Case details

- Name: Kadija-Tul-Kubra
- Age: 13 years 6 months
- Sex: Female
- Address: Padarayanapura
- DOB: 22-03-2009
- Informant: Mother
- Reliability:good

Chief complaints

- Delayed developmental milestones noticed since 6 months of age

History of presenting illness

- Mother noticed delayed developmental milestones noticed since 6 months of age however the child was not well even even prior to that. Since there is developmental delay and on direct questioning there is an obvious post natal insult hence I would like to analyse history from antenatal history.

1st trimester:

- Pregnancy confirmed by UPT at 3 weeks after missed periods.
- Single dose of Td taken
- Folic acid tablets taken.
- No h/o radiation exposure
- No h/o fever with rashes
- No h/o alcohol consumption during pregnancy
- No h/s/o active/passive smoking during pregnancy
- No h/o maternal hypothyroidism.
- Dating scan done at 10 weeks.

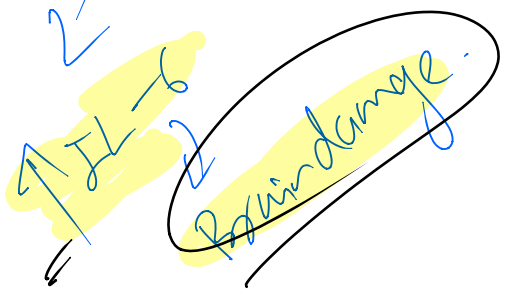
BIRTH HISTORY

2nd trimester:

- Quickening felt at 20 weeks.
- Iron and folic acid tablets taken.
- Anomaly scan done at 20 weeks - normal.
- OGCT done - normal
- Second dose of Td taken
- No h/o headache, blurring of vision, pedal edema
- No h/o leak pv or bleeding pv.

3rd trimester:

- Continued to perceive fetal movements well.
- No h/o headache , blurring of vision, pedal edema
- No h/o leak pv/bleeding pv
- No h/o fever /UTI
- Growth scan taken at 33 weeks - normal.



NATAL HISTORY

- Full term LSCS i/v/o **Non progression of labour** at Vani Vilas hospital.
- Birth weight – 2.65 kg .
- Baby did not cry immediately after birth.
- Resuscitation done , details not completely known to mother.

Birth History

- Married life = 6 years
- Mother's age at time of pregnancy = 25 years
- Father's age at that time = 29 years
- Second child
- Non consanguineous marriage child
- Pre conceptional folic acid not taken
- Registered case , number of ante natal visits : 6
- Weight gain during pregnancy = 9 kgs

POSTNATAL

- Baby was intubated in labour room and shifted to NICU immediately after birth, connected to ventilator i/v/o breathing difficulty(?no spontaneous efforts).
- On day 2 of life had multiple convulsions.
- Expressed breastmilk started on day 5 of life.
- Direct breastfeeding started on day 18 of life.
- Kept in NICU for 23 days

- Baby discharged from NICU on day 23 of life and was advised to continue anticonvulsant and follow up regularly.
- Stopped anticonvulsants by 3 Months without followup.
- At 6 months of age mother noticed that baby had no neck control attained compared to older sibling for which she visited local clinic and was advised to restart anti convulsants .

- Mother also felt that all 4 limbs were stiff while giving bath and changing clothes
- By 8 months of age child had attained neck holding and was able to talk monosyllables by 1year of age.
- At 3 years, child was able to sit without support.
- At 4 years, child started walking with support.
- Child was put in special school and physiotherapy continued

- Child has one more episode of generalised tonic clonic convulsions around 7 years of age lasting for five mins after which child was seizure free till now and anticonvulsants stopped 3 years back (2017)after advice by a neurologist.
- At 8 years she started walking independently and was also able to tell 2-3 word sentences clearly and responds to commands given by mother
- She has not attained bladder and bowel control yet.
- She is able to eat by herself since age of 8 years but takes time

Cerebral palsy refers to permanent, nonprogressive and occasionally evolving disorders of tone, movement or posture, caused by an insult to the developing brain. It is the most common chronic motor disability in childhood, affecting 2–3 infants per 1000 live births. While perinatal asphyxia was considered the most common cause, it accounts for less than 10% of cases. Various causes are listed in Table 19.4.

- No h/o regression of attained milestones.
- No h/o emotional disturbances/aggressive behaviour
- No history of impaired awareness
- No h/o early hand preference
- No h/o loss of difficulty in following basic commands and doing daily activities at home

- Child does not have any difficulty in recognising the smell of commonly used things at home.
- Child does not have any difficulty in seeing near and distant objects.
- Mother also noted a deviation of eyes while fixating but child was able to follow moving objects.
- Child does not have any difficulty in chewing.
- No h/o deviation of angle of mouth, drooling of saliva
- The child is able to understand when spoken to and doesn't have any ringing sensation in ears or vertigo.
- No h/o nasal regurgitation and nasal twang of voice, child was able to swallow the food given without any difficulty and was continued breastfeeding till 2 years of life.

