

Managing dry weight and hypertension in dialysis patients: still a challenge for the nephrologist in 2009?

Summary of the EDTNA/ERCA Journal Club discussion. Winter 2009.

A discussion based on "Managing dry weight and hypertension in dialysis patients: still a challenge for the nephrologist in 2009?" by Charles Chazot, MD., of Centre de Rein Artificiel, Tassin-France. Article was published in Journal of Nephrology, 2009, 22: 587-597

Edited by Rovner Jenny (1), based on contributions from Boogaerts Marc (2), Filteau Nancy(3), Küntzle Waltraud(4), Milo Elisheva(5), Polaschegg Hans-Dietrich (6), Ribitsch Volker (7), Vogels Theodôr (8) and Diane Walker (9)

Israel (1), France (2), Canada (3), Germany (4), Israel (5), Austria (6,7), The Netherlands (8), UK (9)

Summary

The article presented for the Journal Club discussion during the winter of 2009 was "Managing dry weight and hypertension in dialysis patients: still a challenge for the nephrologist in 2009?" by C. Chazot.

Nine respondents from seven different countries participated in the discussion and provided their evidences, opinions and relevant literature references. The discussion focussed on the different strategies for setting dry weight, nursing competency to set dry weight and the issue of salt restriction either through the diet or the dialysate composition.

Key words: dry weight, low salt diet, competency to set dry weight.

Introduction:

The author of the article states that:" Hypertension prevalence is high in both Haemodialysis and peritoneal dialysis patients. Hypertension may provoke de novo

left ventricular hypertrophy and cardiac failure in dialysis patients and is also associated with a higher risk of stroke."

According to the article, setting correct dry weight is an efficient way to cope with hypertension. In addition, low salt diet and appropriate sodium dialysate concentration in haemodialysis are major contributors to minimizing interdialytic weight gain (IDWG) as well as reaching ultrafiltration goals throughout the treatment.

Methods used for dry weight assessment:

Diane Walker had shared experience from her unit: "We used Blood Volume Monitoring (BVM) on Fresenius machines, but now our preferred method is bioimpedance, pre and post dialysis, which we find more useful. In the acute unit, nurses adjust fluid removal according to the 15 minutes BP measurements".

Elisheva Milo added, that their unit policy is to utilize BVM installed on Fresenius machines in combination with physical assessment and patient's background.

Theodôr Vogels also added the methods used in the unit he works as Medical Social Worker: "We use several and individualized methods : biofeedback module on Integra machine, performing UF until physical symptoms (of hypovolemia) i.e. cramps occur, clinical symptoms like dry cough, orthopnea, sleepiness due to shortness of breath, chest X-ray, ultrasonographic measurement of vena cava diameter."

Nancy Filteau commented:" In our center, nurses monitor pre and post dialysis weight, BP throughout the treatment and post dialysis side effects to see if dry weight requires adjustment. We have tried using profiling on the Fresenius machines as well as BVM; it works well, but dialysis staff needs to stay up to date with respect to principle and practice of the procedure. With multiple acute patients and due to turnover, it's hard to maintain well certain practices.

Marc Boogaerts provided the following input:" Dry weight is a very complicated topic and nurses sometimes have difficulties with it. We frequently use predialysis bioimpedance measurement. If the result shows fluid overload, nurses can increase UF, but they will seek physician's approval for it. If the patient has cramps or episodes of hypotension at the end of dialysis, the nurse will try to reach dry weight and propose weight change during next dialysis session.

Dr. Ribitsch brought to the discussion the concern regarding assessment of dry weight by bioimpedance analysis:" Using the bioimpedance analysis in our dialysis unit, we observed a striking discrepancy in the estimation of volume excess in

patients with a high body mass index. In those patients the actual ultrafiltration volume, determined by clinical prescription was much higher than the estimated overhydration assessed by bioimpedance analysis."

Dialysate composition:

According to the article "avoiding high sodium content of dialysate is necessary to avoid sodium transfer from dialysate to the patient; this will have the same effect as a large amount of salt consumption on thirst, increasing the risk of a large IDWG"

Hans-Dietrich Polaschegg was sending us a very important comment that stresses out the importance of dialysate composition and conductivity measurement for sodium load:

"The paper indicates once more that not high-tech but good medical care and patient discipline is more important for outcome. The Tassin clinic founded by Dr. Guy Laurent has achieved outstanding results before the clinic was acquired by Fresenius. Until this point most patients were dialyzed with a central dialysate delivery system and low sodium. Many patients were still dialyzed with Kiil dialyzers (low flux, cuprophane, flat membrane).

It is interesting that in this clinic almost all patients were treated with the same dialysate sodium. Murisasco and coworkers (2) have shown that patients react differently to intradialytic sodium loads. Independent of this reaction they were able to reduce intradialytic symptoms from 1.5 to 0.2 per session by individualizing dialysate sodium to either 134, 137 or 140 mmol/L. Hypertension was normalized in almost all patients.

This adjustment required much attention from the medical staff including doctors.

The importance of sodium was well accepted in the 1980s. Working on the development of ion selective electrodes for measurement of plasma and dialysate sodium I became aware of the measurement errors of clinical analyzers. I therefore came up with the electrolyte balancing method (patent from 1982) that later became the basis of on-line clearance measurement. Today most machines used in Europe and the US comprise on-line clearance measurement. In principle these machines allow the estimate of the overall electrolyte balance. With appropriate corrections for potassium balance (a major contribution to overall electrolyte balance) intradialytic sodium balance can be estimated. This would allow for the individualization of dialysate sodium and avoid intradialytic sodium loading. In principle this has been attempted by the DIASCAN(TM) but without correction for the influence of potassium and other ions (3).

