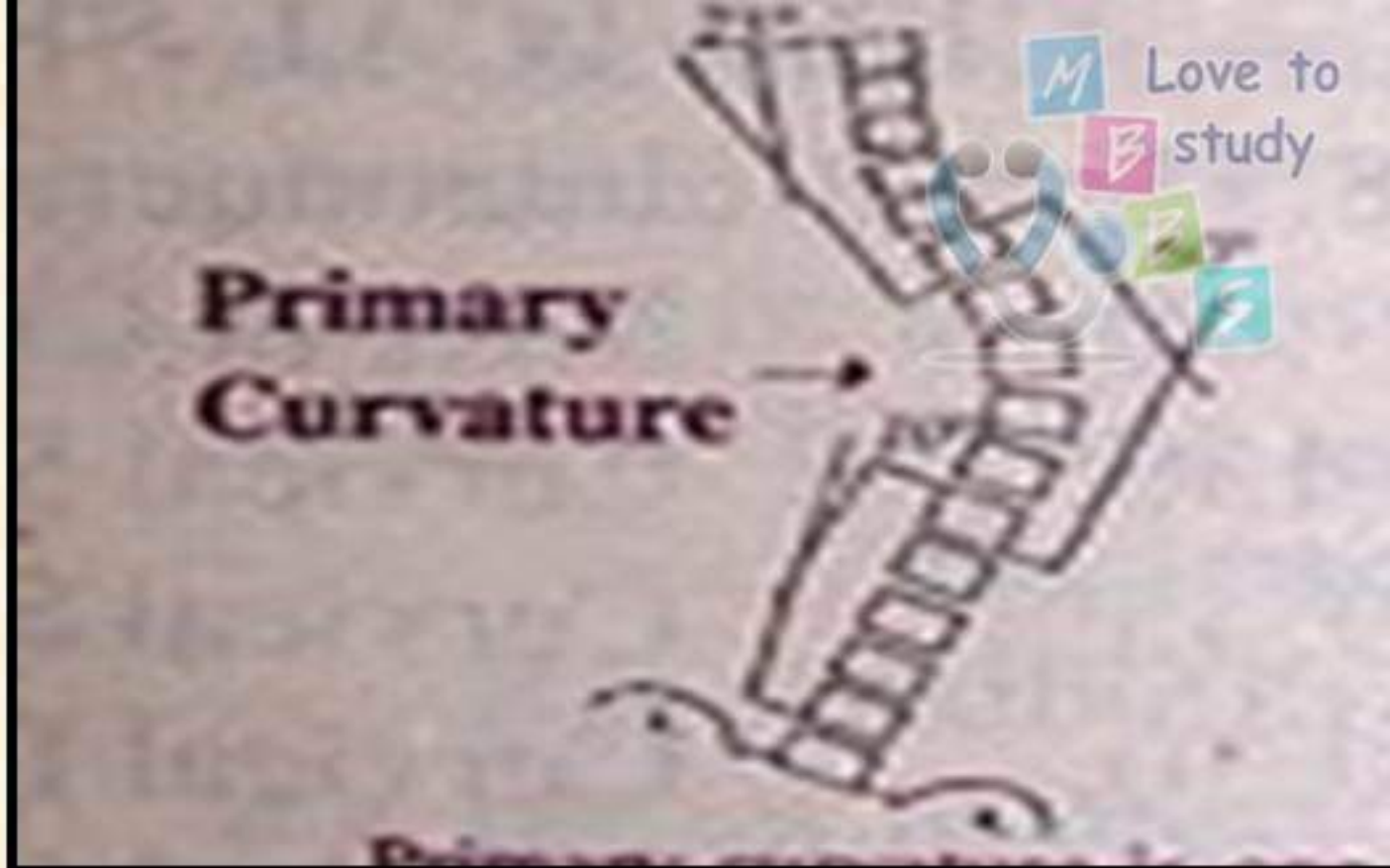


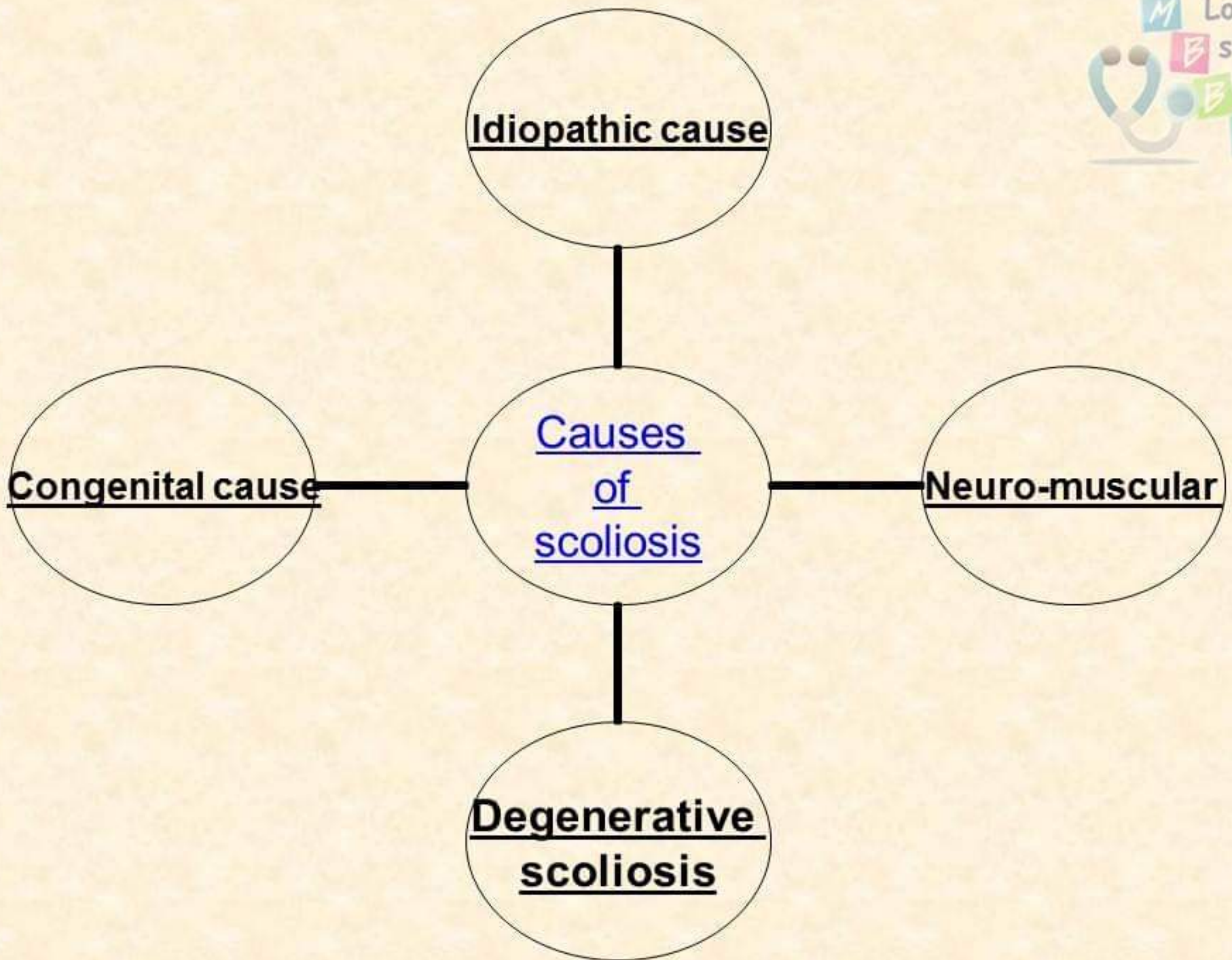
Primary curve –

From where the lateral curvature of the spine started.

Secondary curve –

the spine above and below the primary curve goes in opposite direction as a compensation. It is also called as compensatory curve.







Causes Scoliosis

There are many types and causes of scoliosis, including:

1. **Congenital scoliosis**. Caused by a bone abnormality present at birth.
2. **Neuromuscular scoliosis**. A result of abnormal muscles or nerves. Frequently seen in people with spina bifida or cerebral palsy or in those with various conditions that are accompanied by, or result in, paralysis.
3. **Degenerative scoliosis**. This may result from traumatic (from an injury or illness) bone collapse, previous major back surgery, or osteoporosis (thinning of the bones).
4. **Idiopathic scoliosis**. The most common type of scoliosis, idiopathic scoliosis, has no specific identifiable cause. There are many theories, but none have been found to be conclusive. There is, however, strong evidence that idiopathic scoliosis is inherited.



Type of deformity

Postural

Correctable ,
secondary to some conditions
of spine.

