"Child with a limp - Approach to management"

Dr Ramani Narasimhan, Senior Consultant Pediatric Orthopaedic Surgeon, Indraprastha Apollo Hospitals, New Delhi

A limp is a common reason for a child to present to the doctor. Because of the long list of potential diagnoses, some of which demand urgent treatment, an organised approach to evaluation is required. It is essential to understand the components of gait (walking pattern) and the pathophysiology of specific abnormalities.

Gait reflects the coordinated action of the lower extremities. The body moves forwards smoothly with economy of motion and energy. The stance phase (60% of the entire gait cycle) is the weight bearing portion. It is initiated by heel contact and ends with toe lift-off from the same foot. Swing phase is initiated with toe off and ends with heel strike. Limb advancement occurs during the swing phase (40% of normal gait cycle).

The gait of a child is different from that of an adult for the first three years of life. A normal toddler gait is unsteady, broad-based & inco-ordinated peppered by frequent falls. Children typically take a lot more steps per minute at a slower speed than adults to compensate for their immature balance. Toddlers tend to flex their hips, knees, and ankles more than adults in order to lower their centre of gravity and improve their balance.

A limp or deviation from the normal expected walking pattern may be due to pain, weakness, or a structural abnormality. The cause may be **direct** due to problems associated with the lower limbs and its joints; or **indirect** due to pathologies in pelvis, spine, trunk or scapula. A 'systemic' pathology like spastic cerebral palsy may lead to an abnormal gait.

Abnormal gait patterns:

- Antalgic gait (lurching away) is usually caused by pain due to any cause.
- A Trendelenburg limp (lurching towards) is from ineffective hip abductors.
- A waddling gait is seen with bilateral hip dislocations or neurologic disease.

- A stiff-legged gait is manifested by knee extension and circumduction with pelvic elevation on the affected side.
- Toe walking may be habitual or due to muscle contractures, spasticity, or simply a puncture wound on the heel. Unilateral toe walking may indicate a lower extremity length inequality.
- Stamping gait is the result of difficulties with dorsiflexion of the foot, usually associated with common peroneal nerve palsy.
- Slow, deliberate gait associated with truncal stiffness may represent lumbosacral pathology or spondylolisthesis.
- Stooped gait might indicate rounded kyphosis d/t ankylosing spondylitis.
- Generalized muscle weakness from muscular dystrophy or metabolic causes may present with varied patterns.

During history taking, ask regarding:

- Duration and progression of limp?
- Recent trauma and mechanism? Beware limitations of paediatric history and possibility of unintentional trauma
- Associated pain and its characteristics?
- Accompanying weakness?
- Time of day when limp is worse?
- Can the child walk or bear weight?
- Has the limp interfered with normal activities?
- Presence of systemic symptoms like fever, weight loss?
- Do not forget the medical history, BIND—birth history, immunisation history, nutritional history, and developmental history
- Also include the other essentials—drug history and allergies and family history

The physical examination may vary from very extensive to simplistic, depending on the presumed cause of the limp.

- The physical examination should begin with an overall assessment of the child, including his or her vital signs.
- The abdomen, pelvis, back, and extremities of the supine or sitting child should be inspected and palpated. Inspection and palpation are best accomplished when the child is sitting comfortably in the mother's lap.
- Neurovascular status, including strength, sensation, and reflexes, can also be assessed while the child is sitting or supine.

- The child should ideally be observed while barefoot and minimally clothed for assessment of stance and gait.
- Take the child into an open area to observe several gait cycles to elicit the gait abnormality and anatomic location. Running often accentuates subtle abnormalities.
- Each digit and joint should be examined for motion, ligamentous stability, and occult trauma.[9]
- Measure and compare lower extremity lengths.
- Considering the child's age is imperative when determining the cause of a limp.

Investigations for assessing limp in children

Full blood count
Differential white cell count

Erythrocyte sedimentation rate
More specific in indicating the presence of infection than C reactive protein assay but not as sensitive

C reactive protein assay
Most sensitive early test for musculoskeletal infections and is rises before ESR; abnormally high values rapidly return to normal after effective treatment

Joint aspiration
If effusion is present; Requires cell count and differential, Gram's stain, and culture and sensitivity

Blood cultures
For causative organism in septic arthritis, and osteomyelitis; it may need to be repeated at peaks of temperatures

Imaging
Plain x ray of hip is a part of initial study. Yield is low if specific findings are not noted on physical examination. X ray of the joints above and below the affected area may also be useful. A bone scan is sensitive but not highly specific; it defines areas of increased or decreased metabolic activity caused by neoplasm, infection,

or avascular disease. Ultrasound is useful for assessing for joint effusion or abscess. Computed tomography defines bone and soft tissues anatomically. Magnetic resonance imaging is most effective in evaluating neurological disorders such as disciitis and spinal tumours

Under anaesthesia
Joint arthrogram/arthroscopy is also an option

Broad causes for a limp may be Trauma, Infection, Congenital, Developmental, Tumours, 'Systemic' and others.

Common causes

1-5 years old

- Trauma
- Transient synovitis
- Osteomyelitis or septic arthritis
- Developmental dysplasia of the hip
- Juvenile rheumatoid arthritis

5-10 years old

- Trauma
- Transient synovitis
- Osteomyelitis or septic arthritis
- Legg-Calve-Perthes disease

10-15 years old

- Trauma
- Osteomyelitis or septic arthritis
- Slipped upper femoral epiphysis
- Chondromalacia
- Neoplasm

There can be systemic like CP, Arthrogryphosis, etc which can affect a child of any age.

To conclude, various pathologies are responsible for limping in children and it is impossible to enumerate all of them at present. At times, differentiating normal developmental changes from disease states presents a difficult dilemma. Establishing a diagnosis can be quite challenging and these patients often require multiple assessment. Aggressively pursuing the source of a child's limp at the first visit is essential to ensure optimal outcomes in the most patients. Appropriate and early referral to an orthopedic specialist can benefit selected patients tremendously. However, in certain instances, a conscientious physician can accurately assess and treat many of the conditions discussed in this article. Regardless, successful treatment of the child presenting with a limp demands sound clinical judgment, judicious ancillary testing, understanding of the possible differential diagnoses, and knowledge of therapeutic options.