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Infection with hepatitis C virus as a cause of cirrhosis – case study

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Abstract

Background and study aims. HCV may cause an acute or chronic hepatitis C and, when left untreated, may lead to cirrhosis and/or primary liver cancer. The aim of the study was analysis of personal medical records of a patient with cirrhosis from the aspect of its relation with HCV infection;
Materials and Method. A case of a 36-year old patient was presented diagnosed with *cirrhosis*, admitted to the emergency department due to haemorrhage from the upper gastrointestinal tract. Anti-HCV antibodies were present. The method was a case study, the technique – analysis of records the research tool – case history with the results of diagnostic tests, visual analogue scale (VAS) measuring pain intensity, the Hamilton Depression Rating Scale, fluid balance chart, and an author-constructed questionnaire to be completed by the patient;
Results. Based on internal documentation of the hospital and patient medical records a case of a patient was described with gastrointestinal bleeding and cirrhosis, diagnosed with HCV. Physical examination was presented, as well as epidemiological interview, medical history,

course of diagnostics and treatment of the patient qualified for follow up ambulatory care in the outpatient hepatology department.
Conclusions. Screening tests are recommended in order to early diagnose the presence of anti-HCV antibodies. Early diagnosis of infection with HCV and implementation of anti-viral treatment may prevent cirrhosis of the liver. Health education of society is necessary from the aspect of risk factors of HCV infection in the medical environment, as well as in beauty salons and tattoo parlours.

Key words: HCV infection; hepatitis C complications; liver cirrhosis

1. Introduction

Hepatitis C (HCV infection) has been considered by the World Health Organization as one of the main epidemiological threats – in 2024 there were approximately 50 million cases worldwide [1, 2]. Hepatitis C is caused by hepatitis C virus (HCV), which was identified in 1989 [3, 4]. To-date, in the case of HCV infection no vaccine has been developed which would protect against contracting hepatitis C [5-9]. HCV, belonging to the family *Flaviviridae*, is characterized by a genome consisting of a single strand of RNA. HCV virus is classified into six major genotypes (1-6), each characterized by a different degree of sensitivity to drugs, which is an important factor in therapy of this infection [10].

It has been confirmed that in Poland approximately 80% of infections are caused by HCV genotype 1b [11]. Infection with HCV frequently develops asymptomatically for many years. Patients are often unaware of infection and its potential consequences [12, 13].

Infection with HCV may occur as a result of inappropriately performed medical procedures, which lead to contact with infected blood. Examples are: improper use of needles for injections or blood collection for diagnostic tests, unhygienic dental procedures, acupuncture or tattooing and piercing [14]. The risk of infection also increases while intravenous drug use through the same needle which has had contact with an infected person. There is also a risk of transmitting the virus through sexual contact, especially when there is damage to the skin or mucous membranes, therefore, it is important to use protection during sexual contact. Once the virus enters the body, an infection develops, which may progress through an acute (initial) stage or remain asymptomatic for a long period of time turning into chronic stage. Infection with HCV may lead to various liver complications - cirrhosis, or *he*patocellular carcinoma (HCC) [15-17].

Cirrhosis is a chronic disease, which causes cell destruction – fibrosis (scarring) of liver tissue [18]. Fibrosis alters the normal structure of the liver and vascular system, leads to impaired blood and lymph circulation, which causes liver failure and portal vein hypertension [19]. Liver dysfunction leads to hyponatremia, water retention, bleeding from

oesophageal varices. At the advanced stage, coagulopathy is diagnosed, bacterial peritonitis and hepatic encephalopathy. The disease often develops asymptomatically, but as it progresses, symptoms, such as abdominal pain may occur, swelling, skin lesions, sleep disorders, loss of appetite, and other symptoms. Cirrhosis often develops without visible symptoms. However, as the disease progresses, complications may arise, which significantly complicate patients' lives and exert a negative effect on their quality of life. The main complications of cirrhosis are: hepatorenal syndrome, hepato-pulmonary syndrome, ascites, oesophageal varices and bleeding from the gastrointestinal tract, hepatic encephalopathy, and the symptoms of depression [20, 21].

