__Case study__

Recognition and Prevention of Hospitalised Malnutrition: A Case Report

Abstract

Rationale:

Poly-trauma post road traffic accident often induces a state of malnutrition due to the pathological changes and the insufficient protein and caloric intake for long time. If left unmanaged, malnutrition will have negative consequences on rehabilitation. Nutritional intervention provides caloric requirements and the nutritional support necessary to cover the daily nutritional needs and help contrast hospitalised infections. Our hypothesis is that integration of organised and continuous nutritional assessment and management can enhance prevent the state of malnutrition and increase rehabilitation outcomes.

Patient concerns:

We present the case of an adult man with Poly-trauma post caused by road traffic. The patient underwent tracheostomyand percutaneous endoscopic gastrostomy (PEG) procedures, had severe consciousness disorder.

Diagnosis:

He has severe consciousness disorder that necessitated the tracheostomy and the PEG.

Interventions:

Our approach included regular nutritional assessment and caloric calculation and implementation of as well as the gradual introduction of diet from NPO to clear liquid, as well as using of supplements and enteral formulas.

Outcomes:

The patient was followed for seven months during which the metabolic/nutritional pattern and the blood tests improved, normal weight restored, and consciousness regained.

Conclusion:

Nutritional intervention integrated has prevented drastic loss in weight, a better recovery, and the stabilization of the metabolic-nutritional framework. Nutritional approach used has contributed to the reduction of recovery times, making the therapeutic path more effective and applicable.

Keywords: Nutritional assessment, PEG, traumatic brain injury

Introduction

Road traffic accidents “RTA” is a one of the major sources of public health concern in Libya. Libya has the third highest per capita of fatal “RTA” in the world with a value of *40.5/100,000* inhabitants per year.(1) Unfortunately, despite the extent of this issue and the large number of people affected, not enough research in being made in relation to health consequences of motor vehicle collisions in Libya.(2) Nutritional status impairment is a common phenomenon among hospitalized patients. Malnutrition is a multifactorial clinical state that affects the structural status and body’s functional. Malnutrition leads morbidity, mortality, and deteriorated life quality. Furthermore, malnutrition is associated with an increase in nosocomial infection, prolong wound healing, and long hospital staying. Serious road traffic accidents, and consequently admission to a surgical and/ or intensive care unit cause protein and energy deficits. This has negative consequences on the overall nutritional and health rehabilitation process. (3, 4) Systematic nutritional intervention facilitates the provision of daily calories requirements and providing support against metabolic imbalances and hospitalised infections that occur as a consequence of traumatic brain injury. Intensive and early nutritional intervention provides a greater role for patient improvement. Prolong hospitalization can increase nutritional deterioration cycle in traumatic injured patients. Hospitalised malnutrition is a status of deficiency in energy, nutrients, and protein. It also includes adverse consequences on body shape, body function, composition, and size as well as clinical outcome. (5, 6)Researchers state varying statistics regarding the prevalence of hospitalised malnutrition. Recent statistics identified 19- 60% of hospitalized patients at risk of malnutrition. (3) It is essential to identify variables strongly associated with nutritional outcome in order to improve the nutritional care process. Rationing of calories requirements, meals consistency, meals modification, meals distribution, use of high or low diet contents and/ ordensity caloric foods all are significant components of the nutritional care process.A successful plan for prevention hospitalised malnutrition should include nutritional screening and assessment, effective utilization of the clinical nutrition team and/ or nutrition services, and an adequate utilization of proper nutrition support (oral, enteral or parenteral) with correct timing. [(7, 8)]Our hypothesis is that the use of well organised nutritional care process prevents hospitalised malnutrition and accelerates rehabilitation. This study aims to examine how the current guideline of Nutrition Department at New Marwa Hospital in Benghazi helps in of prevention of hospitalised malnutrition. This study was approved by New Marwa Hospital Ethical Committee.

Case study

Patient Information

The current paper describes the case of a 40 year old Libyan man who was admitted to emergency department on 5/7/2021 as a case of multiple trauma post road traffic accident (RTA) where all first aids and necessary medical examinations were carried out. The patient was intubated and moved to surgical intensive care unit (SICU). Brain CT showed multiple haemorrhage lesions at different levels. According to neurologists, the patient does not need any surgical intervention and need to use conservative management with serial CT/MRI follow up. Patient was on mechanical ventilation for one month then moved to simple face mask. Regarding nutritional care cycle; the nutrition team have done all the required steps of assessing his nutritional status continuously. Upon admission, in addition to the objective and clinical examination, the state of patient consciousness was assessed through neuropsychological and neurological scales. Glasgow coma scale was recorded (GCS 3/15); and the medications therapy was adapted to stimulate the various functional systems and modulate the awaking. These resulted in a severe disorder of consciousness, the patient did not show any contact with surrounding people or the environment. Anthropometric, biochemical, clinical signs and dietary intake were all assessed. Tracheostomy was applied as well as percutaneous endoscopic gastrostomy (PEG) was carried out. At admission, body weight was 85 kg; height was 1.74 meter with body mass index (28.1kg/ m^2 over weigh class). Table (1) shows the anthropometric measurement of the patients during seven months.

