

Child Development

5/4/2022

Dr Mikey Bryant

Introduction:

- Child development involves a range of milestones and key moments.
- There is a continuum of normal ranges.
- It is important to identify those children at risk of delays earlier than others in order to assist the family in rapidly helping those with delays.
- Many children have underlying causes which need assessment and support.
- These children need full support for their family.

Gross motor development: Head Control

- Newborn: Head lag on pulling to sit, head extension in ventral position.



- 6 – 8 weeks: Lifts head on lying prone and move from side to side.
- 3 months: Infant holds head upright when held sitting.

Primitive Reflexes:

- Moro reflex: Sudden extension of the head leads to symmetrical extension of the limbs followed by flexion.
- Grasp reflex: fingers/toes grasp on an object or finger on the palms and soles.
- Rooting reflex: head turns towards tactile stimulus placed near the mouth.
- Stepping reflex: Infant held vertically: Then steps on a surface if foot is placed on it, followed by an upstep by the other foot.
- Asymmetrical neck reflex: lying supine, if head turned, a “fencing posture” is adopted with the arm on the head is turned to outstretched.
- These reflexes disappear by 4 – 6 months in normal development.

Moro Reflex:



Asymmetrical Neck Reflex:



Stepping Reflex:

Stepping Reflex



Sitting:

- By age 6 – 8 months an infant can sit without support.
- Any child unable to do this at 9 months is likely to have some kind of developmental delay.
- In order to sit, the child must have the 2 reflexes:
 1. Propping or parachute reflex in response to falling.
 2. Righting reflex to position head and body back to the vertical on tilting.

Locomotor Skills:

- Initial mobility is crawling, but some bottom-shuffle and others commando crawl/creep.
- Bottom-shufflers generally walk a little later – so some may not crawl.
- By 10 months, most infants are usually cruising around the edge of furniture.
- By 12 months, 50% infants are walking independently but the age range of this is very broad.
- **Any child not walking by 18 months needs further evaluation.**

Fine Motor Development:

- Beware that fine motor skills are assessed alongside visual skills as the two are interdependent.
- Early visual alertness:
 1. Newborn: Fix and follow a near face or light moving across the field of view.
 2. 6 weeks: More alert and turns head through 90 degrees to follow and object.
 3. By 3 -4 months: Baby watches hands a lot (hand regard) – starts to play with hands more.

Early Fine Motor Skills:

- As primitive grasp reflexes disappear the infants begin to reach for objects:
- 6 months: Grip with whole palm (palmar grasp). Objects held with both hands and banged together, being transferred between hands.
- 10 months: Thumb and finger develop a pincer grip.
- 12 months: Index finger points to objects.



Preschool motor skills:

- 18 months: Can scribble with a pencil.
- 2 years: Builds 6 brick tower.
- 2 ½ years: Copies circle and build 8 brick tower.
- 3 years: Circle.
- 4 Years: Cross.
- 5 years: Square and triangle.

Fine motor developmental milestones

Age	Milestone
4 months	Bidextrous reach
6 months	Unidextrous reach; transfer object
9 months	Immature pincer grasp; probes with forefinger
12 months	Pincer grasp mature
15 months	Imitates scribbling; tower of 2 blocks
18 months	Scribbles; tower of 3 blocks
2 years	Tower of 6 blocks; vertical and circular stroke
3 years	Tower of 9 blocks; copies circle
4 years	Copies cross; bridge with blocks
5 years	Copies triangle



Fine motor delays:

- Delays often very similar in cause to gross motor delays.
- Next session will involve more detailed assessment of the reason for delays.
- Ensure that vision is assessed as for all children and that this may be a cause for visual loss.

Speech and Language

- This should be assessed with hearing and causes of hearing loss also considered as hearing loss can lead to speech delays.
- Early signs of normal hearing and vocals:
 - Newborn: quietens to voices and startles if loud.
 - 6 weeks: responds to mother's voice.
 - 12 weeks: Vocalize alone or when spoken to, also coos and laughs.

