SPLENECTOMY AND EXPERIMENTAL INFECTION OF MICE BY A VIRULENT STRAIN OF TRYPANOSOMA CRUZI

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Splenectomy seems to increase susceptibility of mice to a further infection with a virulent strain of Trypanosoma cruzi.

Parasitemia increases with splenectomy and the sooner the infection follows the operation, the greater the parasitemia.

The mortality rate seems to have not been influenced by splenectomy.

INTRODUCTION

The effects of splenectomy in infectious diseases, especially in those produced by protozoa, are still a matter of dispute (12).

In some people's opinion animals previously splenectomized are more susceptible to certain parasitic and bacterial infections than are normal animals (1, 4, 5, 6, 13, 15), while others claim that splenectomy has no effects on the development of a further infection (3, 11, 13, 14).

Being interested in the consequences of splenectomy in experimental trypanosomiasis cruzi in mice, we performed some experiments hoping to shed some light on this controversial question.

MATERIAL AND METHODS

1 — Two groups of 24 and 10 male white mice, each, with a mean body weight of 10g. were splenectomized under ether anesthesia.

6 days later the animals of the first group were infected with the virulent Y strain of *Trypanosoma cruzi,* maintained in mice. At the same time a control group of 21 mice was infected with an equal number of infective flagellates.

We injected 50 flagellates per gram of body weight, by intraperitoneal route.

The parasites were obtained by bleeding mice on the 8th day of infection.

The second group of 10 splenectomized animals was kept as control over the operation.

2 — Twelve male white mice with the same characteristics of the above group were splenectomized under the same conditions. Twelve days later these animals and 10 of a control group were infected as the preceding groups.

3 — Seven male white mice with 10g. body weight were splenectomized under ether anesthesia. After 30 days these animals and 7 of a control group were infected as had been the above mentioned groups.

Parasitemia by the Pizzi-Brener technique (2) was done on the 8th, 15th and 30th day after the infection.

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TABLE 1

INFECTION 6 DAYS AFTER SPLENECTOMY

	Mice	Number of parasites/5mm³ of blood		
		Days after infection		
		8	15	30
Splenectomized	1	1.435	6.020	—
	2	1.925	8.450	—
	3	3.080	6.440	—
	4	2.730	8.120	—
	5	980	4.795	—
	6	2.590	3.255	—
	7	1.505	25.085	—
	8	630	11.095	—
	9	2.480	10.185	—
	10	1.890	19.180	—
	11	1.890	6.980	—
	12	3.010	7.875	—
	13	3.430	5.075	—
	14	4.865	3.570	—
	15	2.555	3.675	—
	16	2.590	3.045	—
	17	1.295	2.095	—
	18	1.540	10.500	—
	19	3.080	17.500	—
	20	4.060	10.500	—
	21	2.205	10.500	—
	22	1.855	5.075	—
	23	1.610	4.480	—
	24	4.270	17.500	—
	Mean	2.395	8.499	—
	Median	2.342	7.427	—
Controls	1	1.085	4.515	—
	2	—	—	—
	3	3.570	3.465	—
	4	1.890	5.390	—
	5	2.415	2.520	—
	6	1.435	1.715	—
	7	1.575	2.450	—
	8	735	1.680	—
	9	—	—	—
	10	—	—	—
	11	—	—	—
	12	2.205	10.500	—
	13	1.785	1.855	—
	14	1.085	4.830	—
	15	2.485	7.280	—
	16	3.770	4.025	—
	17	1.820	6.475	—
	18	945	3.290	—
	19	1.330	5.075	—
	20	770	2.870	—
	21	1.645	4.025	—
	Mean	1.796	4.232	—
	Median	1.645	4.025	—