Structural

Non- correctable deformity
Involves vertebral rotation.

Signs and symptoms -



Scoliosis signs and symptoms in children:

1. Shoulders may not be of the same height (one is higher than the other)
2. Head is not centered directly above the pelvis
3. Ribcage is not symmetrical; ribs may be at different heights
4. A shoulder blade is higher and more prominent than the other
5. Unequal gap between the arm and the trunk
6. One hip is more prominent than the other
7. Clothes do not hang properly
8. The individual may lean to one side
9. Uneven leg lengths

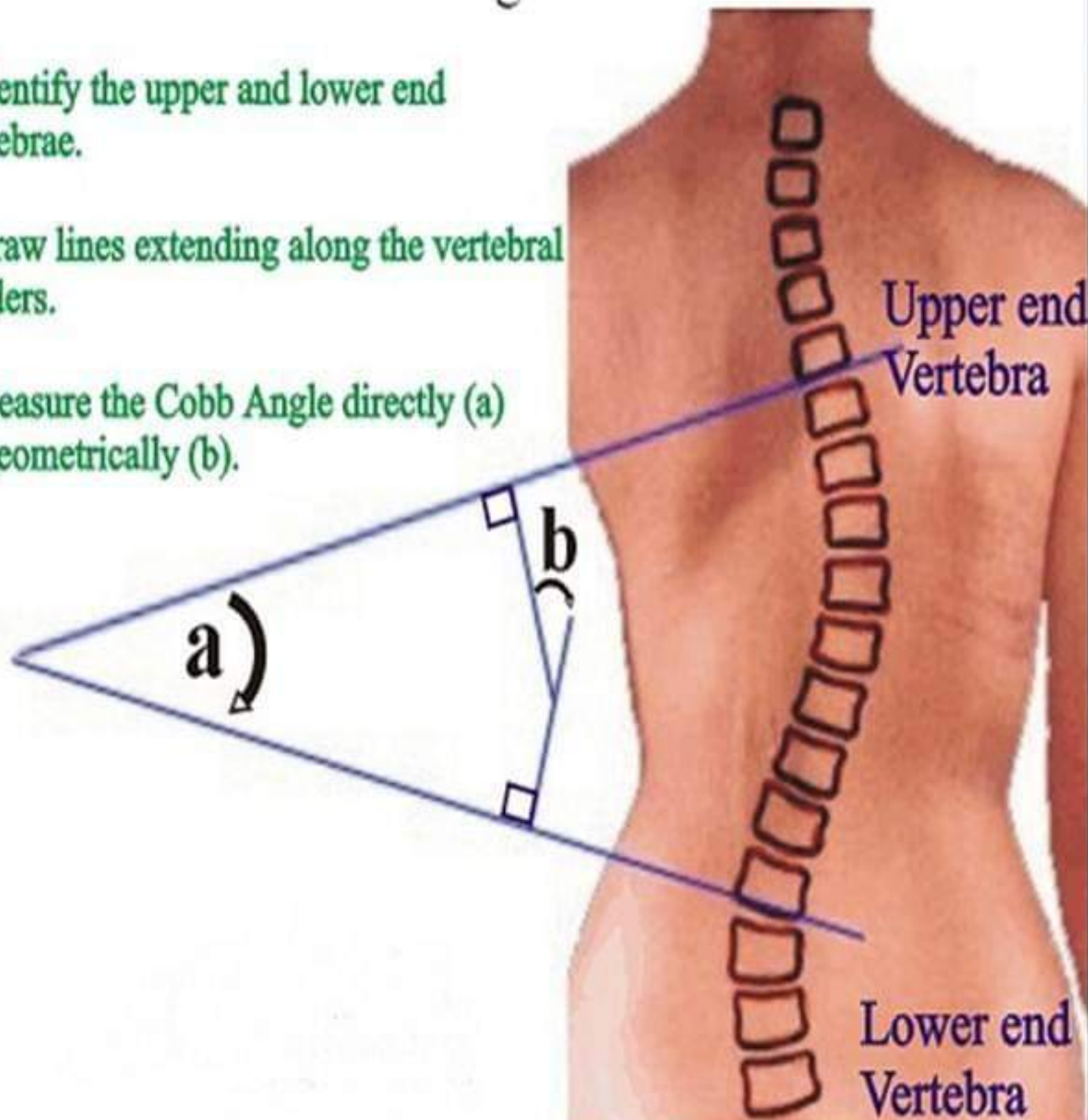
Scoliosis signs and symptoms in babies:

