

Inadequate feeding and excess sodium in neonates causing double trouble - A case series.

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Abstract- Hypernatremic dehydration manifests typically in neonates in the first 2 weeks of life. Early post-partum discharge with lack of knowledge about techniques and adequacy of breast feeding in mothers, primi-parity, anxious elderly mother with lactation problems and caesarean delivery are major risk factors. Most of these babies are seen during the summer months. The common presenting features include excessive weight loss, hyperthermia, jaundice, lethargy and poor feeding. We present herewith the clinical characteristics and the challenges we encountered in managing 6 babies with Hypernatremic dehydration with life-threatening complications. An increased awareness among health professionals is required so that this potentially devastating condition can be prevented.

Index Terms- Hypernatremic dehydration, , Breastfeeding, Infant, Lactation,

I. INTRODUCTION

Hypernatremic dehydration in neonates is associated with a free water deficit secondary to inadequate fluid intake. (1) It is a common but underrecognized problem in the primary care setting. Neonates of primiparous mothers with early postpartum discharge with lack of knowledge about techniques and adequacy of breast feeding in mothers has been proposed as a major risk factor for developing hypernatremic dehydration and most often present for care between 6 and 10 days of life. (2) The patients who require special attention are primigravida mothers with breast feeding difficulties (improper positioning or latching), breast engorgement, flat or inverted nipples. No consensus treatment guidelines exist, but most experts recommend a goal reduction rate of serum sodium levels of 0.5 mEq/L per hour with correction over 48 hours. Serum sodium level greater than 160 mEq/L is a risk factor for morbidity and mortality. Complications of hypernatremic dehydration, with seizure being most common, usually occur during improper correction. An early diagnosis is

absolutely warranted in this clinical condition as delay may result in irreversible neuronal insult.(3)

Criteria for Inclusion:

1. History of inadequate breastmilk or improper dilution of formula milk.
2. Clinical features of dehydration like delayed skin pinch, decreased urine output, lethargy and icterus.
3. Serum sodium level >150meq/L.

II. CASE PRESENTATION:

CASE 1- 17days old female born to primi mother with inadequate breastmilk 2.8kg at birth, admitted with lethargy and severe dehydration, feeble pulses, deranged renal function and 39% of weight loss with doughy skin and Na level 198meq/L. Treated as per protocol but succumbed within 24hrs of admission.

CASE 2 – 15days old male born to 35yr old mother, on improper breast feed admitted with fever and decreased urine output with Na level of 163meq/L and deranged renal function, was treated as per protocol and discharged on 6th day after admission on proper breastfeeding.

CASE 3 – 9day baby born to primigravida on breast feeding was admitted with convulsions and 14% of weight loss with Na level 158meq/L and reduced urine output and was discharged successfully after 7days of hospital stay.

CASE 4- 6 days baby born to elderly primi 30yr, on inadequate formula feed admitted with fever and lethargy with 25% of weight loss with Na level 152meq/L and discharged after 6days of treatment.

CASE 5- 11days baby born to primi mother on inadequately prepared formula feed admitted with fever, lethargy, reduced urine output and convulsions with 22% of weight loss and Na level 166meq/L. Baby received treatment as per protocol and was successfully discharged after 8 days of hospital stay.

CASE 6- 9days baby born to primi mother age 19yrs, on inadequately breastmilk admitted with fever, icterus and reduced urine output with 11% of weight loss and Na level 162meq/L. Baby received treatment as per protocol and was successfully discharged after 5 days of hospital stay.

CASE 7- 13days baby born to primi elderly gravida and was on inadequately prepared formula feed admitted with fever, icterus and reduced urine output with 15% of weight loss and Na level

165meq/L. Baby received treatment as per protocol and was successfully discharged after 7 days of hospital stay.

CASE 8- 20days baby born to primi mother on inadequate breastfeed admitted with history of 5 days fever, lethargy, reduced urine output and convulsions at time of admission and gasping respiration. With 35% of weight loss and Na level 181meq/L. Baby was intubated and started on treatment but died within 20hrs of admission.

TABLE: 1 – ON ADMISSION

CASE	DAY OF PRESENTATION	PRESENTING FEATURES	PERCENT AGE OF WEIGHT LOSS	Hb ON ADMISSION (g/dl)	Na ON ADMISSION (meq/L)	HCT ON ADMISSION (%)	BUL/CREAT (mg%)
1	17DAYS	Lethargy	39%	23	198	78.5	336/6
2	15DAYS	Fever, decreased urine output	27%	18.8	163	60.5	196/1.2
3	9DAYS	Convulsion	14%	18.8	158	57.6	70/0.9
4	6DAYS	Fever, Lethargy	25%	22	152	69	140/1.8
5	11DAYS	Fever, decreased urine output, convulsion	22%	21	166	65	176/2.1
6	9days	Fever, Icterus, reduced urine output	11%	24	162	63	98/0.9
7	13days	Fever, icterus, decreased urine output	15%	18	165	64	88/2.4
8	20days	Fever, lethargic, gasping respiration, convulsion	35%	27	181	82.7	321/5.5