According to researchers (Rodríguez-Tajes S., et al.) one of the causes of cirrhosis is infection with HCV [22]. The European Association for the Study of the Liver has developed guidelines for immediate, urgent treatment of all patients infected with HCV with considerable liver fibrosis or cirrhosis [23]. Fernández Carrillo et al. and Perlman emphasized the necessity for treatment of HCV infection in the case of advanced process of cirrhosis [24, 25]. Sometimes liver cirrhosis due to HCV infection is an indication for liver transplant [26]. If left untreated there is a risk of hepatocellular carcinoma (HCC) and liver decompensation [27]. According to Chinese researchers since 2017 mortality due to cirrhosis as a result of infection with HCV has remained on the level 25.9% [28].

2. Objective

The aim of the study was analy-sis of personal medical records of a patient with cirrhosis from the aspect of its relation with HCV infection.

3. Materials and Method

The case of a 36-year old patient is presented diagnosed with cirrhosis, in whom anti-HCV antibodies were present. The research method used was a case study. The research technique was analysis of internal archive records of the University Clinical Centre of the Medical University of Warsaw, Poland. The research tools included: patient medical history with results of diagnostic tests (laboratory tests, computed tomography of the abdominal cavity, abdominal ultrasound examination, completed VAS, completed Hamilton Depression Rating Scale, and completed fluid balance chart. Medical records concerned the treatment of the patient in the clinic of gastroenterology and internal diseases at the University Clinical Centre of the Medical University of Warsaw during the period from 18 November 2023 – 7 December 2023 due to an attack of severe pain located in the upper abdomen and bleeding from the upper gastrointestinal tract. Hospitalization of the patient was urgent, caused by decompensation of liver function. The selection of the patient for the study was random, and

consent was expressed by the manager of the clinic of gastroenterology and internal diseases, and the patient.

The criteria for selection for the study were as follows:

- medical diagnosis: bleeding from the upper gastrointestinal tract in the course of cirrhosis;
- laboratory confirmed presence of the genetic material of HCV virus;
- laboratory confirmed the presence of anti-HCV antibodies.

The criteria of exclusion from the study were:

- medical diagnosis: bleeding from the upper gastrointestinal tract not related with cirrhosis;
- results of laboratory tests not confirming the presence of the genetic material of HCV virus;
- results of laboratory tests not confirming the presence of anti-HCV antibodies.

4. Results

4.1. Individual case study

On 18 November 2023 a 36-year male was brought by ambulance and admitted to the emergency room urgently to the University Clinical Centre at the Medical University of Warsaw. The reason for admitting the patient was sudden bleeding from the upper gastrointestinal tract, manifested by vomiting with ground and bloody contents. At admission to hospital the patient complained of strong abdominal pain, which had accompanied him for several months – located mainly in the upper right part of the abdomen. The pain radiated towards the back and hindered daily functioning. While taking medical history the patient informed that pain was occurring increasingly more intense, and assessed the intensity of pain to be 8-9 scores according to the Visual Analogue Scale (VAS) [29].

During conversation the patient reported that for a week he experienced the feeling of shortness of breath, itching of the skin, and his abdomen increased in volume. The patient had laboratory blood tests performed the results of which confirmed elevated values: alanine aminotransferase (ALT – 129 U/l), aspartate aminotransferase (AST – 159 U/l), gamma-glutamyltranspeptidase (GTTP – 123 U/l), alkaline phosphatase (ALP – 269 U/l), and an increase in total bilirubin – 6.5 mg/dl, International Normalized Ratio (INR – 1.59), creatinine (1.36 mg/dl). In addition, other laboratory blood test results were received: platelets (PLT – 30,000), lymphocytes (700), haemoglobin (Hgb – 15 g/dl, red blood cells (MCV – 99 fL), potassium (3.06 mmol/l), thyroid-stimulating hormone (TSH – indefinitely low), thyroxine (ft4 – 41 pmol/l), and triiodothyronine (ft3 – 11.6 pmol/l).

