

Treatment of Chronic Hypertension and Hypertensive Urgency on Haemodialysis

Key Issues

- Acute control of blood pressure on haemodialysis (HD) should be differentiated from chronic BP control;
- Hypertension in HD is multi-factorial;
- Patients requiring total ultrafiltration volume greater than 2.5 kg may have an elevation in pre-systolic and pre-diastolic BPs;
- Larger fluid removals of range >10-13ml/hour/kg are associated with increased all cause and cardiovascular mortality;
- Both pre-dialysis, post-dialysis BP and in between dialysis BPs (by ABPM) are useful in assessing BP control (Conlon, Walshe et al. 1996);
- The average value of 12 pre-dialysis BP measurements over 1 month has also been shown to be useful method of assessing control ((Zoccali, Mallamaci et al. 1999).

HTN Urgency

- Patients with blood pressures >170/110, pre or post dialysis, should be considered serious enough to warrant being treated immediately as per a person with a hypertensive urgency (see protocol 'Hypertensive Urgency' and link below);
- Patients on anticoagulants are at particular high risk of morbidity e.g. haemorrhagic stroke;
- The aim is to reduce blood pressure below 170mmHg systolic blood pressure (SBP) and 110mmHg diastolic blood pressure (DBP) within 2 hours post dialysis, pre-dialysis or on dialysis;
- If one fails to achieve this then the patient may require an admission;
- High Blood pressures in the presence of the use of anticoagulation therapy is possibly a reason for more aggressive or urgent management.

Long term BP control

- Long term BP control should be based on the correct evaluation of blood pressure e.g. correct home recordings (see guideline URL: <http://stgrenal.med.unsw.edu.au/StGRenalWeb.nsf/page/Policies%20and%20Protocols>) and 24 hour ambulatory blood pressure recordings
- Long-term observations favour normal BP values not only for the general population but also for the haemodialysis patients.

Current Hypertensive Urgency Definition and Guideline – St George Renal Department

- Severe hypertension (SBP \geq 200mmHg and/or DBP \geq 120mmHg)
- Absence of symptoms or signs of hypertensive emergency.

Investigations needed

- Creatinine, electrolytes
- Plasma renin, aldosterone, cortisol, plasma free metanephrines
- ECG
- Urinalysis

Management Principles

- Treatment should begin quickly but the aim is to lower BP over 6-12 hours.
- Aim to lower BP over 3-6 hours **using oral therapy** to around 160/100mmHg.
- Then adjust usual antihypertensives or institute treatment.
- Admit to hospital.

Drugs to use

- Prazosin 0.5 mg q6h

OR

- Nifedipine tablets 10 mg q6h

If patient is unable to tolerate oral medications

- Intravenous hydralazine 5mg bolus q30min

OR

- Sodium nitroprusside infusion

Consistent with published guidelines:

- European Society of Hypertension: Treatment of hypertensive urgencies and emergencies Journal of Hypertension: Volume 24(12) December 2006 p 2482-2485

Background Information (Levin, Kotanko et al. 2009)

Hypertension in the haemodialysis (HD) population is multi-factorial (Horl and Horl 2002). It is associated with an increased risk for left ventricular hypertrophy, coronary artery disease, congestive heart failure, cerebrovascular complications, and mortality. Antihypertensive medications alone will not adequately control blood pressure (BP) in HD patients. The therapeutic options to achieve BP control, often without the need for additional medications include home haemodialysis options. This can allow for long, slow haemodialysis; short, daily haemodialysis and nocturnal haemodialysis. Other effective options include dietary salt and fluid restriction in combination with reduction of dialysate sodium concentration.

Hypertension is mainly related to weight gain during the interval between 2 dialysis sessions. The BP can be maintained within the normal range by correcting extracellular volume excess with dialysis (Flythe, Kimmel et al. ; Charra, Calémard et al. 1983). Maintenance of normal BPs has been largely attributed to optimal volume control (Mailloux 2000).

Optimal BP in dialysis patients is not different from recommendations for the general population, even though definite evidence is not yet available (Ritz 1993).

Conlon et al found no difference between daytime and night-time inter-dialytic ABP in adult haemodialysis patients; however, they observed a strong correlation between systolic inter-dialytic ABP and pre-systolic BP (Conlon, Walshe et al. 1996).

