TABLE II—Plasma hormone levels (geometric means) in groups of men before and after vasectomy. Standard errors of mean log₁₀ concentrations are given in parentheses.

Hormone	No of estimations	Pre-vasectomy group	Post-vasectomy groups Time since operation (years)					Variance ratio*	
			<1	1-2	3-4	≥5	All times	All five groups	Before vasectomy v after vasectomy
Testosterone (nmol/l)	277	9.1 (0.015)	11.4 (0.028)	9.8 (0.023)	9.9 (0.035)	9.4 (0.031)	10.0 (0.015)	1.73	3.06
LH (μg LER-907/l)	269	57.9 (0.020)	59.0 (0.036)	56.4 (0.024)	57.5 (0.035)	60.7 (0.031)	58.2 (0.015)	0.18	0.002
FSH (μg LER-907/l)	266	87.1 (0.025)	83.2 (0.038)	94.0 (0.026)	98.9 (0.026)	95.3 (0.034)	93.8 (0.015)	0.86	1.30
Prolactin (μg/l)	258	12.4 (0.033)	9.4 (0.063)	12.6 (0.038)	11.4 (0.054)	15.1 (0.048)	12.3 (0.025)	1.84	0.005
Oestradiol-17β (pmol/l)	276	96.8 (0.017)	93.7 (0.032)	87.4 (0.020)	94.6 (0.025)	92.4 (0.027)	91.4 (0.013)	0.69	1.45

* To achieve 5% level of significance variance ratio would have to exceed 2.40 for comparison of five groups and 3.87 for comparison of two groups.
Conversion: SI to traditional units—Testosterone: 1 nmol/l ≈ 28.8 ng/100 ml. Oestradiol-17β: 1 pmol/l ≈ 0.272 pg/ml.

specimens were taken in the evening, when testosterone concentrations are generally lower than during the day.^{6 7}

Previous studies of testicular endocrine function at one month⁸ and up to three months⁹ after vasectomy have not shown significant changes. Smith *et al*¹⁰ followed men for up to a year after the operation, but over a quarter of their subjects were either excluded or untraced. They reported a significant increase in both mean plasma testosterone and LH after vasectomy; in our study mean testosterone concentrations (though not LH levels) were slightly higher in men who had undergone vasectomy.

If testosterone levels really are higher after vasectomy several explanations are possible. Firstly, there may be an increased frequency of intercourse after the operation, and this may affect testosterone secretion.¹¹ Secondly, psychological stress may suppress plasma testosterone;¹² expectation of the forthcoming surgery might therefore lower the preoperative testosterone concentrations. Finally, there may be an actual increase in Leydig cell population after vasectomy. Although the results of animal experiments are not consistent, hyperplasia of Leydig cells after vasectomy has been suggested,^{13 14} and Gupta *et al*¹⁵ recently reported a similar histological change in some humans.

Clearly the endocrine effects of vasectomy remain uncertain, and, although our results are reassuring, long-term prospective studies are essential.

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The retroverted gravid uterus and its effect on the outcome of pregnancy

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Summary

Among 1954 pregnant women who booked before the end of the 14th week of gestation the uterus was retroverted in 220 (11.2%). The incidence of bleeding in early pregnancy and spontaneous abortion was significantly higher

in the retroverted group. Only three patients (1.4%) with a retroverted gravid uterus developed acute retention of urine. Patients with retroverted uteri did not have a higher incidence of previous infertility, nor any increase in the incidence of common obstetric abnormalities.

Introduction

The retroverted gravid uterus is now thought to cause fewer problems than was once believed, and its importance as a contributory factor in infertility and abortion has been the subject of changing opinion.¹⁻³ It is no longer thought to be associated with a higher incidence of abortion but this view is largely based on the results of a small series of cases⁴; furthermore, this contention has never been statistically proved.⁵ We sought to clarify whether retroversion of the uterus in early pregnancy was associated with a significantly higher incidence of abortion when compared with pregnancies occurring in women with a normally

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positioned uterus. We also investigated the generally held belief that mobile retroversion of the uterus does not predispose to infertility. The last report on this subject recommended surgical correction of the retroverted uterus in an infertile woman if all other causes of infertility had been excluded.⁴ We also investigated the relation of the retroverted gravid uterus to the outcome of pregnancy as judged by common complications, birth weight, and perinatal mortality, as this has not been reported.

Patients and methods

The patients studied all attended Mill Road Maternity Hospital, Liverpool, from 1972 to 1974. All patients were asked at their booking visit for a full obstetric history, and the position and size of the pregnant uterus was recorded in all patients who booked before the end of the 14th week of gestation. Any complication that occurred during the pregnancy along with any other relevant facts and the final outcome were recorded on punch cards. Of the 6798 patients surveyed 1954 patients who booked before the end of the 14th week of gestation were included in the study. They were divided into two groups according to whether the uterus was retroverted (220 patients) or anteverted (1734 patients).