- No h/o difficulty in neck movements.
- No h/o deviation of tongue

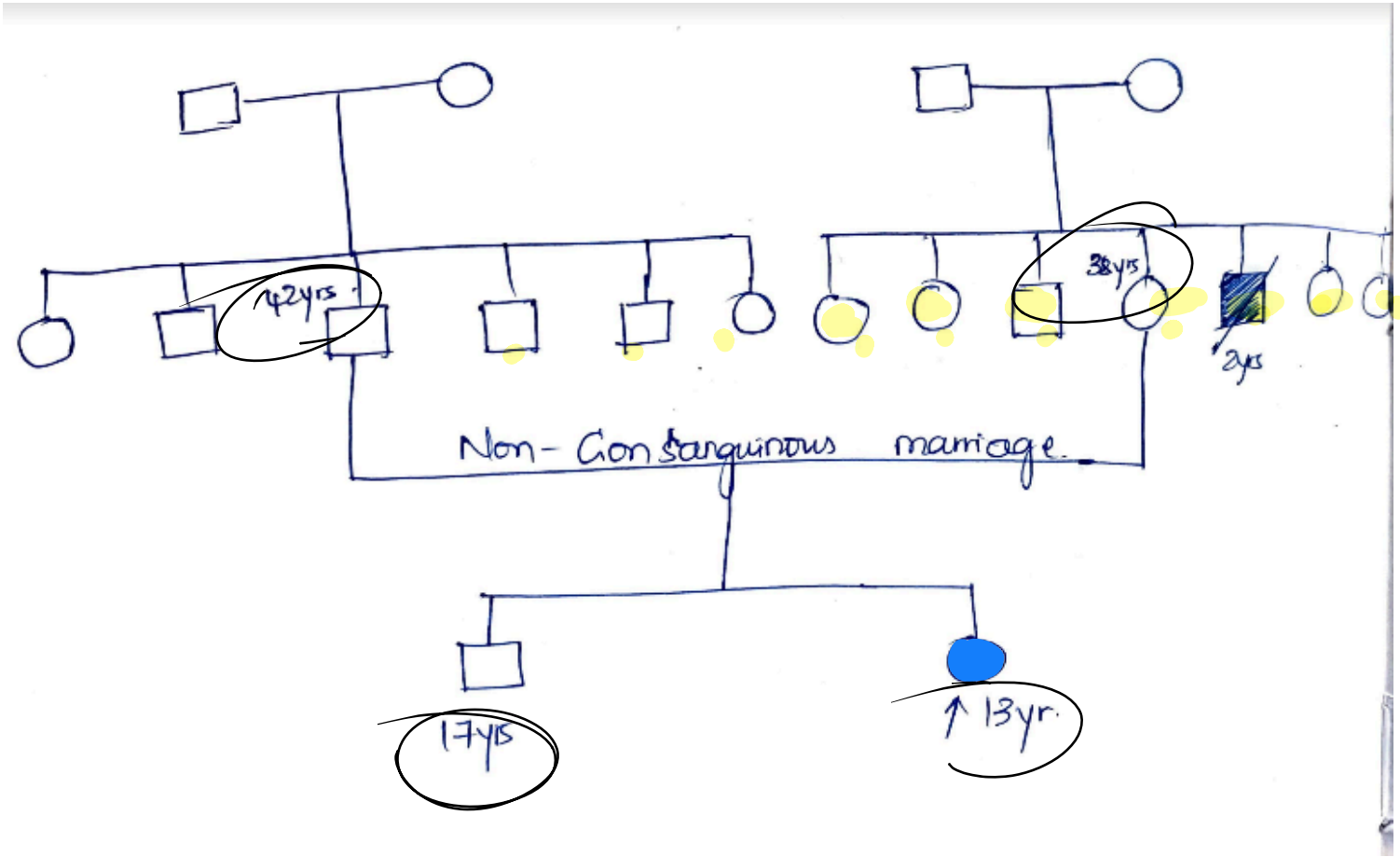
- Child is able to perceive touch
- Able to appreciate pain
- Able to appreciate hot and cold temperature.
- Child is able to lift hands above head and able to mix food but with difficulty.
- Able to get up sitting position with support and is able to hold on to slippers while walking.
- No h/o involuntary movements.

- No h/o constipation
- No h/o recurrent respiratory tract infection.
- Initially child was bedridden till 2 years now Child is able to do certain activities with mothers help

Past history

Fracture of elbow at 7 years of age when she fell from bed for which she was treated conservatively.

FAMILY HISTORY



Immunisation history

- BCG at birth given
- OPV 0 1 2 3 b1 b2 given
- DPT 1 2 3 b1 b2 given
- Hepatitis B 1 2 3 given
- Measles 1 2 given,
- Td given

Complete as per National immunisation schedule.

