Doctors case medicals; CME serries.

BIRTH ASPHYXIA/HIE

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your life, our passion

Definition

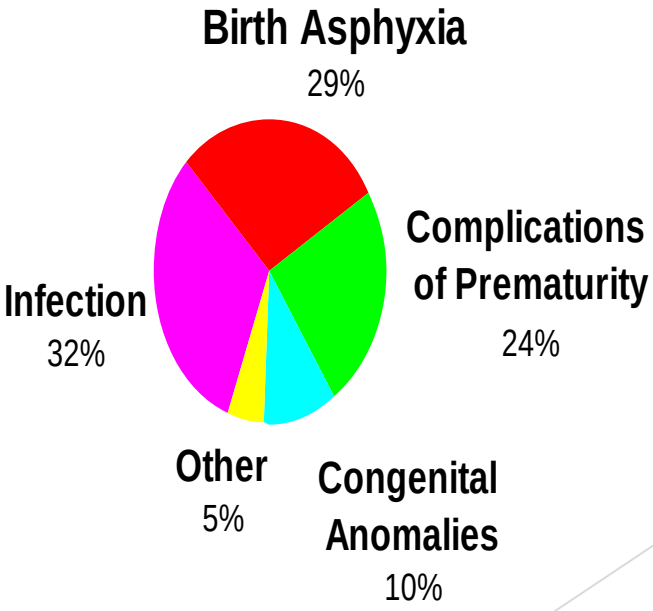
- Birth asphyxia is a condition of impaired gas exchange during labor leading to progressive hypoxia → carbon dioxide retention → metabolic acidosis.
- Asphyxia (Greek) = stopping of the pulse

HIE diagnostic criteria

- Profound acidemia in the umbilical artery (PH<7)
- Persistence of APGAR score 0-7 >5min
- Neonatal neurologic squeala (seizures, coma,hypotonia)
- Multiple organ involvement

EPIDEMIOLOGY

- Accounts For 840,000 ~29% of total neonatal death world wide, more in developing countries.
- 2nd leading cause of neonatal mortality after infection



Aetiology

- During normal labor there is compression of uterine blood vessels by uterine contractions, resulting in intermittent interruption to blood flow into the placenta → no oxygen delivery to the fetus during contractions
- Restoration of oxygen delivery when the uterus relaxes
- There is only a slight fall in blood pH during normal labor with a healthy fetus and placenta.

Aetiology

- Any abnormalities in the mother, placenta or fetus which prevent such successful adaptation to the effects of uterine contractions result in intrapartum fetal hypoxemia.
- If the condition persists, the switching to anaerobic metabolism results in increasing production of lactate, acidosis and asphyxia

Aetiology

- Unless immediate delivery takes place, the result is irreversible organ damage to susceptible organs (brain & kidneys) and ultimately cardiac arrest and intrapartum death.

Causes

1. **MATERNAL FACTORS**

- maternal shock
- cardiac arrest
- pre-eclampsia, eclampsia
- severe anemia
- smoking
- aortic compression by the gravid uterus
- chronic renal failure
- chronic heart disease

- anesthetics, sedatives & hypotensive drugs
- prolonged gestation
- prolonged labour
- ruptured uterus

2. **PLACENTAL FACTORS**

- diseases of the placental infarcts
- abnormal villous maturation
- placenta praevia
- abruptio placentae
- widespread villitis
- villous oedema
- thrombotic occlusion of fetal chorionic vessels

3. **UMBILICAL CORD**

- abnormal cord length
- entanglements around fetal body &nuchal cords (only a cord tightly around the neck more than once is a risk factor)
- true knots
- cord prolapse
- cord compression
- umbilical vessels thrombosis
- acute fetal blood loss with rupture of vasa praevia

4. **FETAL FACTORS**

- fetal size (large fetus, small, growth-retarded fetus)
- malpresentation
- fetal malformations
- chronic fetal anemia
- cardiac failure from any cause

5. **MECHANICAL FACTORS**

- excessive uterine contractions
- prolonged labour
- pelvic abnormalities
- CPD(cephalopelvic disproportion)
- use of oxytocics
- precipitate labour

Clinical signs (before delivery)

- fetal heart rate abnormalities (very rapid,
  very slow or irregular)
- absent fetal movements
- thick amniotic fluid stained by meconium

Clinical features (at birth)

Use APGAR SCORE

- Baby not breathing or breathing weakly
- Blue and/or pale skin
- Very low heart rate
- Lethargy
- Poor muscle tone
- Weak reflexes
- Acidosis
- Meconium-stained amniotic fluid
- Seizures

TABLE 33-1 The APGAR Score

Sign	0	1	2	Score	
				1 min	5 min
Appearance (Skin color)	Blue, pale	Body pink, extremities blue	Completely pink		
Pulse Rate (Heart Rate)	Absent	Below 100	Above 100		
Grimace (Irritability)	No response	Grimaces	Cries		
Activity (Muscle Tone)	Limp	Some flexion of extremities	Active motion		
Respiratory (Effort)	Absent	Slow and irregular	Strong cry		
			TOTAL SCORE =		

