

THE URINARY EXCRETION OF
ALBUMIN IN NORMAL PREGNANCY

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INTRODUCTION

Introduction

In normal pregnancy , the majority of pregnant women excrete up to 5 mg of protein / 100 ml. urine during the first and second trimesters . During the third trimester protein excretion usually increases from 5 - 10 mg / 100 ml. urine [Lopez - Espinoza et al. 1986] .

Not all the albumin that escapes through the glomeruli appears in the urine . There is evidence that some is taken up by glomerular mesangial cells and probably more by tubular epithelial cells . Impairment of these reabsorptive mechanisms could therefore contribute significantly to albuminuria , particularly in the range detected by such sensitive tests as immunoassay [Wright et al. 1987] . As proteins absorbed by the tubule are catabolised within the cells and not returned to the circulation , increased excretion due to impaired tubular absorption has no influence on serum concentrations . The marginal increase in albumin clearance in pregnancy could thus be accounted for by diminished tubular absorption and can not be regarded as firm evidence of increased glomerular permeability [Beetham et al. 1988] .

Urinary albumin excretion can be 10 - 20 times higher than normal , without being detected by conventional laboratory tests [Mogensen , 1976] . It can be measured by tests that are sensitive enough to span the range between

normality and the level , at least 10 times above normal , at which beside tests for proteinuria become positive [Keen and Chlouverakis 1964] ; excretion in this range has been termed microalbuminuria . Microalbuminuria is known to occur in several other conditions in which there is glomerular hyperfiltration [Mogensen 1971 & Hakim et al. 1984] . In addition , Mogensen (1987) , reported that the immunoassay of albumin for detection of elevated microalbuminuria is a well-proven diagnostic tool in early kidney disease or damage.

AIM OF THE WORK

Aim of the work

We report here a study of urinary excretion of albumin at successive stages in normal pregnancy , with two objectives . The first was to look for evidence of a change in glomerular permeability to albumin as pregnancy progressed . The second was to provide data for a screening test that would be convenient in monitoring pregnant women .

REVIEW

CHAPTER I

The Urinary Excretion of Albumin in Normal Pregnancy

The Kidney in Normal Pregnancy :

- Anatomical changes in the urinary tract in normal pregnancy .
- Renal hemodynamics in normal pregnancy .
- Volume changes during pregnancy .
- Blood pressure changes during pregnancy .

The Kidney In Normal Pregnancy

The growth and development of the fetus stimulate dramatic alterations in the maternal internal environment . Morphological and functional changes in the urinary tract are particularly prominent aspects of this adaptive process and have been studied extensively during the last several decades . Such changes may include increased renal size , anatomic changes in the collecting system , alterations in renal hemodynamics and variations in the levels of circulating plasma hormones . These alterations can affect normal renal function and pre-existing renal disease , as well as predispose the pregnant woman to de novo renal disease [Waltzer , 1981] .

Anatomical Changes In The Urinary Tract In Normal Pregnancy

The kidneys of pregnant women enlarge during pregnancy because the renal vascular volume and interstitial space are increased . Kidney length increases approximately 1 cm . during normal pregnancy but true hypertrophy probably does not occur . The addition of new nephrons has never been demonstrated [Hytten and Leitch , 1971] . Using retrograde pyelography in the immediate puerperium [Bailey and

Rolleston , 1971] demonstrated that kidney size was increased when compared to standard height : weight nomograms . When these studies were repeated 6 months post partum renal length decreased approximately 1 cm..

Major morphological changes occur in the collecting system of pregnant women , involving the calices , renal pelves and the ureters [Dure - Smith , 1970] . These structures undergo dilatation and develop decreased peristaltic activity as early as 3 months of pregnancy and become maximal in the third trimester . At this time up to 90 percent of the pregnant women exhibit ureteral dilatation , with accompanying hypertrophy of ureteral smooth muscle and hyperplasia of its connective tissue [Fainstat , 1963]. These anatomical changes may contribute to stasis and urinary tract infections , and they may lead to collection errors in tests based on timed urinary volumes (24 - hour estriol , protein or creatinine) and incorrectly influence the interpretation of roentgenographic studies [Lindheimer and Katz , 1976] . Such alterations have been attributed by some investigators to the muscle-relaxing effects of progesterone-like hormones [Kumar , 1962 & Guyer and Delany , 1970] but other investigators have been unable to confirm these findings [Corriere et al. 1970 & Clayton and Roberts , 1972] .

An equally impressive array of evidence suggests that partial mechanical obstruction may contribute significantly to the ureteral dilatation of pregnancy [Harrow et al., 1964 & Roberts , 1976] . Radiologic studies have shown that ureteral dilatation ends at the level of the pelvic brim and that the ureters are of normal caliber below this landmark [Dure-Smith , 1968 & 1970] . Others have confirmed this finding [Bailey and Rolleston , 1971] but warn that it does not necessarily support the obstruction theory , largely because Waldeyer's sheath (a connective tissue envelope surrounding the distal ureter) undergoes hypertrophy during pregnancy and could prevent hormonally-induced ureteral dilatation below the pelvic brim [Lindheimer and Katz , 1976] . It is likely that hormonal and mechanical elements are operative in pregnancy , causing physiologic changes that frequently are demonstrated on excretory urography (IVP) but should not necessarily be construed as obstructive uropathies requiring intervention .

Because of the intimate anatomic relationship among the bladder , the cervix and the lower uterine segment the bladder is displaced anteriorly and superiorly as the uterus enlarges [Pitkin , 1978] . Therefore , the bladder becomes more of an abdominal and less of a pelvic organ as pregnancy progresses . As term approaches , with the descent of the presenting fetal part , the base of the bladder broadens and