

Infant Insufficient Milk Syndrome Associated with Maternal Postpartum Hemorrhage

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ABSTRACT - Insufficient milk syndrome is defined as failure to thrive in infants due to insufficient daily breastmilk intake. This discussion examines a possible association between insufficient milk syndrome and maternal postpartum hemorrhage. Ten consecutive cases of insufficient milk syndrome associated with maternal postpartum hemorrhage were identified. The mothers presented between 3 and 35 days postpartum. Maternal postpartum blood loss ranged from 500-1500 ml in eight cases (mean: 963 ml); in two cases, blood loss was noted as 400++ and 200++, respectively. Six mothers experienced a drop of hemoglobin by >30g/L; two had a drop in blood pressure >30mmHg for >20 minutes. All infants were failing to thrive. Five infants suffered hypernatremic dehydration with serum sodium levels ranging from 148-166mmol/L. Breastmilk electrolytes were measured in six cases, and elevated sodium levels, ranging from 21-100mmol/L, in five cases. These data serve to heighten awareness of insufficient milk syndrome as a potential consequence of postpartum hemorrhage. Early postpartum review of all breast-feeding mothers and infants is strongly encouraged. *JHL* 11:123-126, 1995.

KEYWORDS: breastfeeding, hypernatremic dehydration, insufficient milk syndrome, postpartum hemorrhage.

INTRODUCTION

The insufficient milk syndrome (IMS) and hence failure to thrive in breastfed neonates is an increasingly recognised problem. There may be demonstrable inadequate milk intake or it may be the mother's perception that her milk supply is inadequate; it may be reversible or irreversible. The etiology of true IMS may be related to a problem with milk synthesis, milk removal, or the daily infant milk intake.^{1,2} Factors related to the mammary gland which are thought to contribute to inadequate milk synthesis can be divided into failure of mammogenesis (breast growth during pregnancy), lactogenesis (initiation of milk production) or galactopoiesis (ongoing maintenance of milk production).

Based on our clinical experience at a large referral breastfeeding clinic, we recognized a correlation between insufficient milk syndrome and maternal postpartum hemorrhage. We postulate that postpartum hemorrhage can produce a transient hypotensive insult and temporary pituitary ischaemia which inhibits the hormonal triggering of lactogenesis II by prolactin.

We report ten cases of infants with insufficient milk intake associated with large maternal postpartum hemorrhages. A representative case is described in detail followed by a review of the cases as a group.

CASE PRESENTATION

A 29-year-old primigravida had an uneventful pregnancy during which she described a one-cup-size increase in breast size. She had an induced vaginal vertex delivery at term, during which she lost 1500 ml of blood owing to uterine atony (normal blood loss is <500 ml). This blood loss was controlled with intravenous oxytocin. Her infant was a healthy male who weighed 3544 g. She breastfed immediately after delivery and subsequently on demand 1-3 hourly; feeds lasted 30-40 minutes. She noticed a slight episode

of breast fullness on day 3 postpartum, but no engorgement. On day 9 postpartum, mother and baby were seen at our centre because of infant failure to thrive. The baby had not passed a stool for 7 days, had only one wet diaper during the past 24 hours, and had passed very concentrated urine.

The infant was jaundiced; hyperbilirubinemia had developed during the previous 24 hours, and the baby had lost 13 percent of his birthweight. However, typical signs of dehydration were absent. The mother had slightly cone-shaped breasts. Her use of the modified cradle position was adjusted. During a feed, the infant took 25 ml of milk (expected intake was 60-70 ml). An electric breast pump obtained no residual milk. Breastmilk sodium was normal at 21mmol/L, and the infant's sodium was elevated at 149 mmol/L (normal range is 135 - 145 mmol/L). A diagnosis of neonatal hypernatremic dehydration and starvation due to insufficient maternal milk was made.

Management goals included increasing maternal milk production by feeding on demand at least every three hours, pumping the breasts after the feed for 5-15 minutes using an electric pump, and prescribing a galactagogue, domperidone—a dopamine antagonist that helps to raise prolactin levels—10 mg three times a day. Milk transfer was improved by correcting the infant's positioning and latch at the breast; the infant's caloric intake was increased by offering 40-60 ml of complementary commercial baby milk using a feeding tube device at the breast after 15 minutes of breastfeeding.

During the next three weeks, the mother's milk supply remained at 15-25 ml after a standard test feed and removal of residual milk using an electric breast pump. The baby regained his birth weight within five days and continued to gain about 30 gms/day. Despite intensive breastfeeding management advice, the rate of maternal milk synthesis failed to increase. The mother and infant were referred back to their family physician for follow-up, after three weeks.

