

Where's the Eschar?: Non-eschar cases and Eschar Distribution Between the serotypes of Karp, Irie/Kawasaki and Hirano/Kuroki Causing Scrub Typhus in Fukushima, Japan

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Background Scrub typhus (ST) is endemic in Fukushima, where the highest number has been reported from 2006 to 2011 in Japan. Lack of the triad (fever, rash and eschar) in the clinical features of ST makes the diagnosis difficult especially without eschar. The distributions of eschars in the serotypes of ST remain unclear.

Methods We reviewed the clinical features of the patients diagnosed as ST in adults from 2008 to 2016 at Ohta Nishinouchi General Hospital in Fukushima, Japan.

Results Total 51 cases (serotype Karp [KP] 24, Irie/Kawasaki [I/K] 19, Hirano/Kuroki [H/K] 8) of ST were confirmed by elevated specific immunoperoxidase IgM and IgG and the positivity by real-time PCR analysis of eschars. Non-eschar cases were found 9.8% (5 cases : one of KP, one of I/K and 3 of H/K). Two eschars were found in a case of I/K. Total 47 eschars were found in the diagnosed cases. Eschars from abdomen to thighs including genitalia were found 24% (4/17) in men and 57% (17/30) in women, which is more than twice as high than men. Eschars in lower extremities from calves to feet were found 29% (5/17) in men and 3% (1/30) in women. There was no eschar in genitalia and hips in men. Eschars of KP were found in all of parts of bodies (head, neck, upper extremities, chest, back, abdomen, genitalia, hips, knees/popliteal fossae and feet). No eschar was found in genitalia and hips in I/K and H/K. No eschar was found in head, neck and feet in H/K as well.

Discussion The contact body sites by vectors, behavior pattern of the patients (passage in women etc) and preference to human, such as slow-biter with migration to genitalia or axillae as *Leptotrombidium Pallidum* (*L. pallidum*; vector of KP), and quick-biter as *L. scutellare* (vector of I/K and H/K) would be the causes of eschar distribution.

Conclusion Eschar is the key feature of ST, so we should not be missed the finding with the high index of suspicion in regards to eschar distribution of the sexes and the serotypes. Atypical presentation such as eschar negative ST should be concerned in this endemic area.

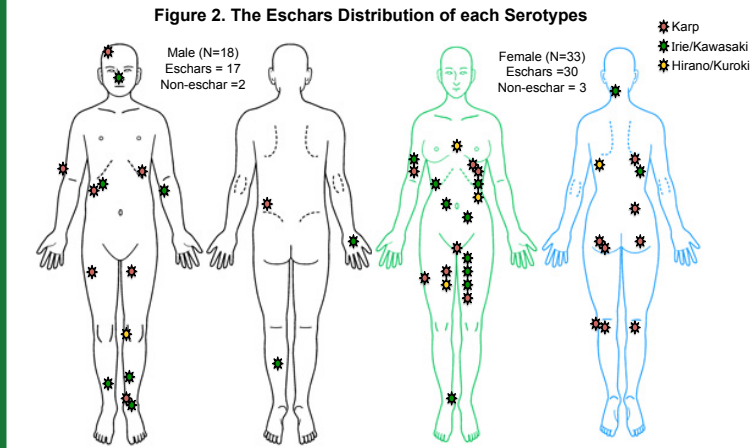
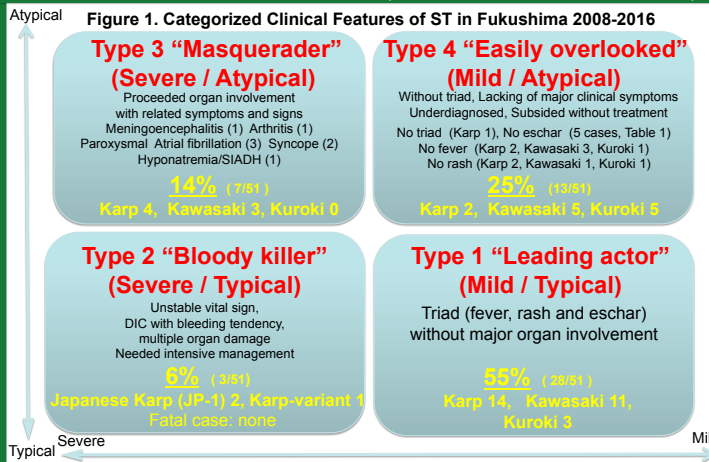


Table 1. Clinical overview of "non-eschar" ST (9.8% 5/51)

Age/ Sex	Serotypes	Serology titer (IP IgG/IgM)	Fever (°C)	Rash Distribution	Treatment	PD/ HD/ DTT	VNT
62/M	Karp	2560/5120	37.1	None	None	6/N/N	2
72/F	Hirano/ Kuroki	10240/20480 10240/10240	39.4	Neck, Anterior chest	None	0/N/N	4
52/F	Hirano/ Kuroki	2560/20480 20480/20480	38.5	Scalp	DOXY po:10D	0/5/5	2
68/M	Irie/ Kawasaki	80/640 5120/5120	38.7	Anterior chest	DOXY po: 7D	5/2/7	1
62/F	Hirano/ Kuroki	1280/-	40.0	Trunk	MINO po:14D	0/7/7	6

M: Male, F: Female, IP: Immunoperoxidase, DOXY: Doxycycline, MINO: Minocycline, po: per os, D:Days, PD: Patient delay, HD: Hospital delay, DTT: Days to treatment, N: Not to detect, VNT: Visits number of times to the diagnosis

Table 2. The Eschars Distribution of both sexes and each Serotypes

Distribution	Male	Female	Karp	Irie/ Kawasaki	Hirano/ Kuroki
Head and neck	2*	1	1	2*	0
Upper ext	3	2	3	2	0
Chest	1	3	3	0	1
Back	1	4	3	1	1
Abdomen	2	5	1	5	1
Genitalia	0	1	1	0	0
Buttocks	0	3	3	0	0
Thighs	2	7	5	3	1
Knees and poples	1	3	3	0	1
Lower legs and feet	5*	1	1	5*	0
None	2	3	1	1	3

*: The two of eschars in one patient

Table 3. Details of clinical features of ST in Fukushima, Japan

Serotype	The summer type		The autumn-winter type
	JP-1/Matsuzawa	JP-2/KNP1	Irie/Kawasaki, Hirano/ Kuroki
Phylogenetic type			Kawasaki, Kuroki
Vector chigger mites	<i>L. Intermedium</i>	<i>L. pallidum</i>	<i>L. Scutellare</i>
Regional distribution	North, middle and east coast (Abukuma mountains) of Fukushima		South to middle of Fukushima
Preference to human	"Slow biter" to soft skin after migration		"Quick-biter" without migration
Virulence	Severe in treatment delay		Moderate to mild
Prognosis	Occasionally fatal with DIC		Relatively good

L: *Leptotrombidium*

Table 4. Summary of Eschars Distribution

Distribution	Male	Female
Abdomen to thighs	24% (4/17)	53% (16/30)
Genitalia and buttocks	0% (0/17)	13% (4/30)
Lower legs and feet	29% (5/17)	3% (1/30)

Distribution	Karp	Irie/Kawasaki	Hirano/Kuroki
Genitalia and buttocks	17% (4/24)	0% (0/18)	0% (0/5)

References

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