



Nutritional Challenges and Management in Post-surgical Non-Hodgkin Lymphoma

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Abstract

Non-Hodgkin Lymphoma (NHL) is a type of cancer that arises in the white blood cells called lymphocytes, when the cells start dividing uncontrollably. We present a 46 year old woman who was a known case of NHL (proximal jejunum which is quite uncommon) post 5th cycle of chemotherapy who presented with history of fever, abdominal pain with vomiting. The patient underwent exploratory laparotomy, resection of perforated segment of distal jejunum and peritoneal lavage with primary anastomosis. A nutrition care plan was devised to prevent nutritional deficiencies and minimize the effect of catabolism. Nutrition intervention supports the overall recovery and surgical outcome. The patient showed remarkable improvement despite the nutritional risk and the nutritional challenges presented to us. The treatment included total parenteral nutrition progressing to soft diet with high protein prior to discharge, which aids in quick recovery, faster wound healing and tissue repair.

Keywords: Non-hodgkin Lymphoma; Laparotomy; Total Parenteral Nutrition; Chemotherapy; High-Protein Diet; Cancer

Introduction

Lymphoma is a type of cancer affecting the body's lymphatic system. Cancer begins when the cells start to grow uncontrollably. The lymphomas can develop anywhere in the body wherever the lymph tissues are present [1]. In NHL, the process involves either two types of lymphoma cells i.e. B-cell or T-cell. B-cell plays the role of producing the antibodies that fight against infection whereas T-cells destroy the foreign cells. B-cell NHL is the most common occurring cancer; it is also known as diffuse large B-cell lymphoma. NHL is further grouped into two on the basis of the growth and

spread of the tumors, indolent lymphoma and aggressive lymphoma. Indolent lymphoma grows and spreads slowly whereas aggressive lymphoma grows and spreads quickly. Ann Arbor is the staging used for lymphoma. RCHOP is the chemotherapy regimen used to treat Non-Hodgkin Lymphoma. A potential complication is perforation, which may result in peritonitis, septic shock, multi-organ failure, prolonged hospitalization, delayed chemotherapy and death. The putative rationale is to facilitate early recognition and reduce peritoneal contamination in the event of perforation.

According World Health Organization Lymphoma classification 2016, total of 390 cases of adult were registered in the department of medical oncology (AIIMS, New Delhi) out of which 89% are B-cell lymphoma whereas T- cell lymphoma is 11% of NHLs. In B-cell Lymphoma, Diffuse large B-cell lymphomas (DLBCL) was the most common subtype which was present among 68.5% of cases [2]. Non -Hodgkin lymphoma is the type of cancer that arises in the white blood cells called lymphocytes [3].

This case report is of 46 year old woman who was a known case of NHL proximal jejunum (Ann Arbor stage II) had received RCHOP which is a drug that includes rituximab, cyclophosphamide, doxorubicin hydrochloride, vincristine (Oncovin, Vincasar PFS), prednisolone post 5th cycle of chemotherapy. Stage II Ann Arbor denotes that the cancer is present in two separate regions. She had presented to medical oncology with severe abdominal pain with vomiting. History of fever and bilious vomiting associated with the same. She was finally diagnosed with perforation peritonitis and advised for exploratory laparotomy, resection of perforated segment of distal jejunum and peritoneal lavage finally was performed.

Exploratory laparotomy is a surgical procedure usually performed when one has unexplained abdomen pain. It can be even done when the information is not clear from the clinical diagnosis [4]. Nutrition intervention, in such critically ill patients, supports the overall recovery and surgical outcome. This lady showed remarkable improvement amidst all the nutritional challenges such as nausea, poor appetite, post-surgical intestinal resection (hence the oral route was inaccessible initially), therefore the nutrition care plan involved prescription of total parenteral nutrition thereafter progressing to soft diet with high protein which aids in quick recovery, faster wound healing and tissue repair. Nutrition support was crucial due to underlying disease condition which predisposed the patient to nutritionally at risk and it was necessary to prevent macro and micronutrient deficiencies in this case and also to manage minimize the effect of catabolism in cancer cachexia. Therapeutic goal was to achieve a high calorie and high protein diet, target of 80% was possible to achieve which resulted in excellent recovery.