Early language development:

- 6 months: Consonant monosyllables e.g. Ba or Da.
- 8 months: 2 syllable babble: mama or dada.
- 13 months: Starts to understand single words e.g. no.
- 18 months: Vocabulary of 10 words, demonstrates 6 parts of the body.

Phrases and conversation development:

- Sentence development usually in the 2nd year of life.
- 24 months: combines 2 words, then 3 words by age 2 years e.g. give me toy.
- 36 months: Knows name, colours and age.

language milestones

Age	Milestone
1 months	Alerts to sound
3 months	Coos
4 months	Laugh loud
6 months	Monosyllables
9 months	Bisyllables
12 months	1-2 words with meaning
18 months	8-10 words vocabulary
2 years	2-3 words sentence, use pronouns "I", "me", "you"
3 years	Ask questions; knows full name and gender
4 years	Says song or poem; tells stories
5 years	Asks meaning of words



Social and behavioural development:

- Early stages:
- 6 weeks: Smiling and a little responsiveness.
- 10 months: Separation anxiety when removed from parent and increased stranger wariness.
- 10 – 12 months: Waves goodbye.

Self-help skills development:

- 8 months: Feed self using fingers.
- 12 months: Drink from a cup.
- 18 months: Feeds self using a spoon.
- 2 years: Removes clothes and begins dressing self.

Further developments:

- Bladder and bowel training is very variable.
- Some children are potty trained by 2 years, others take much longer to develop this behaviour.
- 10% 5 year olds still wet the bed at night.

Social and adaptive milestones

Age	Milestones
2 months	Social smile
3 months	Recognizes mother; anticipates feeds
6 months	Recognizes strange/ stranger anxiety
9 months	Waves 'bye-bye'
12 months	Comes when called; plays simple ball game
15 months	Jargon
18 months	Copies parents in task
2 years	Asks for food, drink, toilet; pulls people to show toys
3 years	Shares toys; knows full name and gender
4 years	Plays cooperatively in a group; goes to toilet alone
5 years	Helps in household tasks; dresses and undresses



Symbolic play and cognitive function:

- 24 months: Copy actions and activities seen around.
- 2nd year: Learn to play alongside others or alone.
- 3 years onwards: Interactive play with taking turns and following rules.

- Cognitive function: Pre-school: thought processes are pre-operational (child at centre of world).
- Junior age: Operational, processes more orderly and practical.
- Teenage years: formal operational thought developed including reasoning and abstract thought.

Developmental delays:

- Important to establish the nature of the delay.
- Global vs localised.

- Establishing the cause has a big impact on next steps, advice and management.

Delayed walking:

- Remember the milestones!
- Children not walking by 18 months should be given contact with a physiotherapist and assessed further.
- Also consider this if not crawling at the appropriate age.
- Causes as below:

Cerebral Palsy:

- Chronic disorder of movement/posture presenting before 2 years and continuous throughout life.
 - Usually a static injury to the developing brain.
 - Risk of impaired vision, hearing, speech, learning and epilepsy.
 - Some children may present with spasticity or ataxia.
-
- CP is a descriptive term, not the cause. Need to establish the cause, is there a history of prematurity, infections as a neonate, cerebral malaria etc?

CP: History taking:

- Is there anything different about your baby?
- How are they moving?
- Were they born on time, late or early?
- How were they born?
- Any problems since birth – neonatal sepsis, malaria?
- Any new medications stopped or started?
- Speech or sounds?