The management of patients in early pregnancy did not differ according to the position of the uterus, and no specific action was taken or advice given to those patients who had a retroverted gravid uterus.

The χ^2 test, with Yates's correction, was applied to assess the significance of differences between the two groups.

Results

Retroversion of the gravid uterus was present in 12.2% of multi-gravidae and 9.5% of primigravidae, with an overall incidence of 11.3%. Gestational age at diagnosis (estimated at booking) in both groups is shown in table I. The proportion of patients in each gestational age group was similar ($P > 0.1$).

TABLE I—Gestational age at diagnosis

Gestational age (weeks):	6	7	8	9	10	11	12	13	14	Total
Retroverted group ..	6	4	40	27	62	23	33	19	6	220
Anteverted group ..	61	27	287	239	534	163	270	118	35	1734
Total ..	67	31	327	266	596	186	303	137	41	1954

Bleeding in early pregnancy and abortion—The overall incidence of bleeding before the end of the 14th week of gestation was 16.9%, and the incidence was significantly higher in the retroverted group (25.5%) than in the anteverted group (15.9%) ($\chi^2 = 12.1$; $DF = 1$; $P < 0.001$). The proportion of patients in the retroverted group who actually aborted was also significantly greater than in the anteverted group ($\chi^2 = 9.8$; $DF = 1$; $P < 0.01$) (table II), but the incidence of abortion in patients who bled was only slightly higher in the retroverted than in the anteverted group ($\chi^2 = 0.42$; $DF = 1$; $P > 0.05$). In the retroverted group 74.3% of abortions occurred after 10 weeks of gestation compared with only 41% of abortions in the anteverted group (table II) ($\chi^2 = 14.06$; $DF = 1$; $P < 0.001$).

Obstetric history—The incidence of previous abortion was significantly higher in patients in the retroverted group (table III) ($P < 0.05$), and the parity of patients in this group was also much greater than in the anteverted group ($P < 0.001$).

Previous Infertility—The incidence of both primary and secondary previous infertility in the two groups was similar (table IV).

Complications of pregnancy—There was a slightly higher incidence of hyperemesis gravidarum when the uterus was retroverted (table V), and urinary tract infection before the end of the 14th week was

TABLE II—Bleeding in early pregnancy related to gestational age. Number of abortions is shown in parentheses

Gestational age (weeks):	6	7	8	9	10	11	12	13	14	Total
Retroverted group ..	2 (1)	0 (0)	5 (2)	1 (1)	8 (5)	9 (6)	14 (8)	12 (9)	5 (3)	56 (35)
Anteverted group ..	6 (4)	2 (1)	51 (37)	12 (7)	77 (43)	17 (10)	64 (35)	27 (10)	19 (9)	275 (156)
Total	8 (5)	2 (1)	56 (39)	13 (8)	85 (48)	26 (16)	78 (43)	39 (19)	24 (12)	331 (191)

TABLE III—Numbers of previous abortions before 14th week of gestation and previous pregnancies reaching 28 weeks

	No of previous abortions				No of previous pregnancies			
	0	1	≥ 2	Total	0	1	≥ 2	Total
Retroverted group ..	166	41	13	220	61	89	70	220
Anteverted group ..	1408	266	60	1734	728	518	488	1734
Significance ..	$\chi^2 = 5.28$; $DF = 2$; $P < 0.05$				$\chi^2 = 17.7$; $DF = 2$; $P < 0.001$			
Total ..	1574	307	73	1954	789	607	558	1954

TABLE IV—Previous infertility in both groups

	Primary	Secondary	Nil	Total
Retroverted group ..	0	3 (1.4%)	217	220
Anteverted group ..	26 (1.5%)	38 (2.2%)	1670	1734
Total ..	26	41	1887	1954

$\chi^2 = 4.05$; $d.f. = 2$; $P > 0.1$

TABLE V—Complications of pregnancy in both groups

	Retroverted group	Anteverted group
Complications in first trimester*		
No of patients ..	220	1734
No with hyperemesis gravidarum ..	10 (4.5%)	49 (2.8%)
No with urinary tract infection ..	11 (5.0%)	156 (9.0%)
Complications in late pregnancy		
No of patients ..	185	1578
No with ante-partum haemorrhage ..	7 (3.8%)	70 (4.4%)
No in premature labour† ..	11 (6.0%)	76 (4.8%)
No with pre-eclampsia ..	27 (14.6%)	263 (16.7%)
No with small-for-dates infants ..	36 (19.5%)	328 (20.8%)
Perinatal mortality (and rate‡) ..	5 (14 per 1000)	29 (18 per 1000)

*Before end of 14th week of gestation.

†Spontaneous delivery before end of 37th week of gestation.

‡Corrected to exclude major congenital abnormalities.

commoner in patients who started pregnancy with an anteverted uterus, but neither of these findings reached significance ($P > 0.05$). Three patients (1.4%) with a retroverted gravid uterus developed acute retention of urine during the 12th to 14th week of gestation. The incidence of the other complications was similar in the two groups. The perinatal mortality rate, corrected to exclude major congenital abnormalities, was 14 per 1000 for those patients who had a retroverted uterus and 18 per 1000 for those in whom the uterus was anteverted.