1. A bulge on one side of the chest
2. The baby might be consistently lying curved to one side.

Scoliosis Radiographs

The Cobb Method of angle measurement

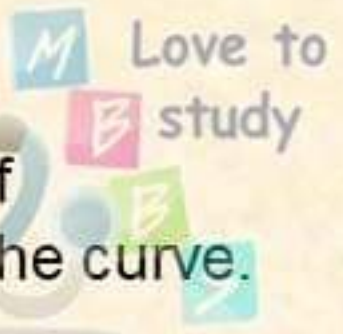
1. Identify the upper and lower end vertebrae.
2. Draw lines extending along the vertebral borders.
3. Measure the Cobb Angle directly (a) or geometrically (b).



Degree of curvature
is measured by :-

Drawing lines on the x-ray at the upper border of the uppermost vertebra and the lower border of the lowermost vertebra of the curve; the angle subtended by these lines is the Angle of curvature (Cobb's angle).

Scoliosis Diagnosed



Imaging scans - the specialist will order an X-ray to confirm the diagnosis of scoliosis, as well as determining the shape, direction, location and angle of the curve.

Bone scan - radioactive material is injected into the bloodstream. This material travels to the parts of the bones that are affected.



Thoracic scoliosis



Lumber scoliosis



Treatment depends on –



Gender - females are more likely to have progressive scoliosis (gradually getting worse) than males.

Severity of the curve - the larger the curve the greater the risk is of it worsening over time. Curve pattern - S-shaped curved, also called 'double curves' tend to get worse over time, as opposed to C-shaped curves.

Where the curve is (location) - if a curve is located in the thoracic (center) part of the spine it is more likely to get worse over time compared to curves in the lower or upper section.

Bone maturity - the risk of curve progression is much lower if the patient's bones have stopped growing. Braces are much more effective while bones are growing.

Casting - in early cases the child's spine may have to be guided back into its normal position as it grows. This can be done with a brace made of plaster of Paris - it is attached to the outside of the patient's body. This is worn all the time (without removing it). Because the child is growing he/she will need regular cast changes.

Possible Treatment Goals



- Improve Fitness
- Improve Function
- Optimize Joint Alignment
- Improve Muscle Strength and Power
- Improve Proprioception
- Improve Range of Motion
- Improve Relaxation
- Self-care of Symptoms
- Improve Safety
- Improve Tolerance for Prolonged Activities

Physiotherapy treatment-



1. Relief of spasm –

- by electrotherapy modalities like heat pack.

2. Postural correction-

- Sleep on the convexity side so as to decrease the curvature.