TABLE 2

INFECTION 12 DAYS AFTER SPLENECTOMY

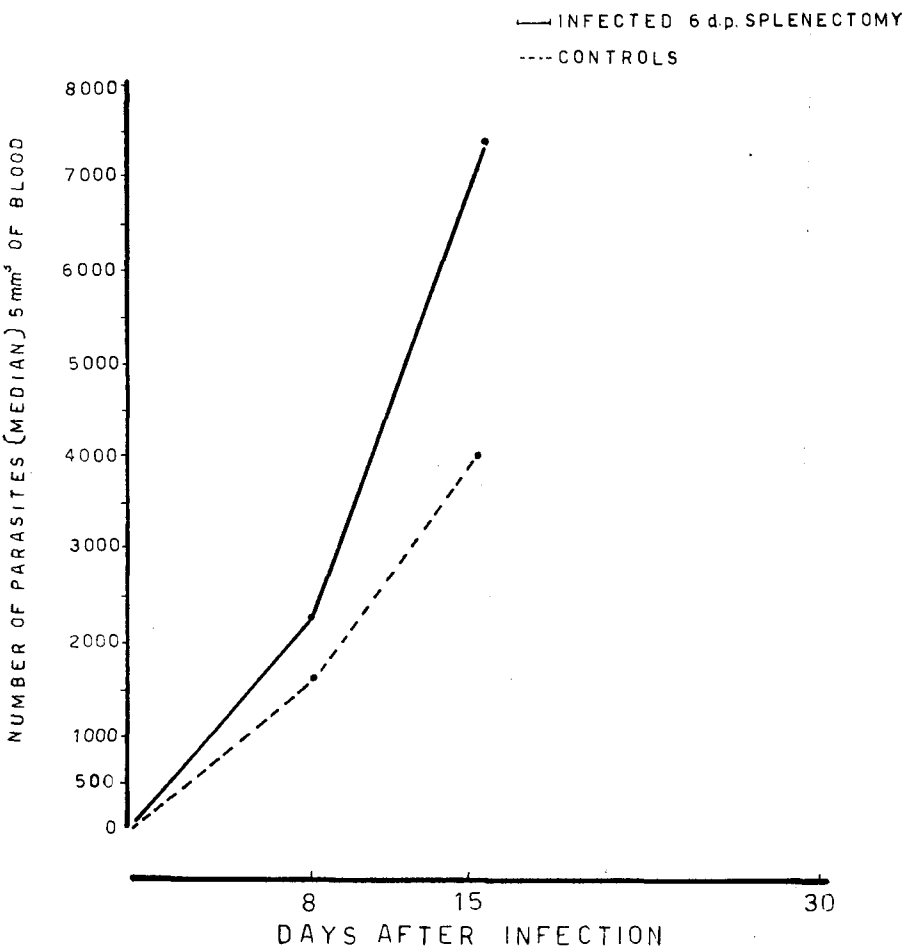
	Mice	Number of parasites/5mm³ of blood		
		Days after infection		
		8	15	30
Splenectomized	1	175	10.500	—
	2	0	2.520	910
	3	0	6.650	—
	4	0	5.635	0
	5	245	2.310	—
	6	0	3.745	140
	7	0	980	280
	8	0	6.895	—
	9	70	4.445	0
	10	0	7.700	—
	11	105	8.050	—
	12	70	11.620	—
	Mean	55	5.920	266
	Median	0	6.142	140
Controls	1	140	11.445	—
	2	0	805	—
	4	105	2.870	—
	3	35	11.830	105
	5	385	3.605	140
	6	70	1.995	—
	7	0	4.445	—
	8	70	2.730	—
	9	35	2.205	—
	10	105	1.435	—
	Mean	94	4.336	122
	Median	70	2.800	122

