



Tabes Dorsalis : *The Neurobiological Analysis*

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The beginning

- Syphilis is a sexually transmitted disease caused by a bacteria named *Treponema pallidum*. During initial infection, the bacteria spreads through the blood stream into remote sites like the brain and spinal cord, but remains silent in these areas. If proper treatment is not instituted, neurological disorders arise about a decade later and is called neurosyphilis. Damage to the spinal cord substance due to syphilis is called **tabes dorsalis**

What is Tabes Dorsalis ?

- *Tabes dorsalis* is a late manifestation of untreated tertiary syphilis or neurosyphilis and is also known as **locomotor ataxia** or **syphilitic myelopathy**
- *Tabes dorsalis* is a slow degeneration of the covering of nerve cells and nerve fibers (known as myelin) that carry sensory information to the brain. The degenerating nerves are in the dorsal column of the spinal cord (the portion closest to the back of the body) and carry information that help maintain a person's sense of position.

What is Tabes Dorsalis ?

- *Tabes Dorsalis* affects the brain, spinal cord and nerves throughout the body
- The incidence is rising, in part due to co-associated HIV infection
- *Tabes dorsalis* is more frequent in males than in females.
- It is usually diagnosed during mid-life.
- Symptoms usually begin 25 to 30 years after the original syphilis infection

The spread

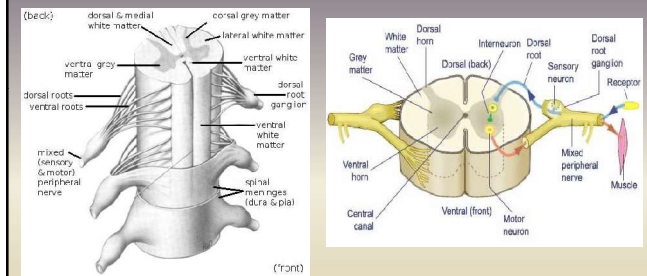
- Inflammation occurs in the dorsal columns of the spinal cord. These columns are in the portion of the spinal cord closest to the back and have nerve fibers that carry sensory information like deep pain and position sense (proprioception) from the legs and arms to the brain. As a result of this, the nerve fibers lose their insulation and start atrophying. The pathological process starts in the lower-most portion of the spinal cord that receives information from the legs and spreads upwards. The inflammation can also involve other nerves that control vision, hearing, eye movements, bladder and bowel.

Axial section of the spinal cord showing syphilitic destruction (whitened area, upper center) of the posterior columns which carry sensory information from the body to the brain



Regions involved

- **Posterior column** (dorsal column) refers to the area of white matter in the dorsomedial side of the spinal cord. It is made up of the fasciculus gracilis and fasciculus cuneatus and itself is part of the dorsal funiculus. It is part of an ascending pathway that is important for well-localized fine touch and conscious proprioception called the posterior column-medial lemniscus pathway.
- **Dorsal root** (or posterior root) is the afferent sensory root of a spinal nerve.
- **Dorsal root ganglion** (or spinal ganglion) is a cluster of nerve cell bodies (a ganglion) in a dorsal root (a branch of a nerve carrying mostly sensory signals into the spinal cord).



Symptoms of TD

- Paresthesias (shooting and burning pains, pricking sensations and formication)
- Hyposthesias (abnormally diminished cutaneous, especially tactile, sensory modalities)
- Loss of coordination
- Dementia
- Deafness
- Visual impairment and impaired response to light
- Joint damage, especially of the knees
- Vision changes
- Bladder control problems
- Sexual function problems
- Muscles weakness

Diagnosis

- CSF (cerebrospinal fluid) examination
- CT or MRI of the brain and spinal cord to rule out other diseases
- Serum VDRL or serum RPR

Treatment

- Penicillin-administered I.V. is the most common treatment of T.D.
- Pain caused by tabes dorsalis can be treated with:
 1. Opiates
 2. Valproates
 3. Carbamazepine

Goals of PT

- Educate the patient about sensory loss and educate on precaution to be taken.
- Strengthening of muscles
- Improve balances
- Improve mobility
- Improve co-ordination
- Eyes care
- Sensory re-education

Physiotherapy m/m

- Strengthening of muscles
- Use to assistive aides to improve mobility
- Balance training
- Breathing exercise
- Frenkel's exercise

Frenkel's exercise

- Developed by Dr. H.S. Frenkel
- Aimed at establishing the voluntary control of movement by the use of any part of sensory mechanism which remains intact, notably sight, sound, touch, to compensate for the loss of kinesthetic sensation.
- The essentials of Frenkel exercise being:
 - concentration of attention
 - precision
 - repetition
- The ultimate aim is to establish the control of movement so that patient is able and confident in his

ability to carry out these activities which are essential for independence in everyday life

Frenkel Exercise

- 1) The patient is positioned and suitably clothed so that he can see the limbs throughout.
- 2) A concise explanation and demonstration of exercise is given before movement if attempted, to give patient a clear mental picture of it.
- 3) The patient must give his full attention to the performance of exercise to make movement

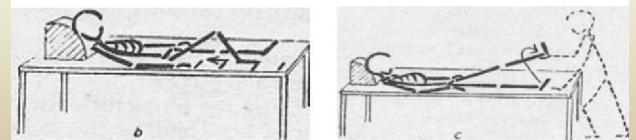
smooth and accurate.

- 4) The speed of movement is dictated by physiotherapist by means of rhythmic counting movement of her hand or the use of suitable music.
- 5) The range of movement is indicated by making the spot on which the foot and hand is to be placed.
- 6) The exercise is repeated many times until it is perfect and easy. It is then discarded and a more difficult is substituted.
- 7) All these exercises are very tiring at first, frequent rest periods must be allowed. The patient retains little of no ability to recognize fatigue, but it is

usually indicated by a deterioration in the quality of movement, or by a rise in pulse rate.

Position	Movements
Supine	<ol style="list-style-type: none"> 1. Flex and extend one leg, heel sliding down a straight line on table. 2. Abduct and adduct hip smoothly with knee bent, heel on table. 3. Abduct and adduct leg with knee and hip extended, leg sliding on table. 4. Flex and extend hip and knee with heel off table. 5. Place one heel on knee of opposite leg and slide heel smoothly down shin toward ankle and back to knee. 6. Flex and extend both legs together, heels sliding on table. 7. Flex one leg while extending other leg. 8. Flex and extend one leg while abducting and adducting other leg.
Sitting	<ol style="list-style-type: none"> 1. Place foot in therapist's hand, which will change position on each trial. 2. Raise leg and put foot on traced footprint on floor. 3. Sit steady for a few minutes. 4. Rise and sit with knees together.
Standing	<ol style="list-style-type: none"> 1. Place foot forward and backward on a straight line. 2. Walk along a winding strip. 3. Walk between two parallel lines. 4. Walk, placing each foot in a tracing on floor.

Modified from Unphred DA, *Neurological Rehabilitation*, 4th edition. St. Louis, Mosby, 2001, p 735.



THANK YOU