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Bulletin de la Dialyse à Domicile

Situation of the Covid-19 epidemic in patients on peritoneal dialysis on 2020/05/15 in France according to RDPLF data-base.

(Situation de l'épidémie de Covid-19 chez les patients en dialyse péritonéale au 15/05/2020 en France : base de données du RDPLF)

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Résumé

De nombreux travaux ont montré que l'insuffisance rénale chronique, quel qu'en soit le traitement, est un facteur de risque important au cours de la pandémie à SARS-Cov2. Nous présentons l'incidence de l'infection au COVID-19, et sa létalité, en France, d'après les données du Registre de Dialyse Péritonéale de Langue Française, au cours de la période du pic épidémique entre le 1er mars et le 15 mai 2020.

Sur les 3 104 patients traités par DP durant cette période, issus de 156 centres, 59 ont contracté le COVID-19 soit 1,8 %, pourcentage nettement inférieur à celui observé en hémodialyse en centre. Parmi les patients contaminés, 64% présentaient un diabète, alors qu'il n'était présent que chez 36% des patients non contaminés. Le mode de contamination a été attribué à un séjour hospitalier dans 19 % des cas, un contact familial dans 17 % des cas, un traitement en EHPAD dans 14 % des cas, inconnu dans 44 % des cas. Soixante-deux pour cent des patients contaminés était en DP assistée, sans identification de la source de contamination. Le taux de mortalité était élevé à 40 %, chiffres comparables à ceux d'autres pays. Une comparaison avec l'hémodialyse ne pourrait être faite qu'après ajustement sur les comorbidités et profils des patients : les données en hémodialyse ne sont pas disponibles dans le RDPLF.

La dialyse péritonéale à domicile diminue le risque de contamination par le Covid-19, mais les comorbidités associées et l'âge sont la source d'une mortalité élevée. Les patients non autonomes ont un risque de contamination plus important.

Mots clés : COVID-19 , SARS-CoV-2, Dialyse périonéale, France, Pandémie

Summary

Numerous studies have shown that chronic renal failure, whatever the treatment, is an important risk factor during the SARS-Cov2 pandemic. We present the incidence of COVID-19 infection, and its lethality, in France according to data from the French Language Peritoneal Dialysis Registry (RDPLF), during the period of the epidemic peak between March 1 and May 15, 2020.

Of the 3,104 patients treated with PD during this period, from 156 centers, 59 contracted COVID-19, ie 1.8%, a percentage significantly lower than that observed in center hemodialysis. Diabetes was found in 64% of infected patients while it was only present in 36% of uncontaminated patients. The mode of contamination was attributed to a hospital stay in 19% of the cases, a family infection in 17% of the cases, treatment in nursing homes in 15% of the cases, unknown in 44% of the cases. Sixty-two percent of the infected patients were on assisted PD, without identifying the source of contamination. The mortality rate was high at 40%, comparable to other countries in PD. A comparison with hemodialysis could only be made after adjustment for comorbidities and patient profiles: data on hemodialysis are not available in the RDPLF.

Home peritoneal dialysis decreases the risk of Covid-19 contamination, but associated comorbidities and age are the source of high mortality. Non-autonomous patients have a higher risk of contamination.

Key words : COVID-19 , SARS-CoV-2, Peritoneal dialysis, France, Pandemia

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INTRODUCTION

In December 2019, an epidemic due to a new coronavirus responsible for a mainly respiratory pathology was identified in China (1).
This new coronavirus and the associated pathology have defined an acute respiratory distress syndrome (SARS-CoV-2) (COVID-19) (1). Its exponential spread resulted in pandemic status on 03/11/2020 by the World Health Organization (WHO) (2), affecting more than 5 million people worldwide.

In France, according to data from the General Directorate of Health, on 05/15/2020, 141,919 cases of COVID-19 were confirmed, including 27,529 deaths (10,187 in nursing homes and social medical establishments) (3).
Patients with end-stage chronic kidney disease (CKD 5) have not been spared from this epidemic. According to data from the Biomedicine Agency (ABM), there are currently 2,266 patients infected with COVID-19: 524 kidney transplant patients and 1,702 dialysis patients (4). The frequency of infection is therefore around 1% of kidney transplant patients and 3% of dialysis patients nationwide. According to these same sources, there have been 90 deaths in transplantation and 298 in dialysis, the cause of which is considered to be linked to SARS-Cov2 (4). Being declarative, these figures may underestimate the actual number of infections.