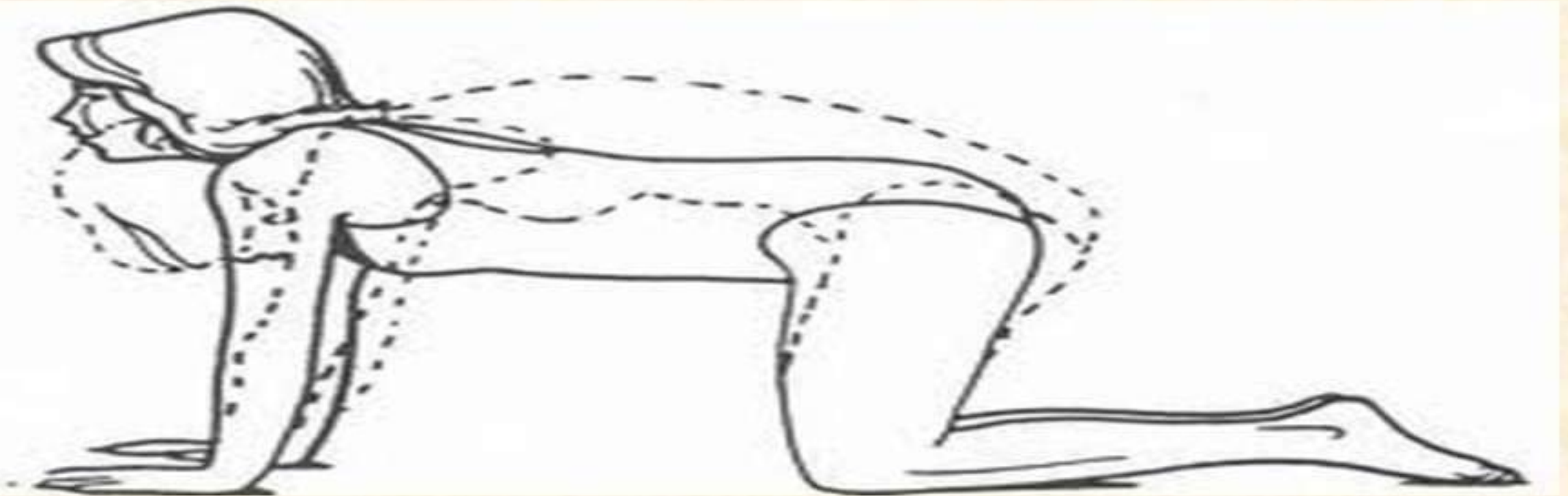
3. Strengthening of weakened muscle:-

- **Bicycle.** Lie down flat on the floor, with the legs off the floor. Now try mimic pedaling a bicycle.
- **Abdominal strengthening.** With knees bent, back flat to table, rotate knees side to side.
- **Back strengthening. Sitting** on your heels, hands behind your back, keep tummy on your thighs. Lift head and shoulders.
- **Back strengthening. Sitting** in a chair, lean forward with tummy on your knees, hands behind your head. Raise head and shoulders only.
- **Back strengthening. With** waist at edge of table, raise trunk and arms in straight line to table.

4. Stretching or flexibility exercise :-

Stretching of gluteus medius, , tensor fascia lata, iliotibila band.

Eg. Cat – camel stretching exercise.



5. Breathing / Aerobic / endurance exercise :-

As in advanced scoliosis there is increase in restriction of cardiopulmonary function. So to maintain that proper deep breathing exercise should be taught to the patient.

SPINAL FLEXIBILITY & STRETCHING EXERCISES

Helps to build strong muscles to support your neck and back. **STRETCHING EXERCISES** increase flexibility and movement of the joints of the body and spine. Do exercises 5 to 10 times, 3 times a week, and don't do any that cause pain.

LYING



Bend knees, lie on back, take a deep breath, place your hands on your thighs and relax.



Tighten your abdomen and buttocks. Press your lower back onto the floor. **ACTION** — Stretches and strengthens stomach and back muscles.



Turn both knees to one side while rotating your head to the opposite side. **ACTION** — stretches lower back, mid back, muscles, and joints.



Pull both knees to your chest. **ACTION** — stretches lower back, buttocks and abdominal muscles.



Slowly raise hips upward. Keep a straight line from the knees to the shoulders. Do not arch your back. **ACTION** — stretches buttocks and stretches upper leg muscles.



Cross your arms, tuck your chin in, tighten abdomen, and curl halfway up. Use hands behind head for support only. (Do not pull). **ACTION** — strengthens abdominal muscles.

LYING



Lie on your back with one leg bent and the foot flat on the floor. Extend the opposite leg straight out. Relax and allow your back to feel the floor.



With knee bent, pull it to your chest, keeping the opposite leg straight, press your knee and lower back to the floor. **ACTION** — buttocks muscles, back muscles and stretches hip.



Press your lower back against the floor, raise the straight leg until it is level with the bent knee. **ACTION** — strengthens and stretches quadricep muscles, hamstring muscles and stretches hip joints.

PRONE



Lie on your stomach, raise one leg off the floor, while keeping the knee straight. **ACTION** — strengthens lower back, abdominal and leg muscles, stretches hamstrings and quadriceps.



Keep your neck in a normal position, push yourself up on your forearms. Keep hips and abdomen against floor. **ACTION** — strengthens posterior back muscles, attains normal low back curve.

HANDS & KNEES



While on your hands and knees, keep your knees directly under your hips, your hands under your shoulders, keep abdominal muscles firm, keep your neck relaxed and in its normal position, that is, with your ears in line with your shoulders.



Drop your head down and press your back upwards by tightening your abdominal and buttocks muscles. **ACTION** — to strengthen abdominal and buttocks muscles and to stretch your lower and mid back.



Relax your stomach and buttocks muscles and allow your back to sag. Do not sit back on your hips. **ACTION** — to stretch back and abdominal muscles and help maintain lower back curve.



Stretch one arm straight out in front of you while maintaining your back and head position while keeping support arm straight. **ACTION** — strengthens and stretches your shoulder, upper back muscles and joints.