Nutritional Assessment and Dietary Intervention

Patient continued on NPO regime for three days; (IVF 3000cc/24 hrs) 1500n/s and 1500R/L. At night, OGT was inserted. IVF was decreased to 2000 cc/ 24 hrs. On 8.7.2021, after calculations of energy requirements, dietitians start their plan with half of his daily needs, that was estimated at about 1200cc/ 24 hours clear liquid diet; low simple carbohydrates, high calories and high protein. The regime was divided into200cc/ 3 hrs (150 cc food/ 50 cc water). The dietitians also advise the nurses to feed the patient slowly on 45^0 degrees. On 9.7.2021, the amount of feeding was changed into 2100 cc/ 24 hours; divided into 350cc/3 hours (275 cc food and 75 cc water). According to ESPEN guideline, the enteral feeding through OGT/NGT route it is preferable not to use for more than four weeks, and the medical state of the patient’s was critical, a percutaneous endoscopic gastrostomy (PEG) was insert. On 27.7.2021; GCS was recorded 5/15 and hypernatremia and hyperkalemia were found in his laboratory value as shown in tables 2 -4. At the first of August, anthropometric assessment was repeated. Body weight 80 kg, height 1.74 meter with body mass index (26.4kg/ m^2 over weigh class). As shown in table 2-4, all the laboratory assessment of the patients during seven months was recorded, and according to some results Vitamin D supplement, iron supplement, and Vitamin B supplement ((multivitamins and minerals)) were administrated. All the nutritional supplements that were given to the patient during the seven months are listed in Table 5. Patient underwent PEG tube placement between (August 2021) and (February 2022) at New Almarwa hospital. EN feeding through PEG tube initiated about 6-8 hours after insertion of the tube, to observe any early complication, and after the first 8 hours’ small amount of water (50ml/ 2h) administered initially. Following the first 24 hours of PEG tube insertion. The type of enteral feed introduced to feeding regimen include, hospital blended enteral home-made formula (HMF), commercial enteral nutrition formula (ENF),and powder formula, administered by gravity using intermittent bolus feeding regimen, started slow and at low volume and the volume increased gradually as patient tolerance rises. After each feed or medication administration, feeding tube flushed with 50ml water, to flush any residue from tube and preventing tube occlusion. The patient positioned at 30_45° angle to facilitate gastric emptying and prevent reflux. Although that blended enteral HMF are more natural, affordable and improves reflux and bowel problems, However the nutrition value and physical properties of blended enteral HMF compered to commercial ENF formula may be limiting its use. The type of diet was based on the following: disease determining energy and protein requirements, presence of any comorbidity, hydration status and electrolytes. The diet based formula was (specialized hospital blended enteral HMF) were made and prepared under supervision of expert dietitian, to meet patient requirements and calories goal, which was estimated at 30_35kcal/kg and protein requirements at 1_2g/kg/day, energy dense rich in phytonutrients, EDA and DHA. At the first 2 months' gastrectomy feeding was based mainly on blended enteral specialized HMF and the prescribed commercial ENF support an drink (Fresubin® kabi) for supplementary nutrition 200ml/3 times per day (early morning, evening, before bedtime), total feeding volume was 2400ml by bolus (400ml per 3hours), the supplemental formula high in calories (40% of energy fat) high in protein (27% of energy protein), in which provides 1.5 kcals/ml and 10g/100ml protein, in addition to vitamins, minerals and trace elements, in order to maintain positive nitrogen balance and prevent severe protein catabolism as result of metabolic response to injury. At the third month the patient had modest improvement in the nutritional status (using S.albumin and CRP), and abdominal ultrasounds showed that patient has hepatic steatosis (fatty liver) , and as triglycerides and higher glycemic index is strongly associated with hepatic steatosis the feeding regimen including blended enteral HMF and commercial ENF were modified while maintaining the same feeding volume, HMF was modified to include foods choices with lower glycemic index, higher fiber content and rich in MUFA PUFA as main fat source. in addition to diben drink formula and hepa drink formula (Fresubin® kabi) 200ml/3 times per day (early morning, evening, before bedtime) administered instead for supplementary nutrition. In which diben drink characterized by low glycemic index as it contains fiber 4g/200ml that help improve glycemic control and insulin sensitivity, low in Na and cholesterol while provides high calories 1.5 kcals/ml, high protein 7.5g/100ml. Whereas hepa drink formula provides high protein (44% of energy) mainly BCAA, fiber rich 2g/200ml, allow for adequate protein supply for patients with hepatic insufficiency. In the last month powder formula (Ensure milk) was administered and added to feeding regimen for supplementary nutrition, 5scoop prepared in 200ml water in which provides high protein, calories formula, 2times per day (early morning and midnight) as patient developed hypoglycaemic episodes at these times. also total feeding volume advanced to 2700ml/18hr (450ml/3hr) by bolus. On 3rd of August, In a step to increase the calories needed by the patient after his medical state is relatively stable, the kabi nutritional support formulas were included in the patient's nutritional therapeutic plan was start with fresubin heap kabi 200ml 3 times /day. The total of feeding was increased up to 3050 cc/ 24 hours (1750 cc from food, 600cc from kabi formula and 1100 cc water)After one week on 11th of August; The patient complain of vomiting for more than 2 times / day, a multidisciplinary team responsible for his medical condition decide to decrease the total volume of feeding up to 2000 cc /24 hours with advised for measure feeding gastric residuals every 3 – 4 hours during the first 24 hour ,and the feeding should be high dense diet. Table (6) shows the diet plans of the patients during seven months. After ten days (22.8.2021); The medical state of patient stable, the anthropometric assessment and laboratory values were reassessed; Body weight 81 kg, height 1.74 meter with body mass index (26.8 kg/m^2 over weigh class) and GCS was 7/15. On the same day total volume was increased up to 2450 cc/ 24 hours; (250 cc/ 3hrs food plus 100 cc water); with nutrients dense diet was used. All nutritional laboratory values are normal except vitamin D 11 ng/dl. Patient is putted on vitamin D and omega 3 supplements as well as high protein drink (Ensure formula 200 ml). On 30th of September his anthropometric measurement are Body weight 81 kg, height 1.74 meter with body mass index (26.8kg/ m^2 over weigh class). On the end of September, patient ultrasound reveals developing of fatty liver. Accordingly, dietitians start low fat diet for two months with rigours monitoring. At the end of October, his anthropometric measurements were reassessed and the patient shows the following parameters; Body weight 81 kg, height 1.74 meter with body mass index (26.8kg/ m^2 over weigh class). At the end of November, the repeating ultrasound reveals improvement in his liver status. Glasgow Coma Scale was repeated several times during the patient's hospital stay and table (7) shows the improvement of patient's GCS of during seven months.

