

Pregnancy

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GUIDELINES

No recommendations possible based on Level I or II evidence.

SUGGESTIONS FOR CLINICAL CARE

(Suggestions are based on Level III and IV sources)

- **Pregnancy generally does not affect the course of renal disease in women who have normal or near-normal renal function at conception. Such individuals should not be discouraged from conceiving purely on the basis of their renal disease. (Level II–III evidence; retrospective cohort and case-control studies; clinically relevant outcomes; inconsistent effects)**
- **Renal function deterioration is probably accelerated by pregnancy in patients with poorly-controlled hypertension or plasma creatinine concentrations of > 0.20 mmol/L at conception. The magnitude of this increase in risk compared with non-pregnant individuals with renal disease has not been established. (Level II–III evidence; retrospective cohort and case-control studies; clinically relevant outcomes; inconsistent effects)**

Background

Opinions vary markedly as to the frequency (or even the existence) of accelerated renal function deterioration during and after pregnancy in women with chronic kidney disease (CKD) (Hayslett 1985, Becker et al 1985). The objective of this guideline is to review the available clinical evidence pertaining to the effect of pregnancy on the rate of GFR decline in CKD.

Search Strategy:

Databases searched: Medline (1996 to November Week 2, 2003). MeSH terms for kidney disease were combined with MeSH terms for pregnancy. The results were then limited to cohort and case-control studies.

Date of search: 16 December 2003.

What is the evidence?

There are no randomised controlled trials (RCTs) or prospective controlled studies.

Most of the literature addressing this subject is limited to retrospective studies and case series, which suffered from many of the following serious limitations:

- case selection bias, since retrospective analyses often in tertiary institutions are likely to be biased in terms of selecting more severely diseased cases;
- recall bias;
- small numbers with a low event rate (i.e. progression to end-stage kidney disease [ESKD]);
- short follow-up times;
- collection of data from several decades ago when maternal and obstetric care (particularly with respect to anti-hypertensive treatment) were not as advanced as presently;
- lack of data prior to the index pregnancy, making it difficult to determine whether the natural history of a patient's kidney disease was actually altered by pregnancy;
- failure to use controls or the selection of inappropriate controls (e.g. unaffected family members where maternal surveillance may have been altered by knowledge of the proband);
- lack of a secure histologic diagnosis in involved patients; and
- infrequent or suboptimal measures of renal function.

Jungers et al (1995) performed a retrospective analysis of the effect of pregnancy on the occurrence of ESKD in 360 women with various forms of histologically-proven glomerulonephritis, but with plasma creatinine concentrations less than 0.11 mmol/L at presentation. These patients were referred between 1965 and 1994. One hundred and seventy-one patients became pregnant at least once after the clinical onset of the glomerulonephritis, whilst 189 patients did not conceive. Mean follow-up was over 14 years. Survival curves for time to ESKD, defined as plasma creatinine > 0.5 mmol/L or need for dialysis, did not differ between the two groups. A case-control study was also performed in which patients who reached ESKD (cases) were matched with those who did not (controls) for age at onset of glomerulonephritis and duration of follow-up with less than 3 years' difference for either. Logistic regression analysis demonstrated that pregnancy was not an independent risk factor for development of ESKD. The authors concluded that pregnancy does not affect the course of renal disease in patients who have normal renal function at conception.

The bulk of other retrospective analyses have also indicated that when renal function is normal or near-normal and hypertension is well-controlled at conception, the natural course of maternal renal disease due to a variety of causes is usually not adversely affected by pregnancy (Jungers et al 1995, Jungers 1994, Chapman et al 1994, Kaplan et al 1966, Katz et al 1980, Imbasciati et al 1984, Rovati et al 1984, Surian et al 1984, Abe et al 1985, Oken 1966, Felding et al 1969, Schewitz 1971, Strauch and Hayslett 1974, Bear 1976, Hara et al 2001, Huong et al 2001, Rossing et al 2002). A small number of authors (mainly from one group in Australia) have not concurred and have suggested that a significant number of such women experience a pregnancy-induced deterioration of renal function (Mackay 1966, Kincaid-Smith et al 1967, Becker et al 1986, Fairley et al 1973).

