Revista
Portuguesa
de
Psicossomática

The psychological interpretation of clinical pathology in pregnancy: *a continuity hypothesis*

João Justo*

Abstract

This paper focuses on the psychological interpretation of obstetric pathology. Several investigations have demonstrated the existence of important links between emotional functioning of pregnant women and different pathologies, as well as problems during delivery. The psychological understanding of such phenomena often points to inner conflicts that pregnant women are unable to deal with or to express.

We are raising a continuity hypothesis underlining the observation that women suffering from different obstetric pathologies may be considered as psychologically similar and suffering from a continuum of related emotional factors, having difficulty in expressing their problems. According to this hypothesis, what characterizes the different pathologies is the moment when the emotional burden becomes too heavy and psychological conflicts are expressed by current physiological functioning.

Obstetric problems occur at distinct moments in the course of pregnancy. We can describe the onset and process of the specific obstetric dysfunction each woman suffers. It remains unexplained why some women submerge under pathology at the beginning of pregnancy, some in the middle and, some only near the end of pregnancy. There is a strong probability that the best answer to this question lies in the patient's resources for dealing with the distinct demands of psychological development that parallel pregnancy.

Key-words*: Obstetric pathology; Psychological interpretation.*

INTRODUCTION

Over the past decades, psychological research on female reproductive life has repeatedly demonstrated that obstetric pathology is often motivated and stimulated by emotional factors. This conclusion was validated in a good number of cases affected by nausea and vomiting, hiperemesis gravidarum, spontaneous interruption of pregnancy, pre-eclamptic and eclamptic toxemia, premature onset of delivery, premature delivery, as well as several problems of the delivery process.

Research in this area usually points to some kind of psychological

* Full Professor at Faculdade de Psicologia e de Ciências da Educação da Universidade de Lisboa.

weakness affecting the personality of the pregnant woman. The aim of this article is, not only, to explore the most important psychological findings related to obstetric problems, but also to point out the similarities among the psychological characteristics of women affected by them. Women affected by different obstetric pathologies may be very much alike from a psychological point of view, the apparent diversity being related to the moment of onset of the obstetric problem. Possibly, this association is influenced by environmental variables such as family development, social and economical resources, quality of relationship to the doctor, and so on. Nonetheless, we have to deal with the question, why some women feel incapable of psychological management so soon, others so late, and others will experience crisis in the middle of this long coping process of psychological accommodation to the demands of gestation.

NAUSEA, VOMITING AND HYPEREMESIS GRAVIDARUM

Nausea and vomiting are quite common during the first three months of pregnancy. According to Huxley [1], morning sickness (nausea with or without mild vomiting) is present in the early stages in 50% to 70% of all pregnancies, and plays an important role in placenta development. Usually, during pregnancy nausea evolution is very similar to that of the chorionic gonadotropin curve, rising during the first weeks, arriving at the top by the 14th week and decreasing from then on [2]. It has also been found that women vomiting in early pregnancy show a significant, although slight, trend to androgyny in their body measurements (as already referred by Coppen, [3]). Biological explanations of pregnancy vomiting have stimulated medical interventions like dietary changes, antiemetics, vitamin B6, etc. [4]. The association of anticholinergic and antihistamine medication with vitamin B6 reduces the number of days with nausea, as well as nausea severity [5], while vitamin B6 alone seems to have better results among patients with severe nausea than among patients with mild to moderate nausea [6].

As Klebanoff et al. [7] observed in a large American sample of pregnant women, vomiting is more frequent among women who are: a) pregnant for the first time; b) younger; c) have less than twelve years of education; d) are non-smokers; and e) weigh more than 77 Kg. It has also been observed that women who vomited during pregnancy had: a) better chances to escape miscarriage or stillbirth; b) less probability of premature delivery and, c) higher probability of vomiting in a future pregnancy.

Positive relationships between morning sickness and pregnancy outcomes have been noticed since the fifties [8,9], and these results were confirmed more recently [10,11]. On the other hand, Klebanoff and Mills [12] have demonstrated that vomiting in pregnancy is not associated with in-

creased risk for congenital malformations. A significant trend for alcohol and tobacco consumers not to vomit during gestation was reported by Little and Hook [13], especially in women whose consumption started before pregnancy. According to Little [14] the relation between birth weight and nausea and vomiting in pregnancy is always a positive one, independently of smoking or drinking status.