Extend your straight leg behind you while holding it parallel to the floor. Maintain your normal back and neck position. **ACTION** — strengthens buttocks, abdomen and leg muscles.

NECK FLEX



Drop head forward, slowly. You will feel the stretch of your neck muscles.

Slowly drop head backward and you will feel the stretch of your front neck muscles.



Slowly turn your head from side to side. Feel the stretch of the muscles on the side of your neck. Do not strain.

Tilt your head to one side. This is to stretch the muscles on the side of your neck.



NECK STRENGTH



Press forehead to palm. Resist forward motion.

Clasp hands behind head, press your head back, resist motion.



Turn head to one side, resist side motion with your hand.

Tilt head to other side, resist motion with hand.



Braces –moderate scoliosis and the bones are still growing then use a brace. This will prevent further curvature, but will not cure or reverse it. Braces are usually worn all the time, even at night. The brace does not generally restrict what the child can do. When the bones stop growing the use of braces is discontinued.

2 types of braces:

Thoracolumbosacral orthosis (TLSO) (Low-profile brace or underarm brace) - it is contoured to conform to the body and is made of modern plastic materials. As this brace fits under the arms, around the rib cage, and lower back and hips it is not usually visibly detectable under clothing.

Milwaukee brace - (T2 – T6 involvement)

this brace has a neck ring with rests for the chin and the back of the head; it is a full-torso brace. It has a flat bar in the front and two flat bars behind. This type of brace is only ever used when the TLSO is not possible or not effective.

TLSO Low
profile
orthosis



Milwaukee
Brace with
superstructure

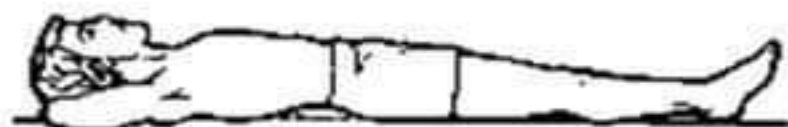


EXERCISES FOR PATIENTS WEARING THE MILWAUKEE BRACE

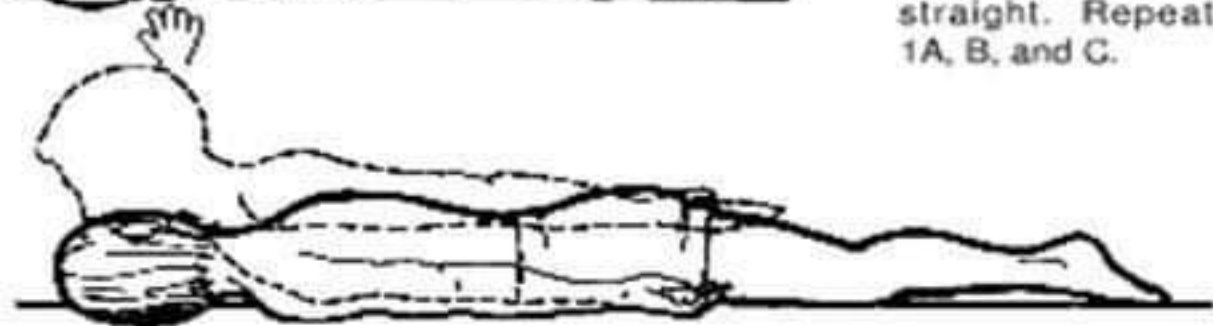
Exercises 1 through 5 are held to the count of five and done ten times once daily. Exercises 7 and 8 are to be done many times a day.



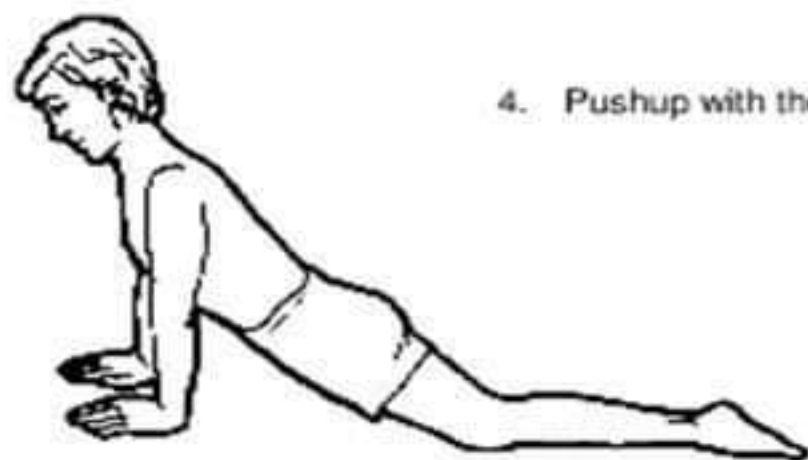
1. Pelvic tilt backlying with the knees bent.
 - A. Keep the shoulders flat on the floor and breathe regularly.
 - B. Tighten the buttocks.
 - C. Force the lumbar spine towards the bars by tightening and pushing backward with the abdominal muscles.



