Hepatitis C virus (HCV) infects an estimated 130-150 million people worldwide, becoming the major cause of chronic liver disease, cirrhosis, hepatocellular carcinoma, and liver transplantation. There are various preventable modes of transmission of HCV infection, including needlestick and sharps injuries. However, HCV infection secondary to needlestick injury by a capillary blood glucose meter (CBGM) lancet has not been previously well reported. We describe an unusual case of a 25-year-old male medical student, acquiring acute HCV infection with a lancing device of CBGM. The source patient was a 54-year-old diabetic male with positive anti-HCV test results. In our patient, after 3 months of initial exposure, a standard set of investigations confirmed the diagnosis of acute HCV infection with the same genotype (3a) as the source. The CBGM, as in our case, may have a role in the transmission of HCV infection warranting radical advancements in diabetes screening and monitoring technology.

Case Report. A 25-year-old, unmarried, previously healthy male medical student was pricked on the first finger of the left hand when he accidently pressed the button of the lancing device of BeneCheck™ capillary blood glucose meter.

Disclosure. Authors have no conflict of interest, and the work was not supported or funded by any drug company.
Acute HCV infection from CBGM ... Inayat & Rai

In our case, the lancing device of CBGM was used to collect blood samples, and it has been designed for multiple uses by an individual patient. However, it was accidentally re-used by the medical student while taking the blood sample of his father at home and later on, developed acute HCV infection.

The Centers for Disease Control and Prevention (CDC) has been warning the people who provide assistance to others for blood glucose monitoring. It

The patient who was the source was a 54-year-old diabetic male, positive for hepatitis C antibodies (anti-HCV), and had a quantitative HCV-RNA level of 1,757,964 IU/mL (COBAS®AmpliPrep/COBAS®TaqMan® HCV Test v2.0.) with a genotype of HCV-3a (The Linear Array HCV Genotyping Test, Roche Molecular Diagnostics, CA, USA). The medical student had been evaluated for HCV 2 months prior, and again, at the time of accidental exposure to the lancet of CBGM. The nucleic acid amplification test results for human immunodeficiency virus (HIV), hepatitis B virus (HBV), and HCV were negative on both evaluations. Furthermore, he reportedly had no history of injection drug use, irresponsible sexual behavior, recent hospital admission, blood transfusion, previous percutaneous needlestick injury, or a potentially non-sterile tattoo in recent past, except for this injury with the lancet of CBGM. On laboratory evaluation, aspartate transaminase (AST) and alanine transaminase (ALT) were within normal limits. It strongly implicated that the injury with the lancing device of CBGM was the most likely cause of seroconversion in our patient. Furthermore, the same laboratory investigations were carried out at 3 months time, and then again on 6th month after the exposure.

On April 25, 2013, a marked increase was observed in the serum levels of transaminases and a clear HCV seroconversion in terms of HCV antibodies was detected. The subject had a viral load of 450 IU/mL. Moreover, on HCV genotyping, he was found to be 3a, which was consistent with the genotype of the source patient. The student did not manifest any of the symptoms of infection; however, diagnosis of acute HCV infection was made based on the laboratory and molecular evaluation. From October 25, 2013 onwards, ALT and AST were measured regularly and HCV-RNA (HCV-RNA positive, <15 IU/mL) was detected. The subject had a viral load of 1,757,964 IU/mL (COBAS®AmpliPrep/COBAS®TaqMan® HCV Test v2.0.) with a genotype of HCV-3a (The Linear Array HCV Genotyping Test, Roche Molecular Diagnostics, CA, USA). The medical student had been evaluated for HCV 2 months prior, and again, at the time of accidental exposure to the lancet of CBGM. The nucleic acid amplification test results for human immunodeficiency virus (HIV), hepatitis B virus (HBV), and HCV were negative on both evaluations. Furthermore, he reportedly had no history of injection drug use, irresponsible sexual behavior, recent hospital admission, blood transfusion, previous percutaneous needlestick injury, or a potentially non-sterile tattoo in recent past, except for this injury with the lancet of CBGM. On laboratory evaluation, aspartate transaminase (AST) and alanine transaminase (ALT) were within normal limits. It strongly implicated that the injury with the lancing device of CBGM was the most likely cause of seroconversion in our patient. Furthermore, the same laboratory investigations were carried out at 3 months time, and then again on 6th month after the exposure.

