



Le Bulletin de la Dialyse à Domicile

EVOLUTION OF PERITONEAL DIALYSIS TECHNIQUE FAILURE FROM 2002 TO 2017 IN FRANCE. RDPLF DATA.

Tendances évolutives des sorties de technique en dialyse péritoneale de 2002 à 2017 en France.
Données du rdplf.

Note : le texte original en version Française est disponible à la même adresse url : <https://doi.org/10.25796/bdd.v1i3.54>

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Résumé

En France, 6 à 7% des patients présentant une maladie rénale chronique terminale au stade de la suppléance sont traités par dialyse péritoneale (1). Depuis 1986, le Registre de Dialyse Péritoneale de Langue Française (RDPLF) recueille les données des patients en dialyse péritoneale. Malgré une augmentation annuelle du nombre de patients incidents, la prévalence reste en dessous des objectifs de santé publique. L'ampleur des mouvements de sorties de la technique peuvent expliquer la faible prévalence de la dialyse péritoneale. Nous avons repris les données disponibles dans le but de décrire les tendances des différentes causes de sorties de technique et d'identifier des points à améliorer pour augmenter la survie technique. Méthodes : Il s'agit d'une étude rétrospective reprenant les données publiques du RDPLF concernant les sorties de techniques sur l'ensemble de la période 2002 à 2017. Le site du RDPLF publie ces données annuellement ; de plus il est mis à disposition un outil statistique qui permet des analyses statistiques descriptives simples grâce à la mise à disposition d'un export anonymisée de la base de données. Résultats : Plus de 30% des patients quittent la DP chaque année et le transfert en hémodialyse compte pour environ 1/3 des sorties techniques. Les tendances évolutives de sortie de technique montrent une diminution de la part de la mortalité de 51% à 38% (2002 à 2017, $p < 0.05$). Sur la même période, la part des transferts en HD est stable de 33% - 36% ($p > 0.05$) et celle de la transplantation est en augmentation de 15% à 22% ($p < 0.05$). Concernant le transfert en HD, les principales causes sont la « sous-dialyse », les péritonites, la dysfonction de cathéter, et l'ultrafiltration insuffisante. L'évolution de ces causes montre une diminution des péritonites de 22% - 26% en 2002-2004 vs 13.6% en 2017 ($p < 0.05$). Une tendance à l'augmentation des dysfonctions de cathéter de 7 - 8% en 2002-2005 vs 8.6 - 11,8% en 2013-2016 ($p > 0.05$). Conclusion : Sur la période 2002-2016, les causes de sortie technique ont évoluées avec une diminution des décès et une augmentation de la transplantation. Néanmoins malgré les améliorations de la technique et l'apparition de nouvelles solutions de DP, la proportion des patients transférés vers l'HD chaque année, n'a pas été modifiée.

Mots clés : Dialyse péritoneale, Evolution, Sortie technique

Abstract

In France, 6 to 7% of patients with end stage renal failure are treated by peritoneal dialysis (1). Despite the annual augmentation of treated patients, it's still under public health goal. Peritoneal dialysis technique failure is one restraint of technique growth in France. The RDPLF collect data about technique survival and infections since 1986. Technique failure width is on restraint of PD growth. We used available data to describe trends in the different causes of technique failure to identify areas with feasible improvement to increase technical survival.

Methods: This retrospective study includes public data from RDPLF over the 2002-2017 period.

Results: More than 30% of treated patients experience technique failure each year and transfer to hemodialysis count for 33%. Main causes of HD transfer are inadequate dialysis, peritonitis, catheter dysfunction and fluid inadequacy. The study of technique failure causes trends shows a decreased mortality from 51% in 2002 to 38% in 2017 ($p < 0.05$), an increase of transplantation access from 15% to 22% ($p < 0.05$). Transfer to hemodialysis is stable 33% to 36% in the same period. The analysis au hemodialysis transfer shows a decrease of peritonitis from 22% in 2002 and 26% in 2004 to 13.6% in 2017 ($p < 0.05$). It shows a light increase of catheter dysfunction from between 7-8% during 2002-2005 period, to 8.6-11.8% during 2013-2016 period ($p > 0.05$).

