

AN OUTBREAK OF MALARIA IN A SURGICAL WARD : POSSIBILITY OF MECHANICAL TRANSMISSION

Dadi S. Argadireja¹, N. Kumara Rai²

ABSTRACT

Penularan malaria pada umumnya terjadi melalui vektor yakni nyamuk *Anopheles*. Cara penularan lain adalah melalui transfusi darah atau secara congenital pada bayi yang baru lahir. Penularan secara mekanis misalnya melalui alat suntik sangat jarang dijumpai.

Berikut ini disajikan laporan penelitian terhadap 26 penderita malaria *Plasmodium falciparum* yang terjadi antara periode November 1981 sampai dengan Maret 1982 di bangsal bedah pria Rumah Sakit Umum Hasan Sadikin, Bandung. Hipotesa penularan melalui alat suntik/semprit ditegakkan sesudah diadakan penyelidikan epidemiologik dan entomologik. Ternyata *disposable syringe* di bangsal perawatan tersebut digunakan untuk lebih dari satu penderita. Hipotesa diperkuat dengan tidak timbulnya lagi penderita setelah alat suntik hanya dipergunakan untuk satu orang penderita yang dirawat.

INTRODUCTION

From October through December 1981 the Faculty of Medicine, University of Pajajaran in Bandung reported the occurrence of 6 malaria cases in the surgical ward of Hasan Sadikin General Hospital. The cases were presented by the Internal Medicine Department. Present among others were the staff of the Surgery Department, the Red Cross, lecturers of the Medical Faculty and staff of the Communicable Disease Control Department of West Java Provincial Health Services.

Apparently transmission continued to have occurred. In February 1982, 15 more cases were reported.

Altogether 26 *Plasmodium falciparum* cases were detected during the period October 1981 to March 1982. They all

came from regencies and municipalities where malaria transmission have been very minimal or negligible. Therefore the possibility that all cases contracted malaria before being hospitalized is very remote. This fact had been corroborated by the finding that *P. vivax* is dominant in West Java Province, whereas all cases reported were caused by *P. falciparum*.

The possibility of nosocomial infection was brought into light. Transmission in the hospital can occur naturally, i.e. through anopheline vector. The other possibilities are transmission through blood transfusion and mechanical transmission through the sharing of Syringes. Prompt decision was made by CDC Department of West Java to investigate those cases. The results of this investigation are reported in this article.

1. Chief CDC, West Java Province.

2. Chief, Malaria Control, Indonesia.

MATERIAL AND MEHTODS

All data pertaining to the 26 cases of *P. falciparum* malaria admitted were retrospectively collected, consisting of age, address, data of admission, diagnosis (clinical), laboratory diagnosis for malaria, blood transfusion, intramuscular and/or intravenous injection, and onset of illness.

Epidemiological investigation with regard to the number of blood films collected around residences of 10 cases is shown in table 1.

Interviews with patients either still being hospitalized or already discharged were held.

Efforts were also made to investigate the occurrence of malaria among the nursing staff of the surgical ward to elucidate the possibility of the source of infection and in some donors who can be found.

Mass blood surveys to detect asymptomatic carriers were carried out among the patients in the surgical ward as well as the neurosurgery ward which was located one level above. Finally, entomological surveys were incorporated to investigate possible vectors.

RESUSTS

A. Retrospective investigation

1. From the 26 cases reported and thus investigated, their status with regard to blood transfusion and injection either intramuscular or intravenous is as follows :
 - a. Thirteen cases received blood transfusion (case no. 1 to 4, 6, 10, 11, 15, 16, 17, 22, 24 and

26), of whom 10 cases received also intravenous injection (case no. 1, 2, 3, 10, 11, 15, 16, 17, 22 and 26), 2 received intravenous as well as intramuscular injection (case no. 17 and 26), while 3 cases received no injection at all (case no. 4, 6 and 24).

- b. Onset of illness counted from the date of transfusion upto the date of laboratory examination, which may be regarded as the incubation period of the 10 cases varies from 16 to 90 days.

Four cases contracted malaria (case no. 3, 16, 22 and 26) before blood transfusion.