Developmental history

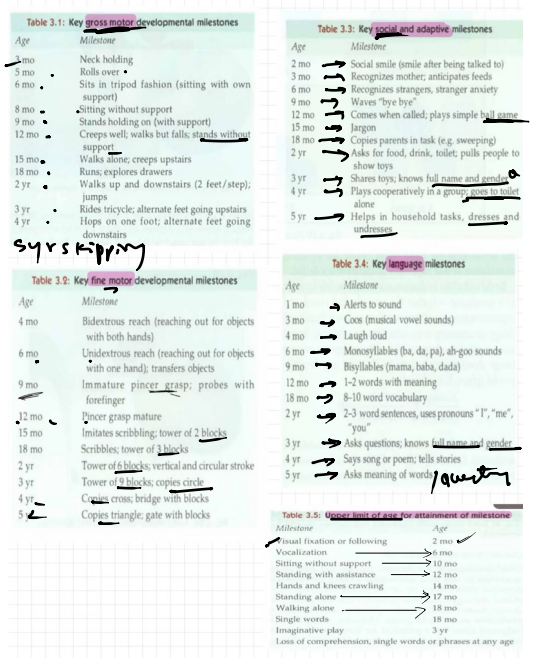


Table 3.1: Key gross motor developmental milestones

Age	Milestone
2 mo	Neck holding
5 mo	Rolls over
6 mo	Sits in tripod fashion (sitting with own support)
8 mo	Sitting without support
9 mo	Stands holding on (with support)
12 mo	Creeps well; walks but falls; stands without support
15 mo	Walks alone; creeps upstairs
18 mo	Runs; explores drawers
2 yr	Walks up and downstairs (2 feet/step); jumps
3 yr	Rides tricycle; alternate feet going upstairs
4 yr	Hops on one foot; alternate feet going downstairs

Table 3.2: Key fine motor developmental milestones

Age	Milestone
4 mo	Bidextrous reach (reaching out for objects with both hands)
6 mo	Unidextrous reach (reaching out for objects with one hand); transfers objects
9 mo	Immature pincer grasp; probes with forefinger
12 mo	Pincer grasp mature
15 mo	Imitates scribbling; tower of 2 blocks
18 mo	Scribbles; tower of 3 blocks
2 yr	Tower of 6 blocks; vertical and circular stroke
3 yr	Tower of 9 blocks; copies circle
4 yr	Copies cross; bridge with blocks
5 yr	Copies triangle; gate with blocks

Table 3.3: Key social and adaptive milestones

Age	Milestone
2 mo	Social smile (smile after being talked to)
3 mo	Recognizes mother; anticipates feeds
6 mo	Recognizes strangers, stranger anxiety
9 mo	Waves "bye bye"
12 mo	Comes when called; plays simple ball game
15 mo	Jargon
18 mo	Copies parents in task (e.g. sweeping)
2 yr	Asks for food, drink, toilet; pulls people to show toys
3 yr	Shares toys; knows full name and gender
4 yr	Plays cooperatively in a group; goes to toilet alone
5 yr	Helps in household tasks, dresses and undresses

Table 3.4: Key language milestones

Age	Milestone
1 mo	Alerts to sound
3 mo	Coos (musical vowel sounds)
4 mo	Laugh loud
6 mo	Monosyllables (ba, da, pa), ah-goo sounds
9 mo	Bisyllables (mama, baba, dada)
12 mo	1-2 words with meaning
18 mo	8-10 word vocabulary
2 yr	2-3 word sentences, uses pronouns "I", "me", "you"
3 yr	Asks questions; knows full name and gender
4 yr	Says song or poem; tells stories
5 yr	Asks meaning of words

Table 3.5: Upper limit of age for attainment of milestone

Milestone	Age
Visual fixation or following	2 mo
Vocalization	6 mo
Sitting without support	10 mo
Standing with assistance	12 mo
Hands and knees crawling	14 mo
Standing alone	17 mo
Walking alone	18 mo
Single words	18 mo
Imaginative play	3 yr
Loss of comprehension, single words or phrases at any age	

Gross motor:

- Head control – 8 months
- Rolling over -9 Months.
- Sit with support- 3 years.
- Walking with support- 4 years.
- Walks up/ down stair(2 feet per step)-5 years

DQ-15%

- **Fine motor**:
- Scribbles- 3years
- DQ-12%

Contd…

- **Language**:
- Cooing-7 months
- Monosyllables- 1year
- Bisyllables- 2 years
- 2 word sentences- 7 years

- DQ-16%

Contd…

- **Social**:
- Waves bye bye - 2.5 years
- Asks for food and drink – 3 year
- Knows her name-9 years
- Bowel and bladder control – not attained
- DQ-24%

Global developmental delay

Item	Quantity	Calories	Proteins
MORNING			
Tea	1 cup (50ml)	30	0.5
Biscuits	2	20	0.5
Chapati	3	210	6
Vegetable curry	2 servings	200	3
Afternoon			
Rice	2 cups	350	6
Chicken curry	2 servings	110	16
Evening			
Tea	1 cup	30	0.5
Night			
Rice	2 cups	350	6
Dal	2 servings	175	10
Total		1475	48.5

Diet history

	Observed	Expected	Deficit
CALORIES	1475	2100 (kcal)	625
PROTEINS	48.5	46 (grams)	No deficit

Socioeconomic history

	Education	Occupation	Income
Father	-	-	-
Mother	2nd PUC	Garments	10,000/m

- Total family members: 3
- Percapita income: Rs 3340/ month
- Belongs to upper lower class as per modified kuppuswamy classification.

