St George Hospital, Renal Department – INTERNAL ONLY

Guidelines for Pregnancy and Dialysis

Summary

i. **Pre dialysis Education -** Conception rates; Contraception options; Pregnancy complications; Stats of live baby; Additional haemodialysis requirements and investigations

ii. **Staff managing patient -** A core group of highly trained senior nurses

iii. **Diagnosis -** Usually not diagnosed until >16.5 weeks; Sometimes difficult to diagnose if woman has amenorrhea and nausea; Best detected via ultrasound as Beta HCG measurements can be erroneous

iv. **Complications -** Fetal death, distress and preterm delivery; Hypertension; Pre-eclampsia, Polyhydramnios or oligohydramnios

v. **Time -** Should be increased to at least 20hours per week; Minimum of 4 hours x 5 days per week to keep pre urea < 15; May require daily haemodialysis

vi. **Hypertension -** 80% of pregnant women on haemodialysis have hypertension; Best treated with Methyldopa, B-blockers (oxprenolol or labetolol, not atenolol) and hydralazine or Prazosin or Calcium channel blockers for severe cases. ACEi and/or ARB should be stopped

vii. **Ideal Body Weight (IBW)** - To be assessed weekly due to fetal growth and increased plasma volume; plan for 0.5kg weight gain per week after 20 weeks as a rough guide.

viii. **Anaemia Management** - Erythropoietin may need to be increased by 50-100%; Iron management (but should not give iron in 1st trimester) - Transferrin to remain above 25% ; Hb 100-110g/L is a good range. Higher Hb likely reflects relative plasma volume decrease.

ix. **Bloods Biochemistry** -Weekly and PRN UEC, Ca, Po4, Mg, Vit D, PTH, LFT's, Uric acid,FBC and Fe studies; Aim for: Pre Urea < 15mmol/L

x. **Diet** - Increase protein, folic acid, vitamin C and zinc

xi. **Dialysate and electrolyte management** - To be adjusted weekly or PRN according to blood results; Phosphate may need to be added; Sodium to be decreased to 135 on machine

xii. **Heparin** - Safe to use and adjusted according to condition of dialyser and venous chamber

xiii. **Antenatal visits** - 2/52 weekly then 1/52 after 24 weeks with early referral to RAP team.

xiv. **Positioning** - Semi reclined or on a bed with a left lateral tilt from 20 weeks gestation. There are recommendations for foetal monitoring while on dialysis.

xv. **Delivery** - 70-100% risk of pre term birth ; Delivery recommended between 34-36 weeks initially and generally no later than 38 weeks ; Babies to go straight to neonatal intensive care

Background

Advances in Haemodialysis therapy have resulted in 40% of women under the age of 55 being able to now continue to menstruate (Daugirdas, Blake & Ing, 2007). Fetal survival rates for pregnant women on haemodialysis have also increased to 87%, with an average gestational age of 32.7 +- 3.1 weeks (Luders, et al., 2010, p.77). Therefore, contraception should be encouraged for women who do not want to conceive. However, Intrauterine devices are discouraged as they can increase bleeding during heparin use on dialysis and oral contraceptives are contraindicated for women with a history thrombophlebitis or lupus (Daugirdas, Blake & Ing, 2007, p.672).

Subsequently, pre -dialysis education and counselling sessions should include conception rates, contraception options, pregnancy complications, statistics of a live baby and all the additional haemodialysis requirements and tests involved in caring for a pregnant woman on Haemodialysis (Piccoli, et. Al., 2010).

A core group of nurses should be assigned to dialyse the pregnant woman to ensure continuity and advanced care is achieved (Coyle, et al., 2008, p.355).

Diagnosis

Ultrasound is the best form of detecting an accurate gestational age, as the patient may be anuric and renal failure produces small amounts of HCG, which make urine pregnancy tests inaccurate (Daugirdas, Blake & Ing, 2007). A pregnancy diagnosis is usually not made til 16.5 gestational weeks as “amenorrhea and nausea often mask the presence of pregnancy” (Daugirdas, Blake & Ing, 2007, p.673).

Complications

The main complications of pregnant women on haemodialysis are fetal distress and pre term delivery (usually before 32 weeks gestation). Fetal distress and an impairment of uteroplacental circulation is caused by electrolyte imbalances, shifts in acute fluid volume and hypotension (Bamberg, et al., 2007, p.289-290).