The objectives of our study are to:
- Describe the clinical and epidemiological characteristics of patients treated by peritoneal dialysis (PD) affected by COVID-19 in France;
- Identify the risk factors for contracting COVID-19 and death in this population.

MATERIAL AN METHODS

We analyzed data from the French Language Peritoneal Dialysis Register (RDPLF).

Patients

Three thousand one hundred and four patients aged over 16 and having had at least one peritoneal dialysis session between 01/03/2020 and 15/05/2020 and residing in France were retrospectively analyzed. No contamination in peritoneal dialysis was declared in the RDPLF before March

Data collected

We collected the following clinical and biological parameters: age (years), sex, initial nephropathy, existence of diabetes, COVID-19 status (COVID + or COVID-) and death.
«COVID +» were patients with:
- a positive SARS-CoV-2 nasopharyngeal RT-PCR (5);
- and / or a clinical or CT scan compatible with COVID-19 infection (6)The data collected for the PD therapy were: seniority in PD, the modalities of PD (Continuous Ambulatory Peritoneal Dialysis (CAPD) or Automated Peritoneal Dialysis (APD) and autonomy (Autonomous or assisted).

Statistical analyses

All analyses were carried out using GraphPad Prism8 software. The results are expressed in number (%) for discontinuous variables and in median (extremes) for continuous variables.

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Data were compared in univariate analysis using Fisher's exact test for non-numeric values and Student's test for numeric values. Values of $p < 0.05$ were considered significant.

Ethics and quality control

The RDPLF database is declared to the National Commission for Computing and Liberties (CNIL) under approval number 542668. Each patient included in the database receives a consent form and can request access and / or the deletion of his/her data. The data entered is subject to a likelihood algorithm and a visual inspection by a trained secretary: in case of doubt, the centers are contacted. During this period of the epidemic, all the centers were contacted by email or telephone to ask whether they had infected patients and, if so, the mode of contamination suspected.

RESULTS

PD activity during the epidemic period

In order to check whether the prescription for peritoneal dialysis had been modified during the epidemic period, we calculated the number of incident patients in mainland France during the first quarter of 2020 compared to the last quarter of 2019, on one hand, and in the first quarter of 2019 on the other hand; no decrease in the number of new patients was observed: conversely, 23 additional patients started PD in the last 6 months compared to those of the previous year over the same period in the same centers.

Population in PD at the time of the epidemic (March-April 2020)

Of the 3104 patients treated with PD (including 1869 men; 60.2%) from 156 centers, 59 contracted COVID-19, or 1.8% (Figure 1).