TEN CASES OF INSUFFICIENT MILK FOLLOWING SEVERE POSTPARTUM HEMORRHAGE

Maternal History. Nine of ten mothers were primiparous. The multiparous mother had stopped breast-feeding her first child due to presumed, but undocumented, failure to thrive (see Table 1). Four mothers had previous spontaneous abortions. Five mothers had normal vaginal deliveries (one occurring at home), three had forceps deliveries; and, two women had emergency cesarean sections, owing to failure to progress and cephalopelvic disproportion, respectively. The mother having the home birth experienced an extensive vaginal tear as a result of fetal shoulder dystocia. This required hospital admission for repair under spinal anaesthesia.

Estimated blood loss ranged from 500 to 1500 ml; in nine cases, mean blood loss was 1063 ml. For two mothers, case notes documented blood loss as 400++ and 200++, respectively. In both cases, these mothers experienced a drop in hemoglobin of >4g/dL, indicating severity of the bleeding. Six mothers experienced a drop in hemoglobin of >3 g/dL; two experienced a drop in blood pressure of >30 mm/Hg for more than 20 minutes. Two mothers had small hypoplastic appearing breasts, which could indicate a primary maternal etiology for lactation insufficiency; however, all mothers experienced prenatal breast growth. Four mothers had minor technical breastfeeding difficulties associated with latching, which did not appear to hinder milk removal. The rest of the mothers used effective breastfeeding techniques.

Infant History. All infants were referred to the clinic because of failure to thrive. Their gestational age ranged from 37 to 42 weeks. Age at presentation ranged from 3 to 35 days postpartum (mean was 13 days). All infants looked undernourished, and two were jaundiced, but only one infant showed the typical signs of clinical dehydration. Four babies had lost more than 10 percent of birthweight. One had not passed a bowel motion for seven days and another for 36 hours.

Laboratory Findings. The breastmilk yields (test feed plus pumped residual milk volume) at the time of presentation at the breastfeeding clinic ranged from 2 to 47 ml. All yields were considered grossly inadequate for the age of the infant. Serum sodium levels were measured in seven infants; five had hypernatremic dehydration with serum sodium levels ranging from 148 to 166 mmol/L (145 mmol/L is upper level of normal). Breastmilk electrolytes were measured in six mothers, and elevated sodium levels were found in five. These levels ranged from 21 to 100 mmol/L, with a mean of 55 mmol/L (normal • 30 minol/L). Post-feed prolactin levels measured in two mothers were 10 ng/ml (low), and 147 ng/ml

(normal). A normal free thyroxin and thyrophin-stimulating hormone level in the former mother indicated grossly intact pituitary function. The clinical investigations performed varied between cases, depending on the infant's age at presentation. Only mothers and their infants younger than 14 days were screened for hypernatremic dehydration.⁴ Maternal pituitary function tests were not part of a routine protocol for investigation of infant failure to thrive. In our clinical practice, formal assessment of pituitary function is carried out several months after delivery. The author has not noted a close correlation between prolactin level and milk yield and hence this was not routinely measured.

Outcome. With the aid of advice, drug therapy to improve milk production, and ongoing support, two mothers were able to exclusively breastfeed after one month of intervention. Five continued to breastfeed with the aid of a tube feeding device for two to six months. One mother stopped breastfeeding. The outcome of the remaining two is not known.

DISCUSSION

In our clinic, insufficient milk syndrome is defined as infant failure to thrive due to insufficient daily breastmilk intake. It may be due to a primary lactation insufficiency, a technical problem associated with transferring milk from the breast, or infrequent or short episodes of feeding, or a combination of the above. In this case series, each mother/infant couple underwent a standard clinical breastfeeding assessment to identify the causes of the insufficient milk syndrome. A consistent finding of postpartum hemorrhage followed by lack of breast engorgement and a poor milk yield indicated impaired lactogenesis and ongoing milk production. Maternal postpartum hemorrhage provides a clue to the etiology of IMS in these cases. The elevated breastmilk sodium in five mothers suggested disruption or delay of the milk maturation process,⁵ although it does not indicate at what stage the disruption occurred.

Sheehan's syndrome is a well documented clinical entity of pituitary failure resulting from significant obstetrical hemorrhage. The typical syndrome is characterized by failure of lactation, loss of pubic and axillary hair, breast atrophy, superinvolution of the uterus, sterility, and evidence of hypothyroidism and adrenocortical insufficiency. Sheehan also states that patients may retain function of some endocrine glands while others are inactive without any apparent reason for the difference.⁶

Postpartum hemorrhage is defined as bleeding >500 ml during the first 12 hours after delivery. It should be borne in mind that measured blood loss is usually twice the estimated amount. When blood loss is estimated at >500 ml, it can be reasonably assumed that the true blood loss is in excess of 1000 ml.⁷

The special vulnerability of the pituitary gland to ischemia during pregnancy is thought to be due to the two- to three-fold increase in size of the adenohypophysis during pregnancy.⁸ This physiologic enlargement of the pituitary gland increases the pressure on the vasculature. In this setting, a sudden drop in blood pressure owing to hemorrhage might allow the increased tissue pressure to collapse these vessels with resultant ischemic necrosis.⁹

None of the mothers were diagnosed as having Sheehan's syndrome, but each mother experienced normal mammogenesis, a large obstetrical hemorrhage, and subsequent failure to lactate adequately. These mothers appeared to show some clinical manifestations of the syndrome without the laboratory evidence of hypopituitarism. Because lactation failure reversed over time in two mothers, the disruption of pituitary function likely was due to ischaemia rather than infarction.

