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Case Report

Biochemical Liver Function Test in a Transplant Recipient: A Case Report

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Abstract

The percentage of liver transplantations over the last two decades has been on the rise across the world, nearly 33000 reported transplants took place in 2017 with an increase expected in the upcoming years. Majority of the recipients of liver transplant generally has liver cirrhosis caused by NAFLD/AFLD making them vulnerable to damage their other organs as well. In most cases the transplantation organ is donated by a blood relative within the family as most other donors have high chances of graft rejection. We report a case of liver cirrhosis patient with continuously liver function tests carried out for a period of three months, subsequently the patient was listed as one of the recipients for liver transplant as his biochemical parameters showed signs of liver failure progressing to severe state.

Keywords: NAFLD; AFLD; Liver Cirrhosis; Liver Function Tests

Abbreviations

NAFLD: Non-alcoholic Fatty Liver Disease; AFLD: Alcoholic Fatty Liver Disease; ESLD: End-stage Liver Disease; e-GFR: Estimated Glomerular Filtration Rate; CKD: Chronic Kidney Disease.

Introduction

Liver diseases cause nearly 2 million deaths worldwide and one of the leading causes of non-communicable diseases (NCD's) [1]. Non-alcoholic fatty liver disease (NAFLD), alcoholic fatty liver disease (AFLD), hepatocellular carcinoma and viral hepatitis have been identified as the main types of liver diseases presently evident globally. Liver cirrhosis leads to end-stage liver disease (ESLD) which can lead to complications such as ascites, hepatic encephalopathy, spontaneous bacterial peritonitis, and esophageal varices making the quality of life even harder in these individuals [2].

In Sri Lanka liver disease is the second leading cause of death in the in-patient care system and averages nearly 15 deaths per 100,000 in the country [3]. With the increasing presence of diabetes and obesity in the country, NAFLD has become the main form of liver disease leading to liver cirrhosis, additionally this also triggers damage to the kidneys resulting in kidney failure as well [4].

Liver function tests, ultrasound and blood profiling are the common tests carried out to diagnose the patient, in some instances a liver biopsy is taken to confirm the cause of the liver disease. Patients in end stage liver disease will require transplantation of a healthy donor as the medications provided will only allow them to get through the day rather than helping them solve the dilemma.

Organ transplantation is a major issue as organ shortage has been known to be a global phenomenon, living donors have high chances of successfully providing the liver has the chances of rejection are lower compared to the non-living [5]. With the uncertainty of liver availability for the recipients affected individuals and their families seek for alternative options and find organs from the "black

market" or bribe physicians to obtain the liver for transplantation. Till date organ trafficking still takes place across continents with the public paying a high sum of money to obtain the desired organ, this is mainly due to the fact that most countries have a shortage in organ supply resulting in an alternative pathway being formed [6,7].

In this paper we present a case of a patient who is seeking for a donor for liver transplantation in Sri Lanka, the purpose of this study is to show the early detection methods we can use by conducting a series of liver function tests that would assist in helping us identify the condition of the patient early to list him under the liver transplantation list registry. Moreover, we describe the changes in the liver function tests carried out on a monthly basis and other symptoms presented by the patient.

Case Report

A 64-year-old male with liver cirrhosis presented with consistent pain around the abdomen region and complained of frequent pale-yellow urination. There was no significant past medical history and family members are healthy. On initial diagnosis, the serum electrolytes profile was conducted. Serum sodium levels were at 122.0 mmol/L and chloride levels were at 87 mmol/L, these were flagged as low values at the investigations.

A complete blood count was ordered based on the results obtained from the electrolyte levels, the lymphocytes level were at 6.8%, total white cell count at 11.9 cells/L, hemoglobin at 9.2 g/dL, red blood cells count at 3.01 cells/L, hematocrit at 27.1%, platelet count at 90 X 10^9/L and c-reactive protein levels at 4.1 mg/L.

Liver profile conducted indicated low total protein levels (47.9 g/L), albumin levels were at 22.6 g/L, total bilirubin were at 5.18 mg/dL and alkaline phosphatase was at 316.0 U/L, AST at 21.5 U/L and ALT at 23.5 U/L. Bilirubin test indicated an elevation of total bilirubin at 6.35 mg/dL and direct bilirubin at 4.32 mg/dL. To assess the function of the kidneys a serum creatinine profile was carried out to understand the implications caused by liver damage, the serum creatinine enzymatic levels were at 1.18 mg/dL and the e-GFR level at 65 ml/min/1.73m^2. A urine test was conducted with pale yellow urine color observed with slightly turbid in appearance, bilirubin was positive in the report and erythrocyte sedimentation rate at 17 MM for the first hour.