Table (1) Anthropometric Measurement

Date	Weight kg	Height m	BMI	BMI category
5.7.2021	85	1.74	28.1	Pre-obese
1.8.2021	80	1.74	26.4	
22.8.2021	81	1.74	26.8	
30.9.2021	81	1.74	26.8	
30.10.2021	81	1.74	26.8	
30.11.2021	82	1.74	27	
30.12.201	82	1.74	27	

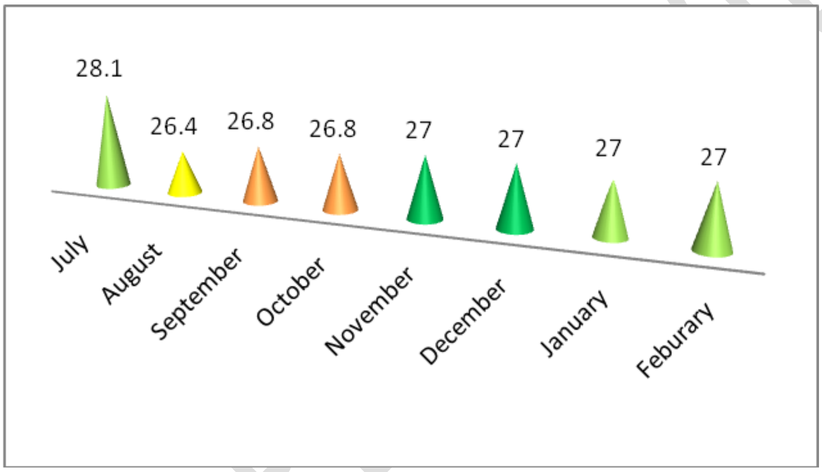

Figure (1) Body Mass Index

Table (2) Laboratory Investigation

Month	Date	Hb	RBC	MCH	Month	Date	Hb	RBC	MCH
July	5.7.2021	12.8	4.27	30	September	1.9.2021	11.4	3.82	29.8
	6.7.2021	9.6	3.18	30		7.9.2021	11.5	3.83	30
	12.7.2021	8.7	2.84	30.6		11.9.2021	12.4	4.08	30.4
	14.7.2021	9.2	2.97	31		19.9.2021	12.3	2.29	28.7
	17.7.2021	8.8	2.88	30.6		26.9.2021	14.1	4.66	30.3
	19.7.2021	8.5	2.78	30.6		27.9.2021	12.7	4.24	30
	20.7.2021	8.4	2.73	30.8	October	6.10.2021	12.9	4.32	29.9
	21.7.2021	10	3.38	29.9		14.10.2021	13.7	4.57	30
	27.7.2021	11.4	3.77	30.2		21.10.2021	12.3	4.16	29.6