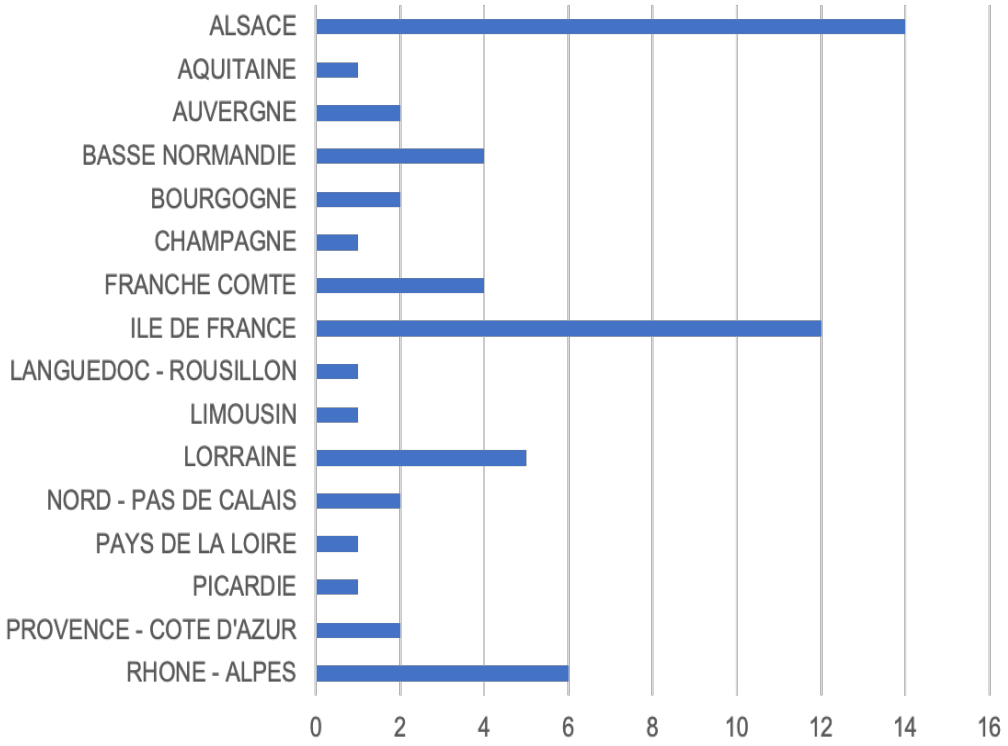

Figure 1: Regional distribution of COVID + PD patients in France

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The characteristics of PD patients during the epidemic period are summarized in Table I.

Table I: Characteristics of COVID + and COVID- PD patients during the epidemic in France

	TOTAL	COVID+	COVID-	p
	3104	59	3045	
Age (years)	73 (16,8-84,2)	73 (16,8-93,4)	69,1 (18,1-101)	
BMI (kg/m2)	26,37 (13,3-57,3)	27,06 (15,5-38,9)	26,38 (13,3-57,3)	
Males	1869	36 (61,02%)	1833 (61,2 %)	
Diabetes	1206	37 (63,79%)	1069 (35,5%)	<0,0001
PD modality				
CAPD	1918	42 (72,41%)	1876 (62,72%)	
APD	1131	16 (27,59%)	1115 (37,28 %)	
MIXTE (APD+CAPD)	39	0	39	
Autonomy :				
Assisted	1421	36 (62,07%)	1385 (46,06%)	0,0176
Autonomous	1644	22 (37,93%)	1622 (53,9%)	
Death	100	23 (38,98%)	77 (2,53%)	<0.0001

Compared to COVID- patients, there were significantly more diabetic patients (37/59 COVID + vs 1069/3045 COVID-; p <0.0001) and more assisted patients (36/59 COVID + vs 1385/3045 COVID-; p = 0.0176) among infected patients.
The mortality rate was significantly higher in patients who contracted COVID-19 (23/59 COVID + deaths vs 77/3045 COVID- p <0.0001). In COVID + patients, all deaths have been attributed to COVID-19.

COVID + population in PD

Initial nephropathy

More than half of the COVID + patients presented with diabetic (n = 22/59) or vascular (n=14/59) nephropathy. The different nephropathies are presented in Figure 2.

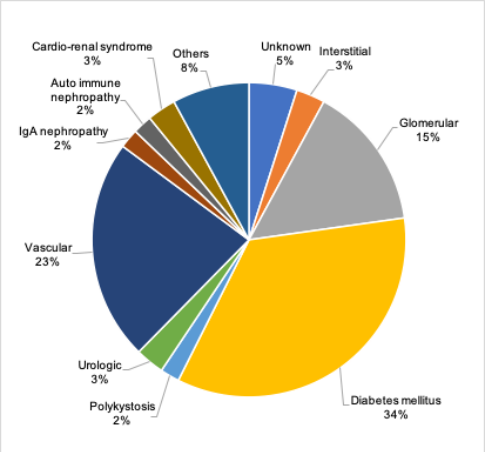

Figure 2: Initial nephropathy of COVID+ PD patients

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Source of contamination

The source of contamination of the patients was identified in almost 60% of the cases. Contamination from hospital was the first cause (n = 12), followed by family contact (n = 11) and then nursing homes (n = 9). The source of the contamination could not be identified in 28 cases. These results are summarized in Figure 3.

