Санкт-Петербург, 7 июня 2018 г.

Автоматизированный перитонеальный диализ (АПД). Показания к применению АПД и адаптированному АПД (АПД-А)

NephroCare

К.Я.Гуревич, проф., медицинский директор Fresenius Medical Care по России, Санкт-Петербург
А.В.Бондарев, врач перитонеального диализа, Fresenius Medical Care, Саратов

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Динамика числа больных в клиниках FMC Russia, получающих перитонеальный диализ

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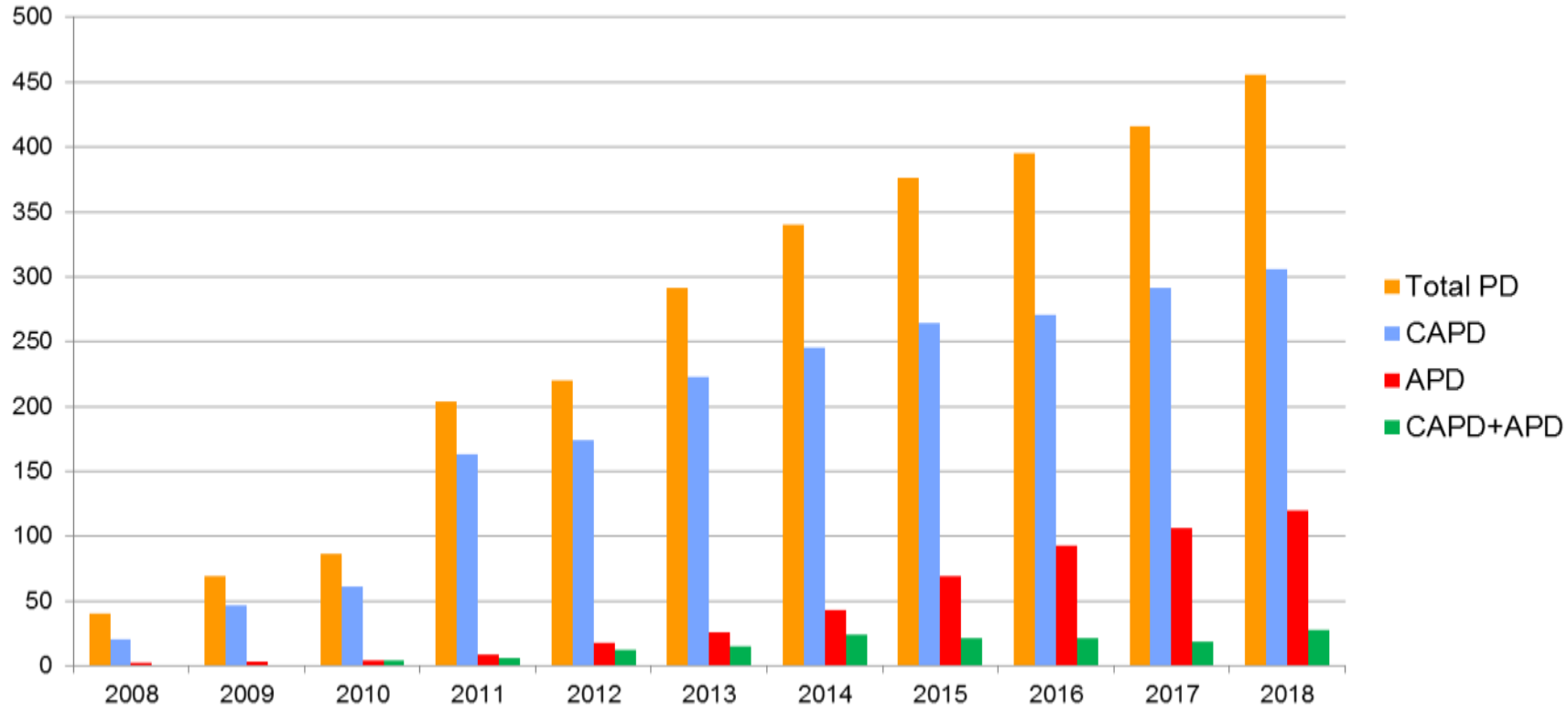

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Total PD	40	69	86	204	220	291	340	376	395	416	456
CAPD	20	47	61	163	174	223	245	264	271	291	306
APD	2	3	4	9	18	26	43	69	93	106	120
CAPD+APD	0	0	4	6	12	15	24	21	21	19	28

Динамика и структура перитонеального диализа в клиниках FMC Russia

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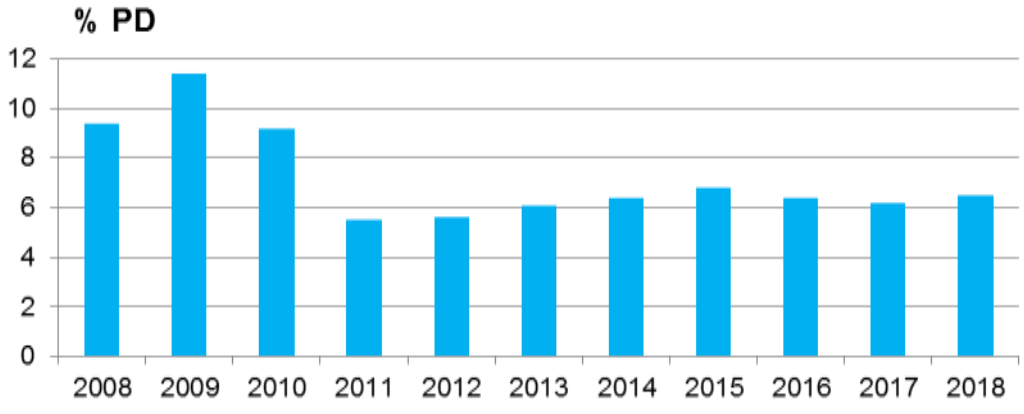
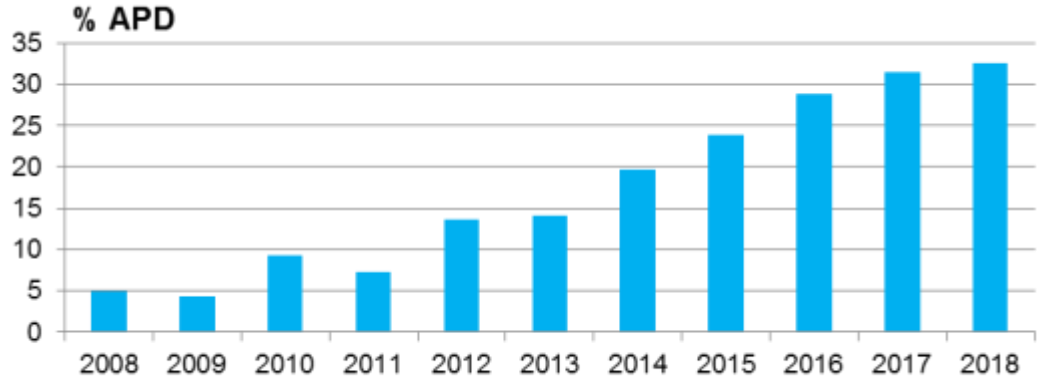


2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
9,4	11,4	9,2	5,5	5,6	6,1	6,4	6,8	6,4	6,2	6,5

Доля перитонеального диализа в общей диализной активности клиник



2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
5	4,3	9,3	7,3	13,6	14,1	19,7	23,9	28,9	31,4	32,5

Доля автоматизированного перитонеального диализа

Отечественное производство растворов для перитонеального диализа

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Выживаемость больных с различной модальностью диализа

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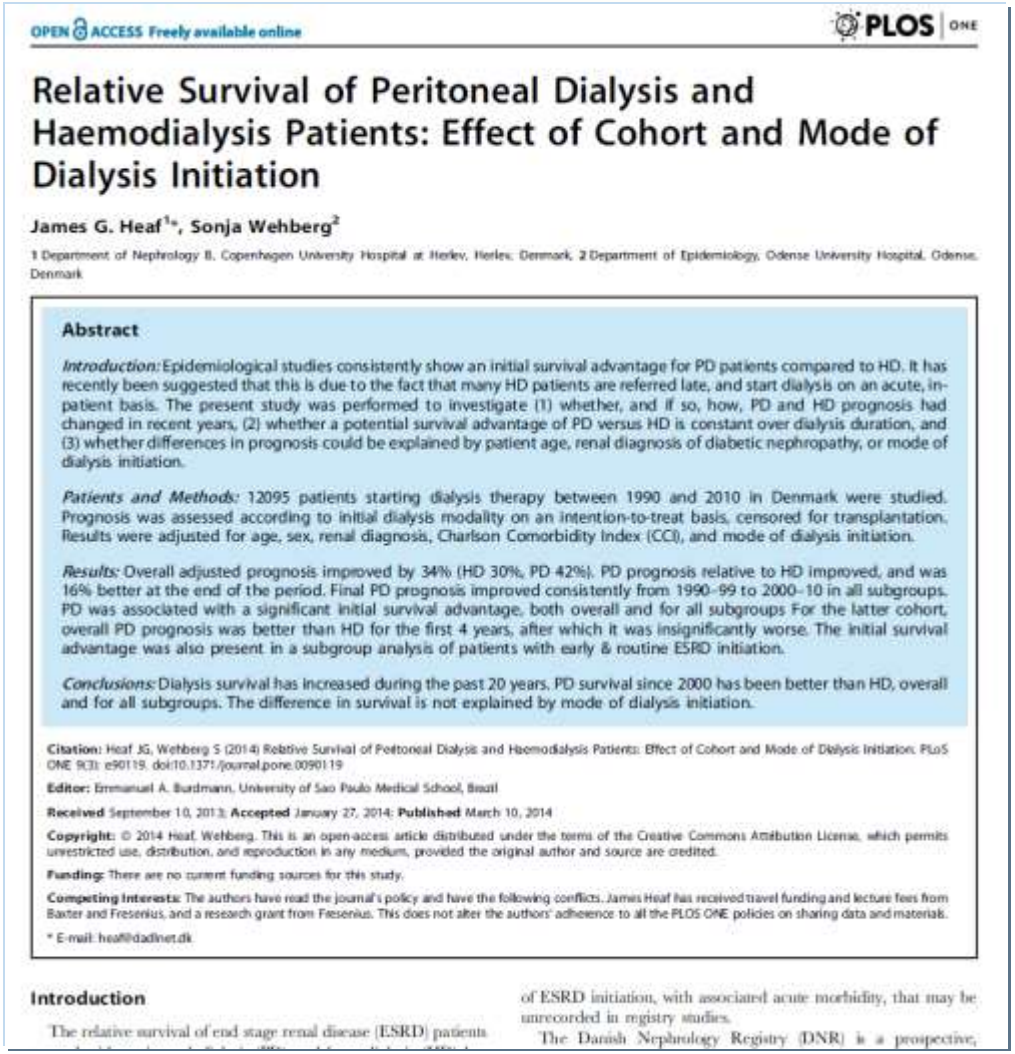

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PLOS ONE

Relative Survival of Peritoneal Dialysis and Haemodialysis Patients: Effect of Cohort and Mode of Dialysis Initiation

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Abstract

Introduction: Epidemiological studies consistently show an initial survival advantage for PD patients compared to HD. It has recently been suggested that this is due to the fact that many HD patients are referred late, and start dialysis on an acute, in-patient basis. The present study was performed to investigate (1) whether, and if so, how, PD and HD prognosis had changed in recent years, (2) whether a potential survival advantage of PD versus HD is constant over dialysis duration, and (3) whether differences in prognosis could be explained by patient age, renal diagnosis of diabetic nephropathy, or mode of dialysis initiation.

Patients and Methods: 12095 patients starting dialysis therapy between 1990 and 2010 in Denmark were studied. Prognosis was assessed according to initial dialysis modality on an intention-to-treat basis, censored for transplantation. Results were adjusted for age, sex, renal diagnosis, Charlson Comorbidity Index (CCI), and mode of dialysis initiation.

Results: Overall adjusted prognosis improved by 34% (HD 30%, PD 42%). PD prognosis relative to HD improved, and was 16% better at the end of the period. Final PD prognosis improved consistently from 1990–99 to 2000–10 in all subgroups. PD was associated with a significant initial survival advantage, both overall and for all subgroups For the latter cohort, overall PD prognosis was better than HD for the first 4 years, after which it was insignificantly worse. The initial survival advantage was also present in a subgroup analysis of patients with early & routine ESRD initiation.

Conclusions: Dialysis survival has increased during the past 20 years. PD survival since 2000 has been better than HD, overall and for all subgroups. The difference in survival is not explained by mode of dialysis initiation.

Citation: Heaf JG, Wehberg S (2014) Relative Survival of Peritoneal Dialysis and Haemodialysis Patients: Effect of Cohort and Mode of Dialysis Initiation. PLoS ONE 9(3): e90119. doi:10.1371/journal.pone.0090119

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Competing Interests: The authors have read the journal's policy and have the following conflicts. James Heaf has received travel funding and lecture fees from Baxter and Fresenius, and a research grant from Fresenius. This does not alter the authors' adherence to all the PLOS ONE policies on sharing data and materials.