	30.7.2021	11.7	4.11	30.2		28.10.2021	12.8	4.32	29.6
August	1.8.2021	11.7	3.86	30.3	November	1.11.2021	13	4.41	29.5
	5.8.2021	12.1	4	30.3		15.11.2021	13.2	4.53	29.1
	7.8.2021	11.7	3.89	30.1		9.12.2021	12.7	4.4	28.9
	10.8.2021	11.4	3.74	30.5		23.12.2021	13.5	4.67	28.9
	12.8.2021	11.7	3.91	29.9		9.1.2022	14.5	5.08	28.5
	15.8.2021	11.4	3.76	30.3					
	21.8.2021	13	4.31	30.2					
	31.8.2021	11.4	3.85	29.9					

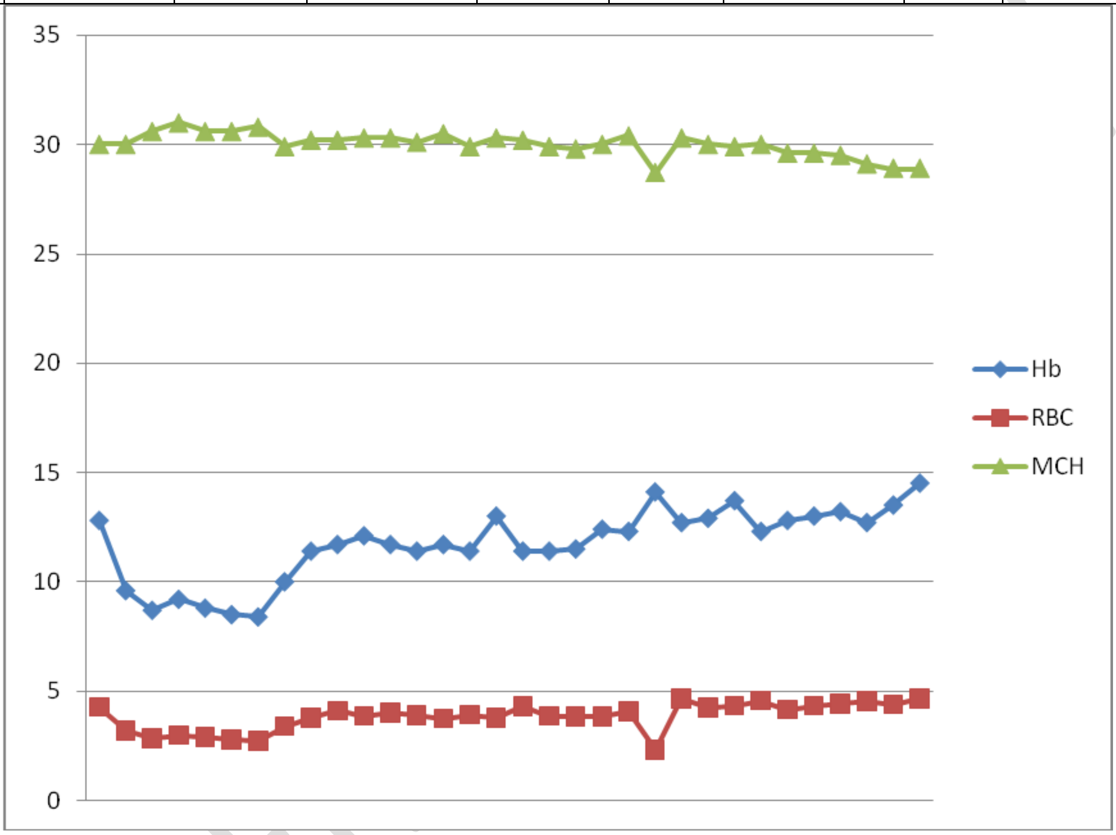

Figure (2): Fluctuations in Blood Counts

Table (3): Liver Function Test

Date	ALT	AST	Albumin
12.7.2021	151	56	3.69
14.7.2021	132	55	
20.7.2021	122	44	3.01
21.7.2021	105	34	
27.7.2021	31	57	3.7
1.8.2021	152	42	----
5.8.2021	111	25	----
10.8.2021	44	31	----
31.8.2021	62	40	----

1.9.2021	59	30	----
19.9.2021	40	----	----
26.9.2021	30	----	----
14.10.2021	19	23	3.86
15.11.2021	21	17	3.9