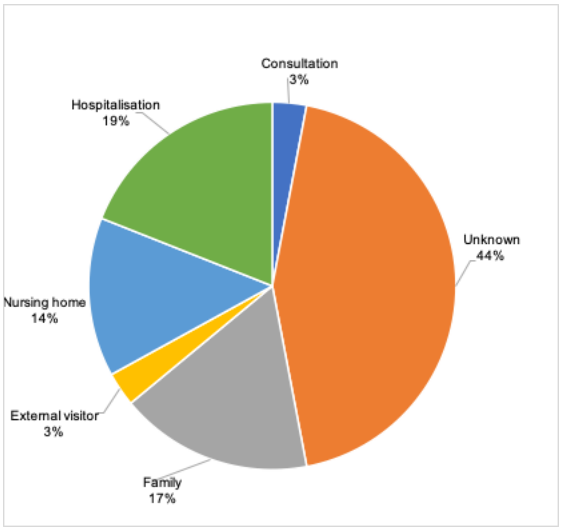

Figure 3: Source of contamination of COVID + patients (n = 59)

Mortality in the COVID + population (Table II)

	DIED PATIENTS (N=23)	PATIENTS ALIVE (N=36)	p
Age (years)	78,7 (61,1-92,7)	70,4 (16,8-93,4)	0,0045
Time on PD (years)	1,8 (0,11-5,67)	1,4 (0,13-13,1)	
BMI (kg/m2)	27.1 (15,5-38,9)	26.65 (20,7-29,15)	
Male sex	13 (60,8%)	22 (61,11%)	
Diabetes	17 (73,9%)	20 (57,14%)	0,27
CAPD	20 (86,96%)	22 (62,86)	0,007
APD	3	13	
Assisted PD	19 (82,61%)	17 (47,22 %)	0,012

Table II : Mortality in the COVID + population

In the univariate analysis (Table II), the Covid + patients who died were significantly older than the patients who did not die (78.7 years [61.1-92.7] versus 70.4 [16.8-93.4]). The deceased patients were more often on CAPD (20/23) than those who did not die (22/36). The percentage of assisted patients was more frequent in those who died (19/23) than in those who did not die (17/36). Given the small number of cases, we did not perform a multivariate analysis.

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DISCUSSION

PD activity during the COVID period

During this COVID-19 pandemic, the incidence of PD in the treatment of ESRD has been more important than before. Between November 2019 and March 2020, 689 patients started treatment on PD compared to 666 in the same period a year ago, i.e an increase of 3.45%.
This increase could be explained in part by the suspension of renal transplant activity during this epidemic period, the direct consequence of which is the impossibility of preemptive transplantation and the need to "secure" patients awaiting replacement therapy, the date of resumption of renal transplant activity being at this time uncertain.
In addition, the difficulty of face to face monitoring of stage V Chronic Kidney Disease (CKD) patients while waiting for replacement therapy (cancellation of day hospitalizations and follow-up only by teleconsultation) requiring very close clinical reassessment also encouraged to start or prepare dialysis earlier (placing a PD catheter or creating an arteriovenous fistula).
It is also possible that patients awaiting dialysis have chosen or been encouraged to choose home treatment to limit the risk of contamination in the hospital sector.

Incidence and prevalence of COVID in PD

Of the 3,104 patients on peritoneal dialysis, 59 contracted COVID-19, a low incidence of 1.8%.
These data are comparable to the British data: As of May 6, 2020, The Renal Association counted 88/3932 PD patients contaminated with COVID-19, representing an incidence of 2.2% (7).
As of May 15, 2020, the Biomedicine Agency listed 2,266 IRCT patients infected with SARS-CoV-2: 524 (19.7%) renal transplant patients and 1,702 (75.1%) dialysis patients (4).
In the United Kingdom out of the 2782 COVID-19 cases in IRCT reported, 14% were transplanted, 3.1% in PD and 79.5% in in-center hemodialysis (7).
The Registry of the Spanish Society of Nephrology included among its 868 patients in ESRD and infected with COVID-19: 33% of transplant recipients, 63% of in-center hemodialysis patients and 4% of peritoneal dialysis patients (8).

Thus, the prevalence of COVID-19 on peritoneal dialysis is low compared to other methods of chronic renal replacement therapies, in particular in-center hemodialysis.
This can partly be explained by the fact that it is a home treatment with a de facto social distancing compared to in-center hemodialysis requiring an average of three passages per week in health establishments. In addition, the strict hygiene rules imposed before the epidemic period for the various PD exchanges (confined space, wearing of surgical masks and repeated hydro-alcoholic disinfection) could have contributed to limiting the spread of the virus within this population of dialysed patients.