Ultrasound scans revealed enlargement of the right and left lobes and the spleen, to confirm this a CT Scan of the abdomen was carried out. Irregular shape and shrunken right lobe were found to be presented by the individual, enlargement of the spleen was evident at 12cm. There was no evidence to show damage caused to the kidneys or urinary tract. A mild increase in the interstitial thickening of the bilateral lung bases were observed as well. A diagnosis of cirrhotic liver and cholelithiasis was made based on the findings in the CT scans.

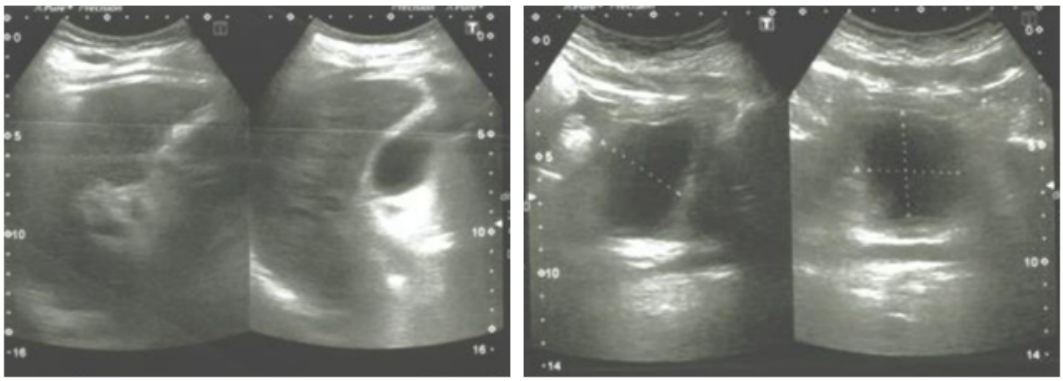

Figure 1: Scan results of the abdomen.

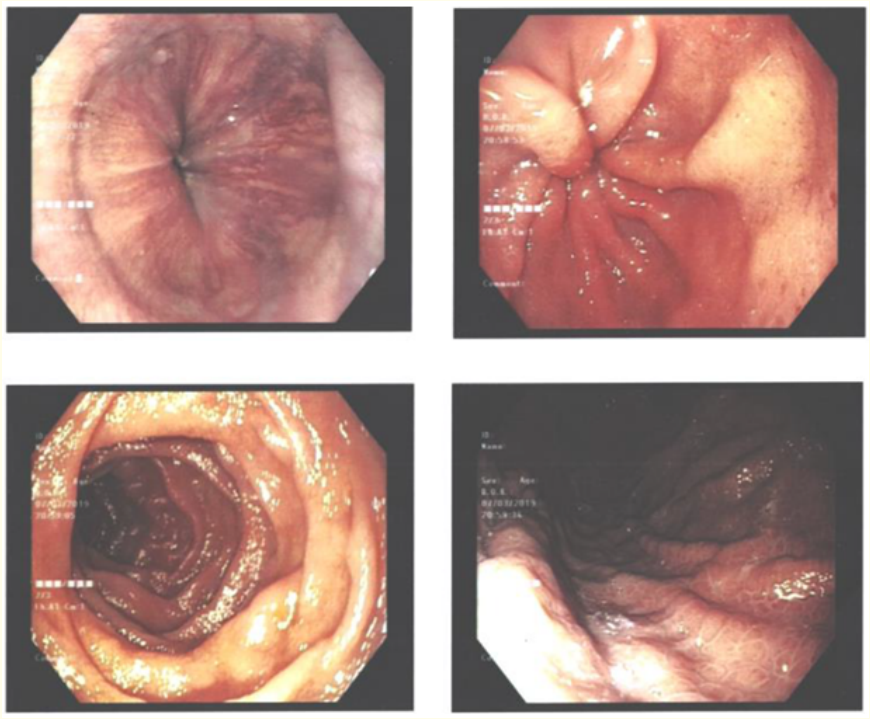

Figure 2: Endoscopy results indicated hypertensive gastropathy.

Discussion and Conclusion

Liver cirrhosis is the end stage condition of liver disease caused by various types of liver diseases most commonly due to NAFLD or AFLD. Hepatitis B has been identified as the common cause of the disease in the Asia-Pacific region, nevertheless in the case of Sri Lanka the main cause has been identified to be AFLD/NAFLD [8,9].