This clinical problem has long been interpreted as a result of psychological variables or pregnant women's mental functioning. Best known was Helen Deutsch's [15] "ambivalence hypothesis" claiming that vomiting at the beginning of pregnancy is a consequence of emotional ambivalence towards pregnancy and towards the future baby. Chertok, Mondzain and Bonnaud [16] tested the ambivalence hypothesis, interviewing 100 primiparous women at the third month of pregnancy, and classifying them according to conscious verbally expressed attitudes. Those authors confirmed that vomiting in the beginning of pregnancy is much more frequent among emotionally ambivalent women (75%) than among women with clearly defined attitudes (61%), based upon outside judges' criteria. But, Macy [17] argues that the affective ambivalence works together with the relationships of the pregnant women to her husband and to her mother to produce the morning sickness of the early pregnancy. According to Iatrakis et al. [18], those factors should be associated with the relationship to the doctor, with the doubts and worries about pregnancy, as well as with the lack of information about pregnancy development, delivery onset and progress, and about the foetus' health. Furthermore, Musaddiq [19] states that stressful life events can play a part in the genesis of vomiting during pregnancy, as can the general emotional functioning of the pregnant women [20].

Some pregnant women don't show a decrease in vomiting, not even by the end of the third month. If vomiting increases to severe levels, health problems of all kinds are expected (disturbance of dietary patterns, electrolyte imbalance, ketosis, acetonuria, severe loss of weigh, etc.). This clinical picture is classically designated as "Hyperemesis Gravidarum" and worries the medical staff because of potential consequences for the mother (dehydration, pulse irregularities, fever, jaundice, neurologic disorder, retinal problems, renal damage, liver damage, etc.) and for the child (increased risk for child malformations [21,22], or lower birth weight [23]).

Some cases are so severe and start so early in pregnancy that total parenteral nutrition must be used [24]. Fortunately, this condition is extremely rare [25]. Hyperemesis is said to be diminishing during the second half of the XX century. This change is attributed to ease in obtaining pregnancy interruption and it is interpreted as a confirmation of the psychological aetiology of vomiting [2]. Also seen as confirmation of the psychological aetiology of this syndrome is the fact that during war times the

number of such hospital admissions drops significantly [26].

While the cause of hyperemesis remains unknown, several medical theories have been raised: a) temporary depression of the adrenal function [27]; b) elevated estrogen levels [21], etc.

Hyperemesis Gravidarum starts by an emetic phase and evolves into a phase of undernutrition and excessive weight loss [28], requiring hospital admission and intensive medication. Medical intervention of this kind is generally enough to restore the physiological equilibrium of patients, but it is also current that vomits persist, or relapse, despite the fact that the health condition of those patients is getting better.

To explain the origin of hyperemesis and its resistance to medical treatment, authors writing in the psychoanalytical tradition posit that patients with this problem have: a) an unconscious rejection of femaleness [29]; b) a general difficulty in dealing with the attributes of feminine personality and exhibit an overall infantile attitude [30]; c) a higher probability of being a hysterical personality [31]; d) present notable difficulties of sexual adjustment [32] and, e) higher levels of psychological immaturity, depression and anxiety [33].

Caruso et al. [34] suggest that these patients have a pathological relation with their husbands based on mutual denial, and Apfel et al. [35] state that they are significantly more hypnotizable than pregnant women with only mild to moderate symptoms of nausea and vomiting.

The observation that pregnant women suffering of hyperemesis tend to be nulyparous, younger and fatter than controls [21] may be concealed by the data mentioned above. According to these authors, the aggregation of data easily lead to the hypothesis that hyperemesis (excessive vomiting) is a result of the psychological mechanism of conversion [36].