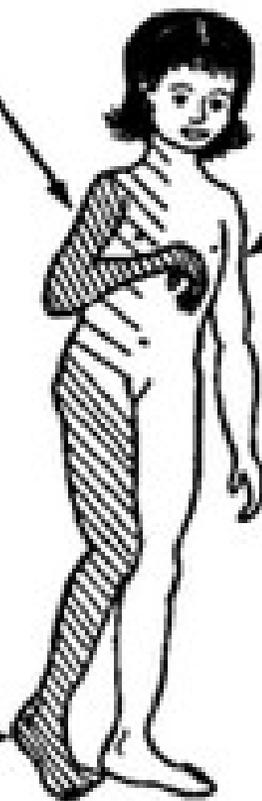
Spastic CP:

- Commonest.
- Many subtypes: Hemiplegic, Diplegic or quadriplegic.
- Increased resistance to passive stretch.
- Disruption to the spinal reflex arc as a result of upper motor neuron damage is the hallmark.

- Features include: Clasp-knife phenomenon (catch on stretching tendons), ankle plantar flexion, foot deformity, hip often flexed and internally rotated.
- Wrist and elbow flexed, shoulder adducted.

**ARM AND LEG
ON ONE SIDE
(HEMIPLEGIC)**

arm bent;
hand
spastic
or floppy,
often of
little use



this side
completely
or almost
normal

She walks
on tiptoe
or outside
of foot on
affected
side.

**BOTH LEGS ONLY
(PARAPLEGIC)
or with slight
involvement elsewhere
(DIPLEGIC)**

upper body
usually
normal or
with very
minor signs



Child may
develop
contractures
of ankles
and feet.

**BOTH ARMS AND
BOTH LEGS
(QUADRIPLEGIC)**

When he walks, his
arms, head, and
even his mouth may
twist strangely.

Children with all
4 limbs affected
often have such
severe brain damage
that they never
are able to walk.

The knees press
together.

legs and feet
turned inward



Choreoathetosis:

- 4-limb disorder with increased tone while awake and less so whilst asleep.
- Patients do not have stretch related response or increased reflexes.
- May get extensive overlap with spastic CP.
- As the child matures, there will be fixed reduction in the range of joint movement with signs difficult to distinguish from spastic cerebral palsy.
- Almost always bulbar problems with swallowing difficulty.

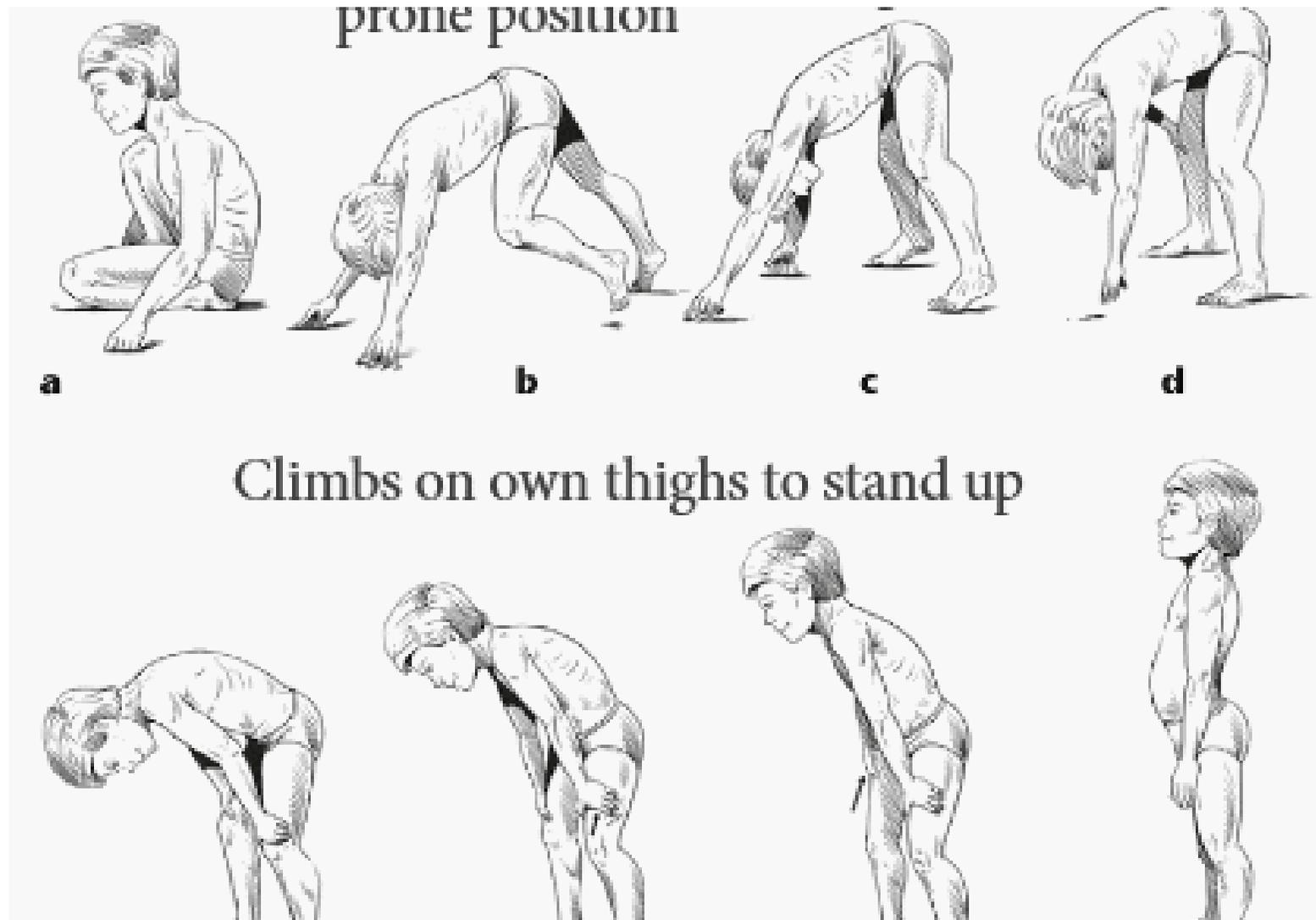
Management:

