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Dialysis with Peritoneal Pressure

Eya Mousoui*

Department of Nephrology, Ambroise Paré University Hospital, Boulogne-Billancourt, Paris, France

Introduction

It is simple and has obvious therapeutic advantages to assess intraperitoneal pressure during peritoneal dialysis. However, adult peritoneal dialysis units hardly ever measure it. The purpose of this review is to promote the value of intraperitoneal pressure measurement. Before starting the manual exchange with "Y" system drain, this measurement is made with the patient supine. The drain bag is raised, and the height of the patient's liquid column is gauged from the mid-axillary line. Intraperitoneal pressure should never be greater than 18 cm H_2O with usual values of 10 to 16 cm H_2O. It increases 1-3 cm H_2O/L of intraperitoneal volume at basal values that vary with posture and physical activity and depend on body mass index.

When doing paediatric peritoneal dialysis (PD), the infusion volume is determined using objective standards that take the size or intraperitoneal pressure into account (IPP). The recommendations in the guidelines are not specific for adults, and the infusion volume prescribed is typically based on the patient's size, weight, and body surface, without taking the IPP into consideration. In any event, the volume infused raises the IPP, which is thought to contribute to some mechanical difficulties and may result in pain, fullness, sleep disturbances, hemodynamic and respiratory changes, and so on (leakage, hernia, etc.). The impact of IPP on the effectiveness of dialysis, primarily through a decrease in ultrafiltration (UF), is less well understood, and this is the component that we would want to examine in more detail here.

How is intraperitoneal pressure measured in peritoneal dialysis?

Methods that are non-invasive are used to measure IPP in PD. Durand introduced the simplest and safest technique in 19926, which measures the IPP in the filled abdomen prior to drainage. To prevent pressure on the abdomen, the patient should be lying horizontally on his or her back, relaxed, and with the head supported.

The liquid column rises to a level where it stabilises with a respiratory oscillation of 1-2 cm H_2O, which ensures an accurate measurement, and the catheter connection is then opened (in systems with wheels, stay-safe type, it is aligned to the drainage position). The IPP, which is given in cm of H_2O, will be calculated as the oscillation's midway.

Normal values of intraperitoneal pressure in peritoneal dialysis

A mid-axillary IPP of 10–16 cm H_2O on stable adult PD patients receiving 2 L of dialysate is regarded as acceptable. A reading above 18 cm H_2O should be avoided because it is linked to symptoms. The umbilicus or other sites have been used as the point zero by several authors.

***Address for Correspondence:** Eya Mousoui, Department of Nephrology, Ambroise Paré University Hospital, Boulogne-Billancourt, Paris, France; E-mail: eyamous@live.fr*

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Low IPP readings might make it possible to enhance intraperitoneal volume (IPV), which would raise clearance capacity. However, even with readings in the low portion of the normal range, IPP has an impact on the effectiveness of PD. Patients who have low tolerance for PD, Kt/V, and UF in the limit may benefit from lower IPP values.

IPP in children typically ranges from 5 to 15 cm H_2O and up to 18 cm H_2O, just like in adults, albeit personal tolerance must be taken into account with a large individual variance that is linked to a more varied body mass index (BMI).

Factors influencing intraperitoneal pressure

The primary component influencing IPP is IPV, which is the sum of previous residual volume, volume injected, and UF volume. It rises from 1 to 3 cm of water per litre (on average 2.2 cm), above the vacuum IPP. 16 Since each patient's increase is fairly consistent, it is possible to estimate future changes in IPP for further volumes in the same patient using an IPP measurement with a known IPV. This consistent increase in IPP with IPV in the same patient stands in stark contrast to the significant interpatient IPP variation, which can range from more than 10 cm H_2O in some individuals with a given IPV to more than 6 L in other patients with the same IPP.

IPP and BMI (weight/height^2) have a strong relationship in both children and adults.Therefore, a higher IPP is linked to more obesity. The interindividual variance in BMI would primarily explain the diversity of IPP in children21 and adults due to this correlation's strength (unpublished own data). Some writers fail to notice this association.

Effects of elevated intraperitoneal pressure on peritoneal dialysis

Elevated IPP in PD patients increases morbidity, death, and the requirement for hemodialysis as a result of the PD approach failing. A gradual increase in IPP at rest may result in an abrupt drop in respiratory indices, and in this case, patients may experience malaise, back or abdominal pain, shallow breathing, and sleep difficulties, including sleep apnea. In patients using APD, these symptoms become more pronounced and more severe when they are decubitus.

Increased IPP is associated with mechanical problems of PD, such as hydrothorax, hernia, leakage, peritoneal-vaginal hydrocele, genital edoema, gastric reflux, haemorrhoids, etc. Hernias have been demonstrated to occur more frequently in PD than in hemodialysis and more frequently in CAPD than in APD, particularly when basal IPPs are above 20 cmH2O, albeit hernias are not necessarily linked to higher basal IPPs.

Because PD has a lower UF capacity than hemodialysis, PD patients tend to overhydrate more frequently, which raises their risk of morbidity and mortality and is a major factor in why they switch to hemodialysis. The ability to ultrafilter is a more accurate indicator of how well a treatment is working than solute removal. Since 1981, it has been understood that the reabsorption of the peritoneal fluid is what causes the drop in net UF that happens during the prolonged exchanges of PD. In 1983, it was demonstrated that this resorption was proportional to an increase in IPP37, and Durand warned in 1992 that in people with PD, an increase in IPP within the normal range of 8 to 18 cm H_2O resulted in a proportionately lower UF volume reached with 3.86% glucose solution. In any case, the IPP-induced infiltration of fluid into the peritoneal interstitium results in edoema and a corresponding drop in interstitial oncotic pressure, which raises the colloid-osmotic transcapillary gradient—another Starling force that boosts fluid recruitment through capillaries [1-7].

Conclusion

IPP measurement is easy and risk-free, and it aids in improving PD prescription, monitoring, and assessment of sufficient IPV that reduces UF and avoids mechanical difficulties. Elevated IPP is a reason of UF failure that can be quickly determined or excluded.

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Conflict of Interest

There are no conflicts of interest by author.

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