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Peritoneal Transport Testing

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The peritoneal membrane is a living tissue with variable functions influenced by several factors. The monitoring of the anatomic and functional characteristics of the peritoneal membrane over time is very important for choosing the adequate dialysis, for the analysis of clinical problems such as ultrafiltration (UF) failure (UFF) and to predict the development of severe peritoneal membrane damage. The analysis of the anatomic changes of peritoneal tissue can be performed only during the placement or removal of a peritoneal catheter or during other surgical procedures. Several tests can be used to evaluate the function of the peritoneal membrane and in particular the transport of solutes and the transport of fluids (peritoneal UF) through it. We need peritoneal tests because the peritoneal transport is very complex: several transports occur simultaneously. More than 20 years ago, Wardowski proposed the peritoneal equilibration test (PET) to evaluate the capacity of the peritoneal membrane to transport solutes and its ability to generate UF in peritoneal dialysis (PD) patients. PET is a semiquantitative assessment of the transport capacity of the peritoneal membrane determined by the speed of equilibration of the concentrations of a solute between plasma and dialysis solution. The concentration ratio between dialysate and plasma (D/P) of a given solute, after a specified time, indicates the speed of equilibration between the concentrations. A high solute D/P means that the balance between dialysate and plasma is reached quickly, and therefore the peritoneal permeability for the solute is high. PET has a variability coefficient that is less than 10% for the transport of small solutes, but can increases to 25%-50% when considering UF. The usefulness of the data obtained with a PET for determining the best dialysis mode requirement has already been shown. The Guidelines of the International Society of Peritoneal Dialysis have accurately described what to do in cases of patients with hydro-saline overload and how to make a diagnosis of UFF. In summary, after excluding mechanical problems associated with the catheter, which are easily demonstrated with an abdomen X-ray, it is necessary to perform a 3.86%-PET lasting 4 hours. A peritoneal UF less than 400 mL at the end of the test is compatible with the diagnosis of UFF. However, a modified PET with a 3.86% glucose solution does not enable us to discover exactly what the mechanism is that has generated the UFF, because with this test it is not possible to discern if the patient had a peritoneal UF in the first part of the exchange with the hypertonic solution, or if the patient produced little or no UF. In the latter case, there is low or no osmotic conductance to glucose. In conclusion, the authors say a modified PET with a 3.86% glucose solution allows the classification of patients according to their capacity for peritoneal membrane transport of small solutes. Furthermore, this test allows us to make a diagnosis of UFF and provides a semiquantitative assessment of free water transport. There are a few new tests of great interest, the latest called Uni-PET. Uni-PET is a 3.86%-PET combined with the Double Mini-PET. The Double Mini-PET allows the assessment of the free-water transport and the so-ca-

lled osmotic conductance to glucose of the peritoneal membrane The Double Mini-PET consists of 2 consecutive PETs, each lasting 1 hour, the first carried out with a 1.36% glucose solution and the second with a 3.86% glucose solution. In cases of UFF, the Double Mini-PET can provide additional guidance to the prescription of the most appropriate peritoneal dialysis modality or of the need to move the patient to hemodialysis.

In conclusion, new tests, such as the Uni-PET, could contribute to exploring other functions of the peritoneal membrane to further improve the prescription of PD therapy, and could give early predictions of some dangerous complications of PD.

Comment on a paper:
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