Early diagnosis of pregnancy in general practice

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SUMMARY. The value of the signs and symptoms of pregnancy and of the pregnancy diagnostic test as predictors of pregnancy was estimated for 1,592 women seen in general practice. The presence of a sign or symptom alone is a poor pointer to a diagnosis of pregnancy. The combination of pairs of features improves the value, the best being breast signs combined with either the presence of signs of pregnancy on vaginal examination or a palpable fundus, both giving predictive values of 0·89. The pregnancy diagnostic test alone, however, had a predictive value of 0·91, a value of 1·00 indicating 100 per cent reliability.

Introduction

THE problems of the early diagnosis of pregnancy which face the general practitioner differ from those facing the hospital obstetrician for the obvious reason that women usually present for diagnosis much earlier in general practice. The time interval from the date of the last menstrual period to the date of consultation at the hospital antenatal clinic is clearly related to a delay in referral, but also to the extent of the antenatal care provided by the general practitioner. In addition, the early signs and symptoms are easily confused with those of some diseases such as urinary tract infection, further complicating the decision to be made by the general practitioner.

The accepted clinical indicators of pregnancy include amenorrhoea, morning sickness, tender tingling breasts and, after about the eighth week, an enlarged uterus with a soft cervix. It is interesting that even the large authoritative textbooks of obstetrics make no attempt to indicate the value of these signs and symptoms as a pointer to the diagnosis of pregnancy. The result is that the diagnosis of early pregnancy is, at present, often very difficult.

It seems reasonable to suggest that the availability of objective evidence as to the value of these symptoms and signs, particularly in general practice, is long overdue and that it may improve the chance of the clinician making a correct diagnosis. Krieg and his colleagues (1975) pointed out that clinicians ordering laboratory tests or making use of the results of tests often fail to consider the measures of reliability of the test. Unless its sensitivity and specificity are assessed the test loses much of its diagnostic value. In the case of a pregnancy diagnostic test the sensitivity indicates the proportion of positive test results obtained in women who were pregnant, and the specificity refers to the proportion of negative test results obtained in women who were not pregnant. The predictive value of such a test is the proportion of true positive results to all positive results. The predictive value varies not only with the sensitivity and specificity of the test but also with the incidence of pregnancy in the population of women presenting for diagnosis.

To illustrate the importance of knowing the predictive value of a test it may be supposed that the sensitivity of the pregnancy diagnostic test indicates high reliability at 0·950 (that is the test would be positive in 95 of every 100 pregnant women tested) and that the specificity of the test also indicates high reliability at 0·950 (that is the test would be negative in 95 out of every 100 women tested who were not pregnant). If, however, the incidence of pregnancy in the population being tested is ten per cent, then of every 1,000 women consulting, 100 would be pregnant and 900 not pregnant. The test would be positive in 95 of those pregnant and in 45 of those not pregnant. In other

Table 1. Diagnostic pregnancy test results; n = 1,592.

Results	Number	Percentage
Correct positive	864	54.3
Correct negative	498	31.3
False positive	83	5.2
False negative	115	7.2
Inconclusive	32	2.0

words, of 140 positive tests only 95 would be true positives so that the predictive value would be 95/140 or 0·679, or there would be a one in three chance of the test result being wrong. It is important, therefore, to know the predictive value of both the early signs of pregnancy and of specific tests, whether these are regarded singly or in combination.

Method

As part of a study to determine the value and reliability of pregnancy diagnostic tests when used in general practice, information was also recorded about the presence or absence of morning sickness, breast signs, signs of pregnancy on vaginal examination, and a palpable fundus (Barber and Robinson, 1975). Briefly, information was collected for 1,631 women who consulted their general practitioner for a diagnosis of pregnancy to be confirmed or refuted. One hundred and fifty-five general practitioners throughout Scotland took part in the study which was restricted to women between the ages of 16 and 45 years.

Three different pregnancy diagnostic tests were used (Barber and Robinson, 1975): 'Gravindex', 'Prepurex' and 'Planotest'. One of these three kits was sent at random to each of the 155 practitioners. All pregnancy test kits were used according to the manufacturer's instructions.

Table 2. Sensitivity, specificity and predictive value of urinary tests of pregnancy.