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Introduction

The relative survival of end stage renal disease (ESRD) patients

of ESRD initiation, with associated acute morbidity, that may be unrecorded in registry studies.

The Danish Nephrology Registry (DNR) is a prospective,

- Изучены 12095 больных, поступившие на диализ в Дании меду 1990 и 2010 гг. Исход оценивался в соответствии с исходной модальностью по принципу ITT, цензурирование по трансплантации. Результаты скорректированы на возраст, пол, почечный диагноз, сопутствующие заболевания (CCI).
- Общий прогноз улучшился на 34% (HD – 34%, PD – 42%). Прогноз лечения на PD по сравнению с HD улучшился и стал на 16% лучше на конец периода. Финальный прогноз на PD значительно улучшился с 1990-99 к 2000-10 гг во всех подгруппах.
- Для последних когорт общий прогноз на PD был лучше, чем на HD в течение первых 4 лет, после был незначительно хуже.

Heaf JG, Wehberg S. PLoS ONE 2014,9;3:doi10.1371

Выживаемость больных с различной модальностью диализа

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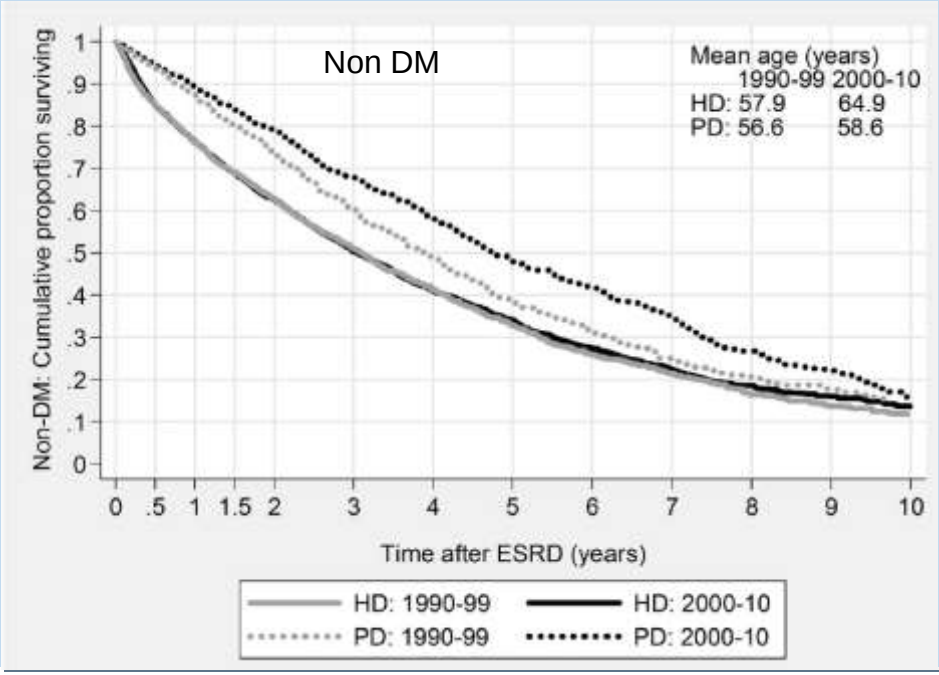

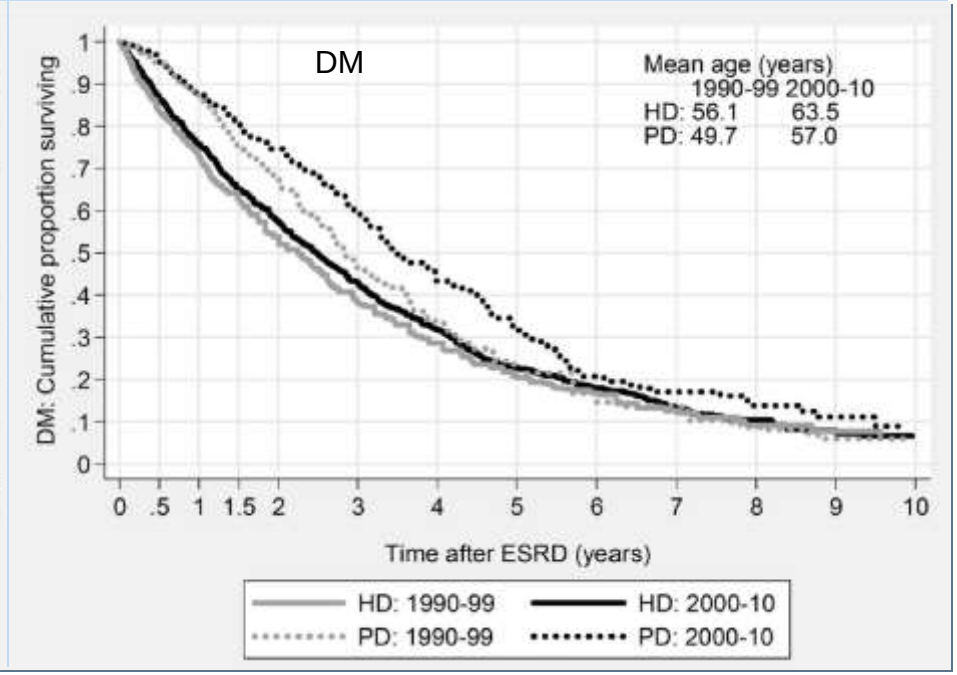

У больных на HD улучшение состояло в неизменной летальности, несмотря на повышение возраста и сопутствующих заболеваний. У больных на PD без диабета выживаемость увеличилась на 10 мес с 1990-99 к 2000-10, с диабетом – на 8 мес, несмотря на 7-летнее повышение возраста.

Heaf JG, Wehberg S. PLoS ONE 2014,9;3:doi10.1371

Выведение уремических токсинов на APD и CAPD

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Peritoneal Dialysis International

Peritoneal Dialysis International, Vol. 35, pp. 436–442
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REMOVAL OF DIFFERENT CLASSES OF UREMIC TOXINS IN APD VS CAPD: A RANDOMIZED CROSS-OVER STUDY

Sunny Eloot, Raymond Vanholder, Clement Dequidt, and Wim Van Biesen

Renal Division, Department of Internal Medicine, Ghent University Hospital, Gent, Belgium

• *Aim:* In this study, we investigated, and this for the different classes of uremic toxins, whether increasing dialysate volume by shifting from continuous ambulatory peritoneal dialysis (CAPD) to higher volume automated peritoneal dialysis (APD) increases total solute clearance.
• *Methods:* Patients on peritoneal dialysis were randomized in a cross-over design to one 24-hour session of first a CAPD regimen (3*2 L of Physioneal 1.36% and 1*2 L of icodextrin) or APD (consisting of 5 cycles of 2 L Physioneal 1.36 and 1 cycle of 2 L Extraneal), and the other week the alternate regime, each patient serving as his/her own control. Dialysate, blood and urine samples were collected and frozen for later batch analysis of concentrations of urea, creatinine, phosphorus, uric acid, hippuric acid, 3-carboxy-4-methyl-5-propyl-2-furanpropionic acid, indoxyl sulfate, indole acetic acid, and *p*-cresyl sulfate. For the protein-bound solutes, total and free fractions were determined. Total, peritoneal and renal clearance (K) and mass removal (MR) of each solute were calculated, using validated models.
• *Results:* In 15 patients (11 male, 3 diabetics, 56 ± 16 years, 8 on CAPD, time on peritoneal dialysis 12 ± 14 months, and residual renal function of 9.9 ± 5.4 mL/min) dialysate over plasma ratio for creatinine (D/P_{crea}) was 0.62 ± 0.10. Drained volume and obtained ultrafiltration were higher with APD vs CAPD (13.3 ± 0.5 L vs 8.5 ± 0.7 L and 1.3 ± 0.5 L vs 0.5 ± 0.7 L), whereas urine output was lower (1.0 ± 0.5 L vs 1.4 ± 0.6 L). Total clearance and MR tended to be higher

Perit Dial Int 2015; 35(4):436–442 www.PDIConnect.com
epub ahead of print: 01 Mar 2014 doi:10.3747/pdi.2013.00202

KEY WORDS: Uremic toxin; removal; clearance; APD; CAPD; dwells.

It is an ongoing discussion whether continuous ambulatory peritoneal dialysis (CAPD) and automated peritoneal dialysis (APD) yield comparable results. In terms of mortality, several observational cohort studies have indicated that CAPD and APD have comparable survival rates (1–3). However, a re-analysis of the ANZDATA registry indicated that survival in fast transporters was better on APD vs CAPD, whereas the inverse was true for slow transporters (4). It was suggested that this effect could be explained by differences on volume status induced by the mismatch between peritoneal transport status and dwell length (5). An alternative explanation could be that the difference in survival rates was based on differences in obtained clearances of uremic retention products. ADEMEX has clearly demonstrated that small solute clearance as expressed in Kt/V_{urea} or creatinine clearance does not influence mortality (6). In addition, several studies have questioned whether increasing instilled volume by increasing the number of short dwells can result in higher small solute clearance. Nevertheless, many centers try

15 больных (11 мужчин, 3 с диабетом, 56 ± 16 лет, 8 на CAPD, время на PD 12 ± 14 мес, RRF 9.9 ± 5.4 мл/мин, D/P creat 0.62 ± 0.10) на PD были рандомизированы: одна группа получала CAPD (3 х 2л 1.36% физионила и 1 х 2л икодекстрина), другая APD (5 циклов по 2 л физионила и 1 цикл 2л экстранила), через неделю – перекрест. Образцы диализата, крови и мочи анализировали на мочевину, креатинин, P, мочевую кислоту, гиппуровую кислоту, 3-карбокси-4-метил-5-пропил-2-фуранпропионовую кислоту, индоксил сульфат, индол ацетиловую кислоту и p-крезил сульфат . Для белок-связанных веществ определялись общая и свободная фракция.
Определялись общий, перитонеальный и почечный клиренсы и массу выведения каждого вещества.

Floot S et al. Perit Dial Int 2015;35,4:436-442

Выведение уремических токсинов на APD и CAPD

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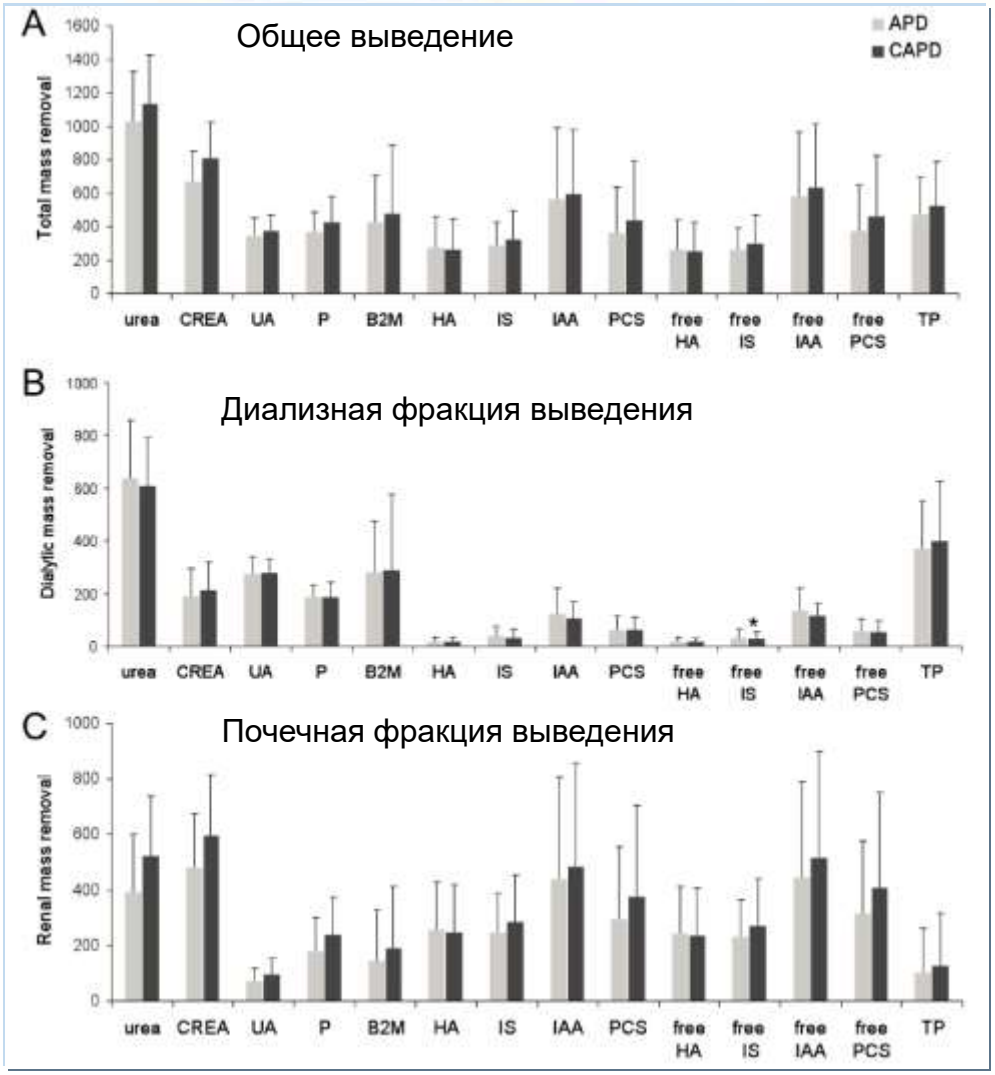

- Общий клиренс и массовыведение были выше (тенденция) на CAPD vs APD для всех малых и водорастворимых субстанций, но в основном за счет большей почечной составляющей, разницы по перитонеальной составляющей не было.
- Для белок-связанных растворов разницы по клиренмаи и массовыведению не было. Ультрафильтрация была выше на APD, а диурез ниже.
- Т.о., хотя выведенный объем диализата при APD почти вдвое больше, APD не приводит к лучшему перитонеальному клиренсу и массовыведению по сравнению с CAPD. APD приводит к лучшей ультрафильтрации, но за счет остаточного почечного выведения и клиренса.