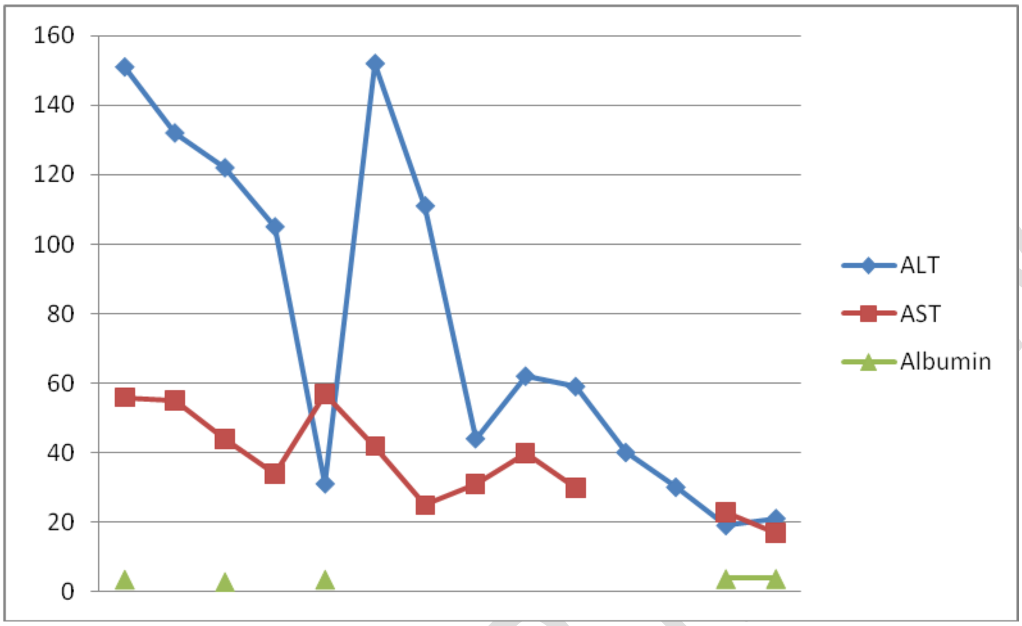

Figure (3): Fluctuations in Liver Function Parameters

Table (4): Renal Function and Electrolytes Tests

Date	Urea	Creatinine	Na	K	CRP
5.7.2021	38	0.4	138	3.3	----
12.7.2021	40	0.4	134	4.2	70
14.7.2021	----	0.5	138	4.1	----
17.7.2021	----	----	136	4.2	----
19.7.2021	----	0.4	147	3.8	----
20.7.2021	23	0.5	135	3.9	----
21.7.2021	19	0.4	140	3.9	----
27.7.2021	27	1.4	150	5.1	----
30.7.2021	51	----	135	4.2	----
1.8.2021	35	0.4	132	42	7.8
5.8.2021	43	0.5	134	4.3	2.1
10.8.2021	8	0.3	132	4.3	2.1
12.8.2021	----	----	----	----	20
15.8.2021	10	0.3	133	3.3	91
21.8.2021	----	----	----	----	12.4
31.8.2021	----	----	----	----	10.7
7.9.2021	----	----	----	----	5.4
19.9.2021	4	0.3	136	3.6	10.3
26.9.2021	12	0.3	133	4	24.6
27.9.2021	----	----	----	----	21.7
6.10.2021	12	0.3	142	3.6	9.5

14.10.2021	18	0.3	133	3.4	26.6
28.10.2021	----	----	----	----	26.6
15.11.2021	11	0.4	136	4	29
23.12.2021	12	0.5	142	4	18.2