Conclusion: Technique failure causes evolved over the past fifteen years in France, there is an improvement in mortality and access to transplant, a decrease in peritonitis. Despite technique improvement and new PD solutions (Icodextrine based, biocompatible), there is still 10% of PD patients transferred each year to hemodialysis without favorable trends.

Abréviations :

DP : Dialyse péritoneale

HD : Hémodialyse

RDPLF : Registre de Dialyse Péritoneale de Langue Française

IRCT : Insuffisance rénale chronique terminale

Keywords : Peritoneal Dialysis, Evolution, Technique Failure

INTRODUCTION

For more than forty years, peritoneal dialysis (PD) has been used to treat patients with chronic end stage renal failure. In France, main PD data has been recorded since 1986 by the RDPLF (French Language PD Registry). The number of incident patients treated by this technique is constantly increasing, but the percentage of prevalent patients treated with PD, compared to other renal replacement therapy, is stable or even decreasing. There are large disparities between regions, but finally, across the entire territory, between 6 and 7% of chronic renal failure patients are treated with PD (1). The overall use is therefore weak despite advantages in terms of quality of life (2-5).

It is now established that renal replacement therapies are not in competition but are complementary with transfers between modalities (DP, HD and Transplantation). Peritoneal dialysis is a technique for which transfers to other modalities are numerous. This characteristic may explain the low prevalence of PD in renal replacement techniques. To promote this technique, it is necessary to identify the technical dropout causes and their evolution to allow a strategy establishment to improve technical survival. We have therefore taken available public data in the RDPLF web site in order to describe the trends of the different technical failure causes and identify improvement areas to increase technical survival.

MATERIAL AND METHODS

We have taken up all the public data of the RDPLF (Shiny RDPLF sites (<http://shiny.rdplf.org/> and www.rdplf.org) for the 2002-2017 period. We looked in particular at the technical outputs category of the annual report published on the site. The personal query tools to complete the year 2006 was not available on the annual statistics. The collected parameters were: every year the number of patients from January 1st to December 31st, incidents and prevalents, as well as their average age, causes of technical dropout, and the median duration until technical failure. The number of patients per year is the addition of the prevalent patients at the beginning of the year and incidents during the year (ie the active file). The causes of transfer identified by the RDPLF are peritonitis, catheter dysfunction, subdialysis, malnutrition, insufficient ultrafiltration, patient incapacity, psychological intolerance, other causes unrelated to PD, other causes related to PD and helper failure. The causes of transfer are defined according to

the clinical assessment by nephrologists treating patients and do not need to meet specific criteria. The data set was analyzed on a statistical software, a Z test was used on Excel © to compare the proportions, verified with a Chi² realized with Medcalc © a $p < 0.05$ was considered significant.

RESULTS

Trend in the number and age of PD patients.

Over the studied period (2002 and 2017) there is a gradual increase in the active file of patients treated with peritoneal dialysis from 3454 to 4429 patients. This corresponds to 975 additional patients, an increase of 28% (Figure 1). This increase does not affect the proportion of overall use of PD (prevalence) that remains low (REIN data).

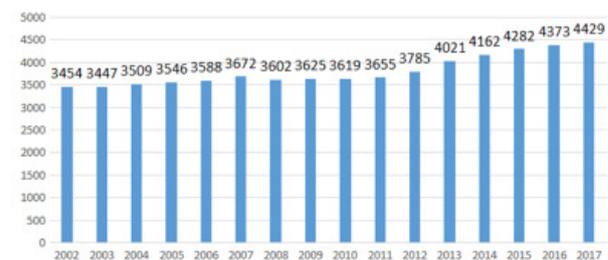


fig. 1 : number of PD patients per year in France

The average age of patients (incidents and prevalent) increased by about 2 years over the same period. Increase in the average age of the prevalent patients follows that of the incident patients, this increase occurs mainly over the last 4 years (2013-2017). (Figure 2)