Floot S et al. Perit Dial Int 2015;35,4:436-442

Выживаемость, «техническая выживаемость» при APD и CAPD

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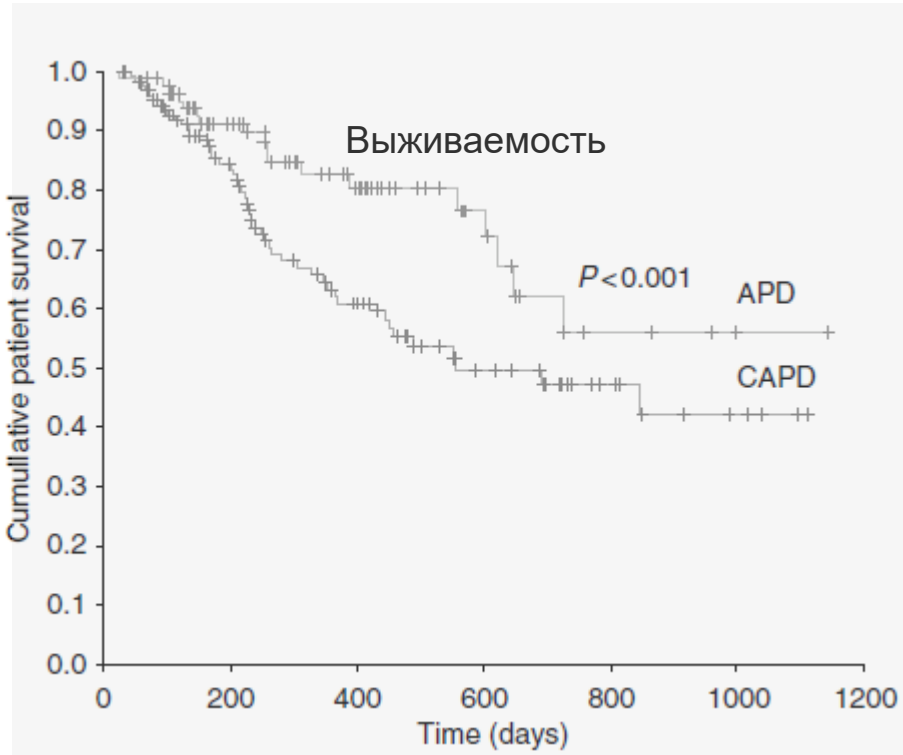
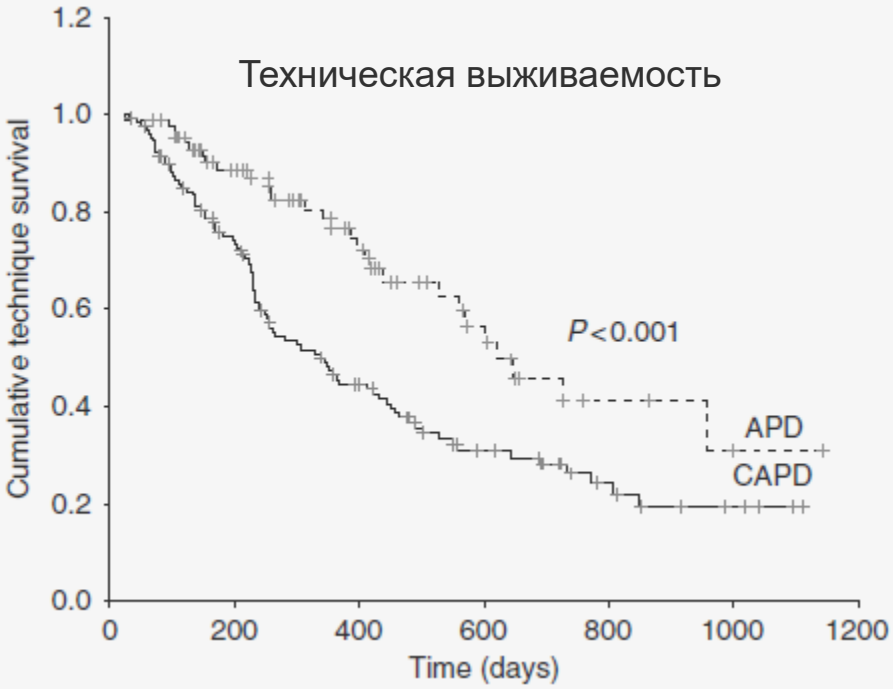
Обследовано 237 больных: 139 на CAPD и 98 на APD. Средний возраст составил 62 г на CAPD и 59 на APD (p<0.031) и доля больных с диабетом была соответственно 77 и 70% (p=NS)





Ramos Sanchez A et al. Kidney Int 2008;73:76-80

Выживаемость при APD по сравнению с CAPD

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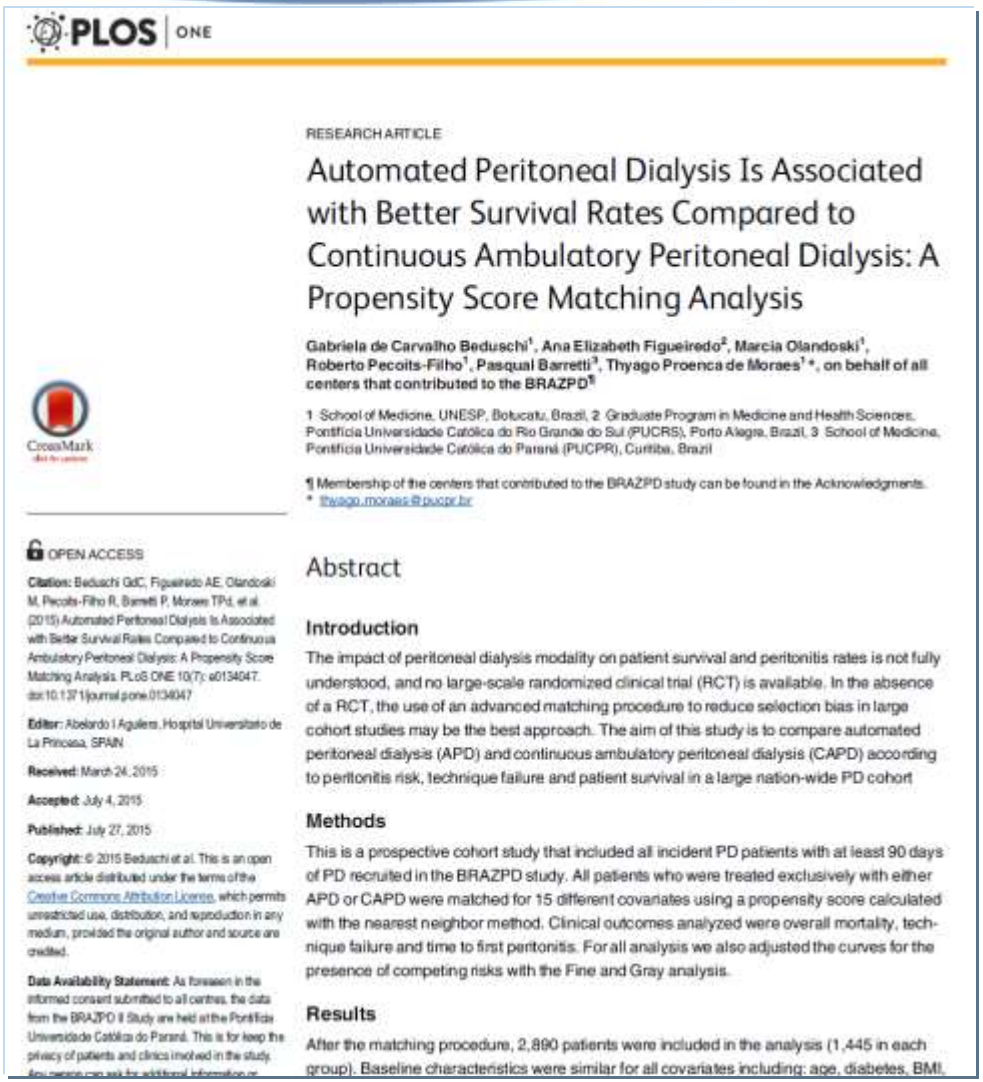

PLOS ONE

RESEARCH ARTICLE

Automated Peritoneal Dialysis Is Associated with Better Survival Rates Compared to Continuous Ambulatory Peritoneal Dialysis: A Propensity Score Matching Analysis

Gabriela de Carvalho Beduschi[1], Ana Elizabeth Figueiredo[2], Marcia Olandoski[1], Roberto Pecoits-Filho[1], Pasqual Barretti[3], Thyago Proenca de Moraes[1]*, on behalf of all centers that contributed to the BRAZPD[¶]

1 School of Medicine, UNESP, Botucatu, Brazil, 2 Graduate Program in Medicine and Health Sciences, Pontifícia Universidade Católica do Rio Grande do Sul (PUCRS), Porto Alegre, Brazil, 3 School of Medicine, Pontifícia Universidade Católica do Paraná (PUCPR), Curitiba, Brazil

¶ Membership of the centers that contributed to the BRAZPD study can be found in the Acknowledgments.
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OPEN ACCESS

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Data Availability Statement: As foreseen in the informed consent submitted to all centres, the data from the BRAZPD II Study are held at the Pontifícia Universidade Católica do Paraná. This is for keep the privacy of patients and clinics involved in the study. Any person can ask for additional information or

Abstract

Introduction

The impact of peritoneal dialysis modality on patient survival and peritonitis rates is not fully understood, and no large-scale randomized clinical trial (RCT) is available. In the absence of a RCT, the use of an advanced matching procedure to reduce selection bias in large cohort studies may be the best approach. The aim of this study is to compare automated peritoneal dialysis (APD) and continuous ambulatory peritoneal dialysis (CAPD) according to peritonitis risk, technique failure and patient survival in a large nation-wide PD cohort

Methods

This is a prospective cohort study that included all incident PD patients with at least 90 days of PD recruited in the BRAZPD study. All patients who were treated exclusively with either APD or CAPD were matched for 15 different covariates using a propensity score calculated with the nearest neighbor method. Clinical outcomes analyzed were overall mortality, technique failure and time to first peritonitis. For all analysis we also adjusted the curves for the presence of competing risks with the Fine and Gray analysis.