Summary

- A 13year old female child second born to a non consanguinously married couple has a global developmental delay that is static probably due to a post natal insult of perinatal asphyxia (HIE stage 2) with history of epilepsy and is completely immunised as per NIS and belongs to upper lower socio economic status

Table 6.1: Daily nutrient requirements and recommended dietary allowances for Indian children

Age	*Energy, kcal*	*Protein, g*	*Visible fat, g*	*Calcium, mg*	*Iron, mg*	*Zinc, mg*	*Magnesium, mg*
<6 mo	92 kcal/kg	1.16 g/kg	–	500	46 µg/kg	–	30
6–12 mo	80 kcal/kg	1.69 g/kg	19	500	05	–	45
1–3 yr	1060	16.7	27	600	09	5	50
4–6 yr	1350	20.1	25	600	13	7	70
7–9 yr	1690	29.5	30	600	16	8	100
Boys, 10–12 yr	2190	39.9	35	800	21	9	120
Girls, 10–12 yr	2010	40.4	35	800	27	9	160
Boys, 13–15 yr	2750	54.3	45	800	32	11	165
Girls, 13–15 yr	2330	51.9	40	800	27	11	210
Boys, 16–17 yr	3020	61.5	50	800	28	12	195
Girls, 16–17 yr	2440	55.5	35	800	26	12	235

Age	*Vitamin A, µg*		*Vitamin*	*Vitamin*	*Vitamin*	*Vitamin*	*Folate*	*Vitamin*	*Vitamin*
	Retinol	*β-carotene*	*B1, mg*	*B2, mg*	*B3, mg*	*B6, mg*	*µg*	*B12, µg*	*C, mg*
<6 mo	350	–	0.2	0.3	710 µg/kg	0.1	25	0.2	25
6–12 mo	350	2800	0.3	0.4	650 µg/kg	0.4	25	0.2	25
1–3 yr	400	3200	0.5	0.6	8	0.9	80	0.2–1.0	40
4–6 yr	400	3200	0.7	0.8	11	0.9	100	0.2–1.0	40
7–9 yr	600	4800	0.8	1.0	13	1.6	120	0.2–1.0	40
Boys, 10– 12 yr	600	4800	1.1	1.3	15	1.6	140	0.2–1.0	40
Girls, 10–12 yr	600	4800	1.0	1.2	13	1.6	140	0.2–1.0	40
Boys, 13–15 yr	600	4800	1.4	1.6	16	2.0	150	0.2–1.0	40
Girls, 13–15 yr	600	4800	1.2	1.4	14	2.0	150	0.2–1.0	40
Boys, 16–17 yr	600	4800	1.5	1.8	17	2.0	200	0.2–1.0	40
Girls, 16–17 yr	600	4800	1.0	1.2	14	2.0	200	0.2–1.0	40

Based on the 2010 recommendations of Indian Council of Medical Research

General physical examination

- 13 year old female child conscious and alert examined while sitting comfortably on the bed.

Vitals:

- PR:84/min,regular in rhythm,normal volume and character,no radio radial or radio femoral delay.All peripheral pulses felt
- RR:26/min.thoracoabdominal type of respiration
- BP:108/72 mm hg in the right upper limb in supine position
- Temp: 98.6^0 F
- SpO2 – 98 % room air

Vital Signs

The vital signs are controlled by the centres in the CNS and depend on feedback received through the peripheral nervous system. Hence any lesion in the nervous system can affect the vital signs.

- Pulse—feel for all peripheral pulses. They may be absent in thromboembolism (stroke). Bradycardia is seen in children with increased intracranial tension (Cushing's triad—bradycardia, hypertension and altered respiration). Irregular pulse is seen due to reflex dysautonomia in spinal transection above T_6.
- Respiratory rate—central hyperventilation.
- Blood pressure—elevated in children with increased intracranial tension. Hypertension is associated with cerebral haemorrhage, subarachnoid haemorrhage and thrombosis.
- Temperature—increased in CNS infections. Hyperpyrexia occurs in pontine haemorrhage.

Contd…

- No pallor
- No icterus
- No cyanosis
- No clubbing
- No lymphadenopathy
- No edema

Anthropometry

	observed	expected	remarks
Weight	24 kgs	50-65 kg	40%
Height	137 cms	155-165 cms	Less 3rd percentile
HC	47 cms	54 cms	Microcephaly+
BMI	12.8 kg/ m^2		underweight

Height age = 10 years
Weight age = 8 years

Head to Toe examination

- Head: microcephaly +
- Hair: normal.
- Face: no dysmorphism
- Eyes: Normal, no cataract, no cherry red spot, no chorioretinitis, no corneal clouding
- Mouth: tooth caries +,crowding of teeth +
- Ears: normal, no low set ears.
- Nose: normal.
- Neck: normal

TABLE 11.4 Dysmorphic Facies and Associated Nervous System Disorders

Condition	Dysmorphic Features	Nervous System Features
Hypothyroidism	Coarse facies	Mental retardation
Down's syndrome	Mongoloid facies	Low IQ
Moebius syndrome	Mask-like facies	Bilateral VI and VII nerve palsy
Prader–Willi syndrome	Almond-shaped palpebral fissures, fish-like mouth	Mental retardation
Wallenberg syndrome	Telecanthus	Sensorineural deafness
William's syndrome	Elfin facies	Mental retardation
Coffin–Lowry syndrome	Coarse facies	Severe mental retardation
Sotos syndrome	Coarse looking facies with large dolichocephalic head	Mental retardation
Fragile X syndrome	Long facies	Autistic or aggressive behaviour