Less severe examples of postpartum hemorrhage have been shown to cause isolated and subclinical pituitary insufficiency. Schneeberg found lactation to be reduced or absent in six out of 20 women who had experienced a postpartum hemorrhage and who otherwise showed no signs of hypopituitarism on clinical or laboratory testing.¹⁰ There appears to be no relation between the level of blood loss within the definition of postpartum hemorrhage and the subsequent development of anterior pituitary insufficiency.^{10,11} In a survey of 128 women with postpartum hemorrhage, 41 (32 percent) had some degree of diminished pituitary function.¹² Hall found a 3.6 percent incidence of hypopituitarism following postpartum hemorrhage in a series of 79 women.¹¹ Out of a group of 70, Hornabrook and Caughey¹³ found one case of panhypopituitarism and two cases of partial hypopituitarism.

Recently, the management of postpartum hemorrhage has been under scrutiny as the risks of AIDS, associated with blood transfusions, have become more apparent. The indications for transfusion are given careful consideration and the patients are often involved in the decision. The question, "Is there less aggressive blood-replacement therapy after a postpartum hemorrhage than before, and is this a factor in the increase in lactation insufficiency?" needs further evaluation.

Table 1. Clinical Features of Mothers, Their Infants, and Related Laboratory Findings.

Maternal Features	1	2	3	4	5	6	7	8	9	10
Parity*	P	P	M	P	P	P	P	P	P	P
Previous Spontaneous Abortion	yes	no	no	no	no	yes	no	no	yes	yes
Delivery**	V	V	V	C	V	VF	VF	C	VF	VF
Estimated Blood Loss (ml)	400++	200++	1300	1000	1500	1000	1000	800	600	500
Hg drop (g/dL)	4.2	4.9	5.2	1.3	3.1	3.1	1.9	2.3	3.4	2.5
BP drop mmHg (mins)	---	50(20)	30(40)	---	---	---	---	---	---	---
Breastmilk yield(ml)	36	35	20	30	25	8	36	2	15	47
Infant Features	1	2	3	4	5	6	7	8	9	10
Age at Presentation	12	25	35	7	9	10	7	4	3	21
Jaundice	yes	no	no	yes	no	no	no	no	no	no
Clinical Dehydration	---	---	---	---	---	---	---	---	yes	---
Weight loss*** (% of birth weight)	15	0	0	9	13	20	6	15	8	0
Hypernatremic dehydration Dx	no	no	no	no	yes	yes	yes	yes	yes	no
Laboratory Findings	1	2	3	4	5	6	7	8	9	10
Serum sodium (infant)	138	---	---	136	149	166	148	162	157	---
Breastmilk sodium (mmol/L)	25	---	---	100	21	80	13	50	---	---

* P=primip; M=multip
 **V=normal vaginal; C=cesarean; VF=vaginal, with forceps
 *** information obtained on the day of presentation

CONCLUSIONS

Hypernatremic dehydration and starvation, the extreme consequences to the infants of insufficient maternal milk, is being recognized more frequently; it may be increasing. The reasons for this are not clear, but may in part be due to early hospital discharge, which returns mothers home before lactation is fully established and before they have mastered the skills for breastfeeding. Some mothers who are aware of the unique characteristics of breastmilk persist with exclusive breastfeeding, not recognising that their infant is failing to thrive.

Maternal postpartum hemorrhage is one of many factors that may put a mother at risk and hence the infant at risk for the insufficient milk syndrome. This case series suggests a relationship between hypotensive episodes, resulting from postpartum hemorrhage, and pituitary insufficiency leading to lactation failure. A mother who has had a substantial postpartum bleed deserves close medical follow-up within the first week postpartum. A clinical breastfeeding assessment should ensure that breastfeeding has been established successfully and that the infant is gaining weight. In this case series, two infants who presented with a weight loss of six and nine percent, respectively, of birthweight, within the first week, were found to have a hypernatremic dehydration. Based on these data and other clinical experiences, we recommend that a weight loss >7 percent of birth weight, regardless of the day such weight loss is noted, warrants further investigation.

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