Case Discussion

UNUSUAL CASE OF IEM

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- 34 year old, G2P1L1A0 delivered a male baby at 37 $^{+1}$ weeks of gestation out of a second degree consanguious marriage

- Pregnancy was uneventful and booked, immunised with normal Level II scans and growth checks.

- Blood group O positive, HIV/HBsAg/HCV negative, Rubella immune, VDRL negative

- No history of pain, trauma or vaginal bleeding.

- Baby was outborn in a pvt nursing home, on 10/02/2021, by LSCS (in view of scar thinning), cried immediately after birth, APGAR not known, B.W 2750 gms

- Baby was breastfed and discharged on day 3 of life

- No immediate postnatal event

- On day 4 of life baby presented with the following complaints:
- Decreased oral acceptance for the last 24 hours
- 6-8 episodes of vomiting in the last 6-8 hours

- While examining in OPD, baby developed an episode of massive non billious vomiting followed by seizure and opisthotonic posturing. (RBS checked=72 mg%)

- Baby went into respiratory arrest and was intubated and put on mechanical ventilation in view of the same

O/E:

•Weight: 2.676 kg

- HR- 156/min
- RR- on SIMV with few spontaneous efforts of 40/min
- SaO2>94% on room air
- Icterus present till legs, no pallor
- No facial dysmorphism or any other obvious congenital malformation

•RESP- bilateral clear and equal

•CVS- normal heart sounds

•Abd- soft, no organomegaly

•CNS- AF was non bulging, stuporous(depressed sensorium) tone was low , plantars upgoing, neonatal reflexes could not be elicited

Pupils- both equal and reacting to light

- Point of care Head USG- no intracranial bleed or anomaly observed

PROVISIONAL DIAGNOSIS

TERM/ AGA/ NNH/ SUSPECTED LATE ONSET SEPSIS with SEIZURES

DIFFERENTIAL DIAGNOSIS

1. Late onset sepsis
2. Metabolic irregularities (Hypocalcemia, Hypomagnesemia)
3. Inborn error of metabolism
4. Neonatal Stroke

COURSE OF STAY

- Following admission to NICU, baby was stabilised and put on mechanical ventilation at PEEP 5, PIP 16, Fio2 21%

- Possibilities of Late onset sepsis and IEM were kept and samples sent (CBC, CRP, Blood culture, S. ammonia, TMS, GCMS) in view of the same, blood gas was also done immediately that was normal.