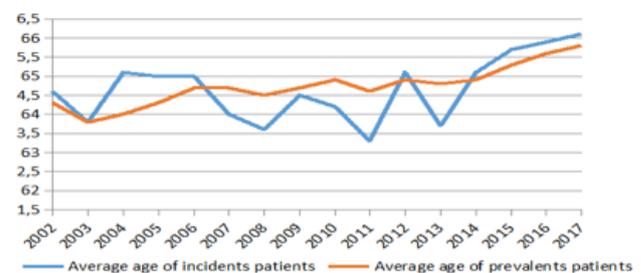


fig. 2 : average age of PD patients per year in France

Evolution trend of technical survival

Over 1980 to 2016, it can first be noted that treatment duration by peritoneal dialysis is mostly less than 5 years (93% of patients) and in a small number of cases, more than 10 years (0.5% of patients), whatever the cause of

exit and regardless of age and comorbidities. The total number of patients over this period is 31,753 (Figure 3)). The median of technical survival has increased since 2000, from 23.8 months for 2000-2006 to 29.5 months for 2007-2015.

Technical dropout concerns about 30% of patients each year. (figure 4). The main causes are: death, transfer to hemodialysis center, transplantation and, to a lesser extent, resumption of diuresis and voluntary discontinuation. Analysis of trends for these causes between 2002 and 2017 shows: a mortality decrease from 51% to 38% ($p < 0.05$), a stable share of transfers to HD (33% to 36% NS) and a transplantation increase from 15% to 22% ($p < 0.05$).

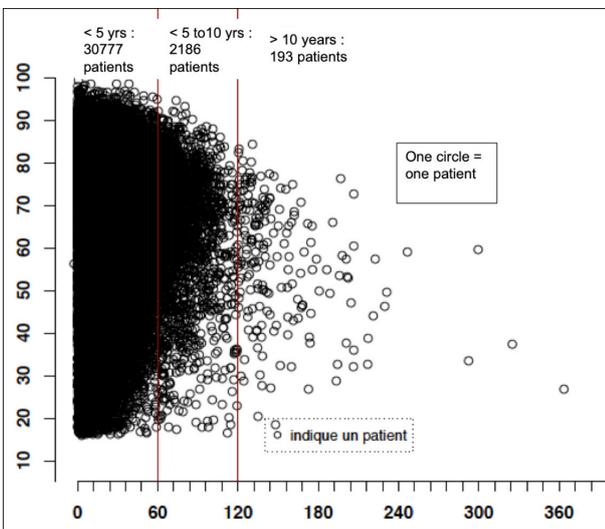


Fig 3 : Total duration (months) on PD for all patients included in the RDPLF since 1986. Each circle represents one patients. All causes of PD cessations are included (death, technic failure, transplantation)

Evolutionary trend of transfer to HD causes

We were particularly interested by the specific causes of hemodialysis transfer, representing approximately 33% of the technical outputs. First, we analyzed the transfer to hemodialysis as a function of time to onset: early or late according to the definition most often used in international studies (6).

Early causes are those whose median time of transfer is less than one year. We find in this group

Table 1 : median number of months before transfer to HD by transfers causes

	2007	2008	2009	2010	2011	2012	2013	2014	2016	Mean
Peritonitis	23,10	25,30	29,20	20,30	15,70	25,30	18,20	16,00	13,80	20,77
Catheter dysfonction	6,30	9,40	4,80	8,40	3,90	8,10	3,10	3,80	3,90	5,74
Subdialysis	22,80	21,60	24,00	29,10	21,60	22,40	26,00	19,20	27,70	23,82
Malnutrition	18,20	12,90	30,90	13,40	13,80	2,60	33,40	18,50	6,50	16,69
insufficient UF	33,40	5,30	16,10	20,30	24,10	15,20	22,90	24,00	15,40	19,63
psychological intolerance	5,10	4,50	4,20	4,00	8,80	6,30	16,00	16,70	7,60	8,13

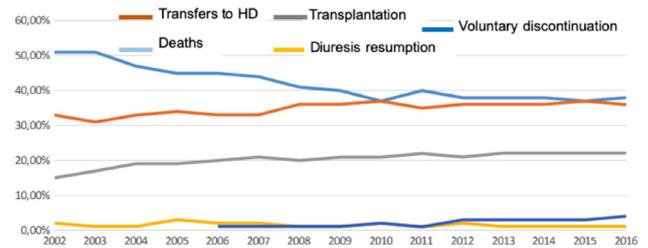


Fig 4 : technical dropouts causes per year

catheter dysfunction (median 3.1 to 9.4 months) and psychological intolerance (4 to 16.7 months) (Table 1). Late causes have a more than one year delay and include: peritonitis (13.8 to 29.2 months), insufficient UF (5.3 to 33.4 months), sub-dialysis (19.2 to 29.1 months) and malnutrition (2.6 to 33.4 months). (Table 1).