TABLE 11.6 Body Odour Associated with Neurological Disorders

Condition	Body Odour	Associated Neurological Disorders
Phenylketonuria	Musty odour	Progressive mental retardation
Maple syrup urine disease	Maple syrup	Seizures, mental subnormality, coma
Uraemia	Ammoniacal	Encephalopathy
Hepatic failure	Musty	Encephalopathy

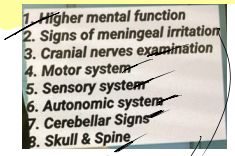
TABLE 11.5 Neurocutaneous Markers

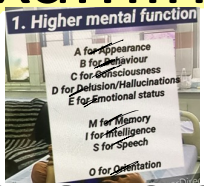
Neurocutaneous Markers	Neurocutaneous Syndromes
Café au lait spots, axillary freckles	Neurofibromatosis
Telangiectasia	Ataxia telangiectasia
Adenoma sebaceum, shagreen patch, ash-leaf macules	Tuberous sclerosis
Haemangioma	Sturge–Weber syndrome
Tuft of hair	Spina bifida
Nevus	Linear nevus syndrome

Contd…

- Extremities: dynamic contracture at the right wrist seen, no other abnormalities seen
- Chest: normal.
- Spine: normal.
- Abdomen: normal.
- Genitalia: normal
- SMR : stage 2
- Skin: normal No Neurocutaneous markers like cafe au lait spots, hypopigmented macules.

Systemic examination





Central nervous system

TABLE 3.5 Altered Levels of Consciousness

Level	Features	Identifying Features
Delirium	Clouding of consciousness with attention deficit	Confusion, disorientation, irrationality and excitability
Lethargy	Drowsiness and disinterest in the environment	Responds to verbal calls but has difficulty in maintaining an aroused state
Obtundation	Increase in lethargy	Mentally dulled or blunted, responds only to repeated verbal and painful stimuli
Stupor	State of unconsciousness from which the child can be momentarily aroused	Responds only to deep painful stimuli (such as pressure over the sternum)
Coma	Prolonged and profound unconsciousness	Not responding even to deep painful stimuli

Modified Glasgow Coma Scale

Rapid neurological assessment in children is done by using the Modified Glasgow Coma Scale. The Glasgow Coma Scale was modified in relation to age, as adults and children respond differently to various stimuli.

Score	Infants	Children
Eye opening		
4	Spontaneously	Spontaneously
3	To verbal command	To speech/verbal stimuli
2	To pain only	To pain only
1	No response	No response
Motor response		
6	Spontaneous and purposeful movements	Obeys commands
5	Withdraws to touch	Localises painful stimulus
4	Withdraws in response to painful stimulus	Withdraws in response to painful stimulus
3	Abnormal flexion response to pain (decorticate posturing)	Abnormal flexion response to pain (decorticate posturing)
2	Abnormal extension response to pain (decerebrate position)	Abnormal extension response to pain (decerebrate position)
1	No movements after painful stimulus	No movements after painful stimulus
Verbal response		
5	Coos and babbles, smiles, and recognises familiar objects and persons	Oriented and converses appropriately
4	Uncertain recognition of objects or persons and irritable or	Disoriented and confused
3	Cries in response to pain	Replies inadequately and speaks incoherently using inappropriate words
2	Moans in response to pain	Makes only incomprehensible sounds
1	No response	No response

- HIGHER MENTAL FUNCTIONS
- Consciousness : patient is conscious and aware to time place and person.
- Appearance : patient is well groomed, appropriately dressed , sitting comfortably in chair.
- Behavior : patient is maintaining eye contact and is cooperative for examination

- Orientation in time—is the child able to tell the day, month, year without looking at a calendar? Is the child able to estimate the approximate time without looking at a watch?
- Orientation in place—is the child aware of the surroundings he/she is presently in? Is the child aware of the place he/she comes from?
- Orientation in person—can the child identify the persons around him/her?
- Orientation to self—can the child tell his/her name and age?

- HIGHER MENTAL FUNCTIONS
- Communication :
- Auditory and semantic comprehension is preserved. Speech is fluent , with poor articulation of words (spastic type of dysarthria). Naming, repetition, reading, writing could not be assessed.
- There is no delusions or hallucination.
- Emotion and mood is appropriate.
- Insight couldn't be assessed.

TABLE 11.8 Types of Speech

Types of Speech	Clinical Examination/Description
Scanning	Separation of syllables of words (e.g., Hip po pota mus)
Slurred	Words not clear
Staccato	Scanning and explosion. No coordination of lip and tongue
Stuttering	The child faces difficulty in uttering the first phoneme or sound at the beginning of a conversation
Stammering	Repetition of phonemes at the beginning or during the course of speech that interferes with normal flow and rhythm
Nasal twang	Occurs in X cranial nerve palsy, cleft palate