TABLE: 2 – BEFORE DEATH/DISCHARGE

CASE	DAYS OF HOSPITAL STAY	Hb ON DISCHARGE/DEATH (g/dl)	Na ON DISCHARGE/DEATH (mEq/L)	HCT ON DISCHARGE/DEATH (%)	BUL/CREATIN ON DISCHARGE / DEATH (mg%)	FATE
1	2	17.8	197	63.5	325/6.6	DEATH
2	6	17.3	144	52.8	37/0.5	RECOVERED
3	7	15.7	139	48.5	21/0.4	RECOVERED
4	6	17	136	52	24/0.6	RECOVERED
5	8	16.4	134	54	30/0.4	RECOVERED
6	5	17	135	55	28/0.6	RECOVERED
7	7	16	137	56	35/0.5	RECOVERED
8	1	25	187	90	335/5.7	DEATH

III. RESULTS:

In our study we enrolled 8 babies, who presented with hypernatremia, lethargy and reduced urine output with history of inadequate feeding. All babies belonged to primi mothers who were discharged early after delivery and the clinical presentation of these babies were between first to third week of life with severe dehydration and lethargy. All babies had >10% weight loss since birth, had haemoconcentration with raised Haemoglobin and HCT due to dehydration and Na level more than 150mEq/L. All babies had raised BUL and creatinine and 6 out of 8 were discharged successfully after treatment.

Case 1 and Case 8 babies who presented with severe hypernatremia more than 180mEq/L, severely deranged renal functions with >35% of weight loss could not be saved and succumbed.

The babies who recovered had on average 7 days of hospital stay requiring treatment.

IV. DISCUSSION:

This case series describe consequences of hypernatraemic dehydration in inadequately feed babies. All 8 babies were born to primi mother with inadequate breastmilk and also lack of proper technique of breast feeding and formula feeding. Hypernatraemic dehydration is notoriously difficult to diagnose on clinical examination alone, as skin turgor may be preserved; the anterior fontanelle can retain its normal fullness, and urine output, although reduced, is maintained even in severe dehydration (4). The clinical features are a spectrum presenting from an alert and hungry child appearing relatively well, to a child who is lethargic, irritable and even moribund (5). Other differential diagnosis like sepsis, meningitis and intra-cranial pathologies has to be ruled out before making a diagnosis of hypernatremic dehydration.

The management protocol in hypernatremic dehydration is to correct hypovolemic shock initially with ringer lactate or normal saline boluses and then to gradually bring down serum sodium by 10-15 mEq/litre/day, as sudden decrease can result in neuronal damage. (6) We used half normal saline (N/2) initially

followed by N/3 saline in 5% dextrose as maintenance fluid. After initial fluid management babies were restarted on breast feeds. We also tried to put baby on breast feeds but because of inadequacy of mother's milk formula feeds were given. Assessing the adequacy of breast feeding includes a careful review of the feeding process, as well as an objective assessment of volume intake by weighing the baby and monitoring the urine output. (7)

A normal term neonate usually loses about 7-10% of birth weight and regains birth weight by day ten of life. Any loss of weight more than 10% is a matter of concern. In our cases, all babies lost about 15-40% of birth weight.

The main challenges in management of Hypernatremic dehydration are Hyperosmolar state and Central Pontine Myelinosis which can occur with rapid correction. The Hyperosmolar state: It causes brain shrinkage, venous thrombosis and subdural capillary haemorrhage which depends both on the severity of the hypernatremia and the rate at which it develops (8). The brain subsequently undergoes an adaptation process - a volume regulatory increase (VRI) in solutes. This involves rapid accumulation of inorganic ions (acute adaptation) and slower accumulation of organic osmolytes, termed "idiogenic osmoles" (chronic adaptation). The major organic osmolytes in the brain are glutamine, glutamate, taurine, and myo-inositol which begin to accumulate after 9– 24 h (9). A rapid lowering of serum sodium while correction, creates an osmolar difference causing the brain cells to swell due to accumulated osmoles leading to central pontine myelinosis but long term follow up studies are lacking to determine the neurologic effects. It is safe to aim for a fall in serum sodium of not more than 12 mmol/l/day (10). A correction rate of > 0.5 mmol/L per hour was also found to be an independent risk factor for death or convulsion (odds ratio, 4.3; 95% confidence interval, 1.2- 6.5) (11).

In a study by Bolat et al, a serum sodium greater than 160 mmol/L at admission was an independent risk factor for death or convulsion (odds ratio, 1.9; 95% confidence interval, 1.3-3.7) Alshayeb et al found that patients with first 24-hour hypernatremia correction rate of less than 0.25 mmol/L per hour had significantly higher mortality (12).

V. CONCLUSION:

There is an urgent need for awareness of this problem among lactating mothers and health care professionals to prevent disastrous complications in babies. With the new trend of early postpartum discharges, it is the duty of medical and paramedical staff to ensure that the mothers have been properly sensitized about adequacy of breast feeding and to monitor weight gain of neonates after discharge. Mothers, relatives and health care professionals must be explained that if a neonate is not gaining weight and has persistent weight loss since birth, they should immediately report to nearby health care facility.

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