Abdominal ultrasound showed enlarged liver, with increased, heterogeneous echo and uneven edges – Figure 1.

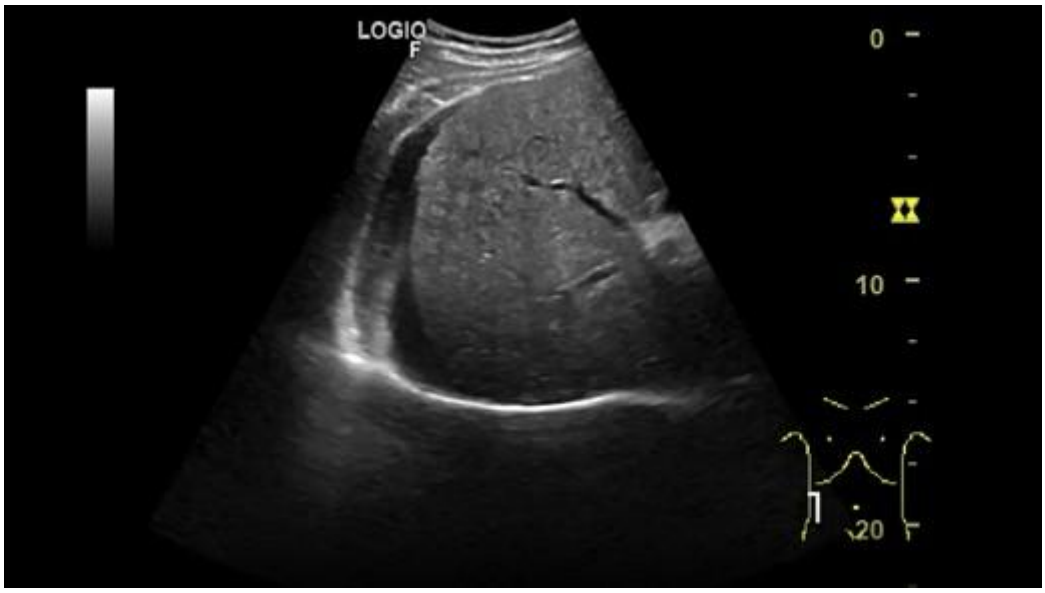

Figure 1. USG examination – Visible fluid around the liver and the uneven outline of its surface.

Source: Internal records of the University Clinical Centre of the Medical University of Warsaw

Description of abdominal ultrasound: A small amount of fluid near the spleen and liver and above the liver approximately 16 mm thick. The liver visible mainly through the intercostal space, slightly enlarged, heterogeneous with slightly increased echogenicity and granular echostructure, with uneven edges – ultasonographic features of cirrhosis. The liver without focal changes in the visualized area. Gallbladder wall thickened to approximately 4 mm, with small deposits, in the fundus numerous wall reflections up to 7 mm without flow. Pancreas, aorta, para-aortic space, right adrenal gland obscured by gas. Left adrenal gland without obvious changes. Enlarged spleen - 180 mm long, homogeneous, normoechoic. Kidneys of the length: right kidney - 113 mm, left kidney - 128 mm, typical shape without signs of retention and visible deposits, parenchymal layer of preserved thickness. Adrenal glands invisible.

Additionally, computed tomography of abdominal cavity was performed which revealed clearly enlarged liver parenchyma without focal changes – Figure 2.

