WEEKLY EPIDEMIOLOGICAL REPORT

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Ministry of Health

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Japanese Encephalitis (Part II)

This is the second in series of two articles on Japanese Encephalitis (JE)

Clinical features

Patients with JE typically present after a few days of non-specific febrile illness, which may include coryza, diarrhoea and rigors. This is followed by headache, vomiting, and a reduced level of consciousness, often heralded by convulsions. In some patients, particularly older children and adults, abnormal behaviour may be the only presenting feature, resulting in an initial diagnosis of mental illness. For example, during the Korean conflict some American servicemen with JE were initially diagnosed as having "war neurosis".

A proportion of patients make a rapid spontaneous recovery (so called abortive encephalitis). Others may present with aseptic meningitis and have no encephalopathic features. Convulsions occur often in JE and have been reported in up to 85% of children and 10% of adults. In some children, a single convulsion is followed by a rapid recovery of consciousness, resulting in a clinical diagnosis of febrile convulsion. Multiple or prolonged seizures and status epilepticus are associated with a poor outcome. In a proportion of children subtle motor seizures occur, causing twitching of mouth, digit, eye or eye deviation, nystagmus, excess salivation or irregular respiration. Without electroencephalographic monitoring these may be difficult to identify.

The classic description of JE includes a dull flat mask-like facies with wide unblinking eyes, tremor, generalised hypertonia and cogwheel rigidity. Opisthotonus and rigidity, spasms, particularly on stimulation occur in about 15% of patients and are associated with poor prognosis. Other extrapyramidal features include head nodding and pill rolling movements, opsoclonus myoclonus, choreoathetosis and bizarre facial grimacing and lip smacking. Upper motor neuron facial nerve palsies occur in around 10% of children and may be subtle, or intermittent.

Changes of respiratory pattern, flexor and extensor posturing and abnormalities of the pupillary and occulocephalic reflexes are poor prognostic signs and may reflect encephalitis in the brain stem. However, in some patients a clear rostrocaudal progression of brainstem signs, an association with high CSF opening pressures and a reversal of signs on aggressive management of raised intracranial pressure suggests that transtentorial herniation may also contribute.

Acute Flaccid Paralysis

Recently, a subgroup of patients infected with JE virus presented with a poliomyelitis-like acute flaccid paralysis. After a short febrile illness there was a rapid onset of flaccid paralysis in one or more limbs, despite a normal level of consciousness. Weakness occurred more often in the legs than the arms and was usually asymmetric. Thirty per cent of such patients subsequently developed encephalitis, with reduced level of consciousness and upper motor neuron signs, but in most, acute flaccid paralysis was the only feature. At follow up (1–2 years later) there was persistent weakness and marked wasting in the affected limbs. Nerve conduction studies demonstrated markedly reduced motor amplitudes and EMG showed a chronic partial denervation, suggesting anterior horn cell damage. Flaccid paralysis also occurs in comatose patients with "classic" JE, being reported in 5%-20%.

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Prognosis

About 30% of patients admitted to hospital with JE die and around half of the survivors have severe neurological sequelae. However, in areas with better hospital facilities there is a reduction in mortality, but a concomitant increase in the number of patients with sequelae. About 30% of survivors have frank motor deficits. These include a mixture of upper and lower motor neuron weakness and cerebellar and extrapyramidal signs. Fixed flexion deformities of the arms and hyperextension of the legs with "equine feet" are common. Twenty per cent of patients have severe cognitive and language impairment (most with motor impairment also) and 20% have further convulsions. A higher rate of sequelae is reported for children than adults. In addition, more detailed studies have shown that about half of those who were classed in the good recovery group have more subtle sequelae such as learning difficulties, behavioural problems and subtle neurological signs.

Diagnosis

Attempts to isolate JE virus from clinical specimens are usually unsuccessful, probably because of low viral titres and the rapid production of neutralising antibodies. Isolates may sometimes be obtained from CSF (in which case it is associated with a failure of antibody production and a high mortality rate) or from brain tissue (either at necropsy or postmortem needle biopsy). Immunohistochemical staining of CSF cells or necropsy tissue with anti- JE virus polyclonal antibodies may be positive. However, for most practical purposes Japanese encephalitis is diagnosed serologically. The haemaglutination inhibition test was used for many years, but it had various practical limitations, and as it required paired serum, an early diagnosis could not be given. In the 1980s IgM and IgG capture enzyme linked immunosorbant assays (ELISAs) were developed which have become the accepted standard for diagnosis of JE. After the first few days of illness, the presence of anti-JE virus IgM in the CSF has a sensitivity and specificity of >95% for CNS infection with the virus (before this false negatives may occur). However, because ELISAs require complex equipment, their use has been confined largely to a few academic or referral centres, rather than the rural areas where Japanese encephalitis occurs. Recently the IgM ELISA has been modified to a simple nitrocellulose membrane based format in which the result is a colour change visible to the naked eye. This test, which is rapid, simple to use and requires no specialised equipment should prove useful for diagnosis of the disease in rural hospitals. Japanese encephalitis virus RNA has been detected in human CSF samples using the reverse transcriptase polymerase chain reaction; however, its reliability as a routine diagnostic test has yet to be shown.