2. Twenty five cases received intravenous injection of whom 4 cases received intramuscular injection as well. A case receiving no injection at all was no. 24.
3. All 26 cases were infected with *P. falciparum*.
4. On average one disposable syringe was used for two patients.

B. Interviews with some malaria cases

1. Cases still hospitalized: 13 cases were interviewed. All assured that they never visited malarious area* or contracted malaria before being admitted to the hospital.
2. Cases already discharged: 10 cases were traced to their residence. Seven cases were found and interviewed accordingly.

Similar answers as in point B.1 were obtained. Two cases were said to have died, whereas one moved to another untraceable place.

*The statement " never visited malarious area" should be interpreted with great precautions since it is very difficult for laymen to differentiate between malarious areas and non-malarious areas.

C. Blood Survey

1. From 7 cases mentioned in point B.2, 403 blood films were collected and examined from their surrounding neighbours. All were negatives for malaria parasites.
2. From two blood donors successfully traced in the field, their blood films were also negative for malaria parasites.
3. From 28 nurses working in the surgical ward, nobody harboured the malaria parasite. Similar results were obtained from 44 hospitalized patients in the neurosurgical ward one level above the surgical ward.
4. Bloodfilms collected from the surroundings of 10 cases (column 10 of table 1) were all negative.

D. Distribution of cases in the surgery ward.

Figure 1 shows the distribution of malaria cases in the surgical ward. Cases positive for malaria but already cured and new cases emerging during the investigation on 3 March 1982 are depicted differently.

The arrow shows the direction for entering the ward as well as the direction of the nursing staff in giving medication including injections.

It shows clearly that new cases always emerge after the old ones, augmenting the possible relationship between the injections and transmission of malaria.

E. Entomological investigation

Entomological investigations were carried out twice in the surgical ward, the first on 10 December 1981 and the second one on 17 March 1982. Both yielded only *Culex* mosquito. These findings were supported by the results of routine entomological surveys

in West Java revealing that in the cities no anopheline mosquitoes have been collected.

F. Efforts to stop transmission

After suspecting mechanical transmission of malaria, efforts were made to use disposable syringe properly. The use of one syringe for one patient was initiated. Transmission ceased to occur thereafter.

DISCUSSION

The hypothesis of transmission through blood transfusion can almost be excluded. Half of the 26 malaria cases did not receive any transfusion and the incubation period ranging from 16 to 90 days is beyond the conventional 10 days for *P. falciparum* resulting from blood transfusion (1).

Natural transmission by anopheline vector were similarly excluded because no malaria vector was detected either in the hospital compound and its vicinity or in Bandung municipality itself. This fact is further corroborated by the distribution of cases confined only to the surgical ward. Natural transmission will not give this case distribution pattern.

The hypothesis of relapse or recrudescence in case of *P. falciparum* as well as cases contracted malaria before admitted to the hospital can also be disregarded. The parasite formula, 100% *P. falciparum*, did not conform with the pattern observed in West Java where *P. vivax* was dominant. Besides, interviews held with some cases and negative bloodfilms taken from the surroundings of 10 cases did not support that hypothesis.

The last hypothesis is mechanical transmission through disposable syringe. Twenty five cases received intravenous injection of whom 4 received both intravenous and intramuscular injection. Only

Table 1. Malaria Cases detected in the male surgical ward of
Hasan Sadikin General Hospital
Oct 1981 – March 1982