Polyhydramnios is a common complication and found in 30-70% of pregnant women on HD (Luders, et al., 2010, p.83). Polyhydramnios “occurs in response to the high placental BUN concentration and fetal diuresis, giving rise to excessive amniotic fluid accumulation” (Al-Saran & Sabry, 2009, p.177). Polyhydramnios is therefore treated by increasing the amount of haemodialysis and in order to decrease maternal and fetal blood urea levels and osmotic diuresis (Luders, et al., 2010, p.83).

Haemodialysis Time:

A 75% infant survival rate is associated with increasing a pregnant woman's haemodialysis time to at least 20hours per week (Dhir & Fuller, 2007, p.558). Other benefits of increasing the haemodialysis time in pregnant women include:

- a less uraemic environment for the fetus and decreased incidence of polyhydramnios occurring
- a more liberal diet (potassium and protein) and intake of fluid for the mother
- more control of the mothers BP and a decreased need for antihypertensives
- decreased blood volume and electrolyte shifts
- easier removal of fluid and estimations of the mothers IBW

(Bahadi, et. Al., 2010, Bamberg, et al., 2007, Vidaeff, Yeomans & Ramin, 2008, Al-Saran & Sabry, 2009).

Hypertension

80% of pregnant dialysis patients have some degree of hypertension (>140/90) and 40% have severe hypertension with a systolic >200mmHg or diastolic >110mmHg (Daugirdas, Blake & Ing, 2007, p.673). Methyldopa, B-blockers and hydralazine are the main antihypertensive medications used on pregnant women and in severe hypertension, clonidine and calcium channel blockers are recommended (Al-Saran & Sabry, 2009, p.178). Please note that Magnesium and Nifedipine should not be used together as it can cause severe hypotension (Daugirdas, Blake & Ing, 2007, p.677).

IBW

Weekly IBW calculations are required due to fetal and placental growth as well as the 30% increase in plasma volume that occurs during pregnancy (Al-Saran & Sabry, 2009, p.178). Approximately 12-16kg of weight gain should be expected during pregnancy with approx 0.3-0.5kg per week in the 2nd and 3rd trimesters (Daugirdas, Blake & Ing, 2007, p.673-674).

Anaemia

"Pregnant women require a 50-100% higher dose of EPO and folate" (Vidaeff, Yeomans & Ramin, 2008, 394 & Daugirdas, Blake & Ing, 2007, p.676). Reasons for increased EPO include a resistance to erythropoietin because of cytokine production during gestation and an increased vascular volume with subsequent hemodilution (Barua, et al, 2008 & Al-Saran & Sabry, 2009, p.178).

Iron

Iron requirements are usually increased to 200mg iron intravenously weekly (Vidaeff, Yeomans & Ramin, 2008, 394) in order to maintain transferrin saturation > 25% (Ind, 2007, p. 49).

Diet

Water soluble vitamins are dialysed off, therefore Zinc and vitamin supplementation are required and at least 170mg/d of Vitamin C and 1.8mg/d of folic acid is recommended (Vidaeff, Yeomans & Ramin, 2008, 390). Also, a minimum daily intake of protein per day should be 1.8/kg/day (Bahadi, et. Al., 2010).

Bloods

Weekly and PRN blood results are recommended (Coyle, et al., 2008, p.350). Targets are as follows:

- Urea: Aim to keep pre urea <15mmol/L (Ind, 2007, p. 49). (Wilkinson, 2007, p.38).
- Creatinine: Pre dialysis creatinine level of 4.5mg/dL is recommended (Vidaeff, Yeomans & Ramin, 2008, 390). Maintain Creatinine < 531_mol/L" (Wilkinson, 2007, p.38).
- Calcium: Production of calcitriol by the placenta may increase the patients calcium, therefore, serum calcium levels need to be checked weekly (Daugirdas, Blake & Ing, 2007, p.675).
- pH: Maintain pH > 7.2 (Vidaeff, Yeomans & Ramin, 2008, 388).
- Vitamin D: "the placenta converts some 25-hydroxyvitamin D3 to 1, 25-dihydroxyvitamin D3, adjustment of vitamin D may be required during pregnancy and should be guided by measurement of levels of vitamin D, parathyroid hormone, calcium and phosphorus" (Al-Saran & Sabry, 2009, p.178).

Dialysate

Due to the increase in haemodialysis time, phosphate may need to be added to the dialysate (Daugirdas, Blake & Ing, 2007, p.672).