Case Report

The patient was pre-operatively not under any nutritional intervention. The case was categorized as nutritionally high risk with subjective global assessment grade as C when the nutrition assessment was carried out at hospital within 24 hours of patient's admission. The PATIENT was closely monitored with a nutrition care

plan devised by team of clinical nutritionists, intensivists and surgeons to achieve better surgical outcome.

Investigations done-

- X-ray abdomen erect: Air under diaphragm: CECT abdomen pelvis: Evidence of Pneumoperitoneum noted. Moderate intraperitoneal free fluids with air fluid levels noted. The free fluid with mottled air pockets noted in the pelvis. Mild to moderate diffuse wall thickening noted in the mild and distal jejunal loops. Stomach, C loops of duodenum and proximal jejunal loops are dilated.

Then the requirement of exploratory laparotomy – repair of perforation and resection anastomosis was suggested.

Past medical history

46 years old lady diagnosed case of Non- Hodgkin lymphoma (Ann Arbor stage II) post 5th cycle of chemotherapy with R-CHOP with complaints like nausea, central abdomen pain, loss of appetite and weight loss. Evaluation had shown jejunal thickening with mesenteric nodes. Upper enteroscopy had shown ulcers from D3 proximal jejunum.

Care plan

Patient was admitted with complaints of abdomen pain and was taken up for surgery after pre-operative counselling with informed consent and anesthesia evaluation.

Procedure done

Exploratory laparotomy, resection of perforated segment of distal jejunum and peritoneal lavage.

Findings

- 1500 ml of bilious fluid in peritoneal cavity.
- Dilated jejunal loops from DJ flexure till perforation in distal jejunum.
- Stricture just distal to perforation with bowel wall thickening.
- Pus flakes all over peritoneum (visceral and parietal).

Surgery

- Under the aseptic precautions, abdomen opened in layers
- Findings confirmed.

- Peritoneal fluid sucked, sent for culture sensitivity, peritoneal lavage given.
- Primary closure of perforation planned, but stricture noted with bowel wall thickening at same site, hence a 15cm segment of bowel resected and anastomosed.
- Mesenteric rent closed.
- Nasojejun tube tip placed in D3 duodenum.
- Peritoneal lavage given.
- Abdomen closed with loop placed in right paracolic gutter inferiorly and left paracolic gutter superiorly.
- Skin approximated with staples.

Post operatively she was admitted to the intensive care unit for 5 days. She was extubated on day 2 and further required non-invasive ventilation till post-op day 4. She was shifted to ward on post-op day 5.

Medication history

She was treated with IV antibiotics and given supportive care.

Dose name	Action
Inj. Piptaz	To treat abdominal infections
Inj. Pantop 40mg	Given in order to decrease the acid production in the stomach and promotes in healing of ulcers.
Inj. Ertapenem	To treat certain serious infections, including abdominal infections caused by bacteria.
Inj. Fragmin 5000	An anticoagulant used to prevent the formation and growth of blood clots in patients with certain medical conditions. It also prevents blood clots that may potentially form during certain medical procedures.
Fentanyl (epidural infusion)	This medication is used to help relieve severe pain due to cancer. It belongs to a class of drugs known as opioid analgesics.
Inj. Bupivacaine	It is given as epidural injection to produce numbness during certain medical procedures.

Table a

Nutritional care and management

Nutrition after surgery plays an important role in the recovery especially while we are unable to access the oral route and in order to avoid starvation [5]. Nutrition support is necessary to prevent macro and micronutrient deficiency, to manage and minimize the effect of catabolism due to the disease condition. Total Parenteral Nutrition is given in post op bowel procedure. It can be administered in both the ways central or peripheral.

In case of contraindications to oral and enteral nutrition, parenteral nutrition should be implemented within three to seven days (ESPEN, 2019). In this case total parenteral was given to patient from POD-0, she tolerated sips of water orally from POD-3 and oral liquids by POD-9 and followed by soft diet from POD-10. The patient was discharged on POD-12 and prescribed high protein soft diet. On POD 0, the TPN at the rate of 30 ml/hr was initiated by accessing peripheral route with that iv fluids as maintenance was given 250 ml/hr was given. On POD 1 and 2 it was increased to 50 ml/hr and thereby on POD 3 central access was utilized to continue feeding the patient intravenously. On POD 5 the volume of TPN was increased to 60 ml/hr with that multivitamins 10 ml/hr was given and TPN was continued for 5 more days thereby gradually tapered. On POD 10 TPN was withdrawn when the patient tolerated oral soft diet, on stable conditions she was discharged on POD12.