Although the numbers of patients progressing to ESKD in each of the studies are very small, the bulk of reports suggest that the risk of deterioration in maternal renal function is increased mainly when conception has occurred at a plasma creatinine concentration in excess of 0.20 mmol/L or in the setting of poorly-controlled hypertension (Hou et al 1985, Bobrie et al 1987, Jungers et al 1987, Jungers et al 1987, Jungers et al 1986, Taylor et al 1978, Hou 1985, Chapman et al 1994, North et al 2000). However, determining the magnitude of the increased risk of renal function deterioration is difficult given the often poor documentation of renal failure progression in these patients prior to conception coupled with the fact that many of these patients do not reach ESKD for many years after delivery. Moreover, rapid deterioration of renal function has also been reported in non-pregnant females and males, such that it is almost impossible to gauge the relative risk of renal function deterioration in the absence of prospective data collection and the inclusion of appropriate controls. For example, in the general renal disease population in Australia, a plasma creatinine between 0.30 and 0.40 mmol/L is associated with a risk of progression to ESKD of 11% in one year (Australian Kidney Foundation 1999). Thus, the reported cases of women with pre-pregnancy plasma creatinine concentrations of > 0.20 mmol/L who progressed to ESKD within several years of a pregnancy could conceivably have just reflected the natural history of their disease without having to invoke a pregnancy-induced deterioration.

Summary of the evidence

There are no RCTs or prospective controlled studies. Most of the literature addressing this subject is limited to retrospective studies and case series, which have suffered from many limitations (detailed in the “What is the evidence?” section – vide supra). Data are conflicting, but the bulk of studies have suggested that when renal function is normal or near-normal and hypertension is well-controlled at conception, the natural course of maternal renal disease due to a variety of causes is usually not adversely affected by pregnancy. Although the numbers of patients progressing to ESKD in each of the studies are very small, the bulk of reports also suggest that the risk of deterioration in maternal renal function is increased mainly when conception has occurred at a plasma creatinine concentration in excess of 0.20 mmol/L or in the setting of poorly-controlled hypertension. Whether such deterioration represents an acceleration of renal failure progression or merely the natural history of the underlying CKD has not been conclusively established.

What do the other guidelines say?

Kidney Disease Outcomes Quality Initiative: No recommendation.

UK Renal Association: No recommendation.

Canadian Society of Nephrology: No recommendation.

European Best Practice Guidelines: No recommendation.

International Guidelines: No recommendation.

Implementation and audit

No recommendations.

Suggestions for future research

No recommendations.

References

- Abe S, Amagasaki Y, Konishi K et al. The influence of antecedent renal disease on pregnancy. *Am J Obstet Gynecol* 1985; 153: 508–14.
- Australian Kidney Foundation. The Australian kidney: national epidemiological survey of diseases of the kidney and urinary tract. Adelaide: Australian Kidney Foundation; 1999.
- Bear RA. Pregnancy in patients with renal disease. A study of 44 cases. *Obstet Gynecol* 1976; 48: 13–18.
- Becker GJ, Fairley KF, Whitworth JA. Pregnancy exacerbates glomerular disease. *Am J Kidney Dis* 1985; 6: 266–72.
- Becker GJ, Ihle BU, Fairley KF et al. Effect of pregnancy on moderate renal failure in reflux nephropathy. *Br Med J Clin Res Ed* 1986; 292: 796–98.
- Bobrie G, Liote F, Houillier P et al. Pregnancy in lupus nephritis and related disorders. *Am J Kidney Dis* 1987; 9: 339–43.
- Chapman AB, Johnson AM, Gabow PA et al. Overt proteinuria and microalbuminuria in autosomal dominant polycystic kidney disease. *J Am Soc Nephrol* 1994; 5: 1349–54.
- Chapman AB, Johnson AM, Gabow PA. Pregnancy outcome and its relationship to progression of renal failure in autosomal dominant polycystic kidney disease. *J Am Soc Nephrol* 1994; 5: 1178–1185.
- Fairley KF, Whitworth JA, Kincaid-Smith P: Glomerulonephritis and pregnancy. *Perspect Nephrol Hypertens* 1973; 1 Pt 2: 997–1011.
- Felding CF. Obstetric aspects in women with histories of renal disease. *Acta Obstet Gynecol Scand* 1969; 48: Suppl 2: S1–S43.
- Hara N. The effect of pregnancy on the long-term renal function in lupus nephritis patients. *Nippon Jinzo Gakkai Shi* 2001; 43: 369–77.
- Hayslett JP. Pregnancy does not exacerbate primary glomerular disease. *Am J Kidney Dis* 1985; 6: 273–7.
- Hou S: Pregnancy in women with chronic renal disease. *N Engl J Med* 1985; 312: 836–39.
- Hou SH, Grossman SD, Madias NE. Pregnancy in women with renal disease and moderate renal insufficiency. *Am J Med* 1985; 78: 185–94.
- Huong DL, Wechsler B, Vauthier-Brouzes D et al. Pregnancy in past or present lupus nephritis: a study of 32 pregnancies from a single centre. *Ann Rheum Dis* 2001; 60: 599–604.

