Breast Milk as a Nutritional Supplement for a Lactating Burn Patient: A Novel Approach

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Abstract

Nutritional optimization is especially vital for recovery in the hypermetabolic burn patient to encourage wound healing and avoid metabolic derangements. Though it is generally recommended to initiate enteral feeds within 24 hours of injury, nutritional regimens must be individualized, considering patient-specific circumstances, such as the lactating burn patient in this case. We present a case of a lactating female burn patient who received her own expressed breast milk as a supplement to her hospital prescribed nutritional support in an attempt to maintain her total caloric neutrality.

INTRODUCTION

Nutritional optimization is especially vital for recovery in the hypermetabolic burn patient to encourage wound healing and avoid metabolic derangements.[1] It is estimated that moderate-to-severely burned patients have approximately a 1.5 to 2 times greater basal energy expenditure, making nutritional support challenging.[2] Though it is generally recommended to initiate enteral feeds within 24 hours of injury, nutritional regimens must be individualized, considering patient-specific circumstances, such as the lactating burn patient in this case. The majority of available breastfeeding literature refers to the post-burn lactation in patients who wish to breastfeed their infants.[3] We present a case of a female burn patient who received her own expressed breast milk as a supplement to her hospital prescribed nutritional support in an attempt to maintain her total caloric neutrality. This case report has received exemption from the Institutional Review Board.

CASE REPORT

Seven months post-delivery of a healthy infant, a 26 year old female sustained a 45% total body surface area (TBSA) partial-full thickness burn after her clothes caught fire while cooking. On admission, the patient requested that lactation be preserved during her hospitalization so that she could continue breastfeeding upon recovery. The continued lactation was an added stress on her catabolic/inflammatory state since approximately 20 calories are needed to produce one ounce of milk. Initially, the expressed breast milk was discarded, following the "Pump and Dump" strategy.[6] To diminish the excess catabolic demand posed by lactation in the setting of the major burn injury, the expressed breast milk was returned to the patient from hospital days 9 through 30 as a part of her enteral nutrition regimen.

During her admission, she required an escharotomy to her right hand and forearm. Subsequently, she was placed in burn dressings to her right hand, torso, and bilateral upper and lower extremities. Her 43 days hospitalization required six tangential excisions and either initial cadaveric allografting or subsequent autografting (days 1, 2, 9, 16, 17, 23, 27) as well as a tracheostomy. Final split thickness skin grafts and harvest sites were also treated with ReCell® (Avita, Valencia, CA) per manufacturer's instructions.[4] She required a total of 35 days of ventilator support and was treated for a ventilator-associated Klebsiella pneumonia during this hospitalization.

Nutritional Support

The expert consensus to calculate resting energy expenditure (REE) in adults, especially burn patients, continues to be indirect calorimetry, which should be used upon admission

to the hospital, and at least once weekly until the patient is medically stabilized.[5] During her admission, metabolic studies were performed, using CCM Express® (Medical Graphics Corporation, St. Paul, MN), within 48 hours of admission and weekly thereafter in accordance with this guideline. The metabolic study results including the REE during her admission ranged from 1722-2495 kcal/day depending on patient-specific circumstances. The patient received enteral feeding from the time of admission. Her admission weight was 50 kg and BMI was 22. The tube feeding rate was subsequently adjusted accordingly using Impact® Peptide 1.5 (Nestle Health Science, Bridgewater, NJ). She received continuous tube feeding over 24 hours with rate varying from 60-80 ml/hour, providing 2160-2880 kcal/day (43-58 kcal/kg). In addition to receiving TF and breastmilk as a caloric and protein source, the patient also received multivitamins and extra supplementation of Vitamins A and C and zinc sulfate. Even though the actual volume of expressed breast milk was inconsistently documented, the volume of expressed breast milk given to her ranged from 160 to 515 ml per day. It amounted to 107 to 345 Kcal/day. She was 52.4 kg at the time of discharge.

Laboratory Parameters

Her nutritional and other laboratory parameters were followed in accordance with the standard protocols in the burn center. Except for her nutritional parameters, the majority of the patient's laboratory values reflected the expected course seen after a major burn injury. During her hospital stay, she received a total of 19 units of packed red blood cells, 8 units of fresh frozen plasma, and 1 unit of platelets. Her initial nutritional values demonstrated the usual decline observed after a major burn injury. The patient was started on her expressed breast milk supplementation on Day 9; her low prealbumin, transferrin, and platelet levels returned to normal within 10 days and continued to increase despite multiple operative interventions throughout her hospital stay, Table 1. Generally, there is an increase in prealbumin levels with a decrease in C- Reactive Protein (CRP) as seen here. At the time of discharge, patient's albumin, total protein, and calcium returned to normal levels.

Table 1

Nutritional Parameters Before and After Breast Milk Supplementation

Parameters	Normal	Hospital Day*						
		1	2	10	13-14	16	20	37
Prealbumin mg/dL	15-36	14	9	10	6	11	17	25
Transferrin mg/dL	170-370	150	81	130	81	113	160	208
^CRP mg/L	≤ 5.0	4.05	--	--	429.97	--	94.11	128.0
Albumin g/dl	3.5-5.5	2.2	2.2	2.1	1.6	2.0	4.3	3.0
Total Protein g/dL	6-8.3	4.3	4.0	4.2	3.9	4.4	1.9	6.2

* Hospital Day 9: Breast Milk Return Starts; ^ CRP= C-Reactive Protein, High Sensitivity

DISCUSSION

This is a case of a novel approach to a successful treatment of a severely burned patient utilizing an immune enhancing enteric formula while supplemented with her own expressed breast milk. During this process, she retained the capacity to lactate and continued to breastfeed her infant post discharge. Major burn injury imparts a significant catabolic response. Adequate nutrition is paramount for wound healing and recovery. Lactation places an added catabolic burden and increases nutritional demand after a pregnancy, and therefore, these patients are at an even higher risk for poor wound healing.

There is little data on the impact of maternal nutrition on breast milk composition.[8] A study by Keikha et al indicated that maternal intake of fatty acids and vitamins may impact the composition of breast milk.[8] Utilizing the patient's own breastmilk as caloric intake provided the mother with an additional 60-75 kcal/100 ml and essential nutrients such as fatty acids, immunoglobulins, fibronectin, lactose, electrolytes, calcium, phosphorus and magnesium along with trace elements as iron, copper, and zinc.[9] To our knowledge, there are no other reports in the literature where a patient's own breast milk has been used as a nutritional supplement while being treated for her severe burn injuries. There is a study of donated breast milk as cancer therapy for adults, to improve their quality of life.[10] Most of the reported benefits were qualitative and seen in individual patients and not across the entire study population.[10]

Conclusion

Supporting lactation and the production of expressed breast milk might provide critically ill hospitalized post-partum women with a nutritional supplement, and maintain their nursing ability after healing.

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