Medical nutritional therapy

- Due to hypermetabolic state of the underlying disease and post-operatively there is increased demand for energy and protein requirement. An energy requirement of 30-35 kcal/kg body weight/day to be prescribed. High calorie diet is helpful in inhibiting the side effects of chemotherapy.
- Protein requirement of 1.4g/kg body weight to be aimed due to increased metabolic stress and prevents the risk of catabolism.
- Adequate amount (60% of total energy) of carbohydrates should be planned
- Vitamin A, C and E help in reducing morbidity and mortality.
- Zinc and selenium supplementation also can be beneficial.
- Adequate intake of fluid is recommended to compensate for loss due to gastrointestinal disturbances, infection or fever.

Nutrient requirement and prescribed diet

Gender: Female
 Age: 46 years
 Height: 154 cm
 Weight = 58 kg (fluid accumulation in peritoneal cavity)
 Dry weight: 54 kg
 Energy: 35 x 54 = 1900kcal
 Carbohydrates: 60% = 60/100x 1900 = 285g
 Protein: 1.5g x 54 = 81g
 Fat = 100-(60+17.05) = 48g

Energy	Carbo-hydrates	Protein	Fat	Iron	Zinc	Vit C
1885 kcal	265g	80g	55.5g	21 mg	9 mg	128 mg

Table 1

Meal timing	Menu	Serving size
Breakfast	Moong dal dosa	2no
	Vegetable chutney	
	Fruit with boiled nuts	1 glass
Mid morning	Ragi/millet/oats porridge+supplement – 2 scoops	1.5 glass
Lunch	Rice	1.5 cup
	Tomato rasam	½ cup
	Bottle gourd sabzi	¼ cup
	Egg scrambled	2no
Evening	Besan cheela	1 no
	Lassi – 1 glass+ supplement 2 scoops	
Dinner	Chicken soup	1 cup
	Tomato methi rice	¾ cup
	Curd	½ cup
Post dinner	Milk + 2 scoops of supplement	1 glass

Table b

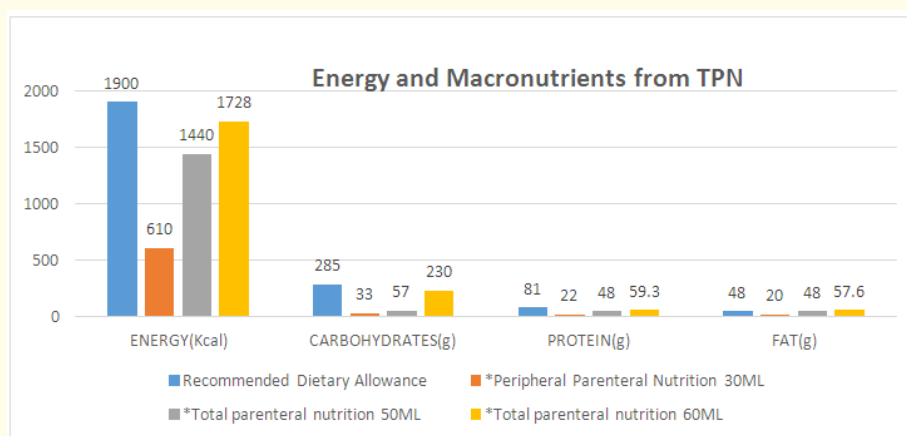


Figure 1: Depicts the macronutrients obtained from the TPN according to the quantity given. The Recommended Daily Allowance of energy, carbohydrates, protein and fat is compared with amount of TPN given in a day. *Peripheral parenteral nutrition Oliclinomel(N4), * Total parenteral nutrition Oliclinomel (N7).

Aspiration is the medical procedure involves removing the fluid (body fluids, air or bone fragments) through tubes like ryles tube, freka tube or by inserting drains. In this case after the surgery the aspiration of bile was taken through those tubes. Gradually there

was decrease in the amount of fluids collected which shows gradual post-operative recovery. When there is less aspiration or no aspiration, then it shows that the gastrointestinal system is getting better [6].