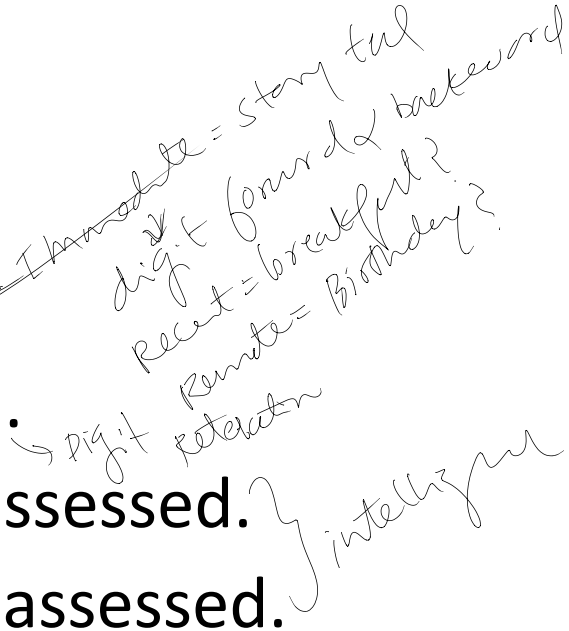
- Aphasia—inability to use language in speaking, writing or comprehending. Complete or partial disturbance of language comprehension, formulation and expression results in lack of speech or inability to speak sensibly and fluently. There is disturbance in speaking, writing or comprehending. Partial lack of speech is known as dysphasia. Speech is affected when dominant hemisphere is affected. In infantile hemiplegia other hemisphere takes over, hence speech may not be affected. Types of aphasia are given in Table 11.10.
- Dysarthria—articulation defects that result in problems in pronunciation of words. The main types of dysarthria are given in Table 11.11. Different presentations of dysarthria are given in Table 11.12.

TABLE 11.11 Types of Dysarthria Based on the Site of Lesion

Dysarthria	Clinical Presentation
Cerebellar dysarthria	The child speaks slowly and deliberately.
Spastic dysarthria	Individual syllables are slurred. It is seen in children with cerebral palsy. This is associated with pseudobulbar palsy and brisk jaw jerk.
Bulbar dysarthria in bulbar palsy	There is non-specific slurring of speech. Pronunciation of consonants is difficult.
Cortical dysarthria	There is irregular hesitancy in word production. This is seen in lesions of left frontal and temporal lesions.
Pseudobulbar palsy	Speech is strangled and spastic. British constitution may be pronounced as 'Britzn constishushion'

- Happy, playful, alert and interested in the surroundings (normal healthy child)
- Anxious (anxiety neurosis)
- Elation—a feeling of well-being or excitement (in bipolar mania)
- Euphoria—an exaggerated feeling of well-being often not justified by circumstances
- Depression (depressive psychiatric disorders)
- Restless (hyperactive child and child with pain)
- Dull, not interested in surroundings, apathetic or irritable (in kwashiorkor)
- Shy and timid or obstinate (seen in overprotected child)

- HIGHER MENTAL FUNCTIONS
- Memory couldn't be assessed.
- Attention couldn't be assessed.
- Abstract thinking couldn't be assessed.
- Spatial perception couldn't be assessed.
- Calculations couldn't be assessed.
- Frontal lobe executive functions couldn't be assessed.
- Parietal lobe function couldn't be assessed.



- HIGHER MENTAL FUNCTIONS
- Temporal lobe functions couldn’t be assessed.
- Occipital lobe functions couldn’t be assessed.
- Frontal Release reflexes are not seen.

NERVE	TEST	RIGHT	LEFT
OLFACTORY	SMELL	Could not be tested	Could not be tested
OPTIC	TURNS TO LIGHT	follows and fixates	follows and fixates.
	COLOR VISION	COULD NOT BE TESTED	COULD NOT BE TESTED
	Field of vision	Could not be tested	Could not be tested.
	PUPILS	EQUAL AND REACTIVE TO LIGHT	EQUAL AND REACTIVE TO LIGHT
	FUNDUS	Normal retinal vessels with normal optic disc with well defined margins and no evidence of hemorrhage, exudates or any CR spot	Normal retinal vessels with normal optic disc with well defined margins and no evidence of hemorrhage, exudates or any CR spot

Newborn. The baby turns the face towards the smell of breast milk. It is uncomfortable if an offending smell is present.

TABLE 11.14 Visual Acuity

Age	Test
<4 years	Ability to follow objects
>4 years	E chart, picture or block-matching
Older children	Snellen chart—for distant vision Jaeger's chart—for near vision

1. Gross vision—test the ability of the child to
   (a) recognise the parents (smile at parents),
   (b) recognise strangers (stranger anxiety),
   (c) recognise and reach out for familiar objects and
   (d) Follow objects.

(b) Menace reflex—it is used to test vision in children who are very small, uncooperative (e.g., aphasic patients) or totally bedridden. The finger of the examiner is suddenly brought towards the patient's eye. It is ensured that there is no air current created as a result of this movement. An air current causing closure of the eyes may give false-positive results. If the patient's vision is normal, moving a finger close to the eye will result in blinking of the eye. Hence, presence of menace reflex denotes normal vision grossly. Any condition with loss of vision will lead to absence of this reflex. Absence of menace reflex in the presence of normal pupillary reflex implies a lesion in the visual pathway after the pupillary reflex fibres cross the superior colliculus.

(c) Accommodation reflex—it refers to contraction of pupils and convergence of eyeballs that occurs when a person suddenly focuses on a nearby object after having

OCULOMOTOR TROCHLEAR ABDUCENS	Alignment of eyes Conjugate eye movements Saccadic movementrs Nystagmus Pupil size and reaction Accomodation reflex	Normal Could. not be assessed Absent Normal, equal and reactive to light Present	Normal Could not be assessed Absent Normal, equal and reactive to light. Present

Light-near dissociation is seen in Argyll Robertson pupil and Adie's tonic pupil.