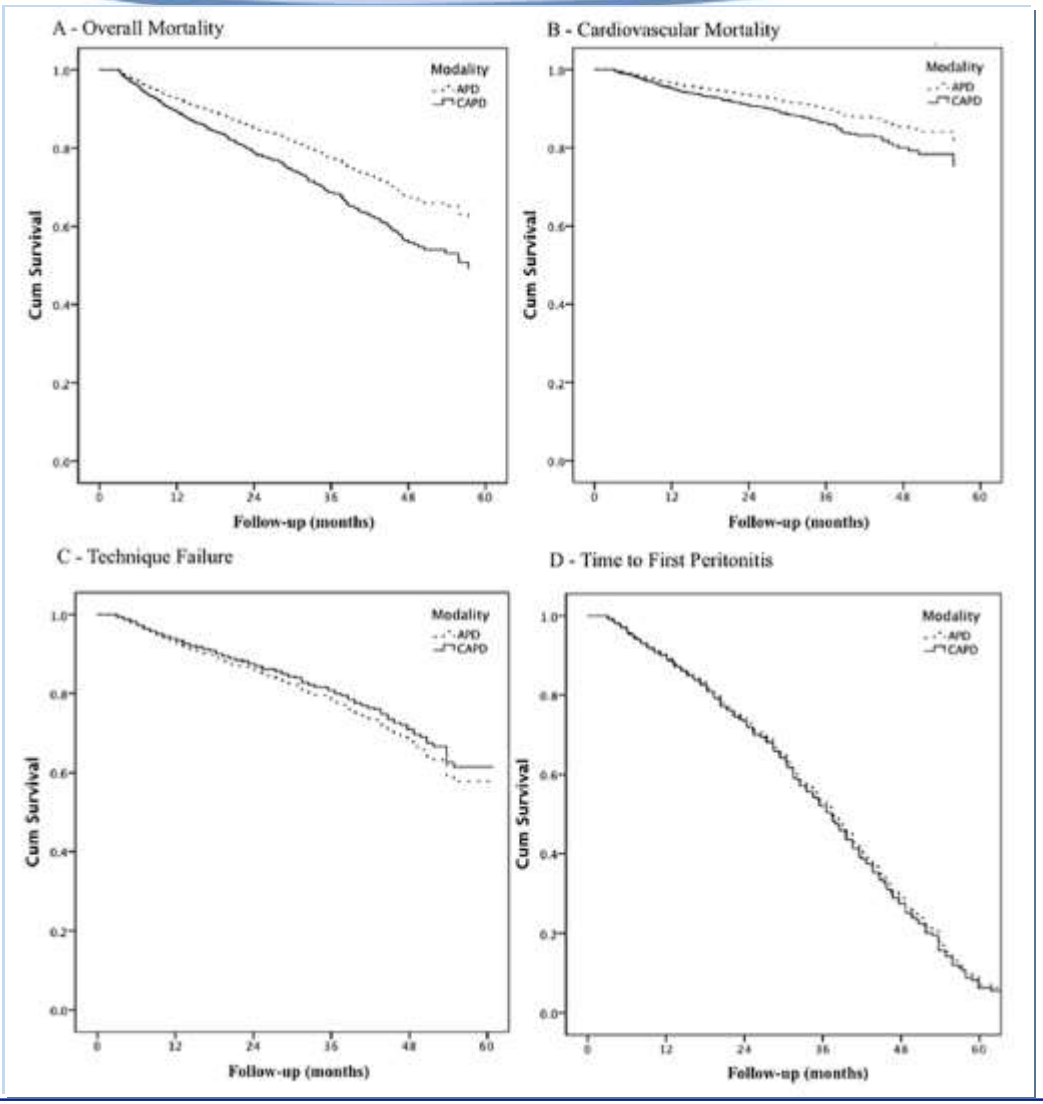
Results

After the matching procedure, 2,890 patients were included in the analysis (1,445 in each group). Baseline characteristics were similar for all covariates including: age, diabetes, BMI,

- Проспективное когортное исследование 2890 инцидентных больных (по 1445 на CAPD и APD) в PSM (propensity score match) анализе сравнивались по 15 различным ковариациям, включающим возраст, диабет, BMI, длительность диализа, ИБС, злокачественные заболевания, образование, гипертензию, расу, предшествующий HD, пол, додиализное лечение, материальное положение, периферические сосудистые заболевания, год начала PD.
- Клинические исходы анализировались по летальности, технической выживаемости и времени до первого перитонита.

Beduschi GdC et al. PLoS ONE 2015.10,7; doi 10.137

Выживаемость пр APD по сравнению с CAPD



- Летальность была выше при CAPD по сравнению с APD.
- Техническая выживаемость и время до первого перитонита не различались.

Beduschi GdC et al. PLoS ONE 2015.10,7; doi 10.137

Выживаемость на APD больных с высоким перитонеальным транспортом

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Superior survival of high transporters treated with automated *versus* continuous ambulatory peritoneal dialysis

David W. Johnson[1,2], Carmel M. Hawley[1,2], Stephen P. McDonald[1,3], Fiona G. Brown[1,4], Johan B. Rosman[1,5], Kathryn J. Wiggins[1,6], Kym M. Bannister[1,7] and Sunil V. Badve[1,2]

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Correspondence and offprint requests to: David W. Johnson, E-mail: david_johnson@health.qld.gov.au

Abstract

Background. Automated peritoneal dialysis (APD) is widely recommended for the management of high transporters by the International Society of Peritoneal Dialysis (ISPD), although there have been no adequate studies to date comparing the outcomes of APD and continuous ambulatory peritoneal dialysis (CAPD) in this high risk group. **Methods.** The relative impact of APD *versus* CAPD on patient and technique survival rates was examined by both intention-to-treat (PD modality at Day 90) and 'as-treated' time-varying Cox proportional hazards model analyses in all patients who started PD in Australia or New Zealand

confidence interval (CI) 0.35–0.87] and comparable death-censored technique survival (HR 0.88, 95% CI 0.64–1.21). Superior survival of high transporters treated with APD *versus* CAPD was also confirmed in supplemental as-treated analysis (HR 0.72, 95% CI 0.54–0.96), matched case-control analysis (HR 0.60, 95% CI 0.36–0.96) and subgroup analysis of high transporters treated entirely with APD *versus* those treated entirely with CAPD (HR 0.29, 95% CI 0.14–0.60). There were no statistically significant differences in patient survival or death-censored technique survival between APD and CAPD for any other transport group, except for low transporters,

Из 4128 инцидентных больных на PD 628 были высокими транспортерами (486 на CAPD, 142 на APD. Больные на APD были моложе и с меньшей частотой диабета. Лечение APD было связано с лучшей выживаемость в ITT и в as treated анализах, а также в подгруппах лечения только APD и CAPD и со сравнимой технической выживаемостью. В группе низких транспортеров выживаемость была лучше при CAPD.

Johnson DW et al. Nephrol Dial Transplant 2010;25:1973-1979

	Univariate analysis			Multivariate analysis		
Transport group	HR	95% CI	*P*	HR	95% CI	*P*
High (n = 628)	0.57	0.35–0.94	0.03	0.56	0.35–0.87	0.01
High-average (n = 1936)	0.98	0.72–1.34	0.9	1.08	0.81–1.45	0.6
Low-average (n = 1146)	0.70	0.46–1.07	0.1	0.98	0.66–1.45	0.9
Low (n = 196)	2.21	1.24–3.93	0.007	2.19	1.02–4.70	0.04

Влияет ли APD негативно на остаточную почечную функцию больных?

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- Ряд исследователей установили, что при APD наблюдается более быстрое снижение остаточной почечной функции (RRF).

  Hirochige K et al. Perit Dial Int 1996;16:307-315
  Hufnagel G et al. Nephrol Dial Transplant 1999;14:1224-1228
  Hidaka H, Nakao T. Nephrology 2003;8:184-191
  Rodriguez-Carmona A et al. Am J kidney Dis 2004;44:132-145

- Другие многочисленные исследования, в том числе 3 большие многоцентровые*, не показали более быстрого снижения RRF.

  Gallar P et al. Perit Dial Int 2000;20:803-805
  Moist LM et al. J Am Soc Nephrol 2000;11:556-564*
  Holley JL et al. Perit Dial Int 2001;21:302-305*
  Jansen MA et al. Kidney Int 2002;62:1046-1053*
  Johnson DW et al. Perit Dial Int 2003;23:276-283

Влияние модальности перитонеального диализа на потерю почечной функции

NephroCare

Peritoneal Dialysis International, Vol. 21, pp. 302–305
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THE INFLUENCE OF DEMOGRAPHIC FACTORS AND MODALITY ON LOSS OF RESIDUAL RENAL FUNCTION IN INCIDENT PERITONEAL DIALYSIS PATIENTS

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University of Rochester Medical Center,[1] Rochester, New York; the University of Pittsburgh Medical Center,[2] Pittsburgh, Pennsylvania, U.S.A.

♦♦ *Objective:* To determine whether gender, race, diabetes, peritoneal dialysis (PD) modality, and comorbid conditions influence loss of residual renal function (RRF).
♦♦ *Design:* Retrospective study of incident PD patients, using database of prospectively collected demographic, laboratory, and clearance data.
♦♦ *Setting:* Peritoneal Dialysis Registry of the University of Pittsburgh Medical Center.
♦♦ *Patients:* The study included 184 continuous ambulatory PD and automated PD patients who had at least two 24-hour urine collections for glomerular filtration rate (GRF) between April 1991 and March 2000. 836 urine collections were analyzed.
♦♦ *Outcome Measures:* Loss of RRF was defined as the slope of the decline in GFR as measured by the average of creatinine and urea clearances in 24-hour urine collections. Stepwise forward regression was used to identify demographic and laboratory factors associated with loss of GFR. Spearman correlations were used to assess the significance of associations.
♦♦ *Results:* The median rate of decline of renal function was –0.17 mL/minute/month. Gender, race, diabetes, auto-

CANUSA study showed that peritoneal dialysis (PD) adequacy influences patient survival (1). Subsequent analysis of the CANUSA data suggested that residual renal function (RRF) is an independent predictor of patient mortality, such that each 0.5 mL/minute higher glomerular filtration rate (GFR) lowered the risk of death by 9% (2). Clearly, adequate dialysis is more easily achieved when there is RRF. Moreover, the non-GFR contributions of RRF (*e.g.*, hormonal and metabolic features as well as volume control) add to patients' quality of life and possibly to their morbidity and mortality. Thus, preserving RRF and understanding the factors contributing to the loss of RRF are of interest. A recent study using primarily patient-reported 24-hour urine volumes as a marker of RRF reported that female gender, nonwhite race, diabetes, prior history of congestive heart failure, and time to follow-up were predictors of loss of RRF among PD patients (3). Although this study examined a large number of patients, it relied on patient-reported urine

Spearman Correlations with Loss of Residual Renal Function Expressed as Slope of Decline of Averaged Creatinine and Urea Clearances

Factor	Correlation	*p* Value
Age	0.047	0.52
Gender	0.052	0.48
Race	0.107	0.15
Diabetes	–0.066	0.372
Hypertension	0.088	0.24
Cardiac disease[a]	–0.123	0.097
Vascular disease	–0.010	0.895
Malignancy	0.050	0.128
Liver disease	–0.041	0.579
nPNA	–0.043	0.597
Modality	–0.070	0.34
Albumin	–0.055	0.46

nPNA = protein equivalent of nonprotein nitrogen appearance normalized to body surface area.
[a] By stepwise forward regression, $p = 0.045$; slope GFR = –0.172 111 + (–0.224 378 3)

- 184 инцидентных больных на CAPD и APD обследованы на факторы риска снижения почечной функции.
- Данных за влияние модальности PD на RRT не получено.

Holley JL et al. Perit Dial Int 2001;21:302-305

Влияние модальности перитонеального диализа на потерю почечной функции

NephroCare

Peritoneal Dialysis International, Vol. 23, pp. 276–283
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0896-8608/03 $3.00 + .00

PREDICTORS OF DECLINE OF RESIDUAL RENAL FUNCTION IN NEW PERITONEAL DIALYSIS PATIENTS

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Department of Renal Medicine, University of Queensland at Princess Alexandra Hospital, Brisbane, Queensland, Australia

♦ *Objective:* The aim of this study was to prospectively evaluate the risk factors for decline of residual renal function (RRF) in an incident peritoneal dialysis (PD) population.
♦ *Design:* Prospective observational study of an incident PD cohort at a single center.
♦ *Setting:* Tertiary-care institutional dialysis center.
♦ *Participants:* The study included 146 consecutive patients commencing PD at the Princess Alexandra Hospital between 1 August 1995 and 1 July 2001 (mean age 54.8 ± rapid loss of RRF. Moreover, a shorter time to the onset of anuria is independently predicted by low baseline RRF, increased body surface area, high dietary protein intake, and diabetes mellitus. Such at-risk patients should be closely monitored for early signs of inadequate dialysis.

Perit Dial Int 2003; 23:276–283 www.PDIConnect.com

KEY WORDS: Angiotensin-converting enzyme in-

- Обследованы146 инцидентных больных на PD с целью выявления факторов риска снижения RRF.
- Среднее снижение RRF составило -0.05 мл/мин/мес. Больные с более быстрым снижением RRF имели большую исходную RRF и большие Cr D/P.
- Время от начала PD до наступления анурии было независимо связано с исходной высокой RRF, большой BSA, высоким диетическим поступлением белка и диабетом.
- Снижение RRF не зависело от возраста, пола, модальности PD, срочности начала диализа, курения, сосудистых заболеваний, АД, медикаментов (включая ИАПФ), частоты перитонитов.