TABLE 3

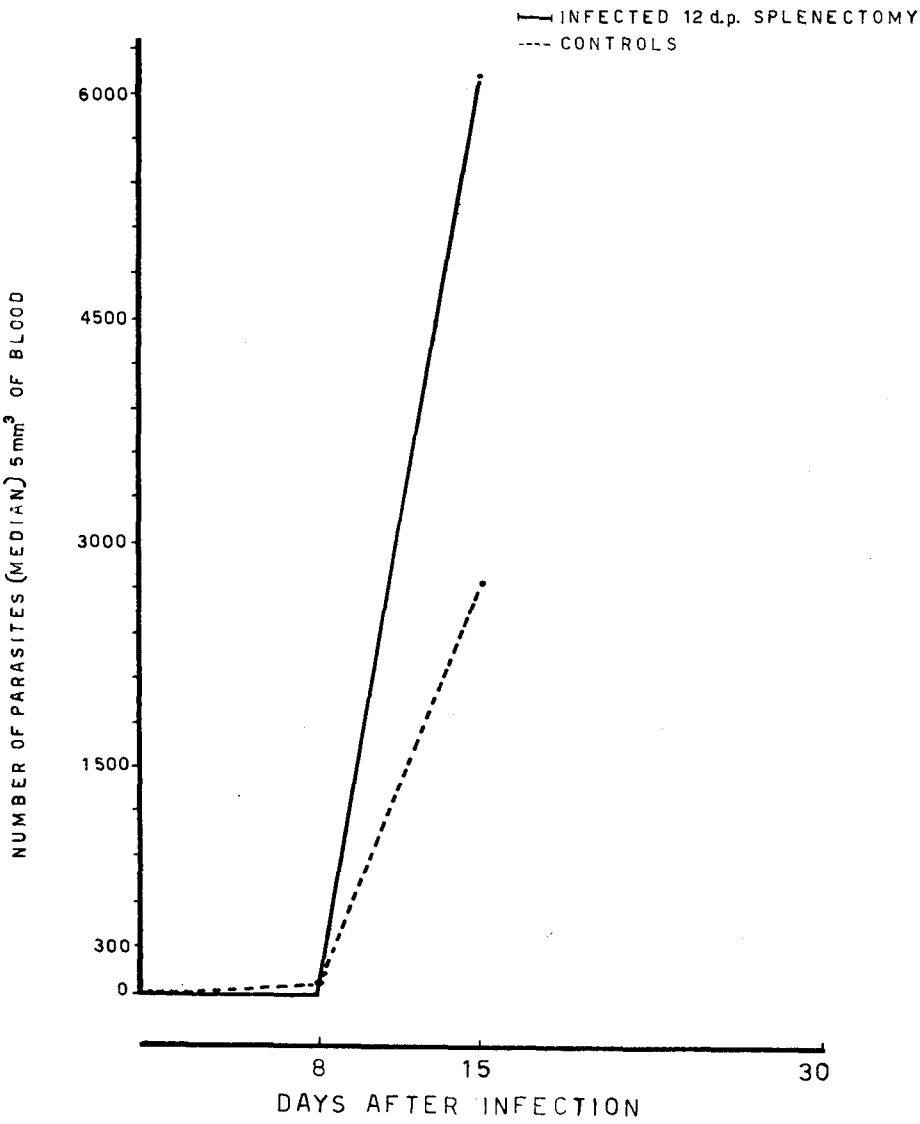
INFECTION 30 DAYS AFTER SPLENECTOMY

	Mice	Number of parasites/5mm³ of blood		
		Days after infection		
		8	15	30
Splenectomized	1	35	735	1.015
	2	70	1.085	—
	3	70	2.940	—
	4	385	3.780	2.730
	5	280	1.435	105
	6	700	1.505	—
	7	735	980	—
	Mean	324	1.780	1.306
	Median	280	1.435	1.015
Controls	1	1.085	280	.0
	2	4.235	420	35
	3	910	1.855	140
	4	1.015	630	0
	5	1.225	980	35
	6	5.565	1.330	70
	7	1.890	280	—
	Mean	2.275	825	46
	Median	1.225	630	35