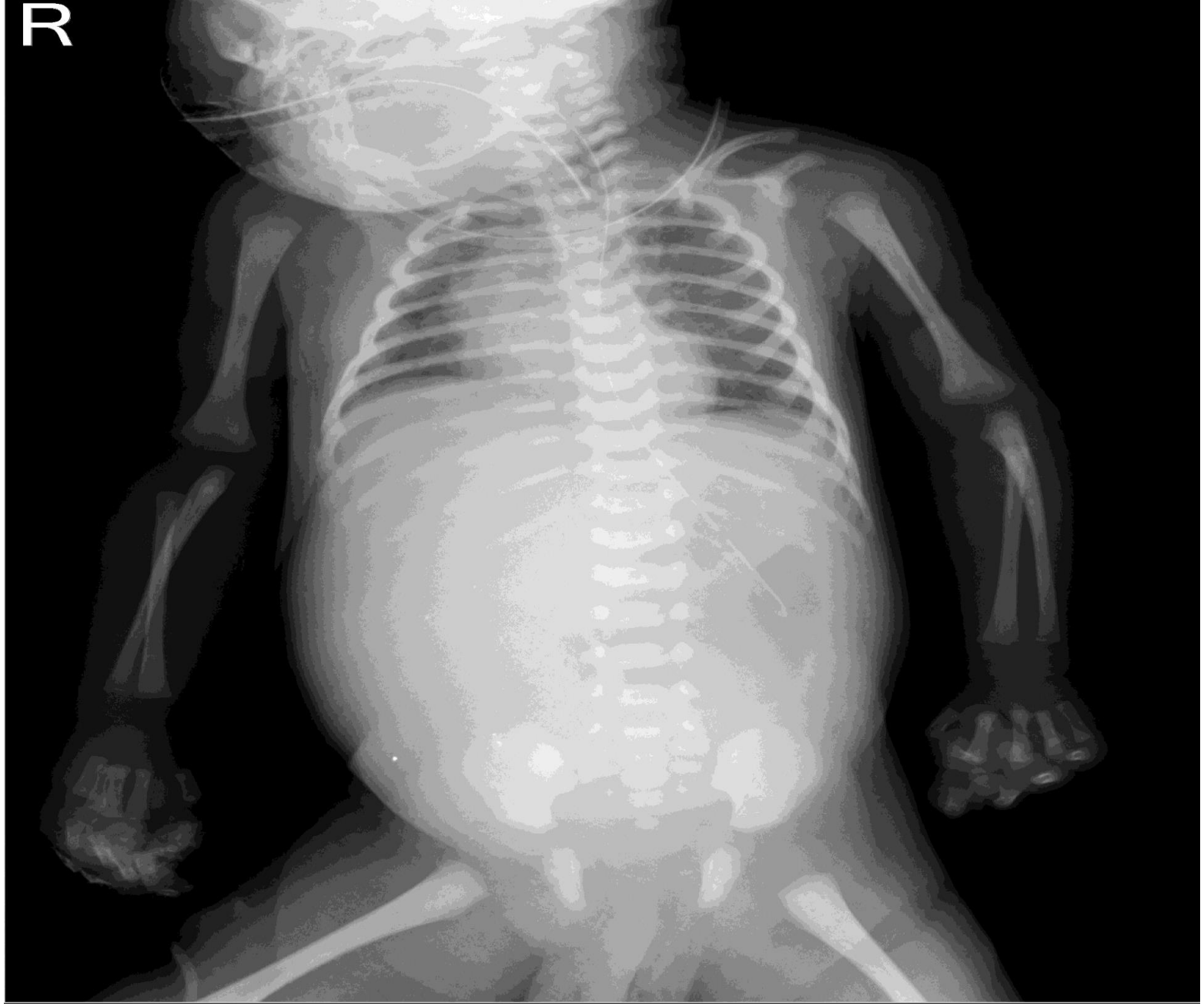
- During this episode of seizure, the RBS and ionised calcium were normal

MANAGEMENT

- Kept NPO, on iv fluids maintenence
- started on antibiotics (Injection Piptaz and Amikacin)
- CRP was negative and CBC was normal, blood culture awaited
- phenobarbitone loaded as antiepileptic.
- Baby continued to have repeated episodes of seizures despite repeat phenobarb, so Inj. Leveraticetam was started following which seizures abated
- Started on phototherapy in view of icterus (S.bil 20.2 mg%), which was continued for a period of 72 hours.

INVESTIGATIONS

Date	Investigations
10/02/2021	pH= 7.435 pCO2= 35mmHg HCO3-= 24.2mmol/l BE= 0, Anion Gap= 7.8meq/l Na+=139meq/l, K+=5.6meq/l, Cl-=107meq/l, iCa=1.08mmol/l Hb=19g/dl
10/02/2021	Hb= 21.2 g/fl, PCV=66.5%, Platelet = 301000/mm3 **TLC=5090/mm3, CRP= 1mg/dl** S.Bil = 20.2 mg/dl (indirect – 19.9mg/dl) ALT/AST/ALP= 11/53/189 U/l S.Protein= 6g/dl, Albumin =3.7 g/dl, Globulin = 2.3g/dl MBG= O+, BBG= A+ve



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COURSE OF STAY

- **At 24 hrs of admission: Serum Ammonia report- 1800 micromoles/L**

- In view of hyperammonemia and associated depressed sensorium, started on SODIUM BENZOATE powder via OG tube after priming at 300mg/kg/day

- TMS/GCMS still awaited

DIAGNOSIS

TERM/ AGA/ NNH/ HYPERAMMONEMIA (under investigation)