Johnson DW et al. Perit Dial Int 2003;23:276-283

Влияние модальности перитонеального диализа на потерю почечной функции

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Characteristic	Univariate HR (95% CI)	Univariate p Value	Multivariate HR (95% CI)	Multivariate p Value
Age (years)	1.00 (0.98–1.01)	0.79	–	
Female sex	0.79 (0.50–1.23)	0.29	–	
Caucasian race	0.88 (0.48–1.61)	0.68	–	
Body surface area (m^2)	0.91 (0.31–2.71)	0.87	6.23 (1.53–25.5)	<0.01
RRF (mL/min/1.73 m^2)	0.82 (0.73–0.92)	0.001	0.71 (0.61–0.82)	<0.001
Mean arterial pressure (mmHg)	1.00 (0.99–1.01)	0.96	–	
Diabetes mellitus	1.11 (0.70–1.76)	0.66	1.65 (1.00–2.72)	<0.05
Symptomatic vascular disease	0.95 (0.61–1.48)	0.80	–	
Current smoker	0.91 (0.58–1.41)	0.66	–	
Dietary protein intake (g/kg body weight/day)	1.13 (0.47–2.69)	0.78	2.87 (1.01–2.72)	<0.05
Elective dialysis start	0.77 (0.48–1.24)	0.29	–	
APD (CCPD or NIPD)	0.93 (0.13–6.72)	0.94	–	
D/P creat 4-hour	6.66 (1.05–4.22)	<0.05	37.5 (2.14–656)	0.01
Peritonitis rate (episodes/year)	2.06 (0.17–25.1)	0.57	–	
Erythropoietin	0.57 (0.27–1.20)	0.14	–	
ACE inhibitors	0.81 (0.52–1.27)	0.36	–	
HMG-CoA reductase inhibitors	1.12 (0.71–1.77)	0.63	–	
Calcium channel blockers	0.79 (0.50–1.24)	0.30	–	

HR = adjusted hazard ratio; CI = confidence interval; RRF = residual renal function; APD = automated PD; CCPD = continuous cycling PD; NIPD = nocturnal intermittent PD; D/P creat = dialysate-to-plasma creatinine ratio; ACE = angiotensin-converting enzyme; HMG-CoA = hydroxymethylglutaryl coenzyme A.

Johnson DW et al. Perit Dial Int 2003;23:276-283

Влияет ли APD негативно на остаточную почечную функцию больных?

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Поскольку число негативных исследований (не выявивших влияния APD на потерю остаточной функции почек - RRF) в 8 раз больше, чем позитивных (выявивших такой эффект), поскольку post hoc анализ двух RCT не выявил тенденции к более быстрому снижению RRF при APD, поскольку в позитивных исследованиях (выявивших влияние APD на потерю RRF) более половины больных получали ингибиторы ангиотензин-альдостероновой системы, считающиеся сегодня стандартной терапией всех PD больных и влияющих на потерю RRF, наиболее вероятно, что различий в снижении RRF при APD и CAPD нет.

Mehrotra R. Perit Dial Int 2009;29:111-114

Частота перитонитов при CAPD и APD

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Improved patient/technique survival and peritonitis rates in patients treated with automated peritoneal dialysis when compared to continuous ambulatory peritoneal dialysis in a Mexican PD center

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[1]Hospital General de Zona #2, IMSS, Hermosillo, Sonora, Mexico and [2]Unidad de Investigación Epidemiológica y en Servicios de Salud Hermosillo, IMSS, Hermosillo, Sonora, Mexico

Since its introduction in Mexico in 1998, the use of automated peritoneal dialysis (APD) has grown steadily and now 35% of Mexican patients are being treated with it.

Automated peritoneal dialysis (APD) has been developed as a therapy option for the treatment of peritoneal dialysis (PD) patients and it has become the modality with the fastest

Частота перитонитов на APD составила 1:34 пациенто-мес, на CAPD – 1:16. Возможность развития первого перитонита в течение первого года PD составила 21% на APD и 47% на CAPD ($p<0.001$). При анализе причин, связанных с развитием первого перитонита, только модальность была достоверна с $p<0.001$ и RR 0.68 в пользу APD

Ramos Sanchez A et al. Kidney Int 2008;73:76-80

Инфекционные осложнения при CAPD и APD

NephroCare

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0896-8608/99 $3.00 + .00

A COMPARATIVE ANALYSIS ON THE INCIDENCE OF PERITONITIS AND EXIT-SITE INFECTION IN CAPD AND AUTOMATED PERITONEAL DIALYSIS

Ana Rodríguez–Carmona, Miguel Pérez Fontán, Teresa García Falcón,
Constantino Fernández Rivera, and Francisco Valdés

Division of Nephrology, Hospital Juan Canalejo, A Coruña, Spain

♦ ***Objective:*** **To compare the incidence of peritonitis and exit-site infection in an ample group of patients undergoing continuous ambulatory peritoneal dialysis (CAPD) and automated peritoneal dialysis in a single center during a 10-year period.**
♦ ***Design:*** **Nonrandomized, prospective study.**

Automated peritoneal dialysis (APD) has become the fastest growing dialysis modality in Europe and the United States during recent years, and is now the first option for peritoneal dialysis (PD) therapy in many centers (1). Freedom from daytime ex-

Обследовано 213 больных на CAPD и 115 на APD. С применением многофакторного анализа сравнивали частоту, клиническое течение и исходы перитонитов и инфекций места выхода катетера.

Rodriguez-Carmona A et al. Perit Dial Int 1999;19:253-258

Инфекционные осложнения при CAPD и APD

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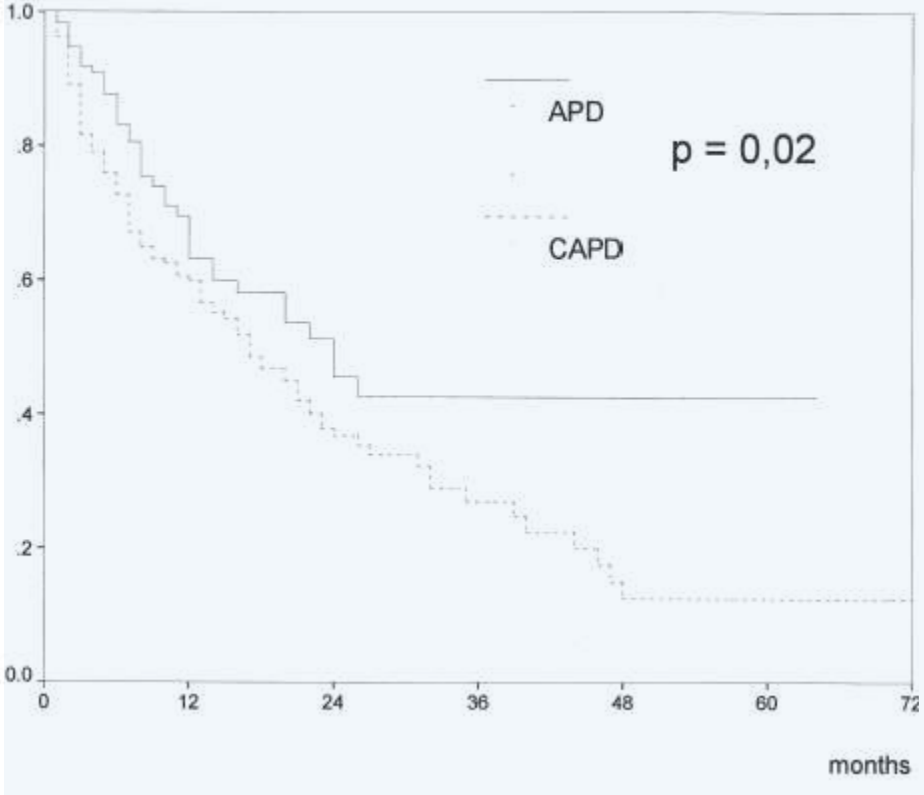
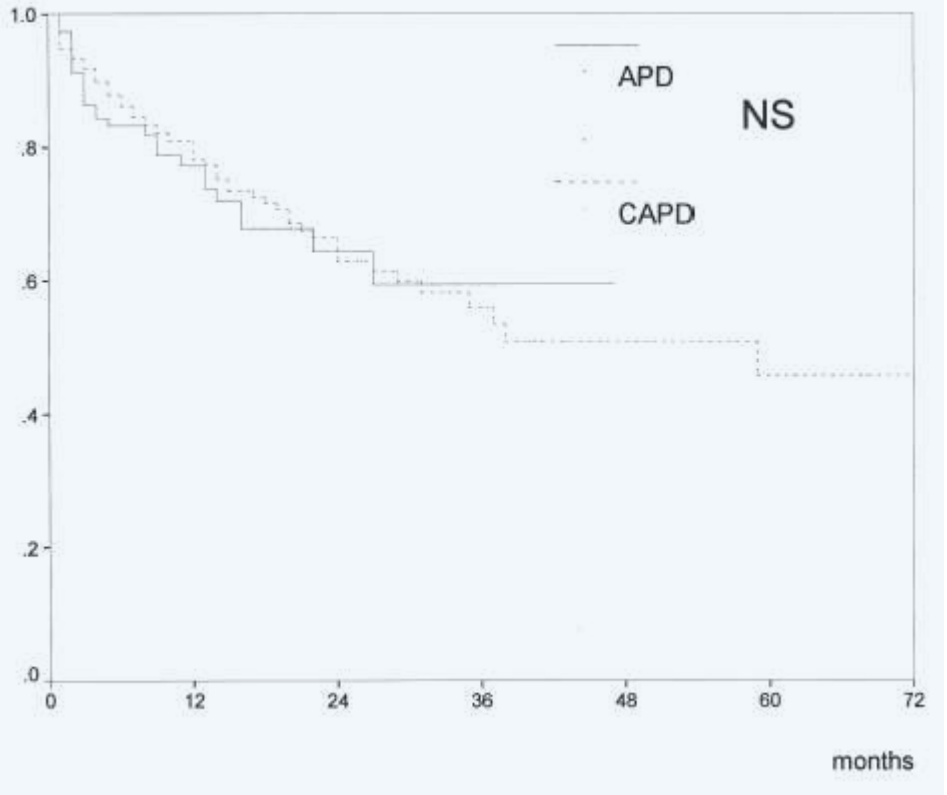


Период до первого эпизода перитонита у больных на CAPD и APD



Период до первого эпизода инфекции места выхода катетера у больных на CAPD и APD

Rodriguez-Carmona A et al. Perit Dial Int 1999;19:253-258

Частота перитонитов при CCPD (APD) была ниже по сравнению с CAPD в большинстве исследований

Table 1. Comparison of peritonitis rates on CAPD and CCPD

Study	Patients	Study design	Location	Peritonitis rate, episodes/year at risk	
				CAPD disconnect	CCPD
Holley et al. [9], 1990	36	case control	USA	0.5	0.3
Korbet et al. [10], 1993	146	retrospective	USA	1.8	0.6
De Fijter et al. [11], 1994	82	randomized	Europe	0.94	0.51
Viglino et al. [12], 1995	104	retrospective	Europe	0.25	0.32
Golper et al. [13], 1996	1,930[1]	registry	USA	0.61	0.78
Troidle et al. [14], 1998	345	retrospective	USA	1.15	1.2
Rodriguez-Carmona et al. [15], 1999	348	observational	Europe	0.64	0.31
Yishak et al. [16], 2001	198	registry	USA	0.55	0.57
Huang et al. [17], 2001	212	retrospective	Asia	0.27	0.15
Kavanagh et al. [18], 2004	1,205	registry	UK	0.65	0.59
Bro et al. [19], 2009	34	randomized	Europe	0.31	0.17
Akman et al. [20], 2009	132	observational	Turkey	0.77	0.78

[1] Total patients on PD and all connection types.

Piraino B, Sheth H. Blood Purif 2010;29:145-149

Сравнение методов постоянного амбулаторного и автоматизированного перитонеального диализа

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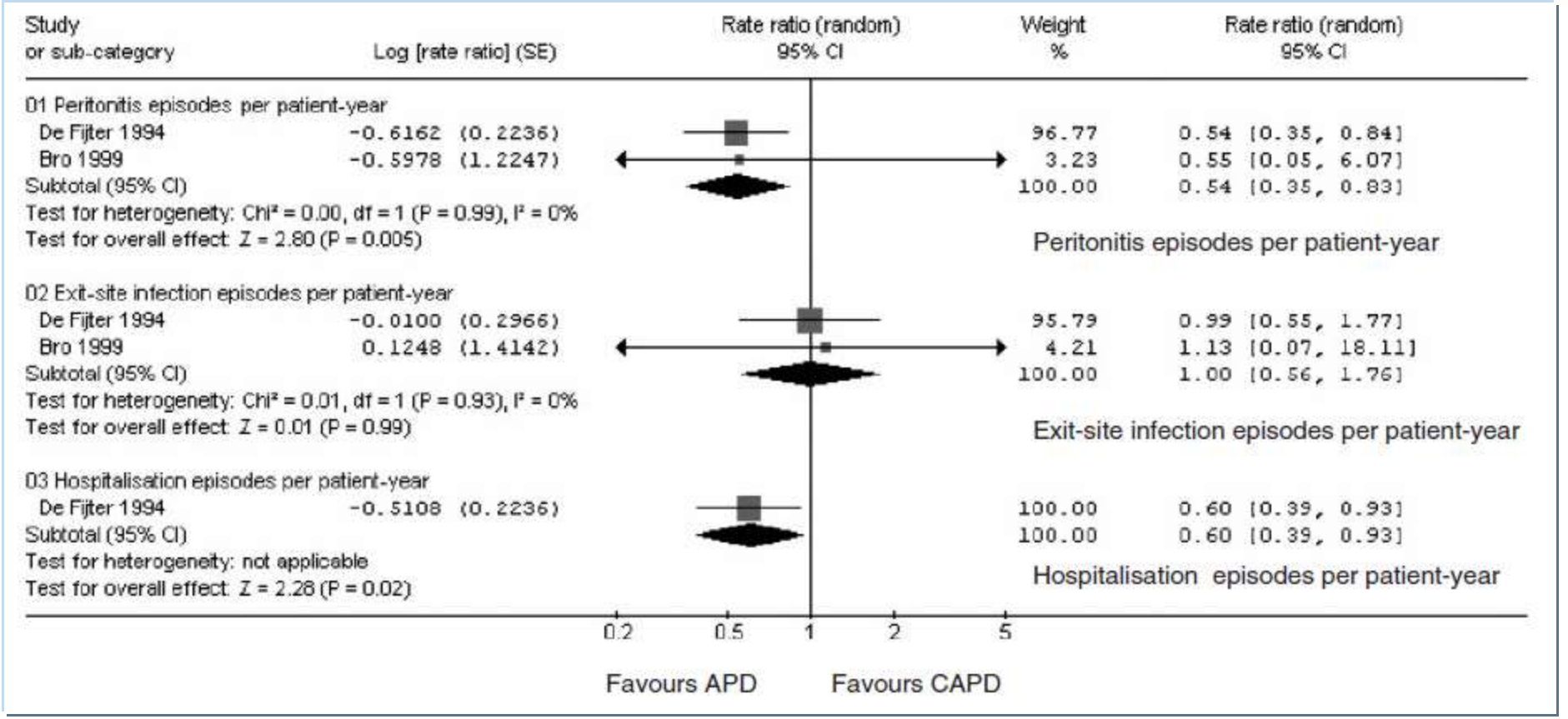

У больных на APD частота перитонитов и госпитализаций была ниже, не получено разницы в частоте инфекции места выхода катетера.