Prevention

Broadly speaking, measures to control JE include those which interfere with the enzootic cycle of the virus and those which prevent disease in humans. Measures to control breeding of Culex mosquitoes such as water management in the paddy fields, application of larvicides to rice fields and insecticide spraying are currently being practiced. Inactivated and live attenuated vaccines have been used to protect swine against the virus; however, widespread vaccination is not feasible in most settings. Residents and travellers to endemic areas should take personal protection to reduce the number of Culex bites. These include minimising outdoor exposure at dusk and dawn, wearing clothing that leaves a minimum of exposed skin, using insect repellents containing at least 30% DEET (N,N-diethyl-3 methlybenzamide) and sleeping under bed nets.

Vaccines

Inactivated vaccine

Formalin inactivated vaccines against Japanese encephalitis were produced in Russia, Japan and in the United States during the second world war to protect American troops in Asia. A similar formalin inactivated vaccine has been manufactured in Japan in 1954. Similar vaccines are made by other manufacturers in India, Japan, Korea, Taiwan, Thailand and Vietnam.

Live Attenuated Vaccine

In 1988 the Chinese authorities licensed a new live attenuated Japanese encephalitis vaccine. This strain (SA 14–14–2) was produced by passing the virus through weanling mice, then culturing in primary baby hamster kidney cells. The vaccine has been shown to be safe and immunogenic, and has been given to over 100 million children in China. Live JE vaccine is manufactured based on growth of genetically stable, neuro attenuated SA 14-14-2 strain of the JE virus on a mono layer of primary hamster kidney cells. After cultivation and harvest, an appropriate stabilizer is added to the virus suspension and then lyophilized. Lyophilized vaccine has to be reconstituted with the dilluent provided by the manufacturer before administration. It elicits broad immunity against heterologus JE viruses with sufficient viral replication.

Notes

National Immunization Programme (NIP) of Sri Lanka is not currently using inactivated JE vaccine and Live Attenuated JE vaccine (LJEV) is being used in Sri Lanka since 2009. Children are immunized with the LJEV on completion of 9 months. In certain countries, a booster dose is given one year after the primary immunization. But many studies suggest that the immunogenicity given by a single dose is equivalent to that two vaccines doses. Based on these data, a single dose of LJEV is recommended in Sri Lanka. However, the necessity for a booster dose will be decided in future based on epidemiological data of JE.

Source

Japanese encephalitis, available from http://jnnp.bmj.com/content/68/4/405.full

Compiled by Dr. Madhava Gunasekera of the Epidemiology Unit

Table 1: Vaccine-preventable Diseases & AFP

26th January – 01th February 2013 (05th Week)

Disease	No. of Cases by Province									Number of cases during current week in 2013	Number of cases during same week in 2012	Total number of cases to date in 2013	Total number of cases to date in 2012	Difference between the number of cases to date in 2013 & 2012
	W	C	S	N	E	NW	NC	U	Sab					
Acute Flaccid Paralysis	00	01	00	00	00	00	00	00	00	01	02	08	11	- 27.3 %
Diphtheria	00	00	00	00	00	00	00	00	00	-	-	-	-	-
Measles	01	00	00	00	00	00	00	00	00	01	01	19	05	+ 280.0 %
Tetanus	00	00	00	00	00	00	00	00	00	00	00	02	01	+ 100.0 %
Whooping Cough	00	00	00	00	00	00	00	00	00	00	01	06	08	- 25.0 %
Tuberculosis	41	21	00	08	32	04	01	10	05	122	145	728	1055	- 30.9 %

Table 2: Newly Introduced Notifiable Disease

26th January – 01th February 2013 (05th Week)

Disease	No. of Cases by Province									Number of cases during current week in 2013	Number of cases during same week in 2012	Total number of cases to date in 2013	Total number of cases to date in 2012	Difference between the number of cases to date in 2013 & 2012
	W	C	S	N	E	NW	NC	U	Sab					
Chickenpox	13	04	07	01	01	05	04	01	06	42	90	353	414	- 14.7 %
Meningitis	02 GM=2	00	03 MT=1 HB=2	00	01 TR=1	02 KG=2	01 AP=1	01 MO=1	00	10	13	99	80	+ 23.8 %
Mumps	04	00	01	00	01	01	01	03	01	12	60	135	398	- 66.1 %
Leishmaniasis	00	00	04 HB=3 MT=1	00	00	00	00	00	00	04	05	96	64	+ 50.0 %

Key to Table 1 & 2

Provinces: **W**: Western, **C**: Central, **S**: Southern, **N**: North, **E**: East, **NC**: North Central, **NW**: North Western, **U**: Uva, **Sab**: Sabaragamuwa.