Age (years)	Sensitivity	Specificity	Predictive value
< 20	0.885	0.798	0.872
20-24	0.888	0.847	0.919
25-29	0.873	0.847	0.948
30-39	0.893	0.819	0.893
40 +	0.818	0.965	0.818
Time interval from LMP (days)			
35-41	0.769	0.814	0.804
42-48	0.849	0.857	0.927
49-55	0.895	0.881	0.957
56-62	0.945	0.816	0.906
63 +	0.932	0.894	0.932
Not known	0.750	0.891	0.783

Results

Pregnancy diagnostic test

A pregnancy diagnostic test was performed on the urine of 1,592 women. There were 864 (54·3 per cent) correct positive results, 498 (31·3 per cent) correct negative results, 83 (5·2 per cent) false positive results and 115 (7·2 per cent) false negative results (Table 1). The sensitivity of the test when carried out in the general practitioner's surgery was 864/979 or 0·883, the specificity was 498/581 or 0·857, and the predictive value was 864/947 or 0·912. The sensitivity, specificity and predictive value of the test in the different age groups and at different intervals between the last menstrual period and the date of consultation is shown in Table 2. It is interesting that the test was at its most sensitive when used in the age group 30 to 39 years (0·893) and when the period of amenorrhoea was between 56 and 62 days (0·945), and that the specificity was highest in the over-40 age group (0·965) and when the period of amenorrhoea was more than nine weeks (0·894). The predictive value of the test was greatest in the 25 to 29 years group (0·948) and when the duration of amenorrhoea was between 49 and 55 days (0·957).

Signs and symptoms of pregnancy

Of the 866 women who presented with simple amenorrhoea (with or without other signs) 618 (71·4 per cent) were pregnant and 248 (28·6 per cent) were not pregnant. Four hundred and sixty-eight women had morning sickness (although they may have had other indicators) of whom 380 (81·2 per cent) were pregnant. Of 676 women in whom breast signs were present, 549 (81·2 per cent) were pregnant. Signs and symptoms of pregnancy on vaginal examination were found in 207 women but only 172 (83·1 per cent) were actually pregnant, and a palpable fundus was found in 104 women examined of whom only 84 (80·8 per cent) were confirmed to be pregnant (Table 3). The predictive value of these features is also shown in Table 3 and, as one might expect, the highest value (0·831) was found for signs of pregnancy on vaginal examination, but even this sign was not as reliable as the pregnancy diagnostic test result at 0·912. A comparison of the predictive value of the various features when observed in women with amenorrhoea of less than six weeks' and more than six weeks' duration is shown in Table 4. The predictive value of a palpable fundus is more significant when the period of amenorrhoea is over six weeks duration; this also applies to morning sickness and breast signs. It should be noted, however, that these features were frequently present in combination. It seems surprising that the time interval from the last menstrual period to

Table 3. Signs and symptoms of pregnancy.

	Pregnant		Not pregnant			
	Number	%	Number	%	Total	Predictive value
Simple amenorrhoea (as a presentation)	618	*71.4*	248	*28.6*	866	0.714
Morning sickness	380	*81.2*	88	*18.8*	468	0.812
Breast signs	549	*81.2*	127	*18.8*	676	0.812
Signs on vaginal examination	172	*83.1*	34	*16.9*	206	0.831
Palpable fundus	84	*80.8*	19	*19.2*	103	0.808
Pregnancy test positive	864	*91.2*	83	*8.8*	947	0.912
Overall clinical impression	714	*90.3*	77	*9.7*	791	0.903

NB. Most women had more than one individual feature.

the date of consultation (and this is usually a period of amenorrhoea) is such a poor indicator of pregnancy. The best predictive value was 0·746 when the period of amenorrhoea was 49 to 55 days (Table 5).

Table 6 shows the number of women who had signs and symptoms of pregnancy either singly or in combination. It is interesting that the most common feature was breast signs and that the most frequent combination was that of breast signs and morning sickness. However, of the 146 women who had morning sickness, only 104 (71·2 per cent) were pregnant, and of the 390 women who had breast signs, only 307 (78·7 per cent) were pregnant. However, despite this, the highest predictive values were for the combinations of breast signs and signs of pregnancy on vaginal examination, and breast signs with a palpable fundus; both with predictive values of 0·892.

Table 4. Predictive value before and after six weeks' amenorrhoea.