Cirrhosis is a result of various multifactorial factors resulting in necroinflammation and distortion of the hepatic vascular architecture is a common histological observation made by histopathologists globally [10]. A reported 56 million deaths were caused by NCD's in 2016 and liver disease was one of the leading causes of deaths, mainly people from the 3rd to 7th decade are generally affected by the disease [11]. Patients suffering from liver cirrhosis generally increases the malnutrition and chances of other diseases such as chronic kidney disease and weight loss to occur in individuals [12]. Most the cases of liver diseases are asymptomatic until it reaches the stage of liver cirrhosis making it hard for early diagnosis, sepsis, encephalopathy and jaundice have been the main symptoms presented by the patients. The only option for patients once they reach end stage of liver cirrhosis is to undergo a liver transplantation before the condition worsens. According to a study conducted by Middleton [13], only 25% of the transplantations have no graft rejection as most donors are not compatible for the recipients. Due to the limitations and availability of the organ for transplantation the rates or mortality due to liver diseases has increased [14].

In order for successful transplantation to occur several tests needs to be conducted prior to being listed on the registry list as a recipient. The patient suffering from liver cirrhosis had no prior history of any other medical condition and no family history of the disease, with increasing signs and symptoms of liver disease being presented he was presented to the physician who conducted a series of tests to confirm the diagnosis.

Serum electrolytes level have shown early indication of liver cirrhosis, hyponatremia is the most common electrolyte abnormality observed in end-stage liver disease. The patient shows signs of hy-

ponatremia with sodium levels below 130 mmol/L [15], additionally the overall chloride levels are also below the normal range at 87 mmol/L indicating the loss of salt in the body causing disruption in the ion channels [16].

e-GFR test was carried out to identify if there are any damages caused to the kidneys as studies have shown that electrolyte levels could fluctuate due to the damage caused to the kidneys [17]. To confirm the presence of liver disease a function test was performed with elevated bilirubin levels indicating that the patient has liver disease resulting of bilirubin in the blood, moreover the pre-existing condition of jaundice was supported by the elevated levels [18]. A urine test was performed to assess the overall extend of the damage, with bilirubin being positive and clear urine detected in the test the patient was administered with a mixture of corticosteroids and chelating agents combined.

Imaging tests were performed a week after the administration of drugs with an ultrasound scan being performed first as it is the most common method used among in-patient care hospitals. Irregular shaped liver and right lobes indicated signs of NAFLD in the patient and enlargement of the spleen was evidently visible [19]. CT-scan confirmed the diagnosis of liver cirrhosis with cholelithiasis formation which disrupted the liver and caused tissue scarring to take place.

The overall prognosis of the patient is poor with progressive liver failure observed in the patient over a period of 3 months. By carrying out step wise series of testing we were able to identify the cause of liver disease and the extent of damage caused in the patient, this method is an easy and fast way of diagnosing patients with liver cirrhosis and would potentially save precious time in identifying a suitable donor for transplantation.

In conclusion, liver transplantation processes generally take long time in identifying the suitable donor and recipient due to the lack of early testing and identification of availability of the organ in the country. With continuous testing performed on a regular time interval we can identify potential donors in a quicker and more reliable manner limiting the number of deaths caused by failure of liver transplantations in the future.

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Availability of Data and Materials

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Ethics Approval and Consent to Participate

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Consent for Publication

Written informed consent was obtained from the patient's physician to use the reports for the study.

Competing Interests

The authors declare that they have no competing interest.

Appendix

Test	Result	Unit	Reference value
Serum sodium	122.0	mmol/L	136.0 - 146.0
Serum potassium	4.10	mmol/L	3.5 - 5.1
Serum chloride	87	mmol/L	101.0 - 109.0

Table 1: Serum electrolyte levels.

Test	Result	Unit	Reference value
Bilirubin - total	6.35	mg/dL	0.1 - 1.2
Bilirubin - direct	4.32	mg/dL	0.1 - 0.5
Bilirubin - indirect	2.03	mg/dL	

Table 2: Bilirubin test.

Test	Result	Unit	Reference value
Total protein	47.9	g/L	60.0 - 83.0
Albumin	22.6	g/L	35.0 - 50.0
Globulin	25.3	g/L	25.0 - 33.0
A/G ratio	0.9		0.8 - 2.3
Bilirubin-total	5.18	mg/dL	0.1 - 1.2
ALK.PHOS	316.0	U/L	98.0 - 258.0
ALT	21.5	U/L	0.1 - 40.0
AST	23.5	U/L	0.1 - 40.0
GAMMA-GT	11.6	U/L	0.1 - 49.0

Table 3: Liver function test.

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