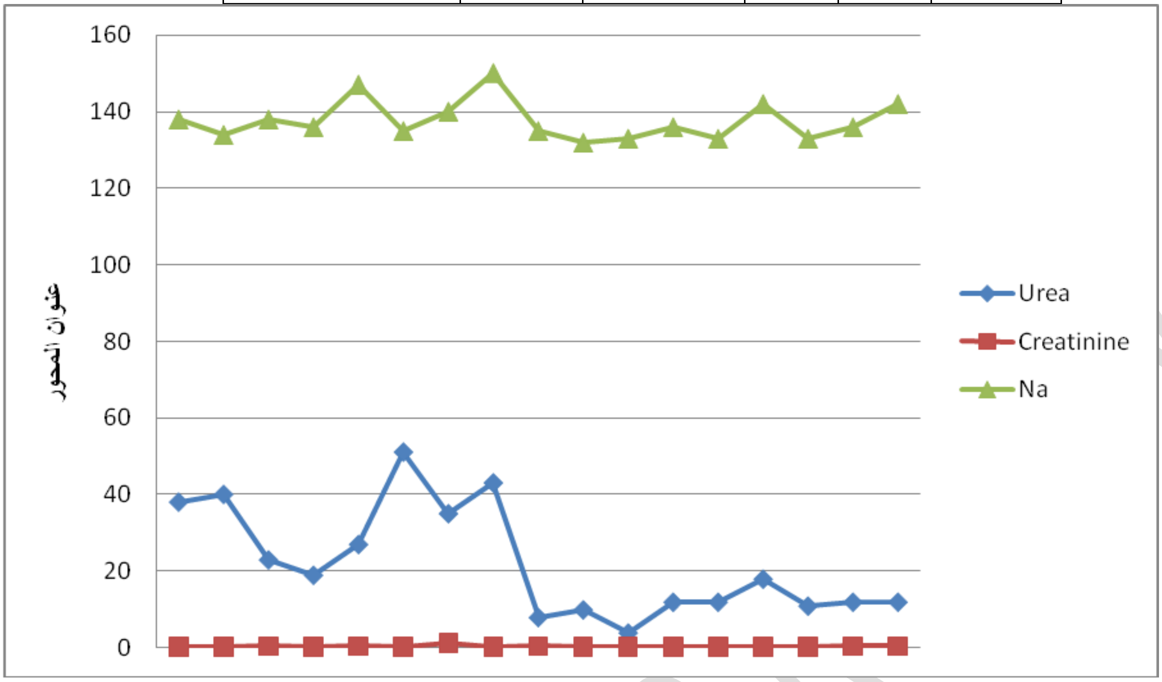

Figure (4): Fluctuations in Renal Function and Electrolytes Tests

Table (5): Supplements

Ferrous syrup 5ml oral	1 time/day – for 7 days
VIT B complex 2ml amp. 1ml IV	1 time/day – for 1 day
Fordal plus drops 800iu	50ml/ day – for 20days
Forvitmin syrup 100ml	1time/ day – for 10days
Human Albumin 200 mg / 10 gm IV	2 times/day for 5 days

Table (6) Diet plan

5.7.2021	NPO regime for three days; (IVF 3000cc/24 hrs) 1500n/s and 1500R/L.
7.7.2021	OGT was inserted. IVF was decreased to 2000 cc/ 24 hrs.
8.7.2021	1200cc/ 24 hours clear liquid diet; low simple carbohydrates, high calories and high protein. The regime was divided into200cc/ 3 hrs (150 cc food/ 50 cc water).
9.7.2021	2100 cc/ 24 hours; divided into 350cc/3 hours (275 cc food and 75 cc water).
10.7.2021	Feeding was staring with decreasing IVF to 2000 cc/ day. OGT 1200 cc/ 18 hours of full liquid diet divided into 200 cc/ 3 hours (150 cc food and 50 cc water).
15.7.2021	(Percutanous endoscopic gastrostomy (PEG).
27.7.2021	Patient was moved to 1900 cc from 8 am to 5 pm on PEG tube with soft diet. tube with soft diet; high calories with rich fiber 20 gram/ 1000 calories; rich in iron, unsaturated fatty acids (USFA), antioxidants; high biological values protein with

	restricted sodium and potassium. PEG tube feeding rate was 350 cc/ 3 hours/ 18 hours (300 cc food. 50 cc water) the total intake was 2100 cc/ 24 hours. At the same day, total water intake per day was 0.6 litters.
3.8.2021	The total of feeding was increased up to 3050 cc/ 24 hours (1750 cc from food, 600cc from kabiformula and 1100 cc water)
11.8.2021	Vomiting for more than 2 times / day, a multidisciplinary team responsible for his medical condition decide to decrease the total volume of feeding up to 2000 cc /24 hours with advised for measure feeding gastric residuals every 3 – 4 hours during the first 24 hour ,and the feeding should be high dense diet. Dietitians have started 30 ml of fresubin 5 kcal+ 120 ml fresubin heap = 150 ml +75 ml water
22.8.2021	Total volume was increased up to 2450 cc/ 24 hours; (250 cc/ 3hrs food plus 100 cc water); with nutrients dense diet was used.
3.9.2021	Patient still on PEG tube; 2400 cc/18 hrs with rate of 350 cc/3 hours divided into 300 cc soft food and 50 cc water.
30.9.2021	Patient ultrasound reveals developing of fatty liver. Accordingly, dietitians start low fat diet for two months with rigours monitoring.
30.11.2021	At the end of November, the repeating ultrasound reveals improvement in his status with liver.

Table (7) Glasgow Coma Scale

Date	**GCS/15**
5.7.2021	**3**
27.7.2021	**5**
22.8.2021	**7**
30.9.2021	**8**
30.10.2021	**10**
30.11.2021	**11**
30.12.2021	**13**

Discussion

To the best of our knowledge, this is the first study looking at influence of nutritional support to critically ill patients after brain injuries in Libya. Traumatic brain injury (TBI) is a major health and socioeconomic problem that affects all societies; and Libya is not an exception.[9, 10] However, TBI is often described as a silent epidemic, since awareness among the public and even clinicians remains low, and no new treatment for TBI has been approved in the past 30 years.In our case study, the patient's initial clinical picture was serious. It had a severe disorder of consciousness and multiple brain injuries. It is essential for a critical patient in intensive care to receive completed and organised nutritional support. The administration of suitable nutritional support and formulas within the first 24hours of the injury as well as during the early days has been shown to reduce the incidence of malnutrition. [11-14]The introduction of nutritional support has allowed a better tolerance of patient, reducing hospitalised malnutrition episodes, while allowing a general clinical recovery, this concerned the reduction of hospital infections, increased basal metabolism and metabolically active mass associated with the restoration of optimal nutritional status and increased muscle mass. [15] Malnutrition universal screening tool (MUST) is used to assess hospitalised Malnutrition.

