

Electrophoretic separation of the liquid drain proteins by geometrical electrofocusing correlated with local complications to the surgical patient

PhD student: Dan Cozma

PhD supervisor:

Radu Boja **PhD**

Minodora Dobreanu **PhD**

INTRODUCTION

Postoperative complications are negatively influencing factors in the evolution of the surgical patient, with severe implications on morbidity and mortality, with repercussions on growth consumption budget and human resources, thus becoming a real public health problem.

Determination of proteins of the peritoneal fluid by geometric electrofocusing, method patented in 1997 by Prof Dr. Alexander Şchiopu compared to determination of C-reactive protein (CRP), as a witness of the nonspecific inflammatory process of the serum of patients with risk factors, could provide further information on local postoperative evolution in these patients.

Main purposes of the study are:

1. Separation of proteins from the drainage liquid by geometrical electrofocusing
2. Assessment of the relationship between local postoperative complications and protein fractions of the local drainage fluid by analyzing data from the two studies.

The secondary objectives are:

- A. Data comparison from the two studied groups.
- B. Postoperative serum proteins determination
- C. Postoperative CRP serum determination as nonspecific inflammatory witness
- D. Comparison of the results obtained by the two types of tests carried out
- E. Comparison of the results with data from specialized literature.
- F. NNISS score correlation with local complications.

A. Geomerical electrofocusing principle

Geometrical electrofocusing is a method developed in 1994 and patented in 1998 (Schiopu A, Schiopu A jr.), which allows liquids analysis with low protein concentration without being necessary preliminary evidence, which removes all the technological inconveniences related to the concentration processes. The method improves electrophoresis in plane gels and has as proteins concentration of the analyzed fluids during of electrophoresis, in some focus areas of electric power lines crossing the migration gel.

B. Assessment of the relationship between local postoperative complications and protein fractions of the drainage fluid by analyzing data from the two studies.

Material and method. We studied a total of 51 patients who were hospitalized and operated in Surgical Clinic I of the Mures County Hospital, for abdominal digestive disorders, consisting of 24 men and 27 women, aged between 18 and 87 years. We have taken a number of 127 serum samples and 125 drain fluid at intervals of 24, 48 and 72 hours after surgery, which were analyzed

without being preserved in advance, in order to avoid any storage errors. We centrifuged the liquids at 3000 r.p.m. in a bucket trucks centrifuge, taking after centrifugation the supernatant;

Quantitative determination of serum proteins and fluid drainage was performed in the laboratory of the Department of Pathophysiology of the UMF Tg. Mures, by Spectrophotometry at 680 nm, with Specord UV analyzer, followed by electrophoretic separation of the proteins, by geometrical electrofocusing (A.Şchiopu, 1995).

Electrophoresis photometric evaluation was made by computed scanning and interpreting using a dedicated Cromos program.

The centrifuged serum samples remaining after these determinations were frozen and used for the quantitative determination of CRP, performed with Konelab prime 60i self-analysis within the specialty Laboratory of the Mures County Hospital.

RESULTS

1. Following protein determinations in the first postoperative day in the group with local complications, we find significantly lower values of total protein and albumin in the drain than the serum and the fact that alpha1, alpha2 and gamma globulins in the drain do not differ significantly from the values in serum, which means that these fractions pass from serum in the drained fluid in patients with postoperative local complications.
2. Serum determination values compared to the drain ones, are similar for all fractions.
3. Averages protein fractions have consistently lower values in the peritoneal fluid unlike serum, in the group with local postoperative complications in all tests carried out.
4. CRP value determination in the first postoperative day, found a significant increase in the group with complications.
5. We identified a significant association between CRP and alpha 2 globulin, in the group with local complications, useful to issue an evolutionary postoperative prognosis.
6. Between NNIS score and complications we obtained a highly significant correlation, which means that there is an association between the score severity and presence of complications.
7. Obtaining a theoretical calculation formula for determination of the serum protein fractions starting from a known value of those fractions in the drained liquid.

CONCLUSIONS

1. Results of the studies demonstrate the existence of correlations between changes of the peritoneal fluid protein fractions and local postoperative complications.
2. Determination of protein fractions of the drained fluid, in the first postoperative day may bring important information on the risk of precocious infectious complications in the surgical patient.
3. Knowing the values of total removed protein by drainage and the amount drained in 24 hours, we can calculate daily protein losses at this level to compensate them.
4. The association of this method with other prediction methods such as non-specific inflammatory markers and NNIS score increases the predictive accuracy.
5. We support the use of this method, as we can detect and interpret, with its help, small quantities of protein, from 10 mg%, which is difficult to make using other types of electrophoresis.

Key words: Electrofocusing, complications, proteic fractions, peritoneal fluid.