DPDHS Divisions: **CB**: Colombo, **GM**: Gampaha, **KL**: Kalutara, **KD**: Kandy, **ML**: Matale, **NE**: Nuwara Eliya, **GL**: Galle, **HB**: Hambantota, **MT**: Matara, **JF**: Jaffna, **KN**: Killinochchi, **MN**: Mannar, **VA**: Vavuniya, **MU**: Mullaitivu, **BT**: Batticaloa, **AM**: Ampara, **TR**: Trincomalee, **KM**: Kalmunai, **KR**: Kurunegala, **PU**: Puttalam, **AP**: Anuradhapura, **PO**: Polonnaruwa, **BD**: Badulla, **MO**: Moneragala, **RP**: Ratnapura, **KG**: Kegalle.

Data Sources:

Weekly Return of Communicable Diseases: Diphtheria, Measles, Tetanus, Whooping Cough, Chickenpox, Meningitis, Mumps.

Special Surveillance: Acute Flaccid Paralysis.

Leishmaniasis is notifiable only after the General Circular No: 02/102/2008 issued on 23 September 2008. .

Dengue Prevention and Control Health Messages

Check the roof gutters regularly for water collection where dengue mosquitoes could breed.

Table 4: Selected notifiable diseases reported by Medical Officers of Health

26th January – 01th February 2013 (05th Week)

DPDHS Division	Dengue Fever / DHF*		Dysentery		Encephalitis		Enteric Fever		Food Poisoning		Leptospirosis		Typhus Fever		Viral Hepatitis		Human Rabies		Returns Received
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	%
Colombo	113	843	1	16	0	2	3	15	0	4	1	14	0	1	0	6	0	0	**46**
Gampaha	11	455	0	11	0	4	0	7	0	0	0	11	0	3	2	24	0	0	**27**
Kalutara	6	161	0	18	1	4	1	10	0	0	0	32	0	1	0	1	0	0	**31**
Kandy	27	118	0	4	0	0	0	0	0	0	1	2	0	1	0	2	0	0	**22**
Matale	4	47	0	15	0	0	0	0	0	0	2	3	0	1	0	7	0	0	**50**
NuwaraEliya	9	25	1	6	0	0	0	1	0	1	0	0	0	8	0	0	0	0	**46**
Galle	4	54	0	6	1	3	0	0	0	1	2	13	1	7	0	2	0	0	**32**
Hambantota	2	31	0	6	0	0	0	1	1	1	4	16	1	9	7	22	0	0	**67**
Matara	10	58	0	2	0	2	0	1	1	3	2	10	1	3	2	45	0	1	**94**
Jaffna	9	108	3	22	0	1	4	57	0	0	0	0	6	79	0	3	0	0	**42**
Kilinochchi	0	4	0	2	0	0	0	2	0	1	0	1	0	0	0	0	0	0	**0**
Mannar	3	26	2	7	0	1	3	10	0	11	0	4	2	2	0	0	0	0	**60**
Vavuniya	0	11	0	9	0	5	0	2	0	3	1	6	0	0	0	0	0	0	**25**
Mullaitivu	1	13	0	1	0	0	0	1	0	0	0	2	0	2	0	0	0	0	**60**
Batticaloa	19	69	2	17	0	1	0	0	0	0	1	3	0	0	1	3	0	0	**86**
Ampara	0	14	3	16	0	0	0	1	0	0	0	3	0	0	0	0	0	0	**29**
Trincomalee	7	29	0	6	0	0	0	0	0	0	0	11	0	1	0	0	0	0	**58**
Kurunegala	81	770	2	26	3	4	0	7	0	0	1	11	1	6	0	2	0	0	**46**
Puttalam	45	179	0	9	0	1	0	2	0	1	0	2	0	0	0	0	0	0	**33**
Anuradhapu	6	82	1	6	0	4	0	0	0	0	1	14	0	4	0	2	0	0	**32**
Polonnaruw	6	40	0	17	0	0	0	3	0	0	0	39	0	0	0	2	0	0	**29**
Badulla	3	45	1	15	0	0	0	3	0	0	0	3	0	4	0	5	0	0	**41**
Monaragala	0	30	1	10	0	1	0	3	0	0	1	13	1	4	4	7	0	0	**64**
Ratnapura	9	125	7	45	7	37	0	5	0	2	1	15	0	2	1	35	0	1	**50**
Kegalle	1	134	0	4	1	3	0	2	0	2	0	8	1	9	4	24	0	0	**36**
Kalmune	3	86	0	7	0	1	0	0	0	2	0	1	0	0	0	1	0	0	**23**
SRI LANKA	**379**	**3557**	**24**	**303**	**13**	**74**	**11**	**133**	**02**	**32**	**18**	**237**	**14**	**147**	**21**	**193**	**00**	**02**	**44**

Source: Weekly Returns of Communicable Diseases WRCD). 0

***Dengue Fever / DHF** refers to Dengue Fever / Dengue Haemorrhagic Fever.

****Timely** refers to returns received on or before 01st February, 2013 Total number of reporting units 336. Number of reporting units data provided for the current week: 148

A = Cases reported during the current week. **B** = Cumulative cases for the year.

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Comments and contributions for publication in the WER Sri Lanka are welcome. However, the editor reserves the right to accept or reject items for publication. All correspondence should be mailed to The Editor, WER Sri Lanka, Epidemiological Unit, P.O. Box 1567, Colombo or sent by E-mail to **chepid@sltnet.lk.**

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