Anthropometric Measurements

BMI is more than 20 kg/m^2 (score = zero); unplanned weight loss in 3 months is less than 5% (score = zero), no nutritional intake for more than 5 day (score = zero). The mini nutritional assessment (MNA) was also used as a clinical evaluation scale, gave an initial score of 2. Accordingly, patient does not suffer from hospitalised malnutrition after this long stay at hospital. [17-19] the weight gain associated with the establishment of the nutritional support has contributed to the improvement of the cognitive status as well as improvement in the rehabilitation process. Recent publications showed the addition of well designed nutritional support participates in the recovery of an optimal state of health.The body mass index of the current case decreased from 28.1 kg/m^2 to 27 kg/m^2. Past studies support our work approaches in different ways. Tappenden, K.B et al 2013; Annetta MG, et al. 2015, Reber, E et al 2019, and Kaegi-Braun et al 2021 support the current paper in term of keeping body mass index within the normal range using intensive nutritional support. The current work proves that malnutrition is frequent in patients during a hospital admission and may not go worsen during the hospital stay with appropriate nutritional support. Moreover, early recognition of individual nutritional risk and timely initiation of a tailored nutritional support are crucial. [17- 21] During the course of the hospital stay in our study, weight loss was 5 kg, and BMI status differed during seven months. This in fact raises a concern, the process of weight loss, regardless of the individual's usual weight, is considered a process of malnutrition in itself even if the patient remains within the normal standards after the body alterations. [23] The problem of weight loss has previously been documented during hospitalization, and it was the main observed variable and the strongest predictor of malnutrition in several studies. [23-25]