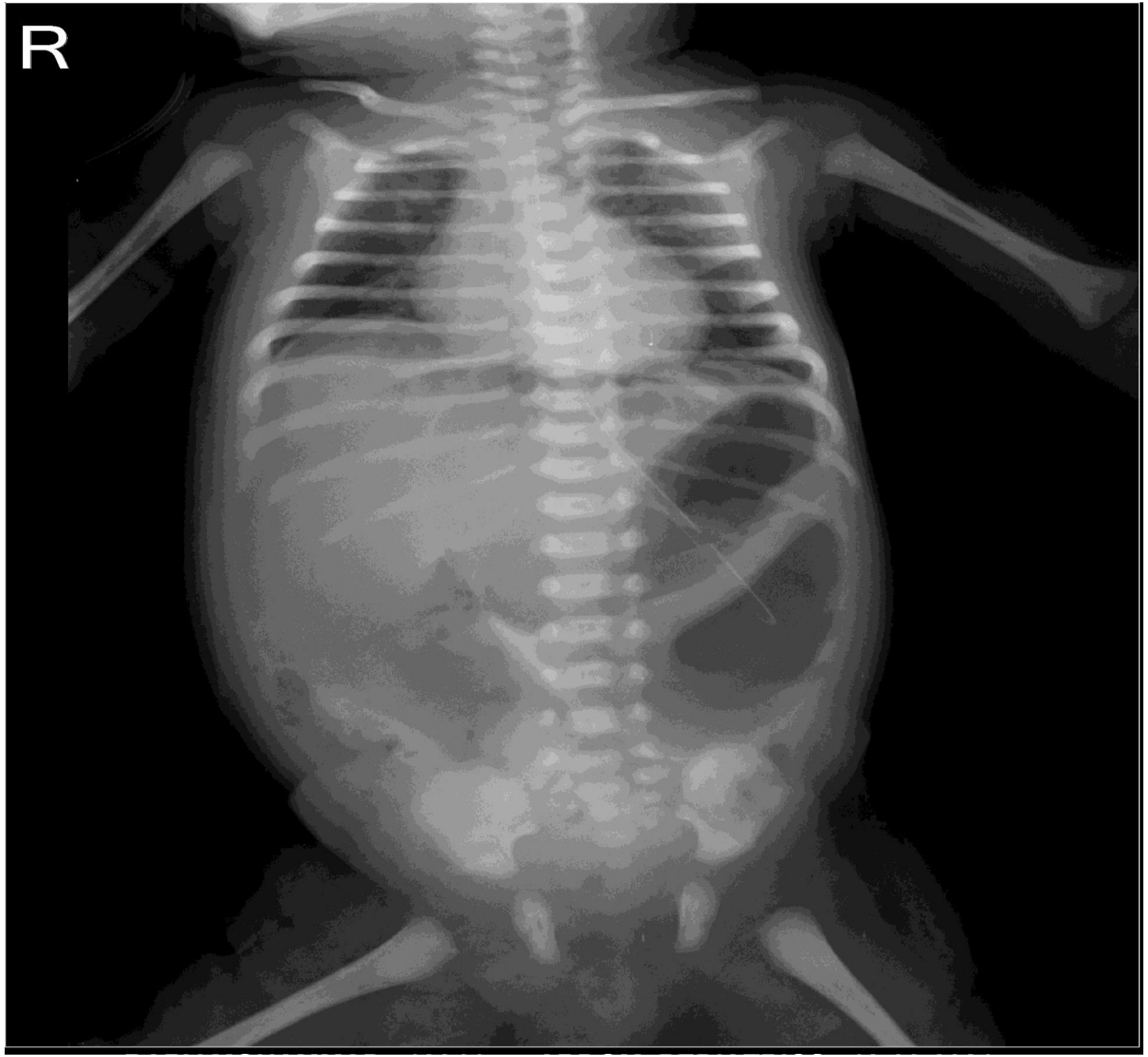
COURSE OF STAY

- On day 5-6 of life (day 2 of admission) evening, baby went into shock
- Antibiotics upgraded(Injection Meropenem and Injection Amikacin)
- started on inotropes, which were graduated from injection dopamine to injection adrenaline in a span of 6 hours.
- Attributed to ?central shock, Sodium benzoate continue PO
- **CNS-** still stuporous, flaccid with poor spontaneous efforts of breathing

COURSE OF STAY

- On day 6, 24 hrs post inotropes, hemodynamics improved. Adr weaned off
- sensorium improved with spontaneous movements and eye opening
- Blood ammonia normalised (Blood ammonia on 14/2/2021: 32umoles/L)
- Special feeds arranged for hyperammonemia: plan to start feeds coming morning!!