Diabetes and risk of COVID-19 contamination

Diabetes has been a risk factor for viral disease in the PD population. Indeed, 37/59 COVID + patients (63.79%) were diabetic vs 1069/3045 COVID- patients (35.5%) ($p < 0.0001$).
In a Chinese retrospective study carried out in two hospitals in Wuhan, including all adult hospitalized patients contaminated with COVID-19 (n = 191), Zhou et al found that diabetes was the second most common comorbidity after high blood pressure (9). Indeed, the prevalence of diabetes was 19% in the total patient cohort and differed significantly when the patients were stratified by outcome: those who survived (14%) versus those who died (31%) (9).
Diabetes was not a risk factor for mortality in our cohort, probably due to a too small sample (59

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patients).

PD autonomy and risk factor for COVID infection

We observed in our cohort that the lack of PD autonomy was a significant risk factor for contracting COVID and dying when contaminated. Indeed, 36/59 (62.07%) COVID + patients were assisted against 1385/3045 (46.06%) COVID- patients (p = 0.0176). Similarly, of the 59 infected patients 82.61% of the deceased patients were assisted versus 47.22% of the surviving patients (p = 0.012).

These results should be interpreted with caution and can be explained in several ways.
First of all, the age of the patients must be taken into account. Indeed, the median age of assisted patients was significantly higher (76.5 years [69.5-92.6]) than that of independent patients (65.25 [37.6-88.2]), (p = 0.0214). Similarly, the median age of COVID + and deceased patients was significantly higher (78.7 years [61-92.7] years) than that of surviving COVD + patients (70.3 years [16.7-93.3]), (p = 0.0042). The source of contamination was identified in more than 60% of the cases. The main origins of the contamination being the hospital environment (29%), the family (19%) and finally nursing homes (15%). Thus, the risk of contamination linked to the loss of autonomy seems more to reflect the frailty of these patients who therefore have more «contacts» to assist in the technique or other care, thus generating lower social distancing. However, in 37% of patients the source of contamination could not be identified.

Mortality and risk factors in PD

The mortality linked to COVID-19 in PD is significant. Indeed, at the end of the follow-up, we counted 23 deaths out of the 59 infected patients, i.e. a mortality rate of 40%. These results are comparable with the British Registry: 89 patients with contaminated PD and 39 deaths, ie a mortality rate of 44% (7). Mortality of COVID+ patents in PD seems to be higher than in in-center hemodialysis. In the United Kingdom, of the 2211 HD infected patients, 494 died, representing a mortality rate of 22%. In France, according to data from the ABM and the REIN registry, mortality on dialysis (all methods combined) linked to COVID-19 amounts to 23% (4). In a Madrid study published in April 2020, Trujillo et al. reported dialysis mortality of 28% (25 cases, including 2 in PD) (10). However, these data are currently lacking in the literature and these results must be consolidated. In the absence of precise data on the profile of patients on hemodialysis compared to those treated with PD, and without possible adjustment for comorbidities, it is not possible to conclude on a different risk of mortality between the two methods. It should however be remembered that the indication of PD in France is frequently reserved for patients at high risk due to age or co-morbidities.

Thus, the main risk factors for death associated with COVID-19 infection in this population are age, CAPD and assisted PD. The last two risk factors appear to be directly related to the age of the patients.

CONCLUSION

The pandemic period linked to COVID-19 made it possible in our study to highlight the lower risk of contamination by home peritoneal dialysis in France. This confirms the results of other teams abroad. Home dialysis methods, when available, are a great way to minimize the risk of transmission related to COVID-19 (11) and possibly other infectious communicable diseases.

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However, we must pay particular attention to certain elderly patients, diabetics and whose autonomy is limited: in this group the distance measurements are more difficult to apply, the risk of contamination is greater and, in the case of a more comorbid population, the risk of death is also greater.

Means of follow-up at home, such as tele-follow-up and teleconsultation have greatly helped the continuation of care during this period of sanitary confinement. However, the limits of these remote consultations are to be assessed in the medium term.

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DISCLOSURE

The authors have no conflict of interest to declare.

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