Imbasciati E, Surian M, Bottino S et al. Lupus nephropathy and pregnancy. A study of 26 pregnancies in patients with systemic lupus erythematosus and nephritis. *Nephron* 1984; 36: 46–51.

Jungers P, Forget D, Henry-Amar M et al. Chronic kidney disease and pregnancy. *Adv Nephrol Necker Hosp* 1986; 15:103–141.

Jungers P, Forget D, Houillier P et al. Pregnancy in IgA nephropathy, reflux nephropathy, and focal glomerular sclerosis. *Am J Kidney Dis* 1987; 9: 334–38.

Jungers P, Houillier P, Forget D et al. Influence of pregnancy on the course of primary chronic glomerulonephritis. *Lancet* 1995; 346: 1122–24.

Jungers P, Houillier P, Forget D. Reflux nephropathy and pregnancy. *Baillieres Clin Obstet Gynaecol* 1987; 1: 955–69.

Jungers P. Reflux nephropathy and pregnancy. *Baillieres Clin Obstet Gynaecol* 1994; 8: 425–42.

Kaplan AL, Smith JP, Tillman AJ: Healed acute and chronic nephritis in pregnancy. *Am J Obstet Gynecol* 1966; 3: 21–34.

Katz AI, Davison JM, Hayslett JP, Singson E, Lindheimer MD: Pregnancy in women with kidney disease. *Kidney Int* 1980; 18: 192–206.

Kincaid-Smith P, Fairley KF, Bullen M. Kidney disease and pregnancy. *Med J Aust* 1967; 2: 1155–59.

Mackay EV. Pregnancy and renal disease: a ten year survey. *Aust N Z J Obstet Gynaecol* 1966; 3: 21–34.

North RA, Taylor RS, Gunn TR. Pregnancy outcome in women with reflux nephropathy and the inheritance of vesico-ureteric reflux. *Aust NZ J Obstet Gynaecol* 2000; 40: 280–5.

Oken DE: Chronic renal diseases and pregnancy: a review. *Am J Obstet Gynecol* 1966; 94:1023–1043.

Rossing K, Jacobsen P, Hommel E, Mathiesen E, Svenningsen A, Rossing P, Parving HH. Pregnancy and progression of diabetic nephropathy. *Diabetologia* 2002; 45:36–41.

Rovati C, Perrino ML, Barbiano di Belgiojoso G, Surian M, Radaelli L, Minetti L: Pregnancy and course of primary glomerulonephritis. *Contrib Nephrol* 1984; 37: 182–89.

Schewitz LJ: Hypertension and renal disease in pregnancy. *Med Clin North Am* 1971; 55: 47–69.

Strauch BS, Hayslett JP. Kidney disease and pregnancy. *Br Med J* 1974; 4: 578–82.

Surian M, Imbasciati E, Cosci P et al. Glomerular disease and pregnancy. A study of 123 pregnancies in patients with primary and secondary glomerular diseases. *Nephron* 1984; 36: 101–05.

Taylor J, Novak R, Christiansen R et al. Focal sclerosing glomerulopathy with adverse effects during pregnancy. *Arch Intern Med* 1978; 138: 1695–96.

Appendices