Apgar cont

- Total Score = 10

score 7-10	normal
score 5-6	mild birth asphyxia
score 3-4	moderate birth asphyxia
score 0-2	severe birth asphyxia

Sarnat and Sarnat Staging Of HIE

	GRADE 1(MILD)	GRADE 2 (MODERATE)	GRADE 3 (SEVERE)
Alertness	hyperalert	lethergic	coma
Muscle tone	Normal/increase	hypotonic	flaccid
Seizures	none	frequent	uncommon
Pupils	Dilated,reactive	Small,reactive	Variable ,fixed
Respiration	regular	periodic	apnea
Duration	<24hrs	2-14days	weeks

Management

- The goal is to prevent further injury to the brain following initial resuscitation
- Oxygen
- Therapeutic hypothermia with in 6 hours
- Warmth
- Fluids and dextrose
- Respiratory support (mechanical ventilation)
- Anticonvulsants (phenobarbital is the 1st line)
- Antibiotics
- NPO for 72 hours-NEC
- Counselling for parents (projected prognosis)

Prognosis

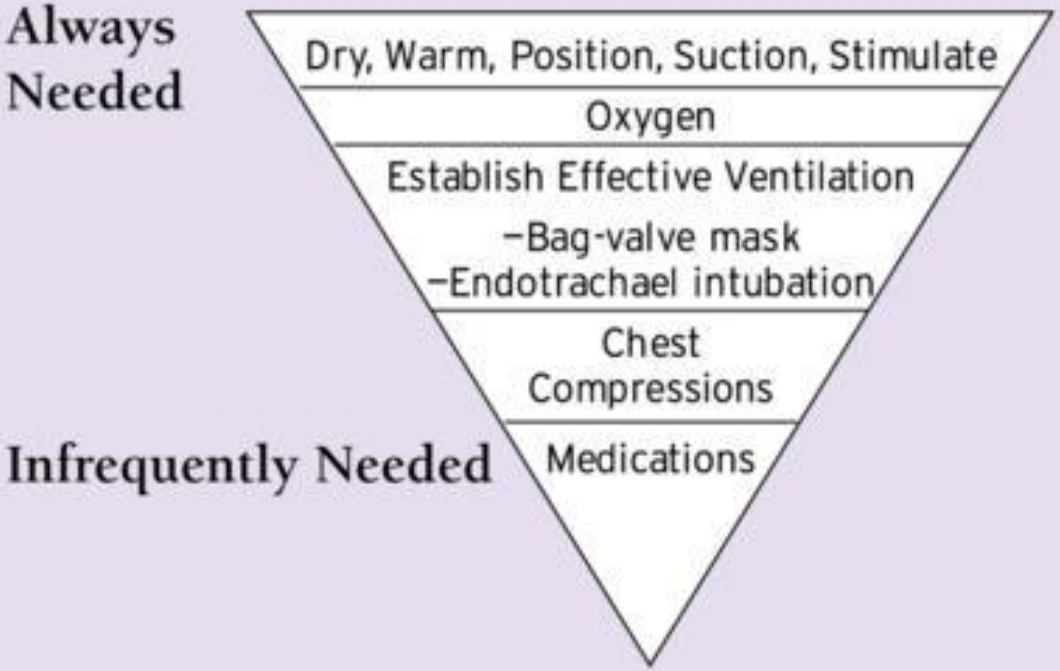
- Severe HIE,60- 70 %mortality, 80% severe complications CP
- Moderate HIE, 20-30% mortality, 30-50% severe complications
- Mild HIE, almost no complication in survivors

prevention

- Proper ANC and detection of risk factors
- Proper management on 2nd stage labor
- NNR competence

Neonatal Resuscitation

Assess and Support: Temperature
(warm and dry)
Airway
(position and suction)
Breathing
(stimulate to cry)
Circulation
(heart rate and color)



Equipment

- Mechanical suction
- Dee lee trap
- Suction catheters (12F,14F)
- NGT and 20mls syringes
- Neonatal self inflating resuscitation bags(500mls)
- Face masks(term and preterm)
- Oxygen with flow meter and tubing
- Intubation equipment
- Resuscitation drugs and fluids