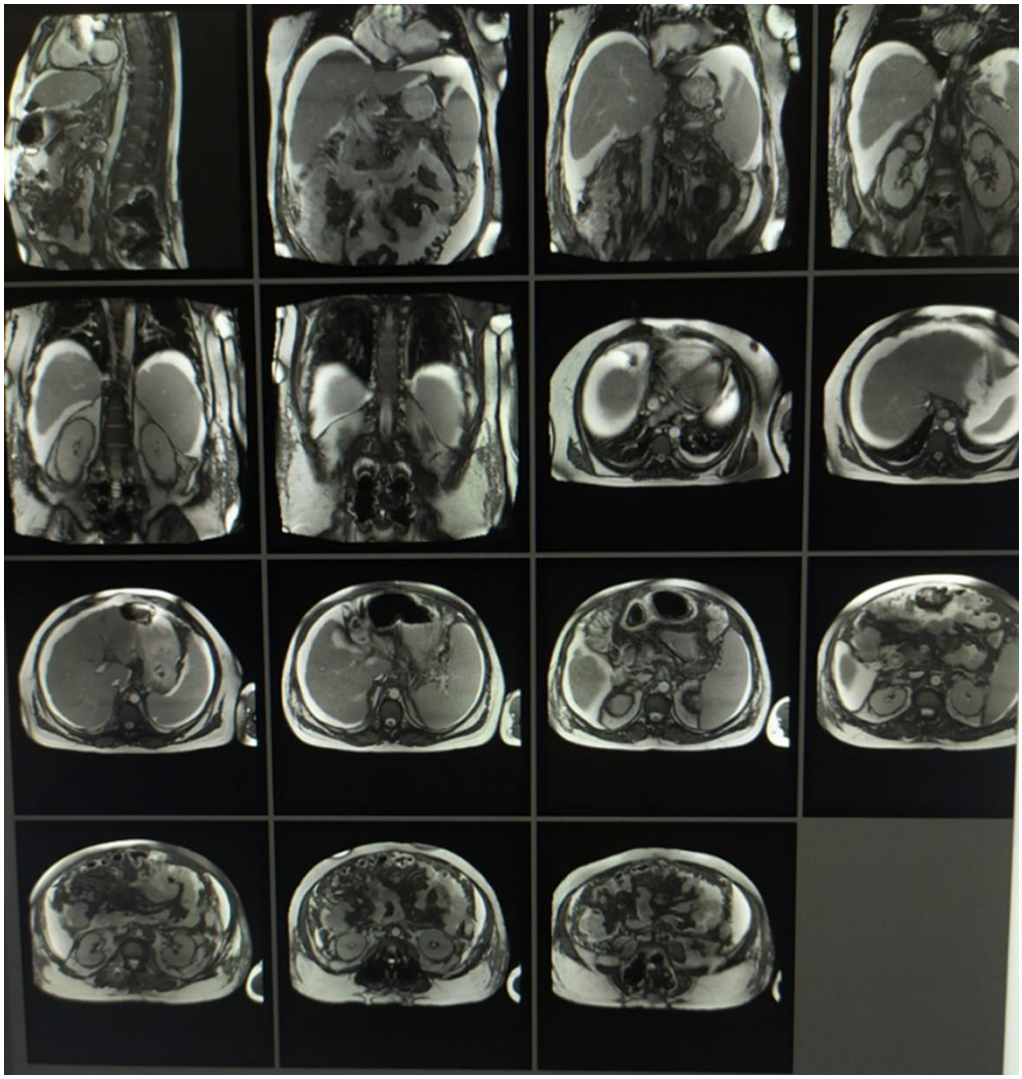

Figure 2. Computed tomography of abdominal cavity.
Source: Internal records of the University Clinical Centre of the Medical University of Warsaw

3.2. Epidemiological interview

The patient mentioned that he had been unaware of infection with HCV until the moment of receiving the result confirming the presence of RNA of the HCV virus. A month earlier (on 17 October 2023) due to poor wellbeing he had laboratory test performed the result of which was considered positive – Figure 3.