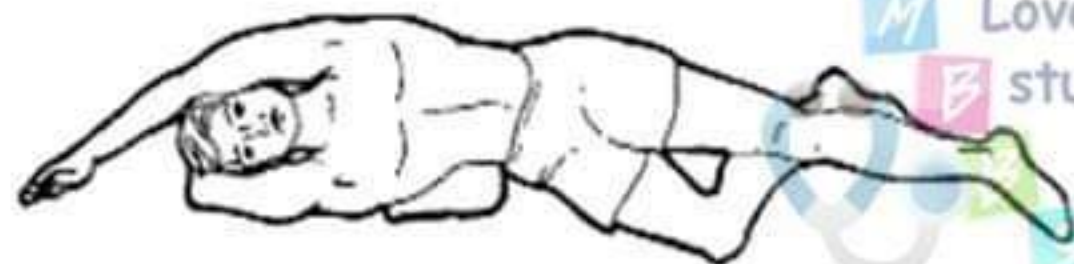
2. Pelvic tilt supine with the knees straight. Repeat 1A, B, and C.



3. Spine extension in the facelying position.
 - A. Tilt the pelvis, pull away from the front of the girdle.
 - B. Raise the head, arms and shoulders about 6 inches against resistance between the shoulder blades.



4. Pushup with the pelvis tilted.



5. Filling out the "Thoracic Valley."
 - A. Lie on your side with a small pillow under the thoracic pad.
 - B. The top arm and leg should be straight, lower arm and leg bent.
 - C. Tilt the pelvis.
 - D. Breathe in while pushing chest back toward the posterior uprights.



6. Pelvic tilt standing.
 - A. Relax the knees, tilt the pelvis by pulling in the abdomen and tucking the hips under.
 - B. Walk, holding the tilt. Make this posture a habit.



7. Active correction of the Thoracic Lordosis and Rib Hump.
 - A. Tilt the pelvis in the standing position.
 - B. Inhale deeply, spread the ribs and press the chest wall backward toward the posterior uprights.

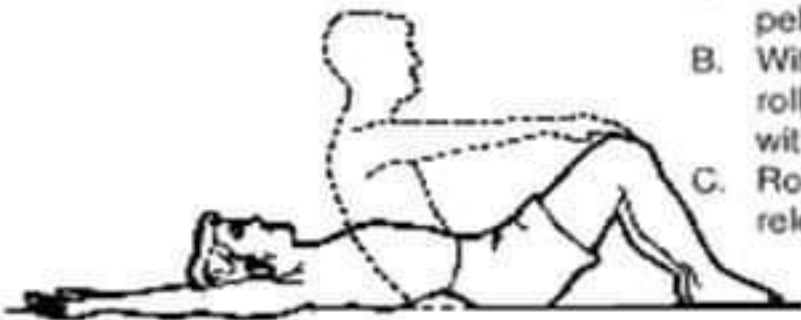
8. Active correction of the curves.
 - A. Tilt the pelvis.
 - B. Keep the pelvis tilted and shift away from the Thoracic Pad.
 - C. Same with the Lumbar Pad.
 - D. Now, tilt pelvis shift away from both pads and stretch up tall out of the brace.



1. Pelvic tilt backlying with the knees bent.
 - A. Keep the shoulders flat on floor, but breathe regularly.
 - B. Tighten the buttocks.
 - C. Force the small to the back into the floor by tightening and pushing backward the abdominal muscles. Try to "Crush" the Therapist's hand under the back.



2. Pelvic tilt with the knees straight. Repeat 1A, B, and C.



3. Sit up with pelvic tilt.
 - A. With the knees bent, tilt the pelvis and hold the tilt.
 - B. With the elbows straight, roll up to touch the knees with fingers.
 - C. Roll back down slowly, then release the tilt.