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Subsequently, on November 25, 2013, a marked rise in the levels of serum transaminases and HCV-RNA was evident, and the medical student was initiated on the antiviral therapy consisting of 180 µg pegylated interferon α-2a (PEGASYS®, Hoffmann-La Roche Inc., Basel, Switzerland) subcutaneously once a week and 800 mg ribavirin (COPEGUS®, Hoffmann-La Roche Inc., Basel, Switzerland) (adjusted for weight), per oral daily. The subject tolerated the treatment well in the beginning; however, ALT and AST were constantly elevated. After one month of treatment, HCV-RNA evaluation revealed that the patient was well on the way towards recovery. He complained of severe generalized weakness and body aches, which were treated with acetaminophen. Complete blood count, hematocrit and hemoglobin were all within normal range. On the twenty third week of the therapy, the patient complained of severe joint pains that did not resolve with acetaminophen and slightly responded to other pain killer agents. He completed the therapy in 24 weeks period.

At one- and 6-month post-therapy follow-ups, he recovered well and showed a sustained viral response (SVR) with normal levels of serum ALT and AST without any signs of the relapse. The subject has been on annual evaluation of HCV-RNA and serum transaminases, and found to be disease free to date. The source HCV patient had been previously initiated on peginterferon-2a 180 ug as a once-weekly subcutaneous injection plus ribavirin 800 mg daily, for a total of 24 weeks. On subsequent follow-ups, the source patient responded well to the treatment and achieved SVR with normalization of ALT and AST, and became disease free afterwards.

Discussion. Hepatitis C virus (HCV) infection contributes significantly in morbidity and mortality worldwide.\(^1\) In acute HCV infection, patients are usually asymptomatic, or may present with non-specific symptoms and signs including fatigue, anorexia, mild or moderate abdominal pain, low-grade fever, nausea, vomiting, and jaundice.\(^2\) On an average, acute HCV infection has an incubation period of 7 weeks, and if it becomes symptomatic, then, lasts for 2-12 weeks.\(^2\)

Injection drug use has been the principal mode of transmission of HCV; however, needlestick injuries have been reported a tool for transmission of HCV (estimated risk, 1.8%) as well.\(^3\) Nevertheless, transmission of HCV after receipt of a needlestick has been an important threat to healthcare workers, but after the advent of CBGM for home usage, it has become a threat to the general population.\(^4\) In our case, the lancing device of CBGM has been designed for multiple uses by an individual patient. However, it was accidently re-used by the medical student while taking the blood sample of his father at home and later on, developed acute HCV infection.

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Premium GLU Monitoring System CBGM (General Life Biotechnology Co. Ltd., Taipei, Taiwan) while collecting the blood specimen of his father for glucose monitoring on January 25, 2013.
has been frequently reminded that fingerstick lancing devices should never be shared. Ideally, the blood glucose meters should be for individual use only. However, if blood glucose meters are required to be re-used then they should be cleaned and disinfected according to the manufacturer’s guidelines. It is essentially important for the assisting person to change gloves and perform proper hand hygiene between fingerstick procedures for glucose screening and monitoring. This is extremely relevant in view of rising incidence of diabetes and emphasis on more intense monitoring with appropriate healthcare providers safety.

Maynard et al6 and Ediger et al7 described non-invasive technology as more effective in terms of higher sensitivity and greater convenience than other available diabetes screening methods. It yields rapid results without fasting and blood draws, minimizing further the risk of acquiring HCV, which makes it an excellent screening and monitoring technique for diabetics. However, on a broader perspective, non-invasive glucose monitoring can be an acceptable alternative, but cannot be recommended as a first line measure to prevent spread of blood borne pathogens as happened in the index case. This case and similar cases reported previously,4,9 strongly implicates that the development and adoption of new diabetes technology is of particular importance and urgency, as growing life expectancy leading to increase in old age (70 years or above) cohort worldwide, and this population is expected to increase significantly over the next decade.8 If specific advancements could not be brought about in diabetes screening and monitoring, HCV infections will increase owing to increased number of diabetic patients receiving diabetes care in the general population, nursing home residents, and in hospitals.9,10 Hence, manufactures should be sensitized to these issues so that better alternative can be established in the future.

In conclusion, reuse of blood glucose lancet should be strictly avoided and technology advancements in diabetes screening devices are very much needed to avoid transmission of acute HCV infection.

References


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