Trend analysis of these late-dropout causes shows decrease in peritonitis from 22% -26% in 2002-2004 to 13.6% in 2017 ($p < 0.05$). The rates of catheter dysfunction are not significantly different between 2002-2005 and 2013-2016, respectively 7-8% and 8.6-11.8% ($p = 0.07$). The Subdialysis and insufficient UF causes are highly variable from one year to another with no identifiable trend: 23 to 31% for subdialysis and 4 to 13% for insufficient ultrafiltration.(figure 5)

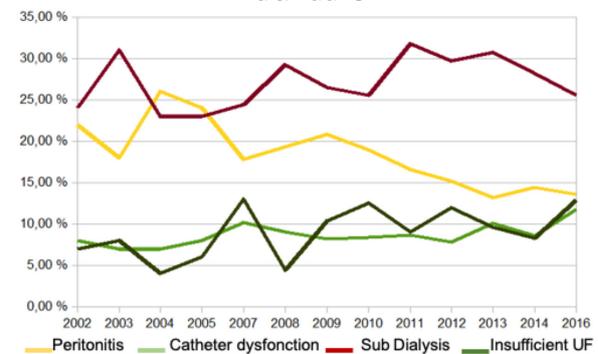


Figure 4. Transfer to HD causes by year

Fig 5 : causes of transfer to HD per year

renal failure in France (1). However, the proportion of PD patients compared to hemodialysis and transplantation stagnates or even decreases. We also report a technique dropout frequency of 30% per year. Transfers to HD represent 30% of technical dropout. The most common

causes of transfer are subdialysis peritonitis, catheter dysfunction, insufficient ultrafiltration, other causes related or not to PD. HD transfer is an event representing a failure for the patient with physical and psychological consequences. Family and professional life organization will be modified. Patients will have to undergo at least two interventions to carry out technique transfer, vascular access creation and DP catheter removal. In case of urgent transfer, patients are subject to the central catheter inconvenience and its infectious risk. In this analysis we report a decrease in mortality for PD patients. Decrease in mortality cannot be attributed solely to advances in the PD technique, but more likely to an improvement in the overall management of cardiovascular risk as it is the case for the general population (7). The analysis here is based on raw descriptive data available on the RDPLF website. There is no adjustment for age, co-morbidities and other confounding factors. These results cannot be compared to other treatment modalities and studies based on more sophisticated statistical analysis. The purpose of this study is to obtain a simple vision of the evolution of technical outputs in France that can be made from public data. A more precise analysis would require access to all variables available in the RDPLF database.

We also report an increase in the main favorable outcome, the graft over the entire period studied but which remains stable over the last years. Increasing access to transplantation remains a public health goal (8). Thus, the efforts undertaken in this direction are found in our study.

In this analysis, we report a stability of transfers to HD over the whole study period and this despite the appearance of biocompatible solutions (Icodextrin since 2002 and other biocompatible solutions since 2008-2009). However, these data need to be analyzed with caution as we have no indication of the proportion of use of biocompatible solutions within the RDPLF in the public data on the site. These biocompatible solutions are expected to provide better preservation of residual renal function and diuresis (9). In addition, the prescription of icodextrin improves peritoneal ultrafiltration and control of blood volume (10). The data analyzed in this study do not show a change in the proportion of technical output related to UF loss that has remained stable since 2002 (7% to 12.9%) or those related to subdialysis which have not diminished. The subdialysis item does not have objective criteria; using this item by the centers to declare their exit of technique could be linked to a lack of conviction from part of the nephrologists in the technique.

Despite the decrease in peritoneal infections, from one

episode every 30 months in 2002 to one episode every 38 months in 2016 (RDPLF), peritonitis remains the main cause of technical failure and transfer to hemodialysis. This should be potentially an easy modifiable cause. The recommendations for the treatment of PD peritonitis have evolved over the study period (11) and probably partly explain the peritoneal infection proportion as cause of technique failure. Involved micro-organisms, particularly those of enteral origin, resistant, and polymicrobial infections are at risk of transfer risk in PD (12) (13). In the registry, antibiotic treatments duration is not recorded, and the organism involved when the cause of transfer is peritonitis, is not directly available on the web site. Our data suggest that practices can be further improved (14).