	Predictive value	
	Amenorrhoea < 6 weeks	Amenorrhoea 6 weeks +
Morning sickness	0.532	0.851
Breast signs	0.690	0.835
Signs on vaginal examination	0.765	0.847
Palpable fundus	0.666	0.846
Pregnancy test positive	0.804	0.931

NB. Most women had more than one feature.

Discussion

Although both general practitioners and hospital obstetricians can develop a high degree of intuitive knowledge of the value of the signs and symptoms used to diagnose pregnancy, it seems likely that an objective measurement of the value of these features would improve this skill and also be of value in teaching it to undergraduate and postgraduate students. Assessing the predictive value of these features may be one way of achieving this aim.

A predictive value of 1·00 means that the feature is 100 per cent reliable in predicting the condition. The nearer the predictive value is to 1·00 the more reliable is the feature as a pointer to the diagnosis; however, the nearer the predictive value approaches 1·00 the more

Table 5. Time interval from LMP to consultation.

	Pregnant		Not pregnant			
Time interval from LMP (days)	Number	%	Number	%	Total	Predictive value
35-41	120	*49.0*	125	*51.0*	245	0.490
42-48	241	*67.1*	118	*32.9*	359	0.671
49-55	203	*74.6*	69	*25.4*	272	0.746
56-62	164	*64.3*	91	*35.7*	255	0.643
63 +	240	*61.1*	153	*38.9*	393	0.611

Table 6. Predictive value of signs and symptoms singly and in pairs.

	Pregnant		Not pregnant			
	Number	%	Number	%	Total	Predictive value
Morning sickness only	104	*71.2*	42	*28.8*	146	0.712
Breast signs only	307	*78.7*	83	*21.3*	390	0.787
Palpable fundus only	53	*79.1*	14	*20.9*	67	0.791
Vaginal signs only	113	*82.5*	24	*17.5*	137	0.825
Morning sickness and breast signs	240	*84.5*	44	*15.5*	284	0.845
Morning sickness and palpable fundus	31	*88.6*	4	*11.4*	35	0.886
Morning sickness and vaginal signs	60	*85.7*	10	*14.3*	70	0.857
Breast signs and palpable fundus	66	*89.2*	8	*10.8*	74	0.892
Breast signs and vaginal signs	123	*89.2*	15	*10.8*	138	0.892
Palpable fundus and vaginal signs	40	*81.6*	9	*18.4*	49	0.816

difficult it becomes to improve it.

The fact that a woman admits to a period of amenorrhoea from the last menstrual period to the date of consultation is a very poor predictor of pregnancy, the highest value being 0·746 at 49 to 55 days from the last menstrual period. The presence of morning sickness or of breast signs alone is an equally poor predictor of pregnancy, the values being 0·712 and 0·787 respectively, and surprisingly so is a palpable fundus alone at 0·791. The combination of pairs of features improves the predictive value, the best being breast signs combined with either the presence of signs of pregnancy on vaginal examination or a palpable fundus, both giving values of 0·892. The combination of a palpable fundus and signs on vaginal examination is less good with a predictive value of 0·816. Greater numbers than are available in this study would be required to assess the value of combining more than two features.

It is important, however, to realize that no feature or pair of features (indeed, not even the 'overall clinical impression' formed by the general practitioners) had a predictive value with a reliability as high as that of the pregnancy diagnostic test result alone. Only the value of the two previously mentioned pairs approaches this value. Even then the addition of another feature only produces slight improvement in the predictive value. For example, the value for signs of pregnancy on vaginal examination only is 0·825, the value for signs of pregnancy on vaginal examination and breast signs as a pair is 0·892. The incidence of pregnancy in the population of women consulting the general practitioner is much lower than that in the women consulting the hospital obstetrician, so that the predictive value of the signs and symptoms is reduced. It is not surprising, therefore, that the hospital obstetrician appears to be more skilful than the general practitioner in making a diagnosis of pregnancy. How much of this is really due to extra skill and how much to the increased predictive value of the information available to the hospital obstetrician is difficult to estimate.

The subject matter of this paper and the arguments used in discussion may appear to be complicating a relatively simple issue. The underlying principles are of importance if the ways in which General Practitioners make decisions, which when compared to traditional teaching seem based on imprecise information, are to be understood.

References

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