- Good history essential to the diagnosis.
- Ideally a brain MRI can indicate a cause.
- Patients need complex MDT input.
- Need physiotherapy with occupational therapy to continue to support the treatment.
- Wheelchairs and other walking aids generally very helpful.

Muscular Dystrophy:

- Duchenne: Usually presents within the first 4 years of life, delayed motor milestones and mild speech delay.
- X-linked recessive.
- Examination: Waddling lordotic gait with calf hypertrophy and weakness in the limb girdles (Gower's sign).
- Sparing of facial, extra-ocular and bulbar muscles.
- Can be diagnosed by a raised creatinine kinase.
- Management generally supportive and prognosis is poor.

Gower's sign:



Delayed Speech:

- Familial: Family history of language delay where parents are late in developing language.
 - Hearing impairment: Chronic otitis media (glue ear) v common.
 - Environmental: No one talking to the child, deprived surroundings.
 - Neuropsychological: global delays including autistic spectrum disorder.
-
- Always check hearing and ears!

Global Developmental Delay:

- This indicates a delay to all areas of a child's development, including speech, motor and other areas.
- Multiple causes, many of which are hard to treat.
- Common prenatal:
 1. Teratogens e.g. alcohol/other substances.
 2. Congenital infections such as rubella, CMV or toxoplasmosis.
 3. Hypothyroidism.

Perinatal insult:

- Complications as a result of extreme prematurity e.g. intraventricular haemorrhage, periventricular leucomalacia.
- Birth asphyxia.
- Metabolic disorder e.g. hypoglycaemia or hyperbilirubinaemia.
- Sepsis.

Post-natal problems:

- Brain injury: Trauma, anoxia as a result of suffocation or drowning.
- CNS infection e.g. encephalitis or meningitis.
- Hypoglycaemic episodes untreated.

Genetic disorders and congenital brain disorders:

- To be covered more in the next session!
- But may include microcephaly, hydrocephaly and metabolic syndromes.
- Also genetic disorders such as Down's syndrome.