

Advantages of the Spared Surgical Treatment of the Spleen Injuries in the Clinical Conditions

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KEY WORDS:

Spleen Injuries; Posttraumatic Splenectomy; Post-traumatic Spleen; Preservation; Spleen auto transplantation

ABSTRACT

Background/aims: Aim of this study was to compare clinical, biochemical and hematological parameters of the patients after posttraumatic splenectomy, posttraumatic spleen preservation and auto transplantation and the control group of the patients.

Methodology: The study included data on 169 patients treated at the University Surgery Department, University Hospital Split, from 1998 till 2006. There were 127 male, and 42 female patients, mean age was 40,3 years (range 15-74), 137 of the patients underwent surgery and 32 were treated without operation. A group of 29 patients, who underwent

inguinal hernia repair, was the control group.

Results: Reduction in postoperative morbidity, hospital stays and blood products administration are achieved if the spleen is preserved. The values of Howell-Jolly bodies, CH50 complement particles, IgM antibodies, lymphocytes and monocytes are reduced if the spleen is not preserved.

Conclusion: No operative treatment and spleen preserving surgical procedures are superior to the splenectomy in the spleen trauma treatment. Splenectomy should be avoided whenever is possible.

INTRODUCTION

No operative spleen trauma treatment is superior in surgical practice (1,2). More conservative approach finds its point of support in contemporary cognition of the spleen physiology and its distinctive importance in immunological, hematological and circulatory spleen homeostasis (3,4). Beside these facts, potentially mortal complications that may occur in splenectomy (surgical and non-surgical) are the additional causes because of which the spleen injury has to be taken care of regarding the best preservation of the lineal tissue. The aim of our research was to establish statistical difference in some biochemical and hematological parameters in the patients submitted some of the spleen preservation methods and the splenectomy patients with spleen auto transplantation referring to the control group.

METHODOLOGY

In the University Department of Surgery, University Hospital Split, from 1998 until 2006, 169 patients were treated because of spleen injuries. One hundred thirty-seven patients of that number were treated surgically and 32 patients with conservative methods. Thirty-three patients submitted splenectomy, 64 splenectomy with spleen auto transplantation in a large omentum, and 40 of them submitted some of the spleen preservation methods among which there were 24 splenectomy. The group of 29 patients, who sub-

mitted inguinal hernia surgery, only, was our control group. There were 127 men and 42 women, median age was 40,3 (range 15 - 74).

The procedure for heterotypic spleen auto transplantation consisted of slicing up the spleen tissue measuring 3 x 5 x 0,5 cm. Three by three slices were implanted in the rolled up parts of a large omentum and stitched up with Vycril 3/0. Although in the middle parts of the transplant we find necrosis in the first week, good blood circulation of the transplant borders gains its quick regeneration and the final stage of the histogenetic process supervenes in 12 months from the transplantation (5,6).

Ten ml of cubital vein blood samples were taken from all patients 12 months after transplantation. For the basic hematological samples blood was taken with EDTA anticoagulant (etilen diamino tetra acetat) in form of potassium (carbonate) salt, 1 mg/ml. For the quantitative and qualitative blood analysis standard procedures were used by Advia 120 (number nomination of leucocytes, erythrocytes, hemoglobin, hematocrit, MCV, MCH and MCHC), bioanalyser Hitachi 917 (albumins, bilirubine, iron, UIBC, TIBC), Olympus (albumins, alpha 1, alpha 2, beta and gama globulins), DADE-Behring (IgG, IgM, IgA, C3 and C4 components of the complement). Haemolytic activity of the CH50 complement was determined by Kobalt-Mayer method "Immunochemistry" modified by Vogh using spectrophotometrical device PYE unicampu

8610 UV/VIS - 413 nm wave-length.

Immunofluorescent technique was used to determine lymphocytes B. After separation of other leucocytes, the lymphocytes were incubated for 30' at 4°C with antihuman immunoglobulin conjugated with fluorescent substance. Then the physiological solution was used to rinse. We observed, with fluorescent microscope, how many of 100 lymphocytes would be fluorescent. That number corresponded to the percentage of the lymphocytes B. Lymphocytes T have ability to form rosettes with sheep erythrocytes. After incubation with mentioned erythrocytes we observed how many of 100 lymphocytes would create rosettes, and that corresponded to the percentage of the lymphocytes T. Regarding total number of leucocytes from the peripheral blood and the lymphocytes percentage from the differential blood results we can count absolute number of lymphocytes T and B. The results are tabled and graphed as arithmetical mean and the statistical feature were valued by the Student t- test.

RESULTS

The results consist three parts. In the first part we shall explain the advantage of the spleen preservation method regarding splenectomy. The second part shows the comparison between some laboratory parameters of the control group and some patients with preserved spleen without auto transplantation.

Comparing the number of the early postoperative complications at the patients submitted splenectomy and those with spleen preservation it can be notified significantly less complications at the patients where one of the spleen preservations were performed (Table 1).

Besides, hospital treatment and the amount of blood received by transfusion are statistically lower at the patients with preserved spleen than those with splenectomy (Table 2).

Patients with spleen preservation didn't submit any repeated intervention but we intervened three times at those with splenectomy (septic complications: subphrenic and subhepatic abscess) and twice at the patients with splenectomy and spleen auto transplantation because of ileus and shock (Table 3).

