Diagnosis of Imported Dengue Fever in the Czech Republic

by

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Abstract

Two institutions in the Czech Republic possess the facilities for the diagnosis of dengue fever (DF): the National Reference Laboratory for Arboviruses, Ostrava, and the Department of Virology, Teaching Hospital Na Bulovce, Prague. During 1997-2002, 417 patients were examined for suspected DF. Serological evidence, i.e. the presence of anti-dengue IgM and IgG antibodies, was based on ELISA using PANBIO kits. Epidemiological data on DF have been collected by the National Reference Center for Epidemiological Data Analysis in Prague since 1997. Up till now, 15 DF cases (diagnostic code A90) and one case of dengue haemorrhagic fever (DHF, diagnostic code A91) have been registered. The latter was a 45-year-old woman who experienced the acute phase of the disease with haemorrhagic signs without shock manifestation in a hospital in Bangkok and, after returning home, was admitted to the Department of Virology in Prague where the DHF diagnosis was confirmed serologically. Since 1999, the Czech Republic is part of the TropNetEurop, a European DF surveillance network.

Keywords: DF, DHF, anti-dengue IgM, anti-dengue IgG, surveillance, TropNetEurop, Czech Republic.

Introduction

A few years ago, dengue fever (DF) was still considered an exotic disease in the Czech Republic, known only from literature and beyond the concern of general medicine in the country. It is certain that DF has been present here for some time but, not being recognized as such, it has passed under the diagnosis such as "a fever following return from a tropical country", etc. It was only in the late 1990s that the disease received

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more attention and since then it has been found that, in the Czech Republic as in countries in Western Europe[1], DF ranks second only to viral hepatitis among the most frequently imported transmissible viral diseases[2]. The objective of this study was to present the history of DF, including that of dengue haemorrhagic fever (DHF), in the Czech Republic with regard to its diagnosis and reporting.

Materials and methods

During 1997-2002, a total of 417 patients presenting clinical signs and symptoms of DF were examined in the Czech Republic. Anti-dengue antibodies were assessed by ELISA, using PANBIO kits (Brisbane, Australia). The specific IgM and IgG antibodies against DF were detected with the use of the Dengue IgM Capture ELISA Test and Dengue Indirect IgG ELISA Test, respectively. When the absorbance values were higher than the cut-off +10%, the sample was considered to be positive, which was in agreement with a relative value of 200 or higher. Since 2002, the results of the quantitative antibody examination have also been expressed in EU (ELISA UNITS) on the following scale: <9 EU, negative result; 9 to 11 EU, marginal result (trace amounts); >11 EU, positive result.

Results

The first DF case with serological evidence of DF was reported in the Czech Republic in 1991. The infection came from Taiwan, was caused by DEN-2 and was diagnosed at the Department of Infectious Diseases, Prague, and confirmed by a serological examination at the State Institute of Health in Prague[2].

The next case of DF disease was diagnosed in 1996 (data from the Institute of Health Information and Statistics, Prague), but no detailed information on the case was made available.

In 1997, the National Reference Laboratory for Arboviruses, Ostrava, introduced procedures for DF diagnosis. The results of serological examinations done during 1997-2002 are given in Table 1. Out of the 89 patients examined, IgM anti-dengue antibodies were found in 16 patients and IgG anti-dengue antibodies in 22 patients.

The Department of Virology at the Teaching Hospital Na Bulovce, Prague, started routine diagnostic tests for DF in 1998. During 1998-2002, 328 patients were examined and serological evidence of acute DF (A90) was found in 15 patients. One case was diagnosed as "post-acute DHF" (A91). She was a 45-year-old woman who was admitted to the Department of Infectious Diseases, Prague. She had returned from Bangkok where she had been hospitalized for haemorrhagic fever, but free from shock manifestations, for three weeks (4-24 May 2002). In the Czech Republic, her diagnosis was confirmed at the Department of Virology at the Teaching Hospital Na Bulovce, Prague. The results of the serological examinations of anti-dengue antibodies carried out at this Department from 1998 to 2002 are presented in Table 2.

***Table 1**. Serological examination of DF cases in the National Reference Laboratory for Arboviruses, Ostrava*[¶]

Antibody class detected by ELISA	Year of examination	Number of serum samples	Number of positive sera	Number of patients examined	Number of positive patients
IgG IgM	1997	5 5	5 5	2 2	2 2
IgG IgM	1998	14 14	3 5	8 8	3 3
IgG IgM	1999	15 15	2 2	15 15	2 2
IgG IgM	2000	11 11	0 0	11 11	0 0
IgG IgM	2001	29 29	6 6	25 25	5 4
IgG IgM	2002	39 39	17 6	28 28	10 5
IgG IgM	1997-2002	113 113	33 24	89 89	22 16

[¶] Higher number of positive sera than positive patients was due to withdrawal of more than one sera from some patients.