4. Deep breathing exercises.

- A. Divide the chest into three parts; abdomen, lower ribcage and upper ribcage.
- B. Inhale deeply and then exhale completely in each part.
- C. Later, when you can do this well, combine all three into one deep breath.



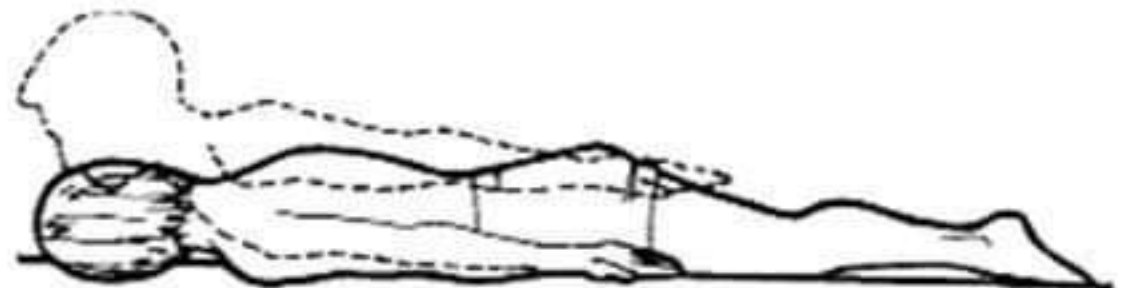
5. Hamstring stretch.
 - A. Sitting with legs out in front of you, touch your toes.
 - B. As you progress, try to touch your head to your knees.



7. Rotational stretch.
 - A. With hands behind head, rotate as far as possible from side to side trying to touch your elbow to the opposite knee (sitting Indian style).



8. Back strengthening.
 - A. Sit Indian style with back as flat as possible to the wall.
 - B. Hold a ball overhead and raise straight up.
 - C. Be sure to keep your elbows to the wall.



9. Spine extension in the prone (facelying) position.
 - A. Tilt the pelvis, make a "Tunnel" under your abdomen.
 - B. Arms at your sides, palm down.
 - C. Pinch shoulder blades together and raise head and shoulders and arms about 6 inches from the floor against resistance.



Surgery

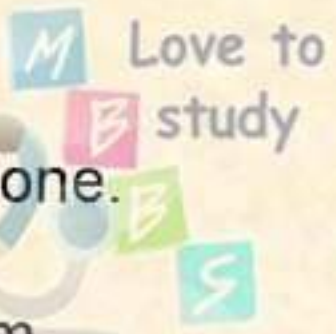


Criteria :-

1. Curve more than 40degree
2. Progressive increase in scoliosis
3. Failure to conservative treatment
4. Cardiopulmonary complications.

Operation method :-

1. Herrington rod :- only fusion of spine vertebra , no correction of the deformity.
2. Double rod method : - on every single level of vertebra of spine is fixed with screws.
3. Vertebra fusion :- fusion of vertebra where scoliosis develep.



Surgery (spinal fusion) –

- In severe cases the scoliosis can progress over time, then spinal fusion is done.
- This is a type of surgery which reduces the spinal curvature and stops it from progressing (getting worse). At least two vertebrae (spine bones) are connected with new bone grafts. Sometimes metal rods, hooks, screws or wires may be used to hold a part of the spine straight while the bone heals.
- The operation lasts from about 4 to 8 hours.
- Children can usually go back to school after 4 to 6 weeks, and can take part in sports approximately a year after surgery. In some cases a back brace is needed to support the spine for about six months.
- The patient will need to return to hospital every six months to have the rods lengthened - this is usually an outpatient procedure (patient does not spend the night in hospital). The rods will be surgically removed when the spine has grown.

Post operation physiotherapy :-



First 2 days :-

- Deep breathing exercises are given to the patient to increase the vital capacity.
- Vibration with assisted coughing.
- Early toe, ankle and upper arm movements within the limit of pain must be initiated as early as possible.
- Change the position of the patient every 2 hours.

Day 3rd and 4th :-

- Full range passive movements are given to hip and knee joint in addition to activities of first two days.
- Active movement must also be initiated within the limit of pain.

Day 5th :-

- Appropriate techniques for rolling, sitting and standing are taught to the patient.
- The patient is encouraged to do all the above activities without giving much pressure over the spine.
- The patient is to be made ambulatory as soon as possible. Hence first balancing is taught to the patient. As soon as the patient is able to balance himself, he is given gait training with the help of parallel bars, **crutch** or cane.