Acute hepatitis C virus infection related to capillary blood glucose meter

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ABSTRACT

يصيب فيروس التهاب الكبد الوبائي (HCV) ما يقارب 130–150 مليون شخص في جميع أنحاء العالم، ليصبح سبباً رئيسياً لمرض الكبد المزمن وتليف الكبد، وسرطان الخلايا الكبدية (HCC)، وزراعة الكبد. هناك طرق مختلفة للوقاية من انتقال فيروس التهاب الكبد الوبائي بما في ذلك وخز الإبر والأدوات الحادة. ومع ذلك، لم يتم الإبلاغ عن فيروس التهاب الكبد الوبائي الثانوي إلى capillary blood glucose meter (CBGM). نصف حالة غير عادية من طالب طب ذكر يبلغ من العمر 25 عاماً، حصل على فيروس التهاب الكبد الوبائي الحاد مع جهاز الوخز من CBGM. وكان مصدر المرض من ذكر مصاب بالسكري يبلغ من العمر 54 عاماً، وكانت النتائج اختبار مكافحة HCV إيجابية. في مريضنا، وبعد 3 أشهر من التعرض لها، وأكد مجموعة قياسية من التحقيقات تشخيص فيروس التهاب الكبد الوبائي الحاد مع نفس النمط الجيني (3A). وCBGM، كما في حالتنا، قد يكون لها دور في انتقال فيروس التهاب الكبد الوبائي وتبرر التقدم جذري في فحص ومراقبة التكنولوجيا في السكري.

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.

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Globally, hepatitis C virus (HCV) infection transmits by blood transfusions from unscreened donors, injection drug use (64-94% of long-term injection users), unsafe therapeutic injections, and other healthcare related procedures.[1] These modes of transmission of acute HCV have been frequently reported in the literature; however, blood glucose meter lancet is relatively an unheard of and considered less likely.[1,2] Owing to the scarcity of literature and lack of knowledge on this potential mode of transmission, diabetic patient population is on an increased risk to develop HCV infection. Here, we present a case of acute HCV infection transmitted by the lancet of a capillary blood glucose meter (CBGM), confirmed with standard set of investigations to prompt awareness on reuse of CBGM along with an urgent need of revolution in diabetes screening technology to stop this growing epidemic of CBGM-induced acute HCV.

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™

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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.

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 tested regularly and HCV-RNA (HCV-RNA positive, <15 IU/mL) was detected in the serum of the medical student.

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.

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

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.[5]

Maynard et al[6] and Ediger et al[7] 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

1. Davis GL, Albright JE, Cook SF, Rosenberg DM. Projecting future complications of chronic hepatitis C in the United States. ***Liver Transpl*** 2003; 9: 331-338.
2. Deutsch M, Papadopoulos N, Hadziyannis ES, Koskinas J. Clinical characteristics, spontaneous clearance and treatment outcome of acute hepatitis C: a single tertiary center experience. ***Saudi J Gastroenterol*** 2013; 19: 81-85.
3. Shepard CW, Finelli L, Alter MJ. Global epidemiology of hepatitis C virus infection. ***Lancet Infect Dis*** 2005; 5: 558-567.
4. Kadi Z, Saint-Laurent P, Cadranel JF, Joly C, Dumouchel P, Jeanne S, et al. Retrospective investigation of patients exposed to possible transmission of hepatitis C virus by a capillary blood glucose meter. ***J Hosp Infect*** 2006; 63: 65-69.
5. Centers for Disease and Control and Prevention. Infection Prevention during Blood Glucose Monitoring and Insulin Administration. [Accessed 2015 October 16]. Available from: http://www.cdc.gov/injectionsafety/blood-glucose-monitoring.html
6. Maynard JD, Rohrscheib M, Way JF, Nguyen CM, Ediger MN. Noninvasive type 2 diabetes screening: superior sensitivity to fasting plasma glucose and A1C. ***Diabetes Care*** 2007; 30: 1120-1124.
7. Ediger MN, Olson BP, Maynard JD. Noninvasive optical screening for diabetes. ***J Diabetes Sci Technol*** 2009; 3: 776-780.
8. National Center for Health Statistics. Health, United States. [Updated 2014. Accessed 2015 August 8]. Available from: http://www.cdc.gov/nchs/products/pubs/pubd/hus/older.htm#healthstatus.
9. Desenclos JC, Bourdiol-Razès M, Rolin B, Garandeau P, Ducos J, Bréchot C, et al. Hepatitis C in a ward for cystic fibrosis and diabetic patients: possible transmission by spring-loaded finger-stick devices for self-monitoring of capillary blood glucose. ***Infect Control Hosp Epidemiol*** 2001; 22: 701-707.
10. Perz JF, Fiore AE. Preventing the transmission of bloodborne viruses during glucose monitoring: lessons learned from recent outbreaks. ***J Am Med Dir Assoc*** 2006; 7: 65-66.

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Alshomrani AT. Prevalence of human immunodeficiency virus, hepatitis C virus, and hepatitis B virus infection among heroin injectors in the central region of Saudi Arabia. ***Saudi Med J*** 2015; 36: 802-806.

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Mansoor AA, Salih AI, Al-Jaroudi DH. Screening of hepatitis B and C and human immunodeficiency virus in infertile couples in Saudi Arabia. ***Saudi Med J*** 2011; 32: 260-264.