- Baby developed abdominal distension with non billious gastric aspirates
- Stool frequency that was normal ,was reduced (attributed to NPO)
- Abdominal Xray and USG was done which showed evidence of **Pneumoperitoneum**



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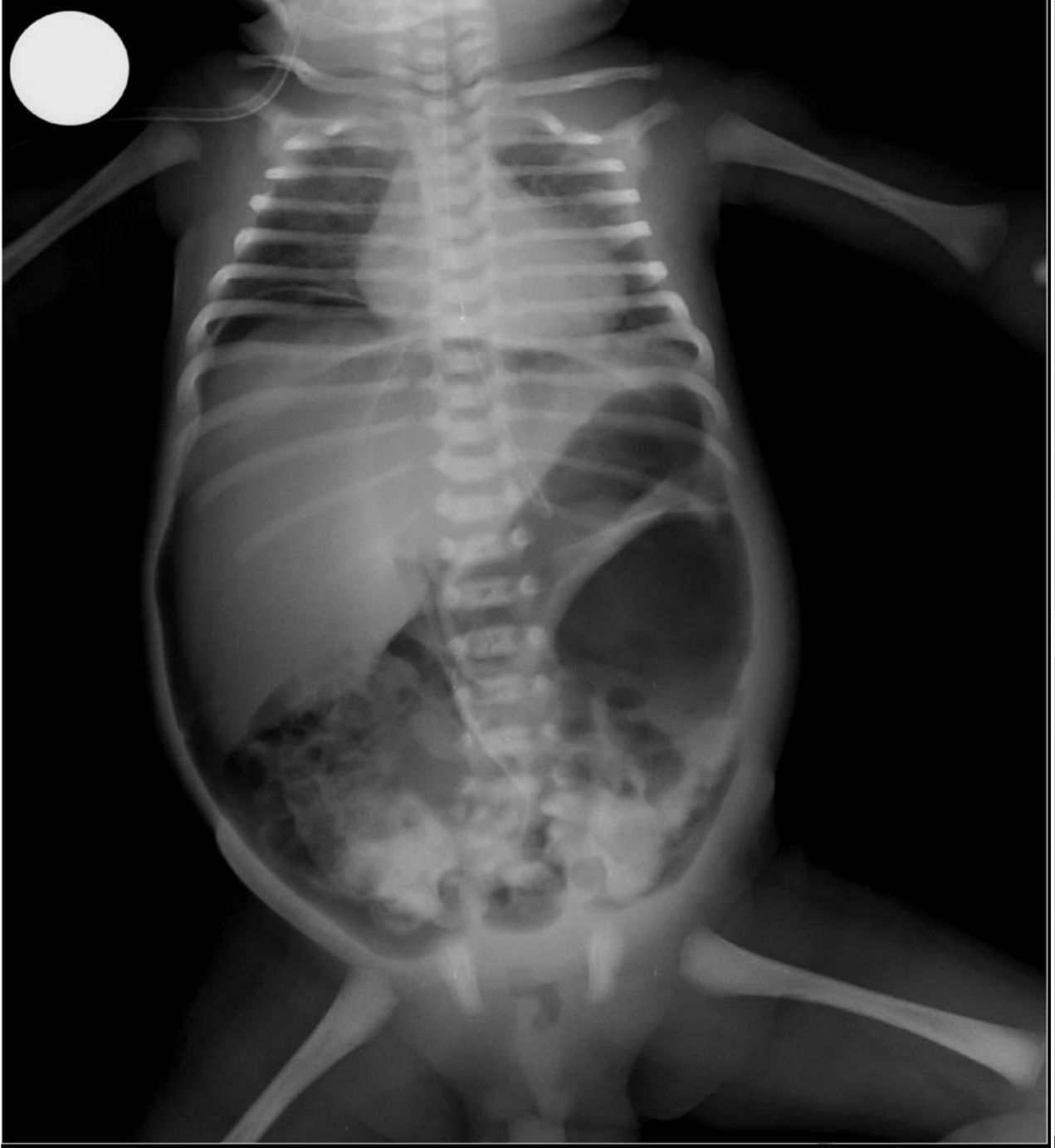
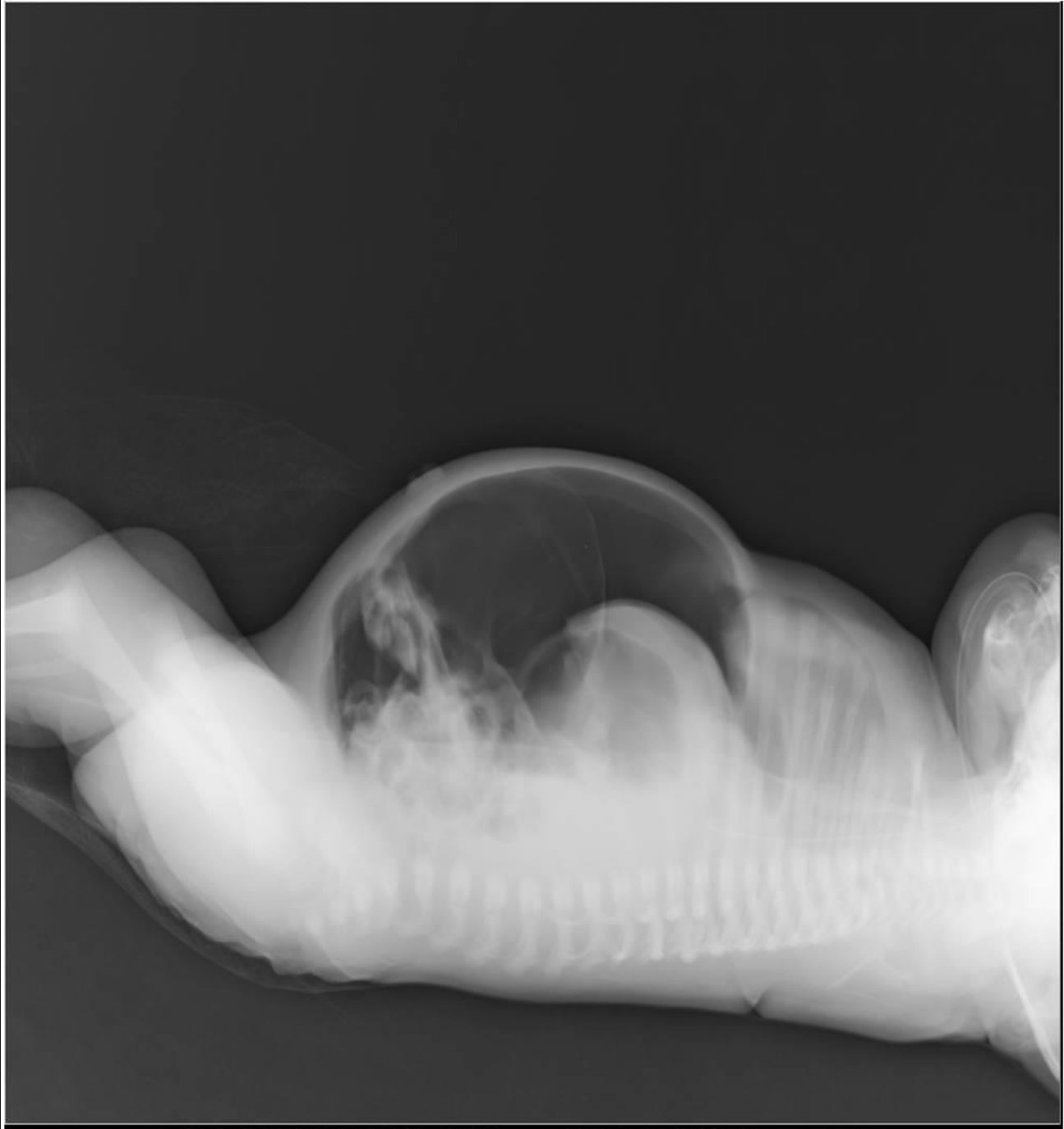


