G17 Detection of HCV in a Body Exhumed After Four Months Followed by a Phylogenetic- Tree Analysis Allows Identification of the Origin of a Nosocomial HCV Transmission Associated With the Use of a Multi-Dose Vial

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The goal of this presentation is to focus on an outbreak of nosocomial transmission of hepatitis C virus (HCV) in a hospital in northern Italy. After attending this presentation, attendees will gain knowledge of a case where a forensic approach by means of exhumation, autopsy, microbiological studies, phylogenetic-tree analysis, and circumstantial evidence led to the conclusion that the outbreak was linked to a patient-to-patient transmission occurred when a multidose vial was contaminated with blood from an HCV-infected patient.

This presentation will impact the forensic science community by demonstrating how important a thorough forensic investigation and a multidisciplinary approach are in order to provide an adequate and high-quality service to the judicial authorities. It will also impact the forensic science community by showing how long HCV can remain active even in a dead body in particular environmental conditions.

Since the introduction of routine screening of blood for anti-HCV and the steep decrease in the incidence of post-transfusional hepatitis, patient-to-patient transmission has become the commonest mode of nosocomial HCV infection.

HCV infection is frequent among patients with hematologic malingnancies, especially those with lymphoproliferative disorders, and unapparent routes of infection may be important in this setting. Indeed, many patients acquire HCV infection in the environment in which they receive treatment for their disease.

Outbreaks of HCV nosocomial transmission have been linked to breaches in standard precautions for blood-borne infections during nursing procedures or interventions such as surgery, dialysis, and colonoscopy.

An outbreak of patient-to-patient transmission of HCV through the use of a multidose vial during the rinsing of central or peripheral venous catheters is reported. At the beginning of 2006, acute HCV infection was diagnosed in six patients hospitalized in a hematology ward and a look-back study identified two other HCV-positive patients. Analysis of the events pinpointed the period in which the contamination occurred due to a single episode of exposure from a unique source between 7:00 a.m. and 8:30 a.m. on December 14, 2006. Circumstantial evidence suggested that the only patient having a known HCV chronic infection in this period was the index case; however, since she died on December 29, 2006, there were no samples available to document the source of the outbreak.

It is well known that HCV, like all viruses, is gradually inactivated in the body of a dead host and the presence of heat can have a drastic impact on the lifespan of the virus. Particularly, the virus is referred to be infectious for about sixteen days at 25°C and two days at 37°C, while it can remain active for more than six weeks at temperatures less than or equal to 4°C.

Regardless of this lability of HCV and the lack of similar cases described in the literature, the cadaver was exhumed four months after burial.

The HCV RNA genome was surprisingly amplified, identified, and genotyped in liver and spleen samples. Genotyping of HCV strains, amplified in various clinical samples from the eight patients, was performed by sequence analysis. The comparative phylogenetic analysis of the strains identified in the patients studied with those from other HCV patients allowed identification of the source of contamination, which was the same for five patients. Moreover, a definite route of transmission has been identified as well as the specific cause-effect relationship for the multidose vial procedure.

Particularly, nursing was found to be inconsistent with recommended safety standards.

In conclusion, the exhumation and appropriate microbiological and phylogenetic investigations allowed for the Identification of the outbreak origin and a correct analysis of the professional liability profiles.

Outbreak of HCV Nosocomial Transmission, Active HCV in an Exhumed Body, Phylogenetic-Tree Analysis

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