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8
Freka	150 ml	450 ml	30 ml	150 ml	800 ml	20 ml	150 ml	250 ml

Table 2: Freka tube aspiration (in ml).



Figure 2: Freka tube aspiration- bile (in ml), this graph shows the aspiration of fluids from the day1 to day 8. There was gradual decrease in the output volume.

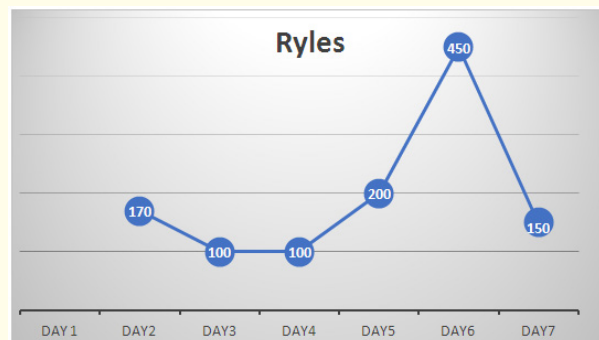


Figure 3: Ryles tube aspiration, this graph shows the gradual decrease of the volume of aspiration as the days progressed.

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Ryles	0	170 ml	100 ml	100 ml	200 ml	450 ml	150 ml

Table 3: Ryles tube aspiration quantity in ml per day.

The main purpose of keeping drains after the surgery is that, its objective is to eliminate the infected or inflammatory tissue fluids and to distress the unacceptable events like bile, pancreatic or bowel leakage. It also helps in preventing accumulation of pus in the body (area of surgery) [7].

	Day 1	Day 2	Day 3	Day 4	Day 5
Left drain	150cc(serous)	70cc(serous)	40cc	50cc	20cc
Right drain	75cc(serous)	150cc(serous)	50cc	50cc	20cc

Table 4: Drains from left and right side.

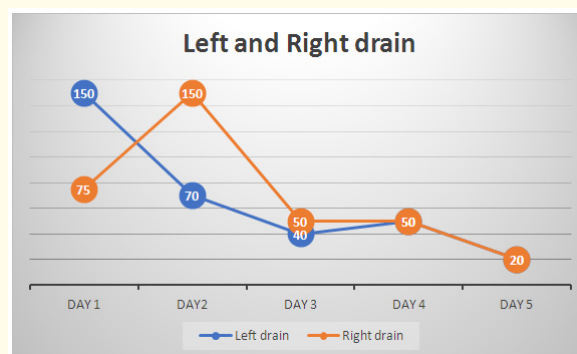


Figure 4: Drains from left and right side, in this graph also the drain volume reduced to 20cc which is the indication of healing.

	Before procedure	POD 7	Follow up 1	Follow up 2	Follow up 3
Height	154 cm	154 cm	154 cm	154 cm	154 cm
Weight	58 kg (fluid accumulation)	55 kg	54 kg	52 kg	53 kg
MUAC	Not recorded	25 cm	25 cm	-	26 cm

Table c

The patient had the history of weight loss after the chemotherapy, but her BMI was normal. During the surgery she weighed 58 kg, due to fluid accumulation of 1500 ml of bilious fluid in peritoneal cavity. After the surgery, on post op day 7 her weight was 55 kg with right hand grip strength 14.4 kg and left-hand grip strength 12.5 kg, both showed weak handgrip strength. The patient was counselled about high protein diet and about food safety and hygiene practices. Regularly food intake pattern was monitored by the Dietitian and the following guidelines were explained:

- Regular short energy and protein dense meal with oral nutrition supplement was advised.
- To eat foods that are soft cooked and chew thoroughly.
- Limit excess spices in meal preparation.
- Include iron rich foods in the diet. Always take iron rich food with the combination of vitamin c for better absorption. The bioavailability of heam iron is better than of non-heam iron. Heam iron includes non-vegetarian sources.
- Fruits (without peel) can be given. Eat the fruit immediately once it is cut.
- If any food causes discomfort, try to avoid such food for a while` and later start including it eventually.
- If there is no appetite, then try something like soups, pudding, moist foods and yogurt can be given.
- Healthy and essential fats such as MUFA and PUFA were emphasized in daily meal.
- Cleanliness and hygiene should be maintained during the food preparations.
- Fruit and vegetables are rich sources of carotenoids, vitamin C and E, folate, and dietary fiber and other nutrient that may inhibit carcinogenesis
- High beef consumption appears as a risk factor, while vegetables appear to be protective.
- Limit the consumption of refined carbohydrates, sweets, processed and red meats.

