The incidence of malaria after splenectomy in Papua New Guinea

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In the tropics, as in the developed world, the spleen is the commonest intra-abdominal organ to be injured.^{1,2} Splenic enlargement due to chronic malaria predisposes to splenic injury, particularly in low velocity blunt trauma due to domestic violence or assault, both of which are common in Papua New Guinea. In developed countries the risk of sepsis after splenectomy has resulted in a more conservative approach to splenic trauma.^{3,4} In the tropics death from malaria after splenectomy has been reported, but no formal study has been undertaken.^{2,5} We studied the sequelae of splenic trauma and splenectomy in patients living in an area of Papua New Guinea where malaria is endemic.

Patients, methods, and results

The study was performed in East New Britain in the Bismarck Archipelago. Nonga Base Hospital, Rabaul, is the islands' referral hospital, and the plantations employ people from all over Papua New Guinea. In 1982-92, 115 patients were treated for splenic trauma, 31 by splenectomy and 84 by splenic conservation. Despite considerable effort, only 56 patients were traceable in 1993, largely because the others had moved to remote parts of Papua New Guinea (35 had returned to the Highlands, a non-malarious area). Six of the 56 had died; the causes of death could not be verified in the two who had undergone splenectomy, while relatives stated old age, bomb blast, cancer, and sorcery as causes in the four with conserved spleens. This left 50 patients (17 who had undergone splenectomy and 33 splenic conservation) who were followed up to obtain a history of post-trauma illnesses (malaria, upper respiratory tract infection, sores, influenza, tuberculosis) and to take blood for a full blood count and malarial film. We also studied 50 controls, similar in age, sex, and place of origin to the patients and admitted to the surgical wards during the same period for a non-traumatic cause. Data were analysed using the χ^2 test.

All 17 patients who underwent splenectomy reported that they had had malaria compared with only 18 of 33 (55%) in the conservation group and 23 of 50 controls ($P < 0.05$). Upper respiratory tract infections were also more common in the splenectomy group (table). Fifteen (88%) of the splenectomy group were positive for malaria at the time of interview compared with six (18%) of the conservation group and eight (16%) controls ($P < 0.001$). The patients who had undergone splenectomy also tended to have a higher leucocyte count ($P < 0.01$), but there was no difference in haemoglobin concentrations. Compliance with anti-malarial prophylaxis declined from 100% in the first year to 29% after three years in the splenectomy group.

Illnesses and results of blood examination in patients with splenic trauma and hospital controls 1-10 years after injury. Values are numbers (percentages) unless stated otherwise

Illness or investigation	Splenectomy	Splenic conservation	Hospital control	Significance (χ^2)
History of malaria	17 (100)	18 (55)	23 (46)	$<0.001(15.43)$
History of upper respiratory tract infection	15 (88)	12 (36)	18 (36)	$<0.001(15.47)$
Visit to clinic	15 (88)	2 (6)	10 (20)	$<0.001(40.93)$
Haemoglobin <130 g/l	14 (82)	17 (52)	34 (68)	$<0.05(5.09)$
White cell count $>10 \times 10^9/l$	13 (76)	10 (30)	18 (36)	$<0.01(10.92)$
Malaria parasites on blood film	15 (88)	6 (18)	8 (16)	$<0.001(34.95)$

Comment

We could follow up only 56 of 115 patients with splenic trauma, but the results still suggest a high incidence of malaria in patients who had undergone splenectomy. All these patients reported having malaria, and although the history given may be unreliable, the fact that 88% were also carrying malaria parasites is convincing evidence that malaria is a major risk after splenectomy. Our data do not suggest that post-splenectomy malaria caused death, but others have reported death from malaria after splenectomy.²

In Papua New Guinea splenic conservation has been practised for over a decade, and the splenectomy rate in splenic trauma has been reduced to below 30%.² When splenectomy is performed every effort should be made to ensure that patients living in endemic areas continue to take anti-malarial prophylaxis for life in addition to pneumococcal vaccination and penicillin prophylaxis. Those living in the tropics, but outside malarious areas (above 5000 feet), require prophylaxis when they travel into an endemic zone.

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Commentary

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The findings reported by Boone and Watters are seriously limited by the low percentage (43%) of subjects traced for follow up. Although there are inevitable practical problems in following up an itinerant population in the tropics, consideration has to be given to how the results should be interpreted.

If only a low proportion of subjects are followed up biased results will be obtained if the success of follow up depends on either the original treatment (splenectomy or splenic conservation in this study) or the outcome measures (history of malaria, upper respiratory tract infection, etc). For example, suppose that for the subjects who had undergone splenectomy those who subsequently contracted malaria were more likely to remain in New Britain (and be available for follow up) than those who did not contract malaria. The estimated rate of malaria among the follow up group would therefore be a gross overestimate of the true rate. The comparison of rates for the splenectomy and splenic conservation groups would then be severely confounded if follow up of the latter group was not similarly related to a history of malaria.

Interpretation of the results for follow up subjects may be helped by calculating the minimum and maximum rates for the various outcome measures based on the assumption that all or none of the untraced subjects have the outcome. For the malaria rates in this study the minimum and maximum values are, respectively, 55% and 100% for the splenectomy group and 21% and 82% for the splenic conservation group, allowing for both the untraced and deceased subjects. The large range of values here reflects the high proportion of untraced subjects.