MEDYCZNE LABORATORIUM DIAGNOSTYKA

SPRAWOZDANIE Z BADANIA

Zlecający: BADANIA PŁATNE
Oddział: PP Gwratów
Lekarz kierujący: -
Odbiorca wyniku: [illegible]R OSOBISTY

Kod kontrahenta: 1
Kod oddziału: 00
Data rejestracji: 2023-10-17
Data/godz. pobrania: 2023-10-17 07:13

Pacjent:
Adres:

PESEL:
Data uroc.
Płeć: Męska

Badanie	Wynik	Jedn.	Zakres referencyjny	LIW **
HCV ilościowo+ genotypowanie met. PCR (ICD-9:) [1]				
HCV met. PCR, ilościowo	**316 779,00**	IU/ml	-	
Stwierdzono obecności docelowych sekwencji RNA wirusa zapalenia wątroby typu C.				
Zakres metody: 12 - 200 000 000 IU/ml				
Badanie wykonano metodą Real Time RT-PCR na aparacie Alinity m firmy Abbott				
Czułość metody ok 95% w zakresie metody.				
W związku z obowiązującym Kierownika Laboratorium Art 29 Ustawy z 5 grudnia 2008 r. o zapobieganiu oraz zwalczaniu zakażeń i chorób zakaźnych u ludzi (Dz.U.2020 poz.1118) wynik badania został zgłoszony do Stacji Sanitarno-Epidemiologicznej.				
HCV met. PCR, genotypowanie	**DODATNI**		-	
Wynik DODATNI świadczy o obecności RNA właściwego dla wskazanego genotypu wirusa HCV w dostarczonym materiale.				
Metoda badania: RealTime RT PCR (łańcuchowa reakcja polimerazy) na aparacie m2000Abbott. Czułość metody: 500 IU/ml				
Wirus HCV genotyp 1a	**UJEMNY**		-	
Wirus HCV genotyp 1b	**DODATNI**		-	
Wirus HCV genotyp 2	**UJEMNY**		-	
Wirus HCV genotyp 3a	**UJEMNY**		-	
Wirus HCV genotyp 4	**UJEMNY**		-	
Wirus HCV genotyp 5	**UJEMNY**		-	
Wirus HCV genotyp 6	**UJEMNY**		-	

Informacje dodatkowe

Badanie	Daty	Materiał	Autoryzował / Nr PWZD***	Wykonano
1	Data/godz. przyjęcia prób.: 2023-10-17 10: Data wykonania: 2023-10-20 Data/godz. wydania: 2023-10-20 [illegible]:18	OSOCZE (EDTA) PCR	K[illegible]A, [illegible]	[illegible]GNOSTY[illegible]A.; MEDYCZNE LABORATORIUM [illegible]GNOSTY[illegible]

Informacje dotyczące próbki/zlecenia

Brak uwag

Figure 3. Result of the test for the presence of HCV genetic material.
Source: Patient's documentation

Based on the result of laboratory test by the real-time PCR (Polymerase Chain Reaction) method the quantitative content of the virus in peripheral blood was assessed. A high level of viral load was determined in peripheral blood – 316,779.00 IU/ml. Through this type of test, it was precisely determined how many copies of the virus were in each millilitre of blood of the examined patient. This examination was important considering the possible qualification of the patient for treatment, among others, combination therapy, as well as to monitor its effectiveness. Apart from this it was determined that the virus was HCV genotype 1b, which mainly occurs among the Polish population – in approximately 80% of infected persons [30-32]. While history taking the patient was asked whether he was aware of infection with HCV, knew or associated when and under what circumstances infection could have occurred – the patient replied that he was unaware of infection with HCV and did not associate the circumstances of infection. The patient was unaware of infection due to its asymptomatic course. In addition, while taking medical history it was found that, in the past, the patient had

not undergone any surgical procedures, no procedures in dental rooms, had no contact with blood to relate infection with the above-mentioned situations. Numerous tattoos were visible on the patient's body. He admitted that he used the services of tattoo parlours several times, which probably was the risk factor of infection with HCV.