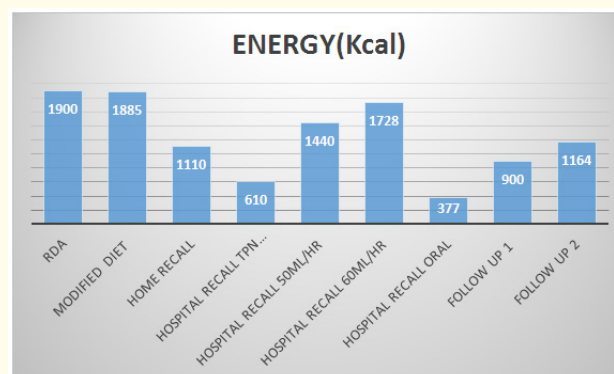


Figure 5: Energy intake.

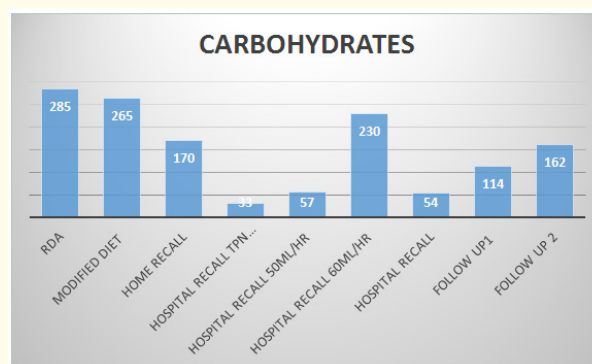


Figure 6: Carbohydrate intake.

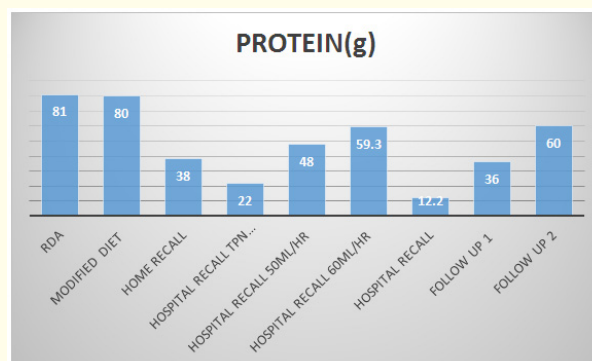


Figure 7: Protein intake.

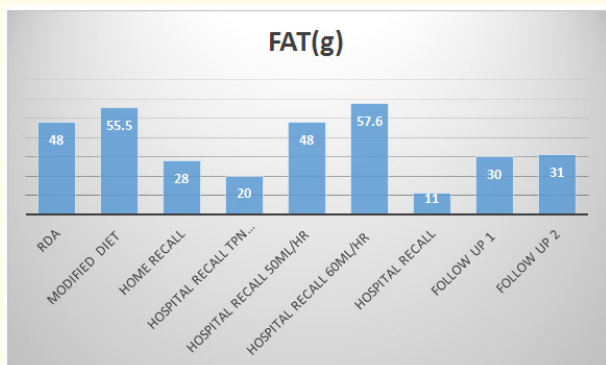


Figure 8: Fat intake.