A center effect has also recently been reported in the occurrence of PD peritonitis, suggesting that a center's experience may improve practices, lower the risk of peritonitis-related technical output, and reduce transfers to hemodialysis (15) (16). This center effect explains 52% of the disparities between the centers (16). PD experience is acquired with the number of patients treated. The increase in the number of patients in the centers and the specialization of the teams is therefore a major challenge for improving practices. The international multicenter randomized study, Peritoneal Dialysis Outcomes and Practice Patterns Study (PDOPPS) in progress will certainly provide an additional level of evidence. Catheter dysfunction is a source of re-interventions and technique failure. Surgical techniques have improved since 2002, but in the present analysis we can see a trend to an increase cause of transfer to HD related to catheter malfunction. In the current literature there is insufficient evidence for the superiority of one type of catheter or operative technique (17) over another. The only consensus which seems to emerge is the importance of having an experienced surgical team.

Several studies have investigated PD technical survival, but only a few have analyzed technical dropout causes (18,19,20). In the US, a registry study of a large cohort of 40,869 patients over 2000-2003 identified the causes of early technical dropout, occurring in the first year. A 20% technical dropout frequency was found in the first year of dialysis, the causes being mainly infections (28%), catheter dysfunction (17%), inadequate dialysis (18%) and psychosocial causes (15%) (21). In Australia and New Zealand, another study of the ANZDATA registry, including more than 9000 patients between 2004 and 2014 found a technical failure rate of 0.35 per patient-year, which would correspond to a technical output of about 35 % per year (22). Death was the main cause 34%, by comparison in France at the same time deaths accounted for about 38% of the causes of dropout. In this

article, second place was occupied by infections (27% of cases), then mechanical causes (13%), inadequate dialysis (12%), and social causes (9%). This registry study did not include transplants as a reason for technique release, making difficult comparisons with our data. This finding emphasizes that even when dropout causes are studied it is difficult to compare our results because there no recommended definitions.

Recently, a definition has been proposed by the Australia and New Zealand Dialysis and Transplant Registry team to compare technical dropout between countries (23). This definition is a composite endpoint of death and hemodialysis transfer of at least 30 days or 180 days. Transplantation is excluded from technical failures (use of competitive risk models), it must be specified if they are incidental or prevalent patients. The 30-day definition includes peritonitis and other intercurrent problems that require transient HD transfer, while the 180-day definition more accurately defines «permanent» techniques failures. In summary, international data on PD output indicate that technique output is a frequent occurrence in many countries, with a minimum of 20% of patients in the first year and up to 35% throughout the follow-up. One of the limits of the work that we present here is that it is a retrospective study based on publicly available data without access to the details of the variables, nevertheless it has the advantage of being exhaustive since the RDPLF collects the data for the same number of patients as in the REIN register, which is 100% complete in France. The analysis is also complicated by the proportion of «other» causes (whether or not related to PD). Indeed this category does not bring real information and is difficult to analyze.

CONCLUSION

In this retrospective study based on data from the RDPLF, we show that technical outputs could contribute to the low prevalence of PD in France. It affects 30% of patients each year. Dropout causes are changing with a decrease in deaths and an increase in transplantation over the period 2002-2016. Nevertheless, despite improvements in the technique and the emergence of new PD solutions, 10% of patients are transferred to HD every year, with no improvement in this frequency in recent years. These figures are similar to those of the United States, Australia and New Zealand. It would be interesting to identify the use of biocompatible solutions. The main modifiable cause of hemodialysis transfer remains peritonitis. However, vigilance should be maintained about catheter dysfunction, which has been slightly increasing for the recent years.

Conflicts of interest

The authors declare that they have no conflict of interest for this article.

Extracted from Public data of the RDPLF available on <https://www.rdplf.org>

These data were partially presented during the «First days of home dialysis» on 21 and 22 June 2018 in Toulouse.

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Receives 2018/12/07, accepted after revision 2018/12/15
published 2018/12/10

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