- *Argyll Robertson pupil:* It occurs due to lesion in pretectal area. The pupils do not respond to light but respond to accommodation.
- *Adie's pupil:* It is seen after damage to parasympathetic ciliary ganglion. It reacts poorly to light but better to accommodation. It is initially larger than the normal pupil, but becomes tonically constricted and redilates very slowly when exposed to dark.

NERVE	TEST	RIGHT	LEFT
TRIGEMINAL	Inspection	No wasting, fasciculations, deviation of jaw	No wasting, fasciculations, deviation of jaw
	Palpation	No wasting, movement against resistance could not be assessed.	No wasting, movement against resistance could not be assessed.
	Reflex - jaw jerk	Exaggerated	Exaggerated
	Sensation over face	Couldn't be assessed	Couldn't be assessed

Testing the Fifth Cranial Nerve in Newborn.

The fifth cranial reflex is tested in newborns by rooting reflex. When the cheek on one side is touched, the child turns towards that side.

Facial 	Inspection - facial symmetry Forehead folds, eyelid position, nasolabial folds, angle of the mouth Maneuvers 1) shutting the eyes tightly 2) Blow out cheeks 3) Showing teeth	Appears Normal Could not be assessed	Appears Normal Could not be assessed
FACIAL	Sensory - Taste Skin over Angle of mandible	Could not be assessed	Could not be assessed

TABLE 11.20 Difference between Supranuclear and Infranuclear Facial Nerve Palsy

Features	Supranuclear Palsy (UMN Type)	Infranuclear Palsy (LMN Type)
Lesion	Above the facial nerve nucleus	At or below the level of nucleus up to the myoneural junction
Parts affected	Lower part of face. Upper face is spared due to bilateral representation	One half of the face is involved (lower and upper)
Movements affected	Voluntary movement Emotional movements	All movements on the affected side will be lost
Bell's phenomenon	Never occurs	Bell's phenomenon—present
Facial muscles	Not atrophied	There may be fasciculation or muscle atrophy on the affected side
Taste sensation	Taste sensation is preserved	Taste sensation may be lost
Corneal reflex	Preserved	Lost
Associated features	Always associated with same-sided hemiplegia	May be an isolated phenomenon (Bell's palsy) and if associated with hemiplegia; it is always crossed
Hyperacusis	Not present	Present if the nerve to stapedius is affected
Plantar response on the paralysed side of face	Extensor	Flexor (may be extensor on the opposite side)

LMN—lower motor neuron; UMN—upper motor neuron.

NERVE	TEST	RIGHT	LEFT
VESTIBULO COCHLEAR	Free field hearing test	Responds to sound/ name	Responds to sound/ name
	RINNE'S TEST	Could not be assessed	Could not be assessed
	WEBERS TEST	Could not be assessed	Could not be assessed
	Absolute bone conduction test	Could not be assessed	Could not be assessed
	Past pointing	Could not be assessed	Could not be assessed
	Romberg test	Could not be assessed	Could not be assessed
	Vestibular - ocular reflexes		
	Doll's eye reflex	Not done	Not done
	Caloric test	Not done	Not done

Testing in Newborn. Sudden loud noise elicits a startle response in the newborn. This is known as startle reflex.

GLOSSOPHARYNGEAL & VAGUS	Pitch and quality of child's voice Inspection GAG REFLEX UVULA POSITION Taste sensation Gag reflex	Spastic dysarthria, with no nasal twang No difficulty in swallowing saliva, no drooling, no flattening of palatal arch, no deviation of uvula Could not be assessed Exaggerated	Spastic dysarthria, with no nasal twang No difficulty in swallowing saliva, no drooling, no flattening of palatal arch, no deviation of uvula Could not be assessed Exaggerated

Testing in Newborn. The palatal movements are checked while the baby is crying. The IX nerve is usually tested together with the X cranial nerve.

SPINAL ACCESSORY	Sternocleidomastoid function One SCM Both SCM Trapezius	Could not be assessed	Could not be assessed
HYPOGLOSSAL	Inspection Tongue movements Tip of tongue to cheek against resistance	No fasciculations No deviation. Could not be assessed	No fasciculations No deviation. Could not be assessed

Testing in Newborn. The examiner should look for shape, bulk of tongue and movements during sucking.

MOTOR SYSTEM

		RIGHT	LEFT
BULK	Inspection Arm	No asymmetry, flattening, bulging 17 cm	No asymmetry, flattening, bulging 17 cm
	Forearm	16cm	16cm
	Thigh	28 CM	28 CM
	Leg	20 CM	20 CM
	SYMMETRY	b/l symmetrical	
TONE **BOX 11.1** History to be noted for alterations in tone **Increased tone**: H/o stiffness; H/o difficulty in wearing napkins, toilet care; H/o holding the child on the hip; H/o toe walking; H/o tendency for scissoring (adductor spasm) **Decreased tone**: H/o flaccidity; H/o floppiness; H/o slipping between mother's hands; H/o increased range of movements in the joints	Inspection Palpation	Posture - flexion deformity in right wrist. Flexion of upper and lower limbs. Stiffness felt	Flexion of upper and lower limbs Stiffness felt

