Case Study: Parenteral nutrition therapy initiated in the home environment in a patient with pancreatic cancer and chylous ascites

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BACKGROUND

Patient X is a 68 year-old female with a primary diagnosis of pancreatic cancer. After successful chemoradiation, the patient underwent a distal pancreatectomy, splenectomy, and portal vein resection in January 2019. In April, she was rehospitalized due to decreased appetite and was found to have chylous ascites and a pancreatic fistula with output measuring 300-900mls per day. Her weight was 95.3lb and body mass index (BMI) was 15.8. Serum protein and albumin levels were 4.0 and 3.1, respectively. Supplemental nutrition support was recommended, and the patient was referred to this specialty infusion organization on 04/25/2019 for initiation of home parenteral nutrition (HPN). The goals of therapy for Patient X were to provide electrolyte and hydration stabilization, replete visceral protein stores, and provide gentle weight gain at a rate not to exceed 2 to 3lb per week. The purpose of this case study is to illustrate this patient's experience with home start parenteral nutrition therapy and achievement of the stated goals.

METHODS

A multi-disciplinary team conducted a retrospective review of the patient's medical records using a proprietary clinical outcomes program, SoleMetrics®. The review contained documents from April 2019 through July 2019, and included the prescriber's office visit notes as well as assessments performed by clinicians within this home infusion organization during each contact with the patient.

RESULTS

Table 1. Lab Results and Interventions 04/25/2019 – 07/01/2019

	Reference Range	4/25	4/26	4/29	4/30	5/6	5/7	5/13	5/14	5/21	5/28	6/10	6/11	6/17	7/1
Glucose	65 - 99 mg/dL	122		146		122		183		147	143	133		145	137
BUN	8 - 27 mg/dL	16		21		19		21		20	18	20		20	11
Creatinine	0.57 - 1.00 mg/dL	0.62		0.43		0.41		0.46		0.44	0.42	0.43		0.48	0.57
BUN/Cr Ratio	12 - 28	26		49		46		46		45	43	47		42	19
Sodium	134 - 144 mmol/L	130		132		137		138		134	137	139		137	141
Potassium	3.5 - 5.2 mmol/L	5		4.7		4.5		4.3		4.6	4.4	4.4		4.2	4.2
Chloride	96 - 106 mmol/L	95		97		102		102		99	101	104		102	105
CO2	20 - 29 mmol/L	22		23		20		22		22	22	19		20	19
Calcium	8.7 - 10.3 mg/dL	9		8.9		8.8		8.5		8.3	8.4	8.4		8.4	8.8
Protein	6.0 - 8.5 g/dL	4		4.6		4.9		4.5		4.2	4.7	4.8		5.1	5.4
Albumin	3.6 - 4.8 g/dL	3.1		2.8		2.8		2.7		2.4	2.6	2.9		2.9	3.2
Bilirubin	0.0 - 1.2 mg/dL	0.2		<0.2		0.2		0.2		0.2	<0.2	<0.2		0.3	0.3
Alkaline phosphatase	39 - 117 IU/L	197		165		237		294		596	503	514		627	1310
AST	0 - 40 IU/L	33		24		47		80		122	94	85		327	201
ALT	0 - 32 IU/L	50		29		63		122		202	123	111		317	283
Phosphorus	2.5 - 4.5 mg/dL	4		4		3.6		3.8		4	3.9	3.9		3.5	4.5
Triglycerides	0 - 149 mg/dL	151		316		170		158		139	175	167		119	99
Magnesium	1.6 - 2.3 mg/dL	2.1		2.1		2		1.9		1.9	2	1.9		1.9	1.8
Prealbumin	10 - 36 gm/dL														15
Intervention			Initial HPN formula recommendation; Lab draw on Day 4		Decrease hours of infusion; increase NaCl; Change lipid formulation from soybean oil to one containing medium-chain triglycerides (MCT) (*pharmacy did not have MCT lipids in stock and took 2 weeks to obtain)		Decrease hours of infusion; decrease dose of lipids from 45gm to 25gm		Change lipid formulation from soybean oil to MCT lipids				Removal of lipids		
Weight	lbs	95.3		97.4		105		104.5			101.3	105.4		106.8	
BMI	kg/m2	15.8		16.2		17.4		17.3			16.8	17.5		17.7	