Rabindranath KS et al. Nephrol Dial Transplant 2007;22:2991-2998

Пути инфицирования полости брюшины

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Путь инфицирования	Способствующий фактор	Микроорганизм	Частота %
Интракатетерный	Нарушение асептики; рассоединения магистралей	Staphylococcus epidermidis	30-40
Перикатетерный	Протечка диализата; воспаление места выхода катетера, туннельная инфекция	Staph.epidermidis, Staph.aureus, Pseudomonas, Дрожжи	20-30
Трансмуральный	Нарушение проницаемости полых органов живота	Кишечная Грам – флора; анаэробы	25-30
Гематогенный	Внебрюшинный очаг инфекции	Стрептококки, микобак. Tbc	5-10
Трансвагинальный	Внутриматочные устройства для контрацепции. Широкие короткие маточные трубы	Дрожжи, лактобактерии	2-5

До 70% случаев инфицирования связано с магистралями, т.е. может быть обусловлено механическими причинами

частично по W.Keane, S.Vas,1994

Внутрибрюшинное давление и осложнения перитонеального диализа

NephroCare

Nephrol Dial Transplant (2007) 22: 1437–1444
doi:10.1093/ndt/gfl745
Advance Access publication 17 February 2007

Original Article

NDT
Nephrology Dialysis Transplantation

Intraperitoneal pressure in PD patients: relationship to intraperitoneal volume, body size and PD-related complications

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Departments of [1]Nephrology and [2]Biomedical Statistics Université catholique de Louvain B-1200 Brussels Belgium.

Abstract

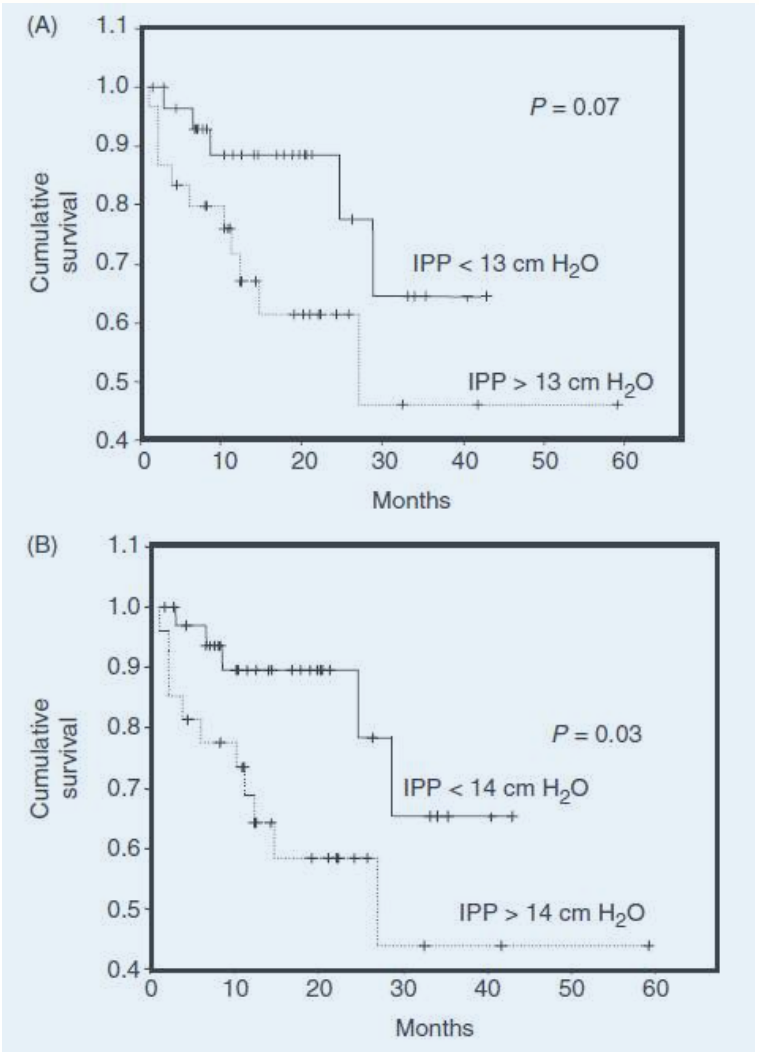
Background. The clinical determinants of intraperitoneal pressure (IPP) are ill defined, and the potential impact of elevated IPP on peritoneal dialysis (PD)-related complications is still a matter of debate. We measured IPP in newly started PD patients, assessed its clinical determinants and analysed the incidence of PD-related complications.

Method. IPP was measured in 61 consecutive patients

Conclusion. This study shows a strong linear correlation between IPP and IPV, a significant impact of BMI on IPP and a higher incidence of EP in patients with higher IPP. We recommend to measure IPP in PD patients to guide the prescription of intraperitoneal volumes.

Keywords: BMI; enteric peritonitis; gastro-oesophageal reflux; hernias; intraperitoneal pressure; peritoneal dialysis

Внутрибрюшинное давление (IPP) измеряли у 61 больного (47 на APD, 14 на CAPD). Объемы диализата ограничивали IPP≤16 см H_2O. Оценивали связь IPP с осложнениями PD (грыжа, поздняя протечка, рефлюкс и диализный перитонит).



Dejarden A et al. Nephrol Dial Transplant 2007;22:1437-1444

Внутрибрюшинное давление и диализные перитониты у больных на PD

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Table 3. Relationship between IPP and enteric peritonitis (EP): sixteen patients presented with EP during follow-up, giving an overall incidence of 0.16 events/patient-year

	IPP day		*P*	IPP night		*P*
	<13 cm H_2O	>13 cm H_2O		<14 cm H_2O	>14 cm H_2O	
Mean IPP (cm H_2O)	10.4 ± 2.1	15.7 ± 1.7		11.2 ± 2.1	16.5 ± 1.5	
Number of events	5 (16,1%)	11 (36,7%)	0.09	5 (14,7%)	11 (40,7%)	0.04
Age (years)	49.96 ± 17.5	53.05 ± 16.36	0.48	49.8 ± 17.7	53.60 ± 15.96	0.38
Gender	7/24	8/22	0.77	8/26	7/20	1
BMI (kg/m^2)	22.43 ± 3.19	24.62 ± 4.40	0.03	23.12 ± 4.00	23.99 ± 3.92	0.40
BSA (m^2)	1.76 ± 0.21	1.81 ± 0.17	0.24	1.76 ± 0.21	1.81 ± 0.17	0.36
CAPD	5 (16,1%)	9 (30,0%)	0.23	7 (20,5%)	7 (25,9%)	0.76
APD	26 (83,9%)	21 (70,0%)		27 (79,5%)	20 (74,1%)	
Mean follow-up (days)	539 ± 359	648 ± 462	0.31	526 ± 348	677 ± 476	0.17
Mean inflow volume (ml)	1710 ± 326	1853 ± 322	0.09	1935 ± 381	2119 ± 421	0.08
Mean inflow volume/BSA (ml/m^2)	977 ± 163	1026 ± 173	0.25	1102 ± 202	1176 ± 231	0.20

При CAPD отчетливая тенденция к ассоциации IPP с перитонитом, при APD такой тенденции нет.

Dejarden A et al. Nephrol Dial Transplant 2007;22:1437-1444

Возможности ассистируемого APD у больных без возможности выбора терапии

NephroCare

Peritoneal Dialysis International, Vol. 33, pp. 252-258
doi: 10.3747/pdi.2012.00031

0896-8608/13 $3.00 + .00

A BRAZILIAN EXPERIENCE IN ASSISTED AUTOMATED PERITONEAL DIALYSIS: A RELIABLE AND EFFECTIVE HOME CARE APPROACH

Marcia Regina Gianotti Franco,[1,2] Natália Fernandes,[2,3] Claúdia Azevedo Ribeiro,[1] Abdul Rashid Qureshi,[4] Jose Carolino Divino–Filho,[4] and Maria da Glória Lima[1]

GAMEN Renal Clinic,[1] Rio de Janeiro, and Department of Medicine,[2] Federal University of Juiz de Fora, Juiz de Fora, Brazil; Department of Clinical Epidemiology,[3] Leiden University Medical Center, Leiden, Netherlands; and Division of Renal Medicine,[4] CLINTEC, Karolinska Institutet, Stockholm, Sweden

♦ ***Introduction:*** **Automated assisted peritoneal dialysis (AAPD) has been shown to be successful as renal replacement therapy for elderly and physically incapable end-stage renal disease (ESRD) patients. In early 2003, a pioneer AAPD program was initiated at GAMEN Renal Clinic in Rio de Janeiro, Brazil.**

♦ ***Objective:*** **We evaluated the results of an AAPD program**

The increase in life expectancy observed in most countries of the world brings as a consequence the aging of the global population. This phenomenon creates an enormous challenge by raising issues such as independence, health care promotion, disease prevention, and maintenance or improvement of quality of life (QOL) for elderly people (1–3).

- С 2003 до 2009 г. на ассистируемом APD (AAPD) наблюдались 30 больных с физическими, когнитивными нарушениями или с проблемами сосудистого доступа, для которых PD был единственно возможным методом лечения
- Показано, что AAPD был возможным, надежным и эффективным методом выбора домашнего лечения для больных с невозможностью другого варианта

Franco MRG et al. Perit Dial Int 2013;33:252-258

Сравнение автоматизированного и прерывистого перитонеального диализа для экстренного начала ЗПТ

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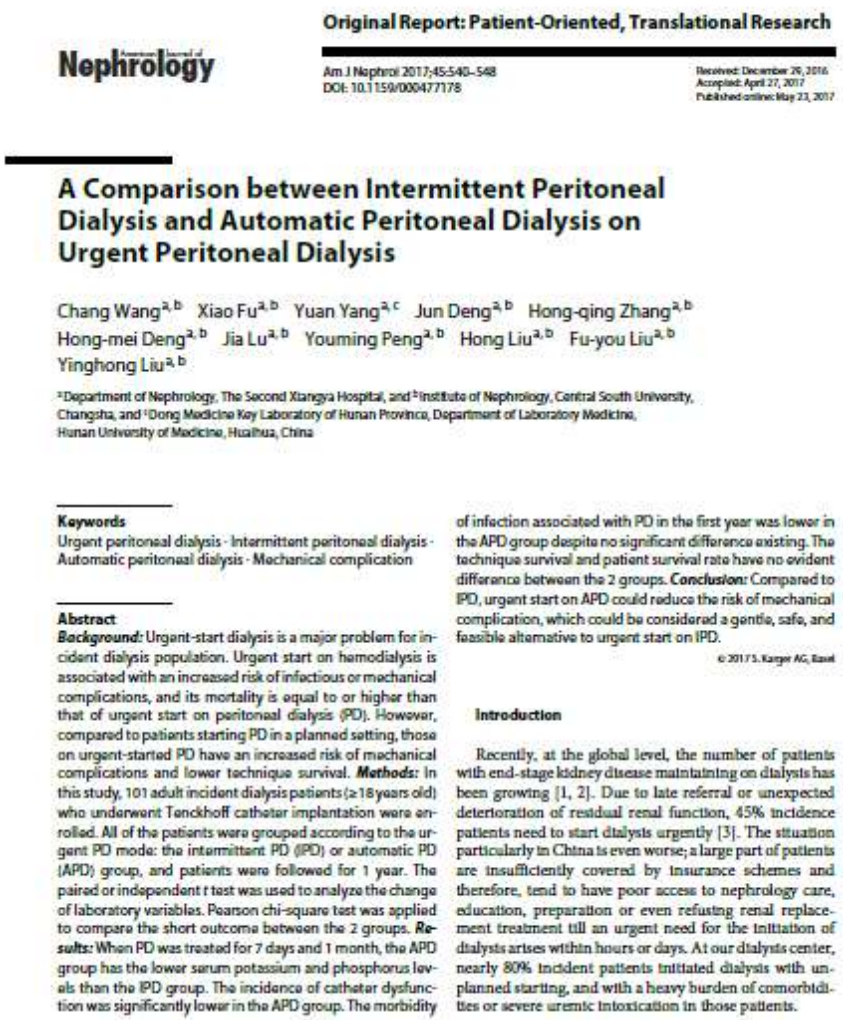