3.3. Physical examination

During physical examination a considerable swelling of the legs was observed in a patient, as well as yellowing of the skin and mucous membranes (symptoms of jaundice). The patient had significant swelling of the lower extremities, because water retention occurred in the body as a result of blood and lymph circulation disorders. An enlarged abdomen was observed - abdominal circumference: 130 cm. The vital signs were as follows: arterial blood pressure: 150/95 mmHg; pulse: 96 u/min; number of breaths: 22 bpm.; body temperature: 37.4^{o}C; body weight: 99 kg; height: 164 cm; body mass index (BMI): 36.4 (obesity class 2).

3.4. Conservative treatment

During hospitalization conservative treatment was applied: Thyrozol 5 mg 2 x 1 tablet orally; Propranolol 10 mg 1 x 1 tablet orally; Viracon 10 mg 2 x 1 tablet orally; Vitamin B_1 100 mg 1 x 1 ampoules intramuscularly; Hepa-Merz 5 g 1 x 1 ampoules intravenously; Prothromplex Total Nf 600 IU. 3 x 1 ampoule intravenously; Syntarpen 1 g 4 x daily intravenously; Terlipressinni Acetas Ever Pharma 1 mg x 2 ampoule intravenously; Albunorm 20% 100 ml 1 x intravenously; Arixtra 2,5 mg/0.5 ml x 1 ampoule subcutaneously; Furosemide kabi 20 mg/2 ml 2 x 1 ampule intramuscularly; Kanavit solution for injection 10 mg/1 ml 2 x 1 ampule intramuscularly; Metocard 50 mg 1 x 1 tablet orally; Paracetmol Kabi 1 g/100 ml 1 x intravenously; Poltram 100 mg/2 ml 1 x 1 ampule intramuscularly; Kalium Chloratum Kabi 15% 3 g/20 ml 1 x 0.75 ampule; Xifaxan 200 mg 2 x 1 tablet orally; Lactulosum Hasco syrup 1 x 15 ml orally; Kaldyum 0,6 g 2 x 1 capsules orally; Pyralgin Polpharma 1 g/2 ml 1 x intravenously; Spironol 100 mg x 1 tablet orally.

Although the patient was receiving diuretics (Furosemide, Spironolol) oedema and ascites persisted. The ascites was resistant to treatment and the abdomen was very tense. A single therapeutic paracentesis was performed; 6 litres of clear fluid was drained from the abdominal cavity.

3.5. Dietary treatment

The patient was placed on a strict diet for the first 3 days of treatment (starvation diet). Only boiled water and oral medications were administered orally. Subsequently, a liquid diet (pap) was applied for 7 days. Next, the patient was recommended a hepatic diet with limited table salt. This type of diet was applied until the patient was discharged from hospital.

On 17 December 2023 the patient was discharged home from hospital. He received prescriptions and recommendations for taking medications permanently:

- Polpril 2.5 mg 1 x 1 daily;
- Kalipoz 1 x 1 daily;
- Propranolol 20 mg 2 x daily;
- Thyrozol 10 mg 1 x daily.

Apart from this, the patient was recommended further treatment by a family physician in a primary health care unit (PHC) and by a medical specialist – hepatologist in the outpatient hepatology clinic. As part of health education, the patient was provided with instructions:

1. *Ban on consumption of alcohol.*
2. *Easily digestible diet (the patient was provided with educational materials concerning the observance of dietary recommendations), limiting the amount of fluid intake to max. 2 l/d.*
3. *Control of body weight, arterial blood pressure and pulse in home conditions.*
4. *Periodic check-up of blood count, ionogram, transaminase, bilirubin, GGTP, coagulation indicators in an outpatient setting. Systematic taking of medications as instructed by the attending physician.*
5. *Limiting physical effort.*

Discussion

Chronic hepatitis (HCV infection) is the frequent cause of cirrhosis (15-30%) and primary liver cancer, which leads to death (1-5%) [33]. Dangerous complications occur in 10–20% persons infected with HCV within 20–30 years after infection [34]. In the case of cirrhosis among persons infected with HCV approximately 50% of patients are exposed to the risk of the development of oesophageal varices [35]. According to D′Amico each subsequent episode of bleeding from oesophageal varices is associated with a 20% risk of mortality [36]. Therefore, in each patient with preliminary diagnosis of cirrhosis diagnostic tests should be performed – endoscopic ultrasound and spiral computed tomography [37, 38].

