Summary

Normal walking is defined as a highly controlled, coordinated repetitive series of limb movements whose function is to advance the body safely from place to place with a minimum expenditure of energy. It's a complex neuro-motor act in which bone and joints are moved by a series of muscles and tendons that a reneurologically controlled.

Initiation of a desired movement begins with the cerebral cortex of the brain and evokes a motor pattern in the central nervous system that is both voluntary and a reflex.

So neuro-muscular function is a willed action with a desired, planned and expected result.

Both learning and maturation of the control nervous system contribute to the development of mature gait.

Human movement, which is a complex combination of the basic forms of motion, takes place around three cardinal planes. These are the sagittal, frontal and transverse.

The walking pattern is studies as gait cycle.

It consists of two phases.

- Stance phase which occupies about 60% of the cycle and the swing phase about 40%.

Stance phase is the peroid of time during which one or the two feet are on the ground. While the portion of cycle during which a limb is being advanced forward without ground contact is known as the swing phase.

**** Priorities of normal gait :***

Actually we have 5 priorities of normal gait there are:

- Stability of the weight bearing foot throughout stance.
- Clearance of the non-weight bearing foot during swing.
- Proper pre-positioning of the foot in terminal swing.

* Adequate step length and lastly is the energy conservation. The typical energy expended in the normal gait is 2,5 kilogram calories about 10.5 kilo. joules per minute deviation from normal gait greatly increase this energy cost for example walking with abelow knee brace 10% with 15 knee flexion contracture the is approximate increase in energy expenditure is about 25%, after abelow the knee amputation 60% and with crutches 300%.

The center of gravity is the point about which abody's weight is equally balanced in all directions. The rhythmic up ward and down ward displacement of the body is a feature of locomotion which is familiar to all. The pathway of the center of gravity in the plane of

progression is a smooth sinusoidal curve this is actually the function of the gait determinants which are:

1- Pelvic rotation.

2- Pelvic tilt in stance .

3- Knee flexion in stance .

4&5- Knee & ankle motion ,

- Lateral displacement of the hips.

**** Gait analysis :***

It has been found that gait analysis is of great value in many areas especially cerebral palsy in which assessment of loco motion is useful for pre-operative assessment, operative planning and post operative evaluation also for evaluation of prosthetic limbs including their aligment and performance.

It also beneficial in studing the progression of muscular diseases and to differentiate and classify pathological conditions.

Gait analysis includes visual observation and Bio-Mechanical analysis the later is subdivided into kinematic which is the study of motion without regard to the forces that cause it.

While kinetic analysis deals with forces, movements and mechanical energies that develop during the course of walking.

Electro-myographic analysis " E.M. G" deals with the muscular activity that develops with the course of walking.

Through studing of various muscle groups during the act of walking it was found that the peak activity was present at the begining of stance in late stance activity increases again.

During the swing phases E.M.G. records show muscular activity with the last degrees of swing.

As regard pathological gaits with the underlying pathology. The two main headings that is the neurologic patterns and the musclo-skeletal gait patterns. The first one is subdivided according to gait character, and the specific site of the lesion into:

- Ataxic gait .
- High steppage gait.
- Shuffling gait.
- Spastic gait.
- Scissors gait.
- Isolated periph, nerve lesion.

Weakness of an isolated muscle group. Resulting from lower motor neurone lesions.

*** Limping is the chief manifestation:**

- Gluteus maximus weakness.

- Gluteus medius weakness.
- Quadriceps weakness.
- Hip flexor weakness .
- Triceps surae weakness.

Secondly, musculo skeletal gait patterns are also classified into the following subgroups:

- Antalgic gait.

Antalgic means relieving pain and often used to refer to a limp. The term does not describe the limp, nor does it imply a specific mechanical component of gait.

So the antalgic gait may be the result of:

- Hysterical gait.

* Limp with diseases of the hip.
* Diseases of the knee.
* Diseases of the foot.

Oesto-arthrosis, which is a chronic degenerative disease of joints with exacerbations of acute symptoms, may be manifested with pain, stiffness, deformity or muscle weakness. So the different gait pattern espectically associated with oestoorthrosis of the hip and knee joint is also discussed in this essay.