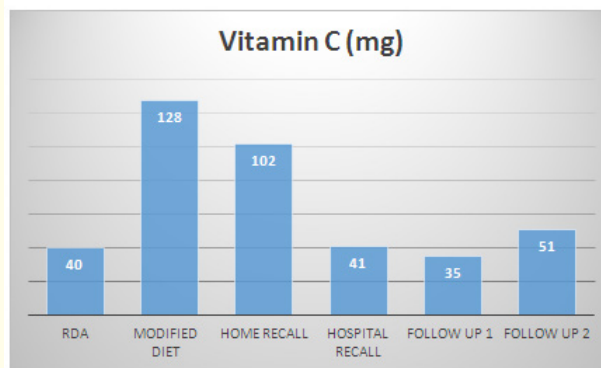
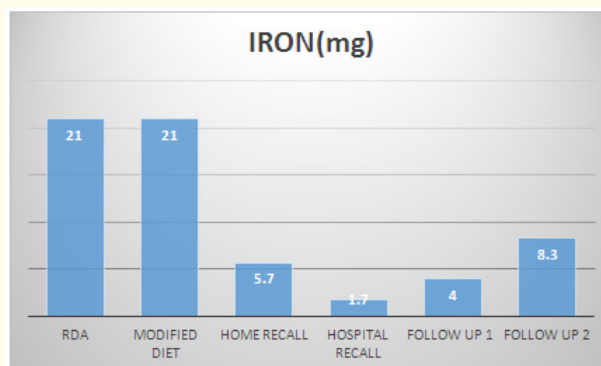


Figure A

Day	Handgrip Strength		Remarks
	Right hand	Left hand	
Day 7	14.4 kg	12.5 kg	Weak
Day 20	17 kg	15.6 kg	Strong

Table 5: Handgrip strength comparison.

Nutrient	RDA	Modified Diet	Home Recall	Hospital Recall (Orally)	Follow up 1	Follow up 2
Energy (Kcal)	1900	1885	1110	377	900	1164
Carbohydrates (g)	285	265	170	54	114	162
Protein (g)	81	80	38	12.2	36	60
Fat (g)	48	55.5	28	11	30	31
Iron (mg)	21	21	5.7	1.7	4	8.3
Zinc (mg)	10	9	4.9	1.6	3.8	4.6
Vitamin C (mg)	40	128	102	41	35	51

Table d

	Reference range	Before surgery	POD 0	POD1	POD 3
Total leukocyte	4-11	5.6	7.2	11.4	8.5
Neutrophils	40-75	82	91.4	68.8	84.7
Lymphocytes	20-45	9.3	4.3	25.1	4.6
Monocytes	2-10	8.5	4.1	5.3	9.4
Eosinophils	1-6	0	0.1	0.5	1.2
Basophils	0-1	0.2	0.1	0.3	0.1
RBC counts	3.8-4.8	5.36	4.71	3.63	3.21
PCV	36-46	40.3	35.2	26.9	23.6
MCV	80-100	75.2	74.7	74.3	73.5
MCH	27-32	24.2	23.7	23.6	24.2
Hemoglobin	12-15	13	11.1	8.5	9

Table 6: Biochemical parameters.

Table 5 provides the information regarding the energy, carbohydrates, protein and fat intake during hospitalization, post discharge and on every follow up intake was recorded and counseled. It was noted that her intake at hospital intake was inadequate due to poor appetite and response to pain but improved her intake after regular counseling, change in recipe, physical therapy as advised which showed drastic recovery and overall improvement in surgical outcome as well as her nutritional status.

Table 6 shows the improvement in the patient's handgrip strength. Though there was no much difference in the weight and mid upper arm circumference of the patient which remained constant as the patient's body mass index was normal before surgery but there was improvement in her handgrip. During the hospital stay her handgrip strength remained constant but a week later her appetite improved, oral intake got better which significantly showed an improved muscle mass and strength [8,9].

Results and Conclusion

Nutrition therapy for post-operative patient who underwent resection of perforated segment of distal jejunum and peritoneal lavage with Non-Hodgkin Lymphoma (NHL) involved minimizing the impact of catabolism amidst nutritional challenges and at risk. Nutrition support contributed in overall surgical outcome and well-being with minimum complication, early discharge, preventing readmission and faster wound healing. The patient was followed up and monitored for two months and observed to find improved nutritional status which was poor prior to her surgery. Post operative nutrition therapy involves during the hospital stay, a quick diet progression from total parenteral nutrition which is soy free and thereby gradually transitioned to oral soft diet. Nutritional monitoring showed remarkable improvement in handgrip strength which signifies that the macronutrient requirement was adequately planned and delivered to the patient. Hence, nutrition intervention supports the overall recovery and surgical outcome.

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