***Table 2**. Serological examination of DF cases in the Department of Virology, Teaching Hospital Na Bulovce, Prague*[¶]

Antibody class detected by ELISA	Year of examination	Number of serum samples	Number of positive sera	Number of patients examined	Number of positive patients
IgG IgM	1998	33 33	14 6	29 29	14 6
IgG IgM	1999	65 65	7 6	56 56	7 4
IgG IgM	2000	90 90	0 1	90 90	0 0
IgG IgM	2001	76 76	2 6	69 69	1 2
IgG IgM	2002	92 92	14 6	84 84	14 4
IgG IgM	1998-2002	356 356	37 25	328 328	36 16

[¶] Higher number of positive sera than positive patients was due to withdrawal of more than one sera from some patients.

Table 3. *Data on patients with DF infection reported to National Reference Center for Epidemiological Data Analysis, Prague*

Year	Patient (sex)	Age (years)	Import from	Patient character-istic
1998	M	46	Thailand	Czech tourist
1998	F	24	Thailand	Czech tourist
1998	M	24	Thailand	Czech tourist
1999	M	28	Malaysia	Czech tourist
1999	F	23	Indonesia	Czech tourist
2000	M	24	Indonesia	Czech tourist
2001	M	45	Thailand	Czech tourist
2001	M	32	Cameroon	Czech working abroad
2001	F	28	Indonesia	Czech tourist
2001	F	27	India	Czech tourist
2002	F	45	Thailand	Czech tourist*
2002	F	26	Thailand	Czech tourist
2002	M	37	Nepal	Czech tourist
2002	M	48	Nepal	Czech tourist
2002	M	53	Thailand	Czech tourist
2002	M	28	Indonesia	Czech tourist

* Patient with a post-acute form of DHF.

The cases of dengue fever (diagnostic code A90) diagnosed in the Czech Republic between 1998 and 2002 and reported to the National Reference Center for Epidemiological Data Analysis, Prague, are presented in Table 3. During this period, only one case of DHF (A91) was diagnosed. Because the patient had experienced the acute stage of the disease with haemorrhagic signs in a hospital abroad, the diagnosis in the Czech Republic was confirmed only serologically and therefore this case was regarded as a "post-acute DHF".

Discussion

The two institutions which specialize in serological diagnostic procedures for DF in the Czech Republic are: the National Reference Laboratory for Arboviruses, Ostrava and the Department of Virology, Teaching Hospital Na Bulovce, Prague. The former has been providing diagnostic services since 1997 and the latter has introduced the laboratory diagnostic methods for DF since May 1998 in response to increasing demands from physicians who were seeing more patients presenting signs reminiscent of DF after their return from subtropical or tropical regions.

The system of reporting DF incidence in the Czech Republic has since improved.

The first and only DF case (diagnosed as A90) was recorded at the Institute of Health Information and Statistics, Prague, in 1996. The National Reference Center for Epidemiological Data Analysis established a comprehensive information system in 1997 and has provided detailed epidemiological information on DF cases that have occurred in the republic since then.

Ever since the detection of dengue fever in 1998 among returning travellers in the Czech Republic[2], the country has been included in the DF surveillance system of Europe since 1999. The lack of surveillance data for cases of infectious diseases imported into Europe prompted the establishment of the European Network on Imported Infectious Disease Surveillance (TropNetEurop) in

February 1999. This is an electronic network connecting hospitals and clinics that diagnose and provide treatment for imported infectious diseases. Although the organization of this network does not guarantee that the data collected will be representative of the entire continent of Europe, major referral centres are included, i.e. 37 hospitals in 14 European countries (including the Czech Republic). From the very beginning, DF has been one of the major target issues of this network. The results from the first year of sentinel surveillance of imported DF in Europe, and the DF patients in the Czech Republic, have also been included in this report.

The clinical signs in our patients have included a combination of fever, headache, fatigue and musculo skeletal symptoms such as arthralgia or myalgia, similar to most of the DF cases imported in Europe[3]. Laboratory tests have shown leukopenia with relative lymphocytosis, thrombocytopenia and elevated transaminase levels (AST was usually higher than ALT). In all patients, treatment was symptomatic and none of them developed signs of DHF. All our patients were Czech citizens; foreign subjects or immigrants examined were free from the disease. All but one patient, who was on business in Cameroon, were tourists. The majority of DF cases were imported from south-east and south Asia and only one case was from Africa.

The standard method for serological diagnosis of DF was ELISA performed with PANBIO (Brisbane, Australia) kits. Screening with "Dengue Rapid Quick" tests based on immunochromatography was also attempted, but the results were not satisfactory, particularly where IgM antibody detection was concerned. From the results of the serological examination, it can be concluded that the presence of serum IgM antibodies is detected at about one week after the onset of the disease, while the first IgG antibodies appear at 10 to 14 days.

In view of the fact that up till now neither DF nor DHF has presented a serious health problem for the Czech health care system, the diagnostic methods so far used have not included serotyping.

Conclusions

In the future, it can be expected that, with increasing tourism, more citizens will return home infected with DF or perhaps even with DHF. This will probably require the introduction of serotyping methods in diagnostic procedures as well as the inclusion of examination for DF in any subject presenting with a febrile condition after return from areas in which dengue fever is endemic.

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