Laboratory Assessment

Regarding laboratory assessment; a few studies have examined biomarkers levels months or years after TBI. Studies have shown that blood biomarkers have a modest capability to distinguish healthy controls from concussed subjects. Some studies have shown that sub-concussive hits to the head can elevate biomarker levels. [26] Routine blood tests, such as haemoglobin, hematocrit, electrolytes, and white blood cells (WBC) count are regularly performed in patients with severe TBI. These tests are objective and could be used to predict outcomes. For example, hyperglycemias and anaemia and electrolytes imbalances are associated with worse outcomes. Early identification of bleeding sites for immediate surgical control is critical for severe trauma patients. One goal of blood biomarker research has been to discriminate between patients with abnormalities on CT scan (CT positive) from subjects without CT scan abnormalities (CT negative). [27]The intent is to identify TBI patients who are unlikely to benefit from CT scanning. Preventing secondary ischemic injury to neuronal tissue by ensuring adequate cerebral oxygen delivery is a cornerstone of post-TBI resuscitation, and the management of anaemia is paramount in this process and this is the same scenario with or current case. Following TBI, up to 46% of patients have a haemoglobin of less than 90 g/L during the first week of admission, and 76% of these patients require a red blood cell (RBC) transfusion. Blood Hb levels, however, have not been considered to be a marker for severe bleeding in the early stages of trauma because of a long-held belief that the compensatory mechanism that replaces the loss of blood volume in the vascular system takes effect slowly. Traditionally, it has been believed that blood component values require hours to equilibrate; however, recent investigations regarding Hb levels at the time of hospital admission of severe trauma patients have reported that peripheral levels of Hb can be lowered even during the very early stages of trauma. [28, 29] Bruns *et al* reported that an early decrease in Hb levels can be associated with the severity of bleeding in trauma patients. [30] The study subjects in these previous studies, however, received pre-hospital intravenous fluid administration. The effect of prehospital infusion may be minimal; however, the dilution effect cannot be ignored. Other studies also included severe trauma patients with massive fluid resuscitation because of their hypotensive status, which may have resulted in lowered Hb levels. In Japan, until 2014, owing to restrictions imposed by the national legislation, certified prehospital emergency life-saving technicians were not allowed to administer intravenous fluids to hypotensive trauma patients. [29, 31] A question that arises from these findings is how long it takes for the body to compensate for blood loss. It has been conventionally believed that after the compensation mechanisms for acute blood loss come into effect, it takes a relatively long time before Hb levels decrease. Looking at table (2) and figure (2); readers can note some drops in blood values during July and fluctuation in the same values during August and September. However, by the end of September patient started to restore the normal values. It is the same time of starting intensive nutritional support using formula. One of the more prevalent laboratory abnormalities following TBI is mildly elevated liver enzymes.[32, 33] Patients in intensive care unit (ICU) receive daily blood tests and some abnormal results can be challenging to interpret in the context of deranged physiology and critical illness-induced alteration in pharmacodynamics. Derangement of liver function tests (LFTs) are commonly observed in critically ill patients. A recent study has shown a prevalence of LFT abnormalities on admission to ICU in up to 61% of the patients without pre-existing hepato-biliary disease (HBD). In critically ill patients, these abnormalities can be attributed to multiple factors, such as hepatic ischaemia, sepsis, drugs, and artificial nutrition. Even though literates showed an association of abnormal LFTs with mortality outcomes and clinical events on ICU, this cannot be extrapolated for patients with TBI. [34, 35]Finding elevated liver enzymes usually prompts a cascade of diagnostic testing to include repeat serum analysis, imaging, and potentially invasive testing such as biopsy. Often these tests are unrevealing, leaving the clinician to decide between additional testing versus continued monitoring. Looking to the current case study, fluctuation within the liver enzymes been noted specially alanine aminotransferase “ALT”. In patients with head injury, additional risk factors for LFT abnormalities include hypotension and splanchnic ischaemia. Furthermore, patients with TBI are often on multiple medications, including antibiotics, antidepressants, acetaminophen, and anticonvulsants, which can cause a subclinical elevation in ALT that tends to resolve once the medication has been discontinued. Recent evidence from large-scale randomised trials states that efficient nutritional intervention not only improves the nutritional status, but also prevents negative clinical consequences and increases patients’ life quality. Furthermore, clear definition of team responsibilities and work processes are significant.[36-38] Multi-professional and interdisciplinary nutritional support teams improve the quality and safety of nutritional treatments. Important finding of our case study is the progressive improvement of fatty liver, ALT and ALP after administration of the nutritional support. Even though a pharmacological analysis was not performed, TBI patients are highly exposed to drugs such as H_2 antagonists (ranitidine), paracetamol, antimicrobials, well known for causing liver insult. [29 -31] Electrolytes and protein products imbalance is a salient finding in traumatic brain injury which can derail their clinical course of recovery in physical and cognitive health while prolonging the hospital stay. Hyponatraemia (defined as serum sodium <135 mmol/L) is one of the most common finding after TBI, manifesting especially in those who are critically ill. This finding can be seen in current case. Causes may be cerebral salt wasting syndrome, syndrome of inappropriate antidiuretic hormone secretion (SIADH), or iatrogenic due to use of drugs (thiazide, loop diuretic like furosemide, osmotic agent like mannitol). [40]Also as the duration of ICU stay lengthens pertinent to the severity of the injury or any cause, protein catabolism worsens; ensuing hypoalbuminemia, which can deteriorate the already set electrolyte imbalance (like hyponatremia). Patients with traumatic brain injury are more likely to develop electrolyte imbalance than patients without head injury. This was consistent with the findings by Suman S, et al 2016 and Rafiq MF et al 2013. [32, 33] The most common electrolyte imbalance in patients with traumatic brain injury was sodium followed by potassium and our case is not am exception. This was consistent with the finding by Dey S et al 2021, Suman S, et al 2016 and Rafiq MF et al 2013. [32-34] Almost every patient developed fluctuation in albumin during course of stay in ICU; the same situation of the current case. This is may be explained by three facts. Firstly, the nutritional status of most of the patients was already poor at the time of admission. Secondly, albumin and pre-albumin are consistent markers of sepsis, so hypoalbuminemia was predominantly seen as patients developed septicaemia during their course of stay in ICU. And thirdly, patients with traumatic brain injury are frequently hyper-metabolic and hyper-catabolic; demonstrate many aspects of acute phase response, and often have depressed albumin concentration on admission and throughout much of their course of admission. (35- 37, 41)

Conclusion

Our work, based on nutritional support and intervention integrated with team based work, has allowed a gradual increase in weight, a better recovery and the stabilization of the metabolic-nutritional framework. Therefore, on the basis of the current observations, we can state that the nutritional support has contributed to the reduction of recovery times, facilitate the rehabilitation, making the therapeutic pathway more effective.

Footnotes

Abbreviations: BMI = body mass index, GCS = Glasgow coma scale, ICU = intensive care unit, MNA = mini nutrition assessment, PEG = percutaneous endoscopic gastrostomy, ALT ..... And other abbreviations

The study protocol was approved by the Local Ethics Committee of The New Almarwa Hospital Informed written consent was obtained from the patient's family during the first month; later on the patient himself gives his consent for publication of this case study report.

CONSENT

As per international standard or university standard, Participants' written consent has been collected and preserved by the author(s).

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