In the presented case of the patient with bleeding from the upper gastrointestinal tract, with suspicion of cirrhosis, an ultrasound examination was performed on the cito, which revealed liquid around the liver and an uneven outline of its surface. Apart from this, a computed tomography of the abdomen was performed, as a result of which ascites was diagnosed, fluid in the left pleural cavity and an uneven outline of the liver with the features of its cirrhosis. Clinical assessment revealed portal hypertension.

In patients with bleeding from oesophageal varices in the course of cirrhosis the cause should be diagnosed to direct pharmacological and dietary treatment and health education [35]. In the presented case the patient was diagnosed with HCV infection. The laboratory test performed using the real-time PCR (Polymerase Chain Reaction) confirmed the presence of HCV 1b genetic material. The level of viral load in peripheral blood was high - 316 779.00 IU/ml. Apart from this the epidemiological interview showed that the patient was unaware of infection with HCV due to its asymptomatic course. The patient reported that he used the tattoo parlour several times, which was probably the risk factor of infection with HCV. According to researchers (Sunil et al.) the AST/ALT ≥1 ratio prognosticates cirrhosis in patients infected with HCV [39]. According to the Canadian researcher and his team (Anderson et al) AST/ALT ratio changes in different patients; however, it increases together with histological progression of liver fibrosis. The ratio AST/ALT ≥1 confirms an advanced process of cirrhosis [40]. In the presented case the results of laboratory tests confirmed damage to the liver parenchyma due to infection with HCV: AST – 159 U/l; ALT – 129 U/l; GTTP – 123 U/l; ALP – 269 U/l), and total bilirubin – 6.5 mg/dl. The ratio between aspartate aminotransferase (AST) and alanine aminotransferase (ALT) >1 (1.233) confirmed cirrhosis.

Bleeding from the upper gastrointestinal tract in patients with cirrhosis requires an intensive conservative treatment. In the case of resistant treatment of ascites, therapeutic paracentesis is recommended [41, 42]. In the presented case a severe state of health of the patient with cirrhosis, with bleeding from the upper gastrointestinal tract required an instant conservative treatment. Due to ascites, diuretics were administered; however, ascites was resistant, therefore therapeutic paracentesis was applied.

After 18 days of hospitalization in the clinic of gastroenterology and internal diseases the patient was discharged home with recommendations for further treatment by a family doctor and a specialist - hepatologist at the hepatology clinic.

Conclusions

Screening tests are recommended for the early detection of the presence of anti-HCV antibodies. Each patient diagnosed with cirrhosis should be examined for the presence of anti-HCV antibodies within primary or specialist health care. Early diagnosis of infection with HCV and implementation of anti-viral treatment may prevent major complications - cirrhosis, hepatocellular carcinoma. Health education of society is necessary from the aspect of risk factors of infection with HCV in the medical environment, as well as in beauty salons, and tattoo parlours.

Human Subjects Approval Statement

This study was conducted in accordance with the Declaration of Helsinki. The research project was submitted to the Dean's Office at the Radom Higher School in Radom (RSW) by the, co-author of the research project – member of the Students' Scientific Circle at the RSW in Radom (Catalogue No. 12744/2023), and consent for the study was obtained from the Dean of the RSW in Radom.

Conflict of Interest Disclosure Statement

The authors have no conflicts of interest to report.

Author Contributions:

1.

Lidia Sierpińska: conceptualization, analysis data, literature analysis, manuscript proofreading, formal analysis, corresponding author (70%)

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2.

Małgorzata Januszek: data collection and analysis, literature analysis, preparation of the publication (30%)

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Data Availability Statement

Does not apply

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