Due to resistance to medical treatment, pregnant women with hyperemesis have been submitted to psychological therapies. The oldest psychotherapeutic approach to this problem was based on hypnosis. Several researchers have found that the hypnotic procedure produces symptom relief in an easy, effective and short way [37,38,39]. Specifically, Kroger based his work on the fact that during deep hypnotic states it is possible to induce nausea, vomits and abdominal pain [40]. In those early experiences, the basic approach consisted in inducing a deep hypnotic state and producing strong post-hypnotic suggestion that symptoms would cease. Another alternative technique uses hypnoanalysis and age regression. The therapist induces the patient to regress to a preadolescent age and afterwards leads her to slowly progress to her real age. With this procedure it becomes easy to identify the psychological conflicts that burden a pregnant woman's emotional life and that are, possibly, responsible for pathological vomiting, as present in hyperemesis gravidarum. Grounded in those data, researchers may have access to a general understanding of interven-

ing inner conflicts: a) lack of desire for pregnancy because of material difficulties; b) marital unhappiness and divorce becoming inevitable; c) pregnancy leading to the loss of a professional career; d) marital relations experienced with huge frigidity, along with passionate extra-marital relations producing the present pregnancy and, e) preference for masculine personality and total unacceptance of pregnancy, maternity and sexual issues.

Looking at the clinical material produced by the use of hypnotic procedures, one may argue that the data, *per se* do not explain hyperemesis gravidarum, because a great number of pregnant women share many of those problems, as described, but don't share the symptoms of the disease.

In fact, conflictual inner experiences seem to lead to symptom formation in such cases in which the pregnant women's personality is capable and willing to enact them. According to the professionals that have been involved in relieving this condition, the underlying personality structure is of hysterical type. This would also be the best explanation for the immediate effect obtained in a good number of cases.

Hypnotic procedures for the reduction of hyperemesis gravidarum have also been administered together with supportive psychotherapy and behaviour modification [41]. This collaborative approach has proven effective and induced faster recoveries than medical intervention alone.

Behavioral intervention on its own has also proven effective in controlling vomit crises in a patient who started her symptoms during a pregnancy and remained vomiting for several years after giving birth [42]. A different psychotherapeutic approach to hyperemesis gravidarum is the ABC (antecedents, behaviour and consequences) intervention proposed by Callahan et al. [43]. In a first stage, patients are involved in identifying factors functionally associated with vomiting, before (releasing factors) and after (reinforcing factors) the symptom is produced. Usually these factors are events taking place in the patient's life. In the second stage, and using this information, the therapist will try to reorganize the patient's life so that such events won't take place or won't be so stressful, leading to significant improvements in the patient's condition.

Among all psychological interventions used with hyperemetic pregnant patients the most consistent remains the use of hypnosis according to Fuchs et al. [44]. These authors used hypnosis on an individual and on a group basis. According to their results, patients hypnotized in a group situation responded better, quicker and avoided hospitalisation more easily than patients treated individually.

SPONTANEOUS INTERRUPTION OF PREGNANCY

Spontaneous interruption of pregnancy is defined as the uterine expulsion of the embryo or of an unviable foetus and, usually happens between

the beginning of pregnancy and the 20th week of gestation. Despite all medical advances, one fifth of all gestations confirmed by clinicians ends spontaneously [45]. Identifiable medical factors for this problem usually fall into one of four categories: 1) chromosomal abnormalities of the foetus; 2) uterine abnormalities; 3) immunological problems and, 4) endocrine problems [46]. During the ten first weeks of gestation chromosomal abnormalities are responsible for about half of the cases of spontaneous miscarriage, while after the eleventh week there are 2.9 to 3.5 more cases of chromosomally normal cases than the opposite [47]. From a classical point of view, the repetition of spontaneous interruption of pregnancy induces a huge decrease in the probability of a woman successfully carrying a future pregnancy to the end [48]. Even nowadays, the repetition of miscarriage induces a negative probability on obstetrical expectations since a women with three or more spontaneous abortions presents problematic outcomes for a future pregnancy. Said in cold numbers: a) 30% of viable babies are small-for-gestational-age; 28% are born pre-term and, c) perinatal mortality rounds 16% [49].