BABY MOHAMMAD 11D/M 18844 ABDOM.,PEDIATRICS
APOLLO CRADLE ROYALE



BABY MOHAMMAD 11D/M 18844 ABDOM.,PEDIATRICS
APOLLO CRADLE ROYALE

COURSE OF STAY

- Laparotomy with Gastric perforation repair and draining gastrostomy & transpyloric jejunostomy was done on day 9 of life.
- “Parents counselled with poor prognoses of such a repair”

SURGICAL FINDINGS:

- Entire posterior wall of stomach perforated
- 25 ml collection in lesser sac
- remaining gut healthy

COURSE OF STAY

- Surgery was uneventful, baby was managed in NICU postop with additional antibiotic coverage (injection metronidazole added),
- TMS/GCMS report came absolutely normal!!!!!!
- KEPT NPO with drain monitor over next 7 days
- Good spontaneous efforts of breathing, ventilator weaned off 3rd day post op onto a minimal nasal canula flow!
- On day 11 of life, baby developed **surgical site infection (leakage)**, with raised CRP and Pus C/S s/o Entercoccus Fecium sensitive to Linezolid /Vanco.

INVESTIGATIONS

Date	Investigations
21/02/21 (day 11 of life)	Hb= 14.9g/dl, TLC = 11120/mm3, ANC = 6116/mmm3 **CRP= 340mg/l** S.Creatinine= 0.3mg/dl, Blood urea=9.4mg/dl, S.calcium = 6.8mmol/l, Serum Phosphorus = 4.7mmol/l, Na+= 134meq/l, K+= 5.3meq/l **Pus C/S from surgical wound site** (reported on 27/02/21) : **Enterococcum Fecium sensitive to Linezolid**
24/02/2021	CRP = 82mg/L
(Feb 16, 2021) USG skull normal	

COURSE OF STAY

- Serial dressing was done. Feeding was started by jejunostomy on day 12 of life, and gradually increased
- CNS- sensorium markedly improved with spontaneous activity, eye opening !

- Full enteral feeding by jejunostomy established by day 18 of life, gradually built on oral feeding by bottle with preterm formula milk and EBM
- Antiepileptics gradually tapered off

- Gastrostomy and Jejunostomy draining tubes removed on day 27 of life following which baby was discharged on full feeds on day 30 of life.

FINAL DIAGNOSIS

TERM/AGA/ TRANSIENT HYPERAMMONEMIA OF INFANCY/ NNH/ SPONTANEOUS "POSTERIOR GASTRIC PERFORATION" IN SHOCK

TIMELINE

DAY OF LIFE	Day 4	Day 5	Day 6	Day 8	Day 9	Day 11	Day 12	Day 18	Day 27
EVENT	•Reduced oral intake •Multiple episodes of vomiting	•Hyperam monemia •shock	•Shock resolved	•Abdomin al distension •Gastric aspirates •Reduced stool frequency •Ammonia normalised	Gastric perforatio n repair	Surgical site infection	•Ventilator weaned off • feeding by jejunostomy	On full enteral feeds	Gastrostom y and jejunostomy tubes removed, prepared for discharge
CNS	Seizures	Stuporous, poor spont. respiration	Sensorium improving, spont. respiration present	Spont. respiratory efforts present	Good respirator y effort	Good respiratory effort	sensorium markedly improved with spontaneous activity, eye opening	Baby active	Baby active

DISCUSSION

Neonatal Hyperammonemia

Causes:

1.Hypoxia

2.Prematurity

3.Disseminated Sepsis

4.Inborn Errors of Metabolism

- Deficiencies of urea cycle enzymes
- Organic Acidemias
- HHH syndrome
- Lysinuric protein intolerance