Discussion

Our results show that in the population studied significantly more patients with a retroverted uterus bled in early pregnancy and actually aborted than in those with anteverted uterus. These differences were most apparent at 10 to 14 weeks of gestation. This increasing rate of abortion with increasing uterine size in the retroverted group in contrast to the anteverted group indicates the possibility of a mechanical aetiology. Nevertheless, patients who bled in early pregnancy had an equal chance of aborting regardless of the position of the uterus. This suggests that, although there seems to be an association between retroversion of the gravid uterus and a higher incidence of abortion, once bleeding has occurred the risk of aborting is similar, irrespective of the position of the uterus.

Because some patients would have aborted in very early pregnancy before being seen for booking at the antenatal clinic they were inevitably excluded from this study. Consequently, our results cannot be interpreted as being representative of the relation between abortion and retroversion in very early pregnancy.

Our findings suggest that retention of urine caused by the retroverted gravid uterus is uncommon. The reason for this is not clear, but Jeffcoate⁶ has suggested that it may be related to the fact that now fewer women are seen with a severe degree of pelvic contraction. Our study did not show an association between retroversion of the uterus and a history of previous infertility. On the contrary, the significantly higher incidence of previous pregnancies in the retroverted group is presumptive evidence of an association between increasing parity and a tendency to retroversion of the uterus. The retroverted gravid uterus clearly does not affect the incidence of urinary tract infection, hyperemesis gravidarum, ante-partum haemorrhage, premature labour, or "light-for-dates" babies.

Our findings suggest that a more cautious approach should be adopted in the management of patients with a retroverted gravid uterus. If seen in early pregnancy advice on sleeping posture, avoidance of intercourse, and frequent emptying of the bladder may be given, and they should be seen again before the end of

the 14th week of pregnancy to ensure that anteversion has occurred. Bimanual manipulation should not be performed when the pregnant uterus is retroverted, as our results show that these patients are already at risk. To correct manually the retroverted gravid uterus may only increase the risk of abortion, especially if any force is required. This contention can be confirmed only by a prospective random study.

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Lysozymuria in diabetes

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Summary

A reversible lysozymuria indicative of proximal tubular damage to the kidney was found in three out of five patients with diabetic ketosis, and a persistent lysozymuria was found in many patients with diabetic nephropathy. There was no relation between lysozymuria and the degree of proteinuria, and lysozymuria was not due to urinary tract infection. The degree of lysozymuria could be used to assess the severity of diabetic nephropathy.

Introduction

Urinary lysozyme excretion is used as a measure of dysfunction of the proximal tubules of the kidney^{1, 2} because lysozyme, with a molecular weight of 15 000 daltons, is normally filtered at the glomeruli and reabsorbed in the proximal tubules. Only if there is a raised serum concentration owing to release from white cells³ or damage to the renal tubular epithelium⁴ does excess lysozyme appear in the urine.

The kidney in diabetic nephropathy presents a difficult problem to the renal investigator. Diabetic nephropathy is

partly a specific lesion due to basement membrane thickening, as in diffuse intercapillary glomerulosclerosis or the nodular Kimmelstiel-Wilson disease, but there is also arteriosclerosis and atherosclerosis leading to ischaemic damage to the glomeruli and tubules. It is generally accepted that proteinuria, slowly increasing in severity over the years, is the simplest clinical index of nephropathy. Certainly patients with the heaviest proteinuria have the worst prognosis.⁵

We were interested to examine the incidence of lysozymuria in diabetic nephropathy to see whether it could be related to any of the other indices of renal malfunction.

Methods

Samples of urine and blood were obtained for estimation of serum and urinary lysozyme and serum and urinary creatinine so that we could calculate a lysozyme:creatinine ratio, as described by Barratt and Crawford.² At the same time a 24-hour urine sample was collected for protein estimation. Samples were obtained from 35 patients with diabetic nephropathy, all of whom had had a renal biopsy and a thorough examination of the retina as part of a therapeutic trial; 68 estimations were performed on samples from these 35 patients. Samples were also obtained from 15 patients with chronic pyelonephritis, 45 patients with a variety of types of nephritis, and seven patients with myeloma. Twenty normal volunteers and 20 diabetics without proteinuria also gave samples. We also performed serial studies on five patients with diabetic ketosis until their recovery.

The lysozyme was estimated by our modification⁶ of the method of Harrison.¹ This was done by using *Micrococcus lysodeikticus* as substrate (Sigma Ltd) and using as comparison a standard curve with dilutions of lysozyme at concentrations of 10, 5, 4, 3, 2, and 1 mg/l.

Results

The figure shows the absolute levels of urinary lysozyme in the various groups of patients. A urinary concentration over 2.0 mg/l was

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