Conlon showed that post-diastolic BP correlated better with diastolic inter-dialytic ABP than did pre-diastolic BP. In this group of haemodialysis patients on stable antihypertensive medications and with stable haematocrit values, left ventricular mass correlated with systolic interdialytic ABP and pre-systolic BP (Fig 2). Zoccali concluded that the pressure load can be satisfactorily approached by using the average value of 12 predialysis BP measurements over 1 month (Zoccali, Mallamaci et al. 1999).

Guidelines on the management of hypertension in haemodialysis patients have been impeded because of cohort studies that show “reverse epidemiology” of hypertension in the haemodialysis population. Several studies, however, have shown that low pre-systolic BP is associated with increased mortality in haemodialysis patients (Lowrie, Huang et al. 1994; Rahman, Fu et al. 2000). The risk of mortality is U shaped, being higher among patients who are markedly hypertensive (pre-systolic BP >180 mm Hg) or markedly hypotensive (pre-systolic BP <110 mm Hg) before dialysis or markedly hypotensive after dialysis (Zager, Nikolic et al. 1998; Port, Hulbert-Shearon et al. 1999). The studies in haemodialysis patients show that those with the highest blood pressure (BP) have the best survival (Agarwal 2010) (2–4). Although observational studies suggest a mean arterial pressure of <99mmHg (150/90mmHg; presystolic BP between 150 and 159 mm Hg) to be associated with best survival (Charra, Calémard et al. 1992; Zager, Nikolic et al. 1998), these patients have long-hours haemodialysis unlike most patients. Mortality was lowest when home systolic blood pressure was between 120 to 130 mm Hg and ambulatory systolic blood pressure was between 110 to 120 mm Hg. Blood

pressure recorded before and after dialysis was not statistically significant in predicting mortality (Agarwal 2010).

In North America and in the general population there is clear evidence of a continuous, graded and etiologically significant relationship of hypertension with cardiovascular morbidity and mortality (Agarwal 2006). The National Kidney Foundation K/DOQI guidelines suggest that pre-dialysis and post-dialysis BPs should be <140/90 and <130/80 mmHg, respectively (*K/DOQI clinical practice guidelines*). However, these guidelines are opinion based. Home BP of 150/90mm Hg would warrant therapy, since it correlates with target organ damage and hypertension diagnosed by ambulatory BP monitoring. If one considers that uncontrolled hypertension in renal patients before starting dialysis therapy has also been shown to be a major risk factor for cardiovascular mortality (Lucas, Quereda et al. 2003), then this will contribute to the desire to achieve long term control.

However, no randomised controlled studies exist in this group and therefore whether control of hypertension translates into better outcomes is not known, but collective evidence suggests that hypertension, over the long term, should be controlled in haemodialysis patients (Agarwal 2006).

Accordingly, it is likely that tolerance to BP goals will vary by cardiovascular co-morbidities. If there is a true association between hypertension and cardiovascular disease in haemodialysis patients, then the lowest possible home BP that is associated with least symptoms on dialysis and best quality of life may be a prudent goal (Agarwal 2006). This BP goal would need to be individualized. As a home BP of >150/90mmHg correlates with hypertension detected by ABPM. A BP targeted to <150/90mmHg would be a prudent goal. Therefore, a home BP of >150 systolic would warrant therapy, as it correlates with target organ damage.

Which blood pressure should be treated: Pre-dialysis or post-dialysis?

Hypertension was defined by Mittal as being a BP>150/90mmHg. In this study 77% were hypertensive and 70% had Systolic HTN (Mittal, Kowalski et al. 1999). Fifty nine percent (59%) had pre-systolic HTN and only 26% pre-diastolic HTN. Post-systolic HTN occurred in 32%% and post-diastolic in only 14%.

It is the systolic BP that is more strongly linked to cardiovascular risk than the diastolic BP or mean arterial pressure (Appelgate 1992; Stamler, Stamler et al. 1993). Based on these findings it led Conlon et al to suggest it is more important to control pre-systolic BP in HD pts (Conlon, Walshe et al. 1996).

The target level of blood pressure or variation of blood pressure that is associated with the need for acute intervention in dialysis patients remains less clear. The studies from which clinical practice is influenced are based on observational data only.

No association was observed between mortality risk and pre-systolic hypertension, except for an elevated risk for cerebrovascular deaths (Port, Hulbert-Shearon et al. 1999). In fact, low pre-dialysis BP must to be viewed with great concern.

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