5. <u>Transient Hypermmonemia of newborn</u>

Neonatal Hyperammonemia

Clinical features

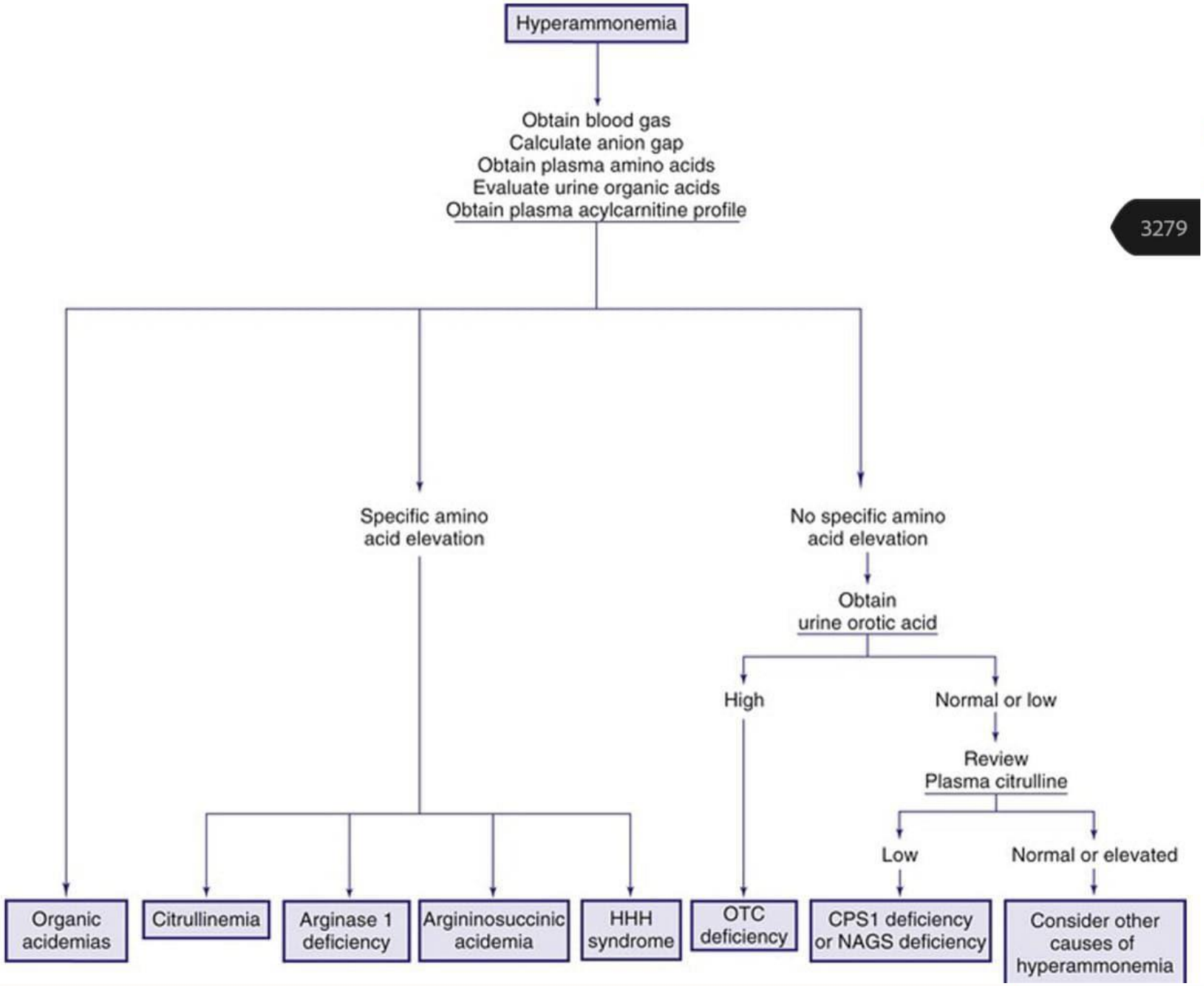
- Refusal to feed
- Vomiting
- Tachypnea
- Lethargy
- Seziures
- Hepatomegaly on physical examination seen in metabolic diseases
- Features of raised ICP

Laboratory features

- Blood ammonia level >150 micromoles/ litre is diagnostic. Normal healthy term infants may have levels as high as upto100 micromoles/l

- Careful inspection and testing of elevations of individual amino acids reveals the specific diagnosis – **Tandem Mass spectroscopy using blood spot and Urine Gas chromatography mass spectroscopy**