	Passive stretching	Spasticity felt	Spasticity felt
	Flappability	Movements reduced	Movements reduced

Contd…

		RIGHT	LEFT
POWER	In sitting position Shoulder abductors Shoulder adductors Elbow flexor Elbow extensor Wrist flexor Wrist extensor Hip flexor Knee extensor Ankle dorsiflexor Hand muscles	4/5	4/5

Weakness	History
Upper limbs	
Proximal	H/o difficulty in lifting the arm above the head H/o difficulty in combing the hair H/o difficulty in taking objects from a height
Distal	H/o difficulty in writing H/o difficulty in mixing food H/o difficulty in buttoning H/o difficulty in dressing/undressing H/o difficulty in eating with a spoon
Neck	Can the child lift the head from the bed?
Trunk	Can the child turn in the bed? Can the child get up from supine position?
Lower limbs	
Proximal	H/o difficulty in getting up from sitting position, supine position H/o difficulty in climbing up and down the stairs
Distal	H/o difficulty in holding the chappals without slipping (while walking) H/o difficulty in walking with chappals held in the foot H/o dragging of foot while walking H/o tripping of toes while walking

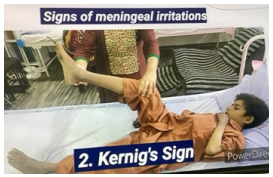
	Supine position Neck flexor Shoulder flexor	4/5	4/5
	Side lying position Hip abductor Hip adductor	4/5	4/5
	Prone position Neck extensor Hip extensor Knee flexor	4/5	4/5
	Standing position Plantar flexor	4/5	4/5

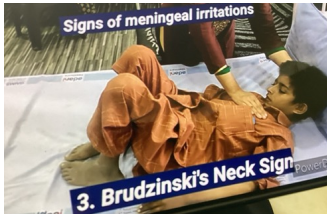
REFLEXES			
DTR	Biceps	2	2+
	TRICEPS	2	2
	Knee	3	3
	Ankle	2	2
SUPERFICIAL	Abdominal reflex Plantar	Absent Extensor	Absent Extensor
Ankle clonus		absent	absent
Gait Involuntary movements		Spastic Not seen	Spastic Not seen

Sensory system:
Proprioception - could not be assessed
Vibration could not be assessed
Crude touch could not be assessed
Fine touch - could not be assessed
Pain - present bilaterally
Temperature - could not be assessed

- Cerebellar functions
- Past pointing could not be assessed
- Position holding could not be assessed
- Dysdiadokinesia could not be assessed
- Nystagmus - not seen

- NO SIGNS OF MENINGEAL IRRITATION
- Autonomic nervous system examination normal
- Primitive reflexes not seen.





- Developmental assessment
- Gross motor : Walks up/ down stair(2 feet per step)
- Fine motor : patient is able to scribble.
- Social : Knows her name and responds when called to.
- Speech : Child can speak 2 word sentences

Respiratory system:

Inspection:

- Shape of the chest Normal
- Chest appears bilaterally symmetrical
- Trachea appears to be central
- No retractions/subcostal indrawing
- No visible pulsations/dilated veins
- No scars or sinuses

Palpation:

- Tracheal position confirmed
- Movements of the chest equal on both the sides.
- Vocal fremitus –B/L equal on both sides

Contd…

Percussion:

- Resonant note+ all over lung fields .

Auscultation:

- B/L Air entry equal+
- B/L Normal vesicular breath sounds+
- No added sounds.

Per abdomen

- Shape: normal
- Umbilicus central
- All quadrants moves correspondingly with respiration.
- No visible peristalsis, pulsations seen
- No scar, sinus, fistula.
- Soft non-tender,
- No organomegaly, Bowel sounds+

Cardiovascular system

- Pre-cordium-normal
- Apex beat-felt left 5th inter-costal space just medial to MCL.
- No abnormal pulsations seen.
- S1 S2 + no murmurs.

Summary

- A 13 year old female child second born to a non consanguinously married couple of with history s/o perinatal asphyxia , with motor deficit involving all four limbs and global developmental delay with convulsion and speech and language difficulty, completely immunised as per NIS , from upper lower socio economic status.
- On examination –PR 84 bpm , RR 26cpm ,BP – 102/60 mmhg ,Head to toe examination and anthropometry showing microcephaly , undernutrition, systemic examination showing no cranial nerve involvement , hypertonia of UL>LL , DTRs exaggerated , no atrophy of muscles
- Other systems within normal limits .

Provisional diagnosis

- Static encephalopathy with spastic quadriplegia with intellectual disability with functional grade 2 of MACS with grade 2 GMFCS with microcephaly and epileptic disorder , with mental age of <3 years with squint with probably normal hearing with undernourishment with dynamic contractures probable etiology birth asphyxia.

TABLE 11.1 Precipitating Factors of CNS Diseases

Precipitating Factors	Conditions
During sleep or immediately after waking up	Cerebral thrombosis
Exertion activity	Embolism
Strain or stress	Haemorrhage
Following generalised convulsions	Todd's palsy

TABLE 11.2 Progression of Weakness and Associated Aetiological Factors

Progression	Aetiological Factors
Improves with time	Thromboembolic manifestations
Static	Cerebral palsy
Deterioration	Degenerative disorders, tumours

Early hand preference before 12 months is seen in hemiplegia.