Patient X began receiving HPN on 04/26/2019. Labs were evaluated prior to the initiation of HPN to assess the potential for refeeding syndrome. Labs were drawn again on Day 4 of HPN therapy and then monitored weekly as the risk of refeeding syndrome was mitigated. A total of 5 clinical interventions were made by the dietitian within the specialty infusion organization, including the initial formula recommendation. The patient's weight at the end of therapy was 106.8lb (BMI 17.7), representing an 11.5lb increase over 9.5 weeks of HPN therapy. Macronutrient composition adjustments were complicated by elevations in the patient's liver function tests (LFTs) up to 5-6 times the upper limit of normal. Some methods employed to help reduce the LFTs were to cycle the HPN infusion down to 12 hours per day, change the lipid formulation from soybean oil to a product containing a combination of soybean oil, medium-chain triglycerides, olive oil, and fish oil, and ultimately remove the lipids from the HPN preparation altogether. The LFT levels did decrease as a result, but an additional rise in LFTs seemed to coincide with the re-introduction of fats into the patient's oral diet. Serum protein levels normalized by week 8 (5.4). Serum albumin levels decreased to 2.8 during the first week of HPN therapy but then slowly trended upward to 3.2 by the end of therapy.

Table 2. HPN Formulation Summary

	4/26/2019	5/1/2019	5/8/2019	6/12/2019	6/25/2019
Infusion Time (hr)	18	14	12	12	12
Volume (mL)	1000	1000	1000	1000	500
Calories (kcal)	910	1010	810	560	282
AA (gm)	55	55	55	55	56
Dextrose (gm)	100	100	100	100	100
Lipids (gm)	35	45	25	0	0
Sodium (mEq)	97	107	107	107	108
Potassium (mEq)	45	45	45	45	46
Chloride (mEq)	110	120	120	120	122
Acetate (mEq)	40	40	40	40	40
Phosphate (mmol)	10	10	12	10	10
Calcium (mEq)	10	10	10	10	10
Magnesium (mEq)	10	10	10	10	10
Copper (mg)	1	1	1	1	2
Chromium (mcg)	10	10	10	10	20
Manganese (mg)	0.5	0.5	0.5	0.5	1
Zinc (mg)	5	5	5	5	10
Selenium (mcg)	60	60	60	60	120
Multivitamins (ml)	10	10	10	10	10
Aluminum (mcg)	43	43	43	43	49

DISCUSSION

Though the International Study Group on Pancreatic Surgery (ISGPS) position paper on nutrition support states that enteral nutrition is preferred over parenteral nutrition[1], this patient already had a central IV access in place. However, if the patient had an insurance other than a private commercial plan, obtaining authorization for HPN therapy prior to a trial with enterals may not have had the same outcome. Attempts were made to obtain lab results that were drawn outside of this specialty infusion provider to evaluate the patient's LFT levels after fully discontinuing HPN therapy, but these were unsuccessful.

CONCLUSION

Patient X's nutritional goals of weight gain, electrolyte and hydration stabilization, and visceral protein repletion were met after 9.5 weeks of HPN therapy. She was able to tolerate an oral diet, and chylous output was eliminated by week 8 of therapy. The patient did not experience any rehospitalizations or catheter infections while receiving HPN therapy.

References:
1) Gianotti L, Besselink MG, Sandini M, et al. Nutritional support and therapy in pancreatic surgery: A position paper of the International Study Group on Pancreatic Surgery (ISGPS). Surgery. 2018 Nov;164(5):1035-1048.

Disclosure: Authors of this presentation disclose the following concerning possible financial or personal relationships with commercial entities that may have a direct or indirect interest in the subject matter of this presentation: Nothing to disclose.