Comparing the number of Howell-Jolly bodies, that serve as a predictor in spleen functioning, in a blood smear of the splenectomy patients and those with spleen auto transplantation within three years after operation and even longer, we can notify statistically less number of the bodies at the patients with spleen auto transplantation in early (<3 years) and late (>3 years) postoperative period.

Analyzing laboratory parameters, of the control group and the group submitted one of the spleen preservation methods; we can notify statistically no big differences. There were analyzed: leucocytes, erythrocytes, IgA, IgG, IgM, lymphocytes, T lymphocytes, B lymphocytes, beta globulin, gamma globulin, UIBC, TIBC, bilirubine, iron, C3, C4, CH50, albumins, alpha 1 globulins and alpha 2 globulins.

TABLE 1 Early Postoperative Complications at the Patients Submitted Splenectomy and those with Spleen Preservation

Complication	Surgical procedure	
	Splenectomy (N)	Spleen preservation (N)
Postoperative bleeding	0	0
Reactive pancreatitis	15	3
Abscessus	3	0
Wound dehiscence	1	0
Wound infection	9	3
Sepsis	2	0
Pneumonia	8	2
Haemorrhagic cystitis	1	1
Postoperative ileus	1	0
Phlebotrombosis	1	0
TOTAL	41	9

N - Number of patients

Comparing chosen parameters (albumins, alpha 1 globulins, alpha 2 globulins, bilirubine, iron, UIBC, TIBC, beta globulins, gamma globulins, C3 and C4 components of the complement, stick, segmented and eosinophile leucocytes, IgA and IgG immunoglobulin) of the control group and the group of the patients that submitted splenectomy with spleen auto transplantation there were no statistically greater differences. As opposite to those parameters aberration tolerance of CH50 component of complement, number of lymphocytes and monocytes and the amount of IgM antibodies in these two groups were statistically significant (Table 4).

DISCUSSION

The risk of the bacterial infection and sepsis after splenectomy is in direct connection with splenectomy and it doesn't depend on age or time from the operation (7). Although the incident of the post splenectomy sepsis is low its fatal consequences are the reasons to

TABLE 2 An Average Hospital Treatment and Blood Transfusion at the Patients with Splenectomy and Spleen Preservation

	Mean hospitalization (days)	Mean blood transfusion (ml)
Splenectomy	22.4	1485
Spleen preservation	9.5	1075
p	< 0.01	< 0.01

TABLE 3 Reasons for Interventions in the Group of Patients with Splenectomy Regarding the Group with Spleen Auto Transplantation

Primary surgical procedure	Reasons for intervention	N
Splenectomy	Subhepatal abscessus	1
	Subphrenical abscessus	2
	Postoperative ileus	1
Splenectomy + auto transplantation	Shock	1
Total		5

N - Number of patients

TABLE 4 Review of Statistically Significant Differences between the Control Group and the Group of the Patients with Spleen Auto Transplantation

	CH50 (g/L)	lymphocytes (%)	monocytes (%)	IgM (g/L)
Control group	102	8.11	2.35	2.22
Splenectomy + auto transplantation	111	31.11	5.8	1.29
p	< 0.01	< 0.001	< 0.001	< 0.001

prevent it (7,8). That includes conservative treatment of the spleen injuries, surgical methods of the spleen preservations and post splenectomy prophylaxis by pneumococcus vaccines and antibiotics (9). Sometimes there are controversial attitudes about the spleen auto transplantation expediency but nevertheless most authors encourage the method (10).

This is particularly established in the field of child surgery (11,12). Auto transplantation method is assumed to be more beneficial than splenectomy itself, but less than other spleen preservation methods. Patients with splenectomy proved concentration decrease of IgM and increase of IgA (13). Similar effects could be seen at the patients with spleen auto transplantation but, although statistically significant, more less than at the patients with splenectomy.

Decreased level of IgM antibodies after splenectomy lasts about a year, and after that period the concentration of these antibodies in blood starts to increase (14,15). Low level of IgM antibodies, especially if it is correlated with disbalance of IgM concentration, can cause difficult infections and OPSI syndrome (overwhelming post-splenectomy infection syndrome)

(16). The group of patients with auto transplantation of the spleen shows statistical significant discrepancy in CH50 complement component, and statistical significant difference in number of lymphocytes and monocytes. Presented disbalances are in the middle between those patients with spleen preservation and the patients with splenectomy.

These facts establish superiority of spleen auto transplantation in respect to splenectomy, and inferiority regarding spleen preservation methods.

Mentioned laboratory parameters confirm the advantages of spared surgical treatment of the spleen injuries (less duration of hospitalization, lower volume of transfusions, lower number of post-operative complications and faster recovery).

Spleen keeping, including auto transplantation, has significant role in decreasing late septic complications and prevention of post-splenectomic sepsis.

Nonoperative treatment is now the most common method of management for patients with spleen injuries and is the most common method of spleen salvage. However, controversy exist about how to appropriately select patients for non-operative treatment since bleeding from spleen injuries can incur significant mortality and morbidity (17-19).

The best way in treatment of spleen injuries is preservation of lineal tissue, whenever is possible. This is not an absolute role and aim that has to be achieved at any cost (20,21). A surgeon that prevails spleen preservation must be well educated in theoretical aspects of the contemporary spleen injuries, to apply and adapt the attitude regarding each patient separately and of course to be conscious of his possibilities in the working conditions (22).

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