Erythrocyte mechanical stability changes in splenectomy and related to various spleen-preserving operation types in a long-term follow-up animal study

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Filtration of the red blood cells (RBC) by the spleen is based on their deformability alterations, including mechanical properties. Thus, in following-up splenic function using various spleen preservation techniques (e.g., spleen autotransplantation or resection) micro-rheological investigations can be informative. In this study we aimed to investigate RBC membrane (mechanical) stability related to splenectomy (SE) and various spleen preserving operations. Twenty-six beagle dogs were divided into control (n=6), SE (n=4), one-third and two-third spleen resection (n=4/each) and spleen autotransplantation groups using Furka’s method (n=8). The animals were followed-up for one and a half year. RBC deformability and membrane stability were tested by rotational ektacytometry. Although deformability values showed fluctuating differences among groups, mechanical stability values alone didn’t show significant difference over the follow-up period. However, the SE group expressed the largest deterioration in elongation index values against the mechanical stress applied. This worsening was the most obvious in the 3rd postoperative month. When we analyzed the cases individually, one splenectomized animal markedly expressed impaired deformability and mechanical stability in the 3rd and 9th month. We concluded, that erythrocyte membrane stability test can be a useful supplementary tool for enforcing micro-rheological alterations when follow-up splenic function.

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