The significance of potassium for the overall electrolyte balance has become obvious when sodium and potassium balance was measured with high precision (4) The DIASCAN (TM) and similar devices measure conductivity differences. Because the mobility of potassium ions is higher than the mobility of sodium ions, the influence of potassium on conductivity is higher compared to sodium.

Improved control algorithms and more work is needed if this method is to be used for sodium control."

Dr. Ribitsch added:" In my opinion the problem of choosing the proper dialysate sodium in order to control water and sodium balance is still challenging.

In clinical practice, hyponatremic dialysate with a dialysate sodium below the plasma sodium is often used in order to achieve a reduction of excess sodium and water. This approach leads to a decrease of plasma osmolarity and subsequently to a shift of water into the cells. Possible consequences of this cellular overhydration are the disequilibrium syndrome characterized by muscle cramps, fatigue and headache, and intradialytic hypotension. Using a hypernatremic dialysate on the other hand prevents episodes of intradialytic hypertension but carries the drawback of insufficient sodium removal and chronic hypertension. Hence, an isonatremic dialysate seems to be the proper solution, because about 80% of sodium is removed by convection (lost with ultrafiltrate) and only 20% by diffusion. But what is isonatremic? In a review article of Locatelli et al (5) a plasma sodium activity multiplied by 0,967 (correction for the Donnan factor) is considered as isonatremic. This recommendation disregards the fact that the plasma not only consists of water but also to about 7% of proteins. The dialysate sodium therefore must be corrected (i.e. raised) by this amount. As the charge of plasma proteins depends on the pH (therefore changing the Donnan factor) and the protein concentration is influenced by the nutritional status, it is difficult to make a correct estimation. So it's still not clear how to adjust the dialysate sodium properly to get an isonatremic dialysate. Reading various review articles on this topic, you get diverse recommendations".

Elisheva Milo said:" We usually set Na levels in accordance with the patient plasma sodium level. It allows patients to control water consumption. Although this method shows only partial success."

Diane Walker commented: " We have for many years been educating and lowering our dialysate sodium. Our aim is to have antihypertensive treatment free patients."

Patient education: salt restrictive diet and fluid regimen:

The author of the article emphasized the importance of salt restrictive diet. "Low salt diet is a mandatory additional that limits the UF rate and allow easy fluid withdrawal"

Diane Walker commented: " Dietitians carry out patients education, backed up by the doctors and nurses".

Theodôr Vogels added: "Our unit has individualized information coordinated education by the renal nurse, dietitian, RSW and nephrologists. As well, a collaborative research pilot was initiated last year, based on motivational interviewing protocol on "Fluid Coaching" from RSW colleagues, for those having great difficulties with fluid restriction regimen".

Elisheva Milo also stressed out the issue of patient education: "We educate the patients regarding low salt diet implementation, but this depends on patient`s compliance as well as cultural background".

Responsibility to set dry weight: nurses or doctors?

Waltraud Küntzle had raised a very important question:" Who, doctors or nurses, should be responsible for assessing dry weight and should nurses have competence to take an action after finding "wrong" or inadequate dry weight?"

Elisheva Milo replied: "In our unit usually the nurses are doing this. When a patient comes with pulmonary edema, then the doctor orders us to try and lower dry weight."

Nancy Filteau noted that although nurses monitor pre and post dialysis weight, final decision is always made by medical team.

Marc Boogaerts added: "...an experienced nurse can anticipate a change in dry weight, but she will always ask for confirmation."

Discussion:

Looking back at the title of the article:" Managing dry weight and hypertension in dialysis patients: still a challenge for the nephrologist in 2009?" the answer is – YES!

The discussion has been focused on haemodialysis patients.

The discussion has raised a variety of available techniques for setting dry weight, practically used in different haemodialysis units:

- Patients anamnesis
- Physical assessment

- Physical symptoms through the haemodialysis treatment like hypotension and cramps.
- Using of BVM system (Fresenius machines)
- Biofeedback module of Integra dialysis monitor.
- Measured of Inferior Vena Cava diameter.
- Bioimpedance.
- CVD measurement with “fluid column arch”.

Most units use a combination of more than one method with the aim to achieve optimal dry weight.

An interesting question was raised regarding the responsibility and competence of nursing staff to set dry weight. Most participants stated that although nurses most closely monitor patient’s state, the final decision is always of medical staff.

An important part of discussion was spent on the issue of dialysate composition, especially sodium concentration. As a part of efforts for salt restriction, many units use low sodium level dialysate.

In addition, low salt diet is recognized as an important tool for decreasing interdialytic weight gain. All participants of discussion mentioned existing educational programs for patients, conducted by dietitians and backed up by nursing and medical staff.

Conclusions:

Setting optimal dry weight is still a challenge .The latest technological developments give us possible solutions, but despite that, the issue remains to be personal, so to speak, a “tailored” approach to the patient. Staff should be educated to acquire proper anamnesis, and perform physical assessment. Patient education regarding salt and fluid restrictions is essential for hypertension prevention in dialysis patients. Educators must take in consideration patient’s cultural background, food habits and language of communication.

Subject of isonatremic dialysate is still being debated among nephrologists. This issue demands special attention in order to provide maximal haemodynamic stability on one hand and to prevent sodium overload on the other.

Most participants mentioned that nurses are not allowed to set dry weight, but as professionals, we can and must closely monitor patient's fluid status and report to the medical staff if adjustment is required.

Clearly, the subject of hypertension and coping strategies demands from all caregivers to stay up to date and constantly seek expansion of professional knowledge.

Thanks' again to all participants. Your comments and responses are very important.

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