At this point a difficult problem arises because, as medical experience states, a good number of pregnant women dealing with own and with foetal problems do carry their pregnancies to term regardless of their and their offspring's disturbances. The psychological suffering associated with these conditions, and specially with their repetition, needs to be called to the attention of psychologists who may help to induce better levels of adaptation and, wherever possible, to ensure better conditions for the development of a new pregnancy.

As can be expected, most women affected by miscarriage experience grief and sorrow, and a good number among them suffer from anxiety and depression [50-58]. Guilt may be the most difficult aspect to deal with, for both men and women after the loss of pregnancy [59]. In some cases, psychological suffering following miscarriage can be observed more than one year later and may reach the level that we observe in persons who are mourning the death of relatives or dear ones [60]. However, a large majority of cases (75%) is capable of overcoming the situation of grief one month after miscarriage, very few cases will report no reaction at all (4%) and, only about one fifth (21%) will proceed into the second month without overcoming the grief reaction (Turner et al., 1991). Nevertheless, four months after miscarriage, there is a significant decrease in anxiety, depression, grief, self-blame and worry [61].

Women with threatened abortion show higher levels of depression, anxiety, anger and of other emotional and stress related variables, when compared with pregnant women affected by vomiting, or when compared with normal pregnant women [20].

According to Conway [62], evidence

gathered from scientific literature points to seven major aspects capable of influencing the grief reaction: social support; professional support including explanation on the cause of miscarriage; seeing the foetus upon request of the woman; relief from having survived the traumatic event; lack of community support; low self--concept; and excessive worries about a future pregnancy. Speaking of social support, there seems to be a consensus that husband [63], relatives and friends [64] are the most important sources, and by that order of preference [65]. The role of female support, specially of meaningful ones like the mother or those who have suffered miscarriage themselves must also be stressed [66]. Concerning professional support, we must realize that many health professionals are not trained to deal with the psychological consequences of miscarriage and, therefore, need to be assisted by mental health experts on the ways chosen to talk and explain the nature of the situation to women who suffered this loss [67]. This is most important, as we know that women informed about the cause of miscarriage are less stressed by feelings of self-blame than women who are given no identifiable cause [61]. Although still controversial, the possibility of seeing the foetus after miscarriage is regarded by some clinicians as a positive first step towards mourning [66,68,69]. In truth, only one third of women in this condition spontaneously stated their wish to see the foetus [50]; but, it is equally observed that among those who actually see the foetus there seems to be no regret [65]. Relief relief from having survived the traumatic event has been pointed out by some authors [65,70,71], and it may be considered positive if one is reminded that this attitude presents the need to test reality immediately after the occurrence of a very stressful event. A temporary reaction, this feeling diminishes the severity of the emotional crisis until other internal capabilities are set in motion to help women face the real consequences of the traumatic event [62]. Lack of community support in the sequence of spontaneous abortion is unfortunately common in our days, and one of its most sad expressions is the lack of mourning rituals, probably linked to feelings of shame related with talking in public about personal traumatic events [65]. Although not universal, lowered self-concept is a natural response to such a serious event as miscarriage. This change of the feeling of worth in one's self evaluation may be due to doubts related to reproductive capability [72], but is also related to the negative side of social interactions which so easily reinforce guilt feelings in suffering women [73]. Another element of these feelings is the notion that she cannot trust her body [70], or the fact that in many couples sexual intercourse may become a difficult situation after miscarriage, either resulting from doubts about a future pregnancy or doubts about sexuality itself [65].

Finally, excessive worries about a future pregnancy are able to impair the psychological life of these women.

A simple but extremely negative impairment is the denial of anxiety during the next pregnancy [65]. This may impair the psychological development inherent to gestation itself, inducing changes in day to day activities [73] and, enhancing natural ambivalence towards pregnancy to grow to levels which are disturbing for a couple's life [73]. In those cases, it would not be surprising to find bonding difficulties between mother and baby after birth [73-75].

The recognition of psychological suffering after spontaneous abortion leads to an easy comparison with other mourning situations. Nevertheless, grieving after the loss of pregnancy during its earliest stages tends to be a solitary situation, viewed by other people as a private problem, resolved within hospital services (the quicker the better), and with a very positive and simple life solution: a new pregnancy in the near future [74]. Unfortunately, when things are taken in this easiest way, and