Newborn Suctioning Devices for Midwives

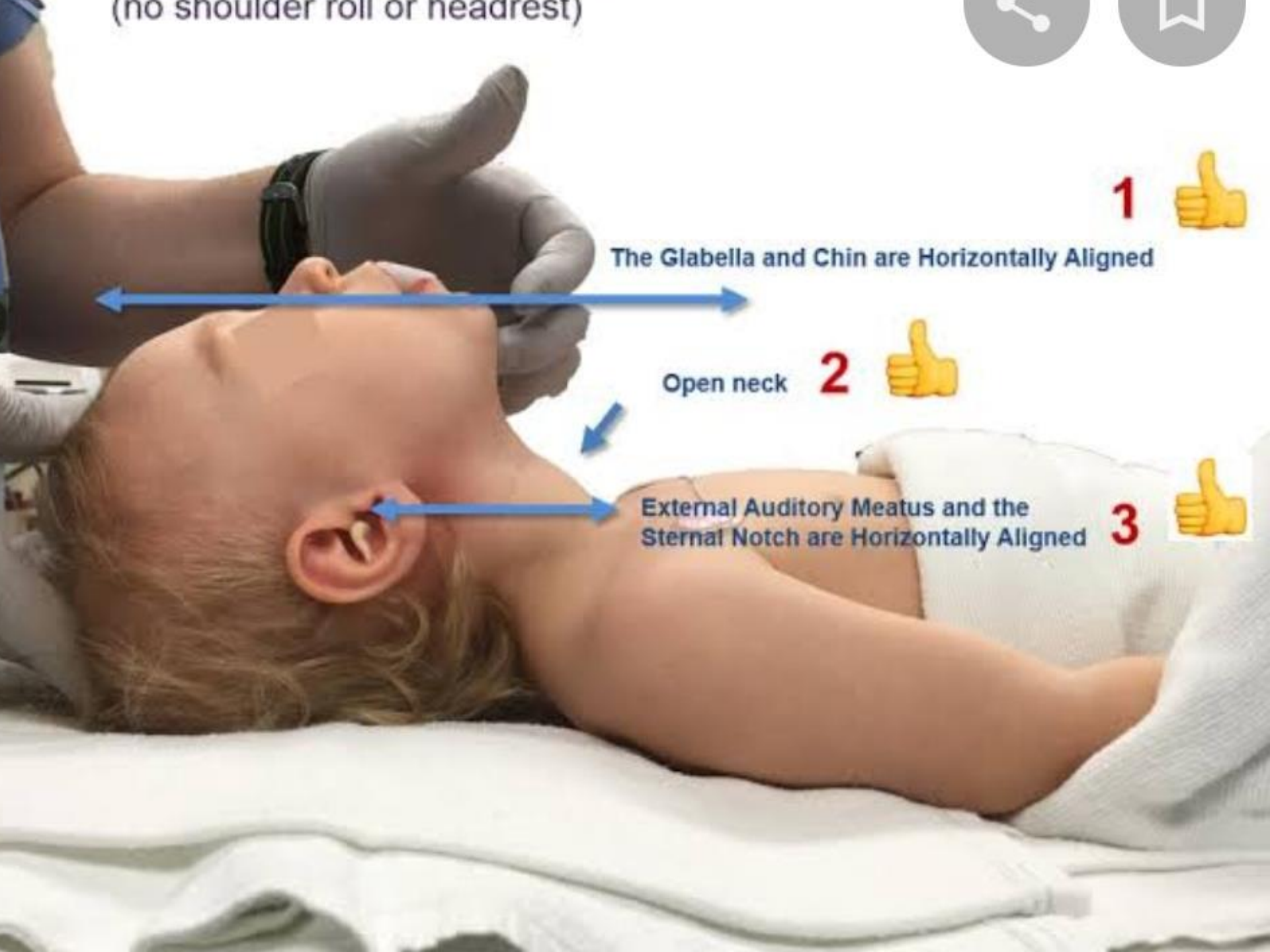
DeLee Suction

Bulb Syringe

Positioning

- Flat surface
- Warm and clean
- Room temp 260c
- Radiant warmer
- Sniffing position

(no shoulder roll or headrest)



Airway

- Gentle suctioning
- Mouth then nostrils 2-3sec
- Suction pressure <100mmhg
- Avoid deep suction

Stimulation

- Flicking the toes and soles twice
- Rubbing the back
- ***NOTE***; all these to be complete <30sec, no spontaneous respiration, go for BMV

Evaluation

- Reassess every 30sec
- Need for intubation??
- Evaluate RR,HR,COLOR
- HR by auscultation
- Count for 6sec then *10

Provide oxygen

- If normal breathing and heart rate but cyanosed
- Free oxygen at 5lt/min
- By oxygen mask or prongs
- Monitor SPO2

BMV

- INDICATED FOR;
- Apnea or gasping respiration
- Hrt rate <100bpm
- Persistent central cyanosis despite spo2,

cont

- Apply the mask covering chin to the nose
- Resucitator at the head end or side
- 5 rescue breaths, then continuous at rate of 40-60/min
- If along with chest compression 30/min
- Evaluate every 30sec till HR>100/min
- If HR<60/min start chest compression 3:1
- DISCONTINUE IF HR>60/min
- If stomach distended, decompress -NGT

Endotracheal intubation

- Meconium stained baby
- Meconium aspiration
- No response to BMV
- Congenital diaphragmatic hernia
- For drug administration