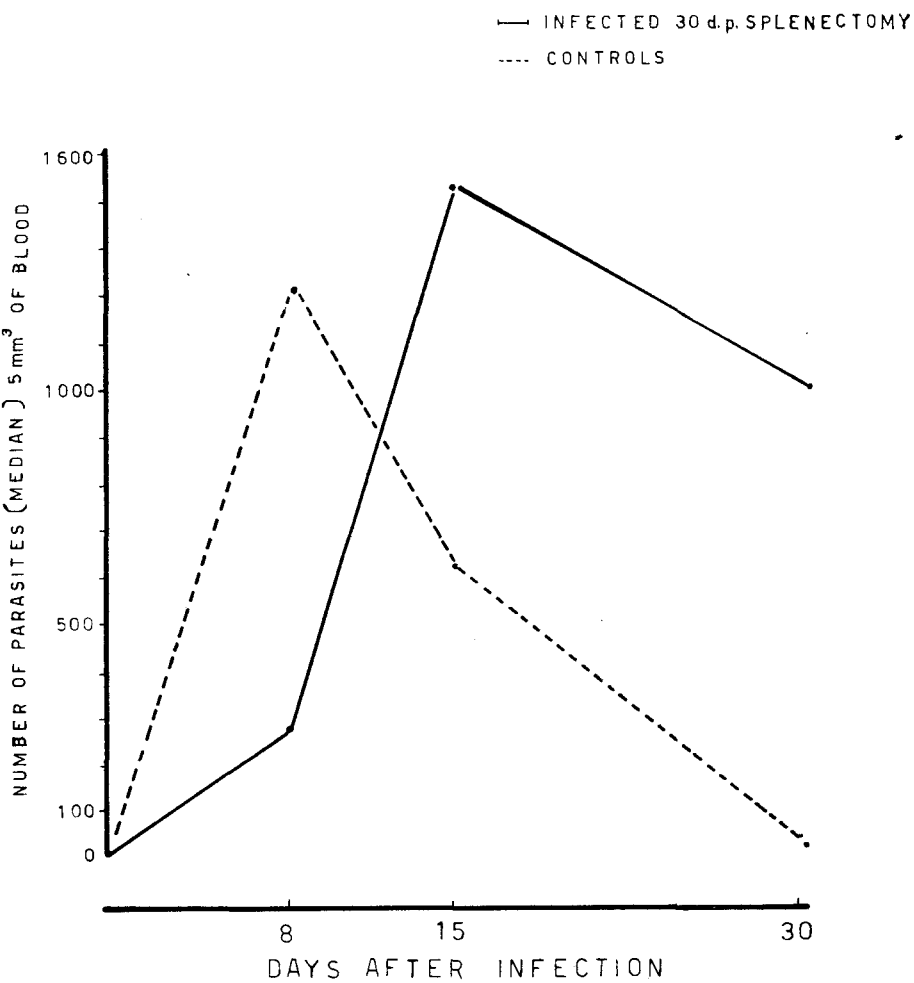
GRAPH I


INFECTED 6 d.p. SPLENECTOMY
CONTROLS
NUMBER OF PARASITES (MEDIAN) 5 mm³ OF BLOOD
8000
7000
6000
5000
4000
3000
2000
1000
500
0
8
15
30
DAYS AFTER INFECTION

GRAPH II


INFECTED 12 d.p. SPLENECTOMY
CONTROLS
NUMBER OF PARASITES (MEDIAN) 5 mm³ OF BLOOD
6000
4500
3000
1500
300
0
8
15
30
DAYS AFTER INFECTION

GRAPH III


INFECTED 30 d.p. SPLENECTOMY
CONTROLS
NUMBER OF PARASITES (MEDIAN) 5 mm³ OF BLOOD
1600
1000
500
100
0
8
15
30
DAYS AFTER INFECTION

RESULTS

As shown by the Tables 1, 2 and 3 and Graphs I, II and III, splenectomy generaly increases parasitemia of white mice submitted to an infection with a low inoculum of virulent Y strain *Trypanosoma cruzi*.

This increase was almost the same in the three splenectomized groups, particularly at the peak of the parasitemia (15th day), as compared with the respective control group.

Our results are inconclusive with respect to the surviving percentage of the splenectomized mice in relation to the control animals but it seems that no significant difference exists between them.

20% of the animals of the splenectomy control group died in the 30 days period of the experiment.

COMMENTS AND CONCLUSIONS

It is almost impossible to make a comparison between the several works done on the subject of splenectomy and infection because the techniques and material used were quite different in each case.

Using a standardized method, and mice of the same age, body weight, sex and strain we could demonstrate, varying only the size of the inoculum, that splenectomy increases the susceptibility of mice to a further infection with virulent *Trypanosoma cruzi* strain as expressed by an increased parasitemia.

The percentage of the animals surviving 30 days seems not to be influenced either by the splenectomy or by the number of injected flagellates, but the time elapsed between the operation and the infection and/or the age of the animals reduces the number of parasites in the blood stream.

Even in these cases in which the infection was delayed in relation to the splenectomy and the parasitemia was lower than in the more precocious infection, a higher parasitemia persisted among the splenectomized mice.

The hyperplasia of the remaining Reticulo-endothelial-system (RES) is perhaps responsable for this, since in cases in which splenectomy plus the blockade of the RES (1) or simply the blockade of this system was done (5), susceptibility to *trypancsoma* infection has been increased.

RESUMO

Esplenectomia em camundongos jovens aumenta sensìvelmente a parasitemia daqueles submetidos posteriormente a uma infecção com um baixo inoculo de Trypanosoma cruzi, *porém não parece influenciar a taxa de mortalidade dos animais, pelo menos dentro do período considerado (30 dias).*

O número de parasitas na corrente sanguínea foi tanto maior quanto mais jovens eram os camundongos e quanto mais próxima foi a infecção da esplenectomia.

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