Sodium: The normal pregnancy serum sodium value is approximately 135mmol/L, therefore the sodium on the machine should be decreased from 140 to 135. This will also help control the pregnant woman's BP (Wilkinson, 2007, p.39).

Heparin

Heparin is safe to use unless there is vaginal bleeding, as it doesn't cross the placenta (Daugirdas, Blake & Ing, 2007, p.676).

Antenatal monitoring

Antenatal visits are recommended 2/52 then weekly after 32 weeks (Vidaeff, Yeomans & Ramin, 2008, 388).

Positioning

The pregnant woman should be positioned semi reclined or on a bed with a left lateral tilt from 20 weeks, to ensure decompression of vena cava (Wilkinson, 2007, p.44).

Delivery

Whilst the birth of a live baby without major complications for women on Haemodialysis is approximately 70%, the risk of pre term birth is 70 -100% (Piccoli, et. Al., 2010). Delivery is recommended between 34-36 weeks and no later than 38 weeks (Vidaeff, Yeomans & Ramin, 2008, 390).

Causes of premature delivery include “polyhydramnios, maternal hypertension and premature rupture of the membranes” (Al-Saran & Sabry, 2009, p.177). Therefore, Neonatal intensive care management is mandatory as even babies born “close to term should be monitored closely, as they generally have solute diuresis and may become seriously volume contracted” (Dhir & Fuller, 2007, p. 559).

References

Al-Saran, K. & Sabry, A. (2009). *Pregnancy in dialysis patients: Two successful cases from a Saudi renal center and management guidelines*. European Journal of General Medicine, 6 (3), 175-180.

Baha di, A., El Kabbaj, D., Guelzim, K., Kouach, J., Hassani, M., Maoujoud, O., Aattif, M., Kadiri, M., Montassir, D., Zajjari, Y., Alayoud, A., Benyahia, M., Elallam, M. & Oualim, Z. (2010). Pregnancy during hemodialysis: A single Center experience. Saudi Journal of Kidney Diseases and Transplantation, 21 (4), 646-651.

Bamberg, C., Diekmann, F., Haase, M., Budde, K., Hocher, B., Halle, H. & Hartung, J. (2007). *Pregnancy on Intensified Haemodialysis: Fetal surveillance and perinatal outcome*. Fetal Diagnosis and Therapy, (22), 289-293.

Barua, M., Hladunewich, M., Keunen, J., Perratos, A., McFarlane, P., Sood, M. & Chan, C. T. (2008). *Successful pregnancies on nocturnal home haemodialysis*. Clinical Journal of the American Society of Nephrology, 3, 392-396.

Coyle, M., Sulger, E., Fletcher, C. & Rouse, D. (2008*). A successful 39-week pregnancy on hemodialysis: A case report*. Nephrology Nursing Journal, 35 (4), 348-402.

Daugirdas, J. T., Blake, P. G. & Ing, T. S. (2007). *Handbook of Dialysis. 4th Ed*. Lippincott Williams & Wilkins, Philadelphia, 673-677.

Dhir, S. & Fuller, J. (2007). *Case report: Pregnancy in hemodialysis-dependent end-stage renal disease: anaesthetic considerations*. Canadian Journal of Anaesthesia, 54 (7), 556-560.

Ind, D. (2007). Pregnancy and renal function. Renal Society of Australasia Journal, 3 (2) 47-49.

Luders, C., Castro, M. C, M., Titan, S. M., De Castro, I., Elias, R. M., Abensur, H. & Romao, J. E. (2010). *Obstetric outcome in pregnant women on long-term dialysis: A case series*. American Journal of Kidney diseases, 56 (1), 77-85.

Piccoli, G. B., Conijn, A., Consiglio, V., Vasario, E., Attini, R., Deagostini, M. C., Bontempo, S. & Tudros, T. (2010). *Pregnancy in Dialysis Patients: Is Evidence strong enough to lead us to change our counselling policy?* Clinical Journal of the American Society of Nephrology, (5), 62-71.

Vidaeff, A. C., Yeomans, E. R. & Ramin, S. M. (2008). *Pregnancy in women with renal disease. Part I: General principles.* American Journal of Perinatology, 25 (7), 385-397.

Wilkinson, J. (2007). *Motherhood becomes a reality*. Renal Society of Australasia Journal, 3 (2) 39-46.