- **“Transient hyperammonemia of newborn is a diagnosis of exclusion”!!**


Hyperammonemia
Obtain blood gas
Calculate anion gap
Obtain plasma amino acids
Evaluate urine organic acids
Obtain plasma acylcarnitine profile
Specific amino acid elevation
No specific amino acid elevation
Obtain urine orotic acid
High
Normal or low
Review Plasma citrulline
Low
Normal or elevated
Organic acidemias
Citrullinemia
Arginase 1 deficiency
Argininosuccinic acidemia
HHH syndrome
OTC deficiency
CPS1 deficiency or NAGS deficiency
Consider other causes of hyperammonemia

Treatment

- Adequate calories, fluid and electrolytes.
- Glucose infusion at 6-8 mg/kg/min
- Add minimal amounts of protein preferably as a mixture of essential amino acids (0.25g/kg/day) during first 24 hours of therapy
- Sodium benzoate powder (only therapeutic compound available in India) : priming dose of 250mg/kg followed by 250-500mg/kg/day in 4 divided doses given via feeding tube
- Peritoneal/ Hemo dialysis indications:

- blood ammonia levels >500 micromoles/ l
- if above treatment fails and sensorium fails to improve in 4-6 hours

Prognosis

- Level of blood ammonia at presentation
- Rapidity of correction
- Transient hyperammonemia usually has better prognosis compared to metabolic disorders, if treated in time

Transient Hyperammonemia of Newborn

- Commonly presents on day 2- day 3 of life
- Clinical features are similar
- Blood ammonia may be higher than 500 micromoles/l at presentation
- Diagnosis is made by excluding other inborn errors of metabolism, and sepsis.

Transient Hyperammonemia of Newborn

- Early treatment and lowering of blood ammonia levels is associated with good prognosis
- Neurologic sequelae may be seen in babies with prolonged hyperammonemic coma
- It doesn’t recur.
- Blood ammonia levels completely normalise in a period of 2-3 weeks.

“Neonatal Gastric Perforation”

- Rare but life threatening condition associated with very poor prognosis.
- Incidence is 1 in 2900
- Most common age of occurrence in the neonatal age is in the first week of life.

Duran R, Inan M, Vatansever U et al. Etiology of neonatal gastric perforation: Review of 10 years experience. Pediatr Int 2007; 49: 185- 8.

Neonatal Gastric Perforation

- Causes:
- Hypoxia
- Prematurity
- Necrotising enterocolitis
- Idiopathic

- High gastric acid secretions in 2nd day of life and stress ulcers in the critically ill patients were also reported and they are supposed to cause perforation due to trans-mural necrosis of these ulcers

- Most common site is anterior wall of the stomach. Posterior wall and greater curvature are associated with worse prognosis.

Kella N, Surahio AR, Soomro BA et al. Gastric perforation in Newborns: Analysis of 14 cases. J Liaquat University, Med and Health Sci 2011; 10(3): 163-7.

Neonatal Gastric Perforation

- <u>Clinical features:</u>

- Abdominal distension
- Feed intolerance
- Lethargy
- Respiratory distress
- Abdominal erythema
- Shock

- Septicemia is the main cause of death.

Kshirsagar AY, Vasisth GO, Ahire MD et al. Acute spontaneous gastric perforation in neonate: A report of Three cases. Afr J Pediatr Surg 2011; 8: 79-81

Neonatal Gastric Perforation

- Poor prognostic factors for survival:[1,2]
- Metabolic acidosis
- Hyponatremia
- Male gender
- Location at posterior wall/ greater curvature of the stomach

[1] *Lin CM, Lee HC, Kao HA, et al. Neonatal gastric perforation: report of 15 cases and review of the literature. Pediatr Neonatol 2008;49:65–70.*

[2] Byun J, Kim HY, Noh SY, et al. Neonatal gastric perforation: a single center experience. World J Gastrointest Surg 2014;6:151–

Neonatal Gastric Perforation

- Surgical treatment of choice: gastrorrhaphy with or without gastrostomy

- Despite the advances in surgical and perioperative management, it is still associated with very high mortality rates of up to 60-70%.

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Thanks