1 No.	2 Age (Yrs)	3 Address	4 Date of admission	5 Diagnosis	6 Transfusion		7 Lab exam *)	8 Onset (6-7) days	9 Injection		10 Epidemiologic Invest	
					Date	No of bottles			I M	I V	No of slides	Positive
1.	20	Tasikmalaya	25- 8-81	Fract Cruris Sin	Feb 81	2	24-11-81	90	-	+	-	-
2.	35	Bandung	11- 9-81	Typhoid perforation	13- 9-81	4	6-11-81	53	-	+	-	-
3.	35	Cianjur	6- 9-81	Vulnus Laceratum	19- 1-82	2	12- 1-82	* *	-	+	-	-
4.	48	Bandung	16-10-81	Typhoid perforation	16-10-81	4	18-11-81	32	-	-	-	-
5.	21	Bandung	16-10-81	Hernia incarcerata	-	-	11-11-81	-	-	+	5	-
6.	75	Bandung	19-10-81	Prostat hypert	19-10-81	7	7-12-81	48	-	-	-	-
			3-12-81	Gastritis	-	-	-	-	-	-	-	-
7.	26	Bandung	16-10-81	Osteomyelitis	-	-	13- 1-81	-	-	+	20	0
			1- 1-82	-	-	-	-	-	-	-	-	-
8.	32	Bandung	21-10-81	Fractura Complic	-	-	23-11-81	-	-	+	68	0
9.	40	Garut	2-11-81	Liver tumor	-	-	3- 3-82	-	-	+	-	-
10.	25	Bandung	11-11-81	Peritonitis	11-11-81	3	13- 1-82	62	-	+	14	0
11.	25	Bandung	15-12-81	Peritonitis	12-12-81	4	2- 2-82	50	-	+	10	0
12.	17	Garut	19-12-81	Vesicolithiasis	-	-	3- 3-82	-	-	+	-	-
13.	28	Bandung	22-12-81	Fract Cruris Sin	-	-	3- 3-82	-	-	+	42	0
14.	52	Cimahi	28-12-81	Perianal cyst	-	-	5- 2-82	-	-	+	46	0
15.	47	Purwakarta	28-12-81	?	28-12-82	?	31- 1-82	33	-	+	-	-
16.	39	Cimahi	6- 1-82	Fract Carpal	20- 2-82	3	16- 2-82	* *	-	+	75	0
17.	15	Garut	7- 1-82	Coxitis	13- 2-82	2	3- 3-82	16	+	+	-	-
18.	18	Sumedang	11- 1-82	Deformitys	-	-	4- 2-82	-	-	+	-	-
19.	18	Bandung	13- 1-82	Amputation	-	-	8- 2-82	-	-	+	8	0
20.	17	Subang	14- 1-82	Fract radii	-	-	11- 2-82	-	-	+	-	-
21.	26	Purwakarta	14- 1-82	Cellulitis	-	-	8- 2-82	-	+	+	-	-
22.	15	Bandung	14- 1-82	Fract radii	17- 2-82	5	6- 2-82	* *	-	+	115	0
23.	19	Cianjur	19- 1-82	Vulnus Seissum	-	-	25- 1-82	-	+	+	-	-
24.	60	Subang	26- 1-82	Retentio urinae	11- 2-82	7	22- 3-82	43	-	-	-	-
25.	24	Cimahi	5- 2-82	Fract humeri	-	-	16- 2-82	-	-	+	-	-
26.	18	Bandung	19- 2-82	Fract Costae	25- 3-82	1	3- 3-82	* *	+	+	-	-

*) ALL Positives for *P. falciparum*

** Positive before transfusion

I M = intramuscular

I V = intravenous.

Figure 1. Distribution of Malaria Cases in the Surgical Ward As of 3 March 1982.

0	0	0	0	0	0			Doctor's office	0	0	0	0	0	0
0	0	0	0	0	0	0			0	0	0	0	0	0
0	0	0	0	0	0	0			0	0	0	0	0	0
2	4	6				0			10	12	14			

ENTRY

1	3	5	0					9	11	13			
0	0	0	0	→0	0			0	0	0	0		
0	0	0	0	→0	→0			0	0	0	0	→0	0
0	0	0	0	0	0		Nurse's office	0	→0	0	0	0	0
0	0	0	0	0	0			0	0	0	0	0	0

0 : Blood Slide Negative
 0 : Blood Slide Positive, already cured
 → 0 : New Malaria Cases.

one case did not receive any injection. This hypothesis is supported by the case distribution in the surgical ward where the emergence of new malaria cases was strikingly in accordance with the direction of the nursing staff in giving injection and by the evidence that disposable syringes were used on the average for two patients.

Eventually transmission ceased to occur after the proper use of the syringe.

CONCLUSION

Despite some shortcomings in the investigation of this unusual event, the hypothesis of mechanical transmission through disposable syringe is the most probable. This kind of transmission usually occurs among drug addicts using contaminated hypodermic syringe (2).

This malaria outbreak occurring in a large general hospital shows that improper use of disposable syringes could initiate an outbreak of communicable diseases.

REFERENCES

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