Original Report: Patient-Oriented, Translational Research

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A Comparison between Intermittent Peritoneal Dialysis and Automatic Peritoneal Dialysis on Urgent Peritoneal Dialysis

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[a]Department of Nephrology, The Second Xiangya Hospital, and [b]Institute of Nephrology, Central South University, Changsha, and [c]Dong Medicine Key Laboratory of Hunan Province, Department of Laboratory Medicine, Hunan University of Medicine, Hualhua, China

Keywords
Urgent peritoneal dialysis · Intermittent peritoneal dialysis · Automatic peritoneal dialysis · Mechanical complication

Abstract
Background: Urgent-start dialysis is a major problem for incident dialysis population. Urgent start on hemodialysis is associated with an increased risk of infectious or mechanical complications, and its mortality is equal to or higher than that of urgent start on peritoneal dialysis (PD). However, compared to patients starting PD in a planned setting, those on urgent-started PD have an increased risk of mechanical complications and lower technique survival. ***Methods:*** In this study, 101 adult incident dialysis patients (≥18 years old) who underwent Tenckhoff catheter implantation were enrolled. All of the patients were grouped according to the urgent PD mode: the intermittent PD (IPD) or automatic PD (APD) group, and patients were followed for 1 year. The paired or independent *t* test was used to analyze the change of laboratory variables. Pearson chi-square test was applied to compare the short outcome between the 2 groups. ***Results:*** When PD was treated for 7 days and 1 month, the APD group has the lower serum potassium and phosphorus levels than the IPD group. The incidence of catheter dysfunction was significantly lower in the APD group. The morbidity of infection associated with PD in the first year was lower in the APD group despite no significant difference existing. The technique survival and patient survival rate have no evident difference between the 2 groups. ***Conclusion:*** Compared to IPD, urgent start on APD could reduce the risk of mechanical complication, which could be considered a gentle, safe, and feasible alternative to urgent start on IPD.

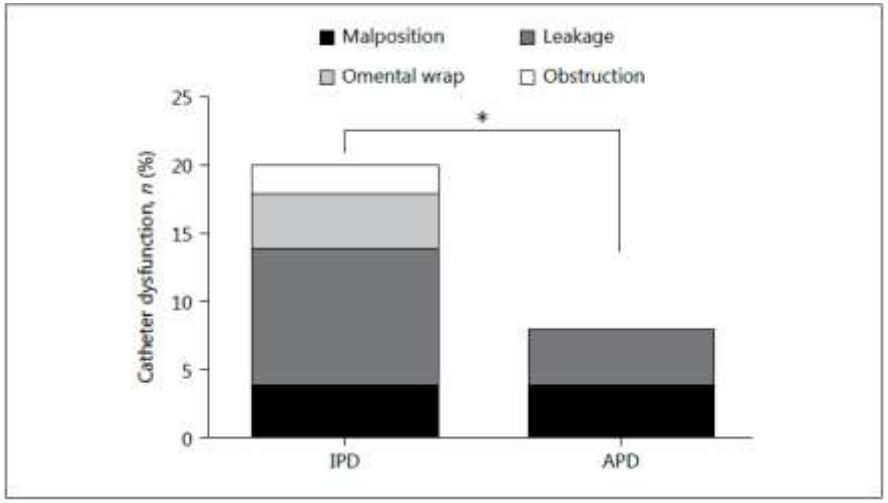
Introduction

Recently, at the global level, the number of patients with end-stage kidney disease maintaining on dialysis has been growing [1, 2]. Due to late referral or unexpected deterioration of residual renal function, 45% incidence patients need to start dialysis urgently [3]. The situation particularly in China is even worse; a large part of patients are insufficiently covered by insurance schemes and therefore, tend to have poor access to nephrology care, education, preparation or even refusing renal replacement treatment till an urgent need for the initiation of dialysis arises within hours or days. At our dialysis center, nearly 80% incident patients initiated dialysis with unplanned starting, and with a heavy burden of comorbidities or severe uremic intoxication in those patients.

- Включен 101 инцидентный больной, которым требовалось экстренное, в течение 48 час после имплантации катетера, начало PD: группы прерывистого (IPD) или автоматизировнного (APD) PD наблюдались в течение года. Исходные клинико-лабораторные характеристики больных не различались.
- Различий в технической выживаемости между группами не было. Все больные пережили первый год наблюдения.
- Экстренное начало PD методом APD позволило проводить более эффективную детоксикацию большим объемом диализата, снизить риск механических осложнений.
- APD показал себя мягким, безопасным методом экстренного начала PD

Wang C et al. Am J Nephrol 2017;45:540-548

Катетерные осложнения и исходы за первый год наблюдения



Число катетерных осложнений в группе больных на APD было ниже

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Variable	IPD	APD	*p* value
Catheter dysfunction, *n* (%)	10 (20)	4 (7.8)	0.077*
Malposition	2 (4)	2 (3.9)	0.984
Leakage	5 (10)	2 (3.9)	0.444
Omental wrap	1 (2)	0 (0)	–
Obstruction	2 (4)	0 (0)	–
Catheter dysfunction needing surgical intervention, *n* (%)	1 (2)	0 (0)	–
Infection, *n* (%)	13 (26)	7 (13.7)	0.122

Chi-square test compare the difference between the incidence rate of IPD and APD. * *p* value <0.10.

Variable	IPD	APD	*p* value
Transfer to HD, *n* (%)	1 (2)	1 (1.96)	0.989
Transfer to kidney transplantation, *n* (%)	2 (4)	4 (7.8)	0.414
Death, *n* (%)	0 (0)	0 (0)	–

Chi-square test compared the difference between the incidence rate of IPD and APD.

Wang C et al. Am J Nephrol 2017;45:540-548

Клинические, биохимические и технические характеристики у больных на IPD и APD

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Variable	PD for 7 days			PD for 1 month		
	IPD	APD	p_1	IPD	APD	p_2
Urine volume, mL/day	–	–		940.2±57.3	910.6±69.8	0.744
Hemoglobin, g/L	81.34±1.6	84.33±2.1	0.265	103.61±2.6	102.96±3.0	0.87
Blood urea nitrogen, mg/L	22.77±1.0	19.84±0.9	0.036*	20.49±0.9	18.43±0.7	0.084*
Creatinine, μmol/mL	863.03±48.6	755.33±45.9	0.046*	835.27±37.9	773.64±36.0	0.185
Albumin, g/L	31.54±0.6	31.34±0.7	0.828	34.67±0.6	35.71±0.7	0.264
CO_2 combining power, mmol/L	22.71±0.5	22.159±0.5	0.418	23.878±0.5	23.84±0.5	0.957
Serum potassium, mmol/L	4.43±0.06	4.18±0.09	0.021*	4.31±0.13	3.92±0.09	0.061*
Serum calcium, mmol/L	1.94±0.03	1.99±0.05	0.168	2.06±0.03	2.09±0.04	0.315
Serum phosphorus, mmol/L	1.86±0.07	1.61±0.07	0.011*	1.67±0.06	1.47±0.06	0.015*

t test for the difference between the value of IPD and APD. * p_1, p_2 value <0.10. Data are expressed as mean ± SEM.

Variable	IPD	APD	*p* value
Operation time, min/day	82.7±6.5	22.1±2.8	<0.001*
Total dialysis volume, mL/day	4,000	5,000	–

t test for the difference between the value of IPD and APD. * *p* value <0.10. Data are expressed as mean ± SD.

- Клиренс мочевины, креатинина, калия и фосфатов при APD был выше.
- Время, затраченное персоналом на лечение APD, было ниже

Wang C et al. Am J Nephrol 2017;45:540-548

Высокообъемный постоянный APD для лечения ОПП

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HIGH VOLUME PERITONEAL DIALYSIS FOR ACUTE RENAL FAILURE

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Background: Peritoneal dialysis (PD) is still widely used for acute renal failure (ARF) in developing countries despite concerns about its inadequacy. Continuous PD has been evaluated in ARF by analyzing the resolution of metabolic abnormality and normalization of plasma pH, bicarbonate, and potassium.

Methodology: A prospective study was performed on 30 ARF patients who were assigned to high-dose continuous PD (Kt/V = 0.65 per session) via a flexible catheter (Tenckhoff) and automated PD with a cycler. Fluid removal, pH and metabolic control, protein loss, and patient outcome were evaluated.

Results: Patients received 236 continuous PD sessions; 76% were admitted to ICUs. APACHE II score was 32.2 ± 8.65. BUN concentrations stabilized after 3 sessions, creatinine after 4, and bicarbonate and pH after 2. Fluid removal was 2.1 ± 0.62 L/day. Creatinine and urea clearances were 15.8 ± 4.16 and 17.3 ± 5.01 mL/minute respectively. Normalized creatinine clearance and urea Kt/V values were 110.6 ± 22.5 L/week/1.73 m^2 body surface area and 3.8 ± 0.6 respectively. Solute reduction index was 41% ± 6.5% per session. Serum albumin values remained stable in spite of considerable protein losses (median 21.7 g/day, interquartile range 9.1 – 29.8 g/day). Regarding ARF outcome, 23% of patients presented renal function recovery, 13% remained on dialysis after 30 days of follow-up, and 57% died.

Conclusion: High-dose continuous PD by flexible catheter and cycler was an effective treatment for ARF. It provided high solute removal, allowing appropriate metabolic and pH control, and adequate dialysis dose and fluid removal. Continuous PD can therefore be considered an alternative to other forms of renal replacement therapy in ARF.

Perit Dial Int 2007; 27:277–282 www.PDIConnect.com

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KEY WORDS: Acute renal failure; continuous peritoneal dialysis; Kt/V; treatment.

Acute renal failure (ARF) is highly prevalent in ICU patients (1–4) and has a mortality rate of about 50%. Acute renal failure requiring dialysis has a higher mortality rate still (5), reaching 80% in critical patients (6,7). The definition of adequate dialysis in ARF is complex and involves time of referral to dialysis, dialysis dose, and dialysis method. There is no consensus in literature on the best dialysis method or the ideal dose in ARF (8), although recent studies report that continuous methods providing doses as high as possible are beneficial in hypercatabolic patients and in those with cardiovascular instability (9,10).

Peritoneal dialysis (PD) for ARF is still the mainstay therapy in many developing countries due to availability and ease of administration (11). Peritoneal dialysis also has limitations, such as the need for an intact peritoneal cavity, risk of peritoneal infection, occurrence of protein losses, and an overall lower effectiveness (12). It has been supplanted by hemodialysis (HD) and, most recently, by hemofiltration and other associated techniques (13).

Because the clearance of small solutes is lower with PD than with HD, there has been concern that PD cannot control the ARF patient's uremia (8). However, treatment duration, for example 24 hours, may produce as much solute removal as 4 hours on HD.

Studies in literature report efficient fluid removal and metabolic control in patients on continuous peritoneal dialysis (CPD) therapy (14–19). These are clinical studies, however, and have limitations, such as small sample size and inadequate parameters for measuring catabolism and dialysis adequacy; also, arbitrarily defined optimum levels of post-dialysis blood urea nitrogen (BUN) and creatinine were used as indices of dialysis adequacy. Recently, Chitalia *et al.* (14) evaluated two methods of

- Проспективное исследование у 30 больных с ОПП, проводился высокообъемный постоянный APD (Kt/V = 0.65/сессия).
- Больные получили 236 постоянных сессий PD. BUN стабилизировался после 3 сессий, креатинин после 4,бикарбонат и pH – после 2. выведение жидкости составило 2.1± 0.62 л/день.
- Метод показал себя эффективным.

Continuous Peritoneal Dialysis (CPD) Session Characteristics

Dialysate fluid/cycle	2000 mL
Inflow time	10 minutes
Dwell time	35–50 minutes
Outflow time	20 minutes
Duration/cycle	65–80 minutes
Total exchanges/session	18–22
Total duration of session	24 hours
Total dialysate volume/session	36–44 L
Flow rate	25–30 mL/minute
Glucose	1.5%–4.25%
n=14	1.5%
n=6	2.0%[a]
n=7	2.5%
n=3	3.4%[b]

[a] Mix of 1.5% and 2.5% glucose bags.
[b] Mix of 2.5% and 4.25% glucose bags.

Gabriel DP et al. Perit Dial Int 2007;27:277-282

Высокообъемный APD при остром почечном повреждении

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High-Volume Peritoneal Dialysis in Acute Kidney Injury: Indications and Limitations

Daniela Ponce, Marina Nogueira Berbel, Cassiana Regina de Goes, Cibele Tarś Puato Almeida, and André Luís Balbi

Summary

Background and objectives Peritoneal dialysis is still used for AKI in developing countries despite concerns about its limitations. The objective of this study was to explore the role of high-volume peritoneal dialysis in AKI patients in relation to metabolic and fluid control, outcome, and risk factors associated with death.

Design, setting, participants, & measurements A prospective study was performed on 204 AKI patients who were assigned to high-volume peritoneal dialysis (prescribed Kt/V=0.60/session) by flexible catheter and cycler; 150 patients (80.2%) were included in the final analysis.

Results Mean age was 63.8±15.8 years, 70% of patients were in the intensive care unit, and sepsis was the main etiology of AKI (54.7%). BUN and creatinine levels stabilized after four sessions at around 50 and 4 mg/dl, respectively. Fluid removal and nitrogen balance increased progressively and stabilized around 1200 ml and −1 g/d after four sessions, respectively. Weekly delivered Kt/V was 3.5±0.68. Regarding AKI outcome, 23% of patients presented renal function recovery, 6.6% of patients remained on dialysis after 30 days, and 57.3% of patients died. Age and sepsis were identified as risk factors for death. In urine output, increase of 1 g in nitrogen balance and increase of 500 ml in ultrafiltration after three sessions were identified as protective factors.

Conclusions High-volume peritoneal dialysis is effective for a selected AKI patient group, allowing adequate metabolic and fluid control. Age, sepsis, and urine output as well as nitrogen balance and ultrafiltration after three high-volume peritoneal dialysis sessions were associated significantly with death.

Clin J Am Soc Nephrol 7: 887–894, 2012. doi: 10.2215/CJN.11131111

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Introduction

Peritoneal dialysis (PD) was the first modality of renal replacement therapy used for AKI patients (1). In the 1970s, acute PD was widely accepted for AKI treatment, but its practice declined in favor of hemodialysis (2–5). It is frequently used in developing countries because of its lower cost and minimal infrastructural requirements (4,5). Recently, interest in using PD to manage AKI patients has been increasing. One important question is whether PD can provide adequate metabolic and fluid control for treating AKI patients.

The work by Gabriel *et al.* (6) showed that, with careful thought and planning, critically ill patients can be successfully treated by PD. To overcome some of the classic limitations of PD use in AKI, such as a high chance of infection and no metabolic control, they proposed the use of cycles, flexible catheter, and a high volume of dialysis fluid.

However, it is also true that PD is not the most efficient therapy: clearance per exchange can decrease if a shorter dwell time is applied, a lower efficiency can be observed in large-sized and severely hypercatabolic patients, fluid removal can be limited, and there is a high risk of infection and possibility of PD worsening mechanical ventilation, thus impairing respiratory performance (7–11).

Given the paucity of good-quality evidence in this important area, additional studies on the use, dose, and limitations of PD for AKI and its effect on clinical outcomes are necessary. The goals of this study were to explore the role of high-volume (HV) PD in AKI patients in relation to metabolic and fluid control and identify the risk factors associated with death.

Materials and Methods

Study Population

This study was a prospective cohort study approved by the ethics committee of the Botucatu School of Medicine University Hospital, Sao Paulo, Brazil; 205 patients who had been consecutively treated by HVPD were evaluated between January of 2004 and January of 2011. Informed consent was obtained from study participants or their legal caregiver.

The inclusion criteria were AKI patients according to Acute Kidney Injury Network criteria (12), clinical diagnosis of septic AKI, and severe acute tubular necrosis (ATN) caused by ischemic or nephrotoxic injury. Indications for dialysis were uremia or azotemia (BUN>100 mg/dl), fluid overload (after diuretics use), electrolyte imbalance (K>6.5 mEq/L after clinical treatment), and acid–base disturbances (pH<7.1 and bicarbonate<10 mEq/L after clinical treatment).

- Проспективное исследование у 204 больных с AKI, которым проводился высокообъемный APD. Основной причиной AKI был сепсис.
- BUN, креатинин, выведение жидкости и азотистый баланс стабилизировались после 4 сессий
- 23% больных восстановили почечную функцию, 6.6% оставались на диализе после 30 дней, 57.3% умерли.
- Факторами риска смерти были возраст и сепсис. Диурез, азотистый баланс от 1 г ультрафильтрация от 500 мл оказались защитными факторами.

Ponce D et al.Clin J Am Soc Nephrol 2012;7:887-894

Алгоритм перитонеального диализа для лечение острого почечного повреждения

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ISPD GUIDELINES/RECOMMENDATIONS

PERITONEAL DIALYSIS FOR ACUTE KIDNEY INJURY

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Peritoneal dialysis (PD) was initially used in the 1920s to treat acute kidney injury (AKI), but it was not until 1946 that it was first described to save the life of a patient (1). Dialysis solutions initially produced hyperchloremia and overhydration, but refinements such as the addition of sodium lactate or bicarbonate rather than sodium chloride, as well as the use of gelatin or dextrose to increase tonicity, led to better outcomes (2). As solutions and peritoneal dialysis catheters improved, so did outcomes, with a resulting increase in PD utilization. Peritoneal dialysis for AKI has, however, more recently become sidelined by newer, more technologically advanced treatments such as hemofiltration and hemodialysis (HD) (3,4). In a recent review on the dose of dialysis in AKI, PD was not even mentioned as a potential modality (5). This is despite studies demonstrating that it is at least as effective as daily HD and possibly hemofiltration (6,7). Gaiao *et al.*'s survey, amongst delegates at 3 major dialysis congresses, found that 36% felt PD was suitable for AKI in the intensive care unit (ICU); however, only 15% actually practiced it. When it came to treating AKI in the wards, more than 50% felt it was suitable. In the

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Supplemental material available at www.pdiconnect.com

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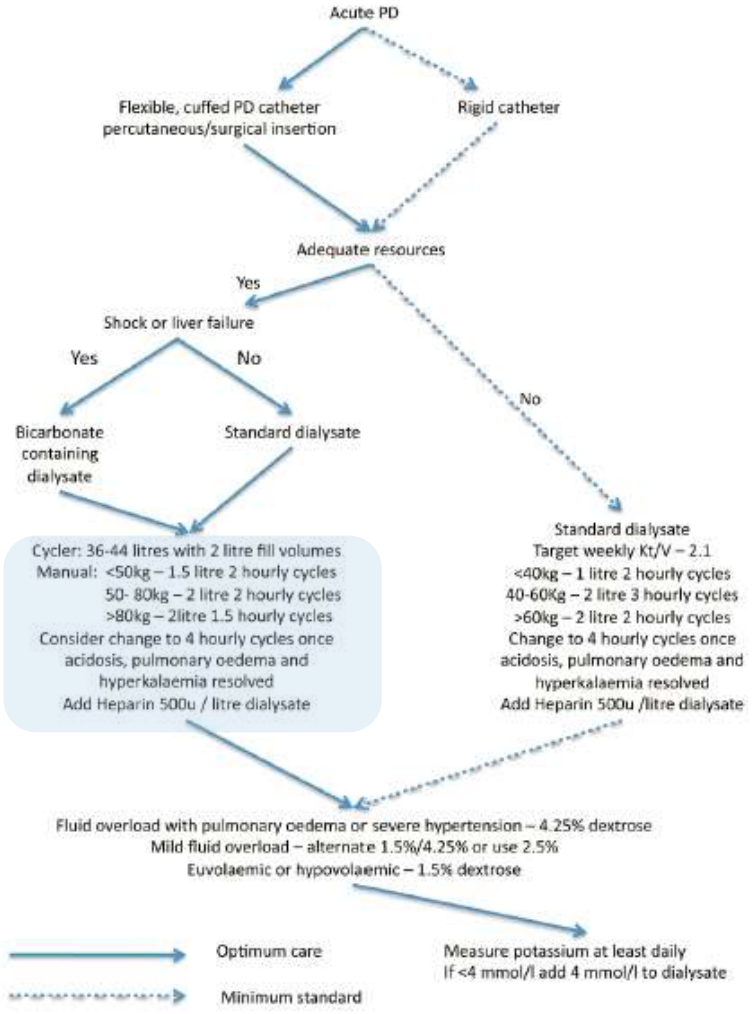

Cullis B et al.Perit Dial Int 2013;34:494-517

Заключение

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- Выживаемость больных на перитонеальном дализе (PD) не только не уступает результатам на гемодиализе (HD), но имеет лучшую положтельную динамику
- Выживаемость и техническая выживаемость при автоматизированном перитонеальном диализе ((APD) вероятно выше, чем при постоянном амбулаторном перитонеальном диализе (CAPD) у больных с высоким перитонеальным транспортом
- Выведение уремических токсинов при APD сравнимо с CAPD
- APD вероятно не влияет негативно на остаточную почечную функцию
- Частота перитонитов при APD ниже, чем при CAPD, возможно за счет более редкого разъединения системы и меньшего внутрибрюшинного давления
- APD имеет явные преимущества при
  - сложностях проведения самостоятельного PD,
  - экстренном начале PD,
  - проведении PD при остром почечном повреждении

Показания к автоматизированному перитонеальному диализу (APD)

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- Проведение ассистируемого APD:
  - Лечение детей: APD – доминантная терапия, к которой больные легче адаптируются и дающая больным и их родителям большую свободу
  - Потребность в помощи при проведении PD вследствие физических и ментальных нарушений у больного
- Лечение больных с высоким перитонеальным транспортом
- Лечение перикатетерных протечек диализата.
- Лечение больных с большой массой тела и минимальной остаточной почечной функцией.
- Попытка снижения высокой частоты инфекционных осложнений при CAPD
- Экстренное начало перитонеального диализа
- Лечение больных с острым почечным повреждением (острый перитонеальный диализ)

Новое методическое пособие по перитонеальному диализу

NephroCare

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2

Методическое пособие по лечению пациентов с хронической болезнью почек методом перитонеального диализа

К.Я. Гуревич, О.Н. Лаврова, А.П. Ильин, А.С. Гурков, С.В. Байко

FRESENIUS MEDICAL CARE

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Критерии качества лечения больных методом ПД

До настоящего времени в международных и российских рекомендациях, касающихся оценки качества диализной терапии, не представлены критерии качества лечения методом перитонеального диализа. В связи с этим для клиник Fresenius Medical Care в России разработаны следующие критерии качества (табл. 16.1).

Таблица 16.1. Критерии качества процедуры перитонеального диализа

№	Параметр	Критерий качества	Комментарии
1	Фактическая доза перитонеального диализа и перитонеальная ультрафильтрация ассоциированы с риском летального исхода. Остаточная почечная функция может компенсировать недостижение данных целевых значений перитонеальным путем	Kt/V ≥1,7 л/неделю, ультрафильтрация ≥1,0 л/сутки и перитонеальный клиренс креатинина ≥45 л/неделю/1,73 м² достигает целевых значений у 90% больных	Клиренс креатинина оценивается только при АПД с частыми короткими обменами. Kt/V и клиренс креатинина оценивается не реже 1 раза в 6 месяцев. Ультрафильтрация оценивается не реже 1 раза в месяц.
2	Автоматизированный перитонеальный диализ показан детям, больным, нуждающимся в помощи при проведении ПД, больным с осложнениями, связанными с повышенным внутрибрюшинным давлением, при лечении перикатетерных протечек диализата, для лечения больных с большой массой тела и минимальной остаточной почечной функцией. Он позволяет проведение более коротких, но частых циклов при лечении больных с высоким перитонеальным транспортом и также может способствовать повышению выживаемости и снижению числа инфекционных осложнений	Доля больных на ПД, получающих АПД, не менее 30%	Оценивается ежемесячно. Больной считается получающим АПД, если получал его не менее половины дней в месяце.
3	Растворы с повышенной биосовместимостью (физиологический pH, сниженное содержание продуктов деградации глюкозы, бикарбонатный	Доля больных на ПД, получающих биосовместимые растворы (Balance®, BicaVera®,	Для взрослых больных достаточно применения растворов типа Balance®, для детей предпочтительно применение Bica-Vera®. Больные считаются получающими биосовместимые растворы, если получают их не менее половины дней в месяце.
	протечка диализата, нарушение слива диализата, эрозия наружной манжеты) являются, как правило, следствием дефектов хирургического пособия или, при длительном ПД, изменений брюшной стенки, они существенно влияют на выживаемость методики ПД	осложнениями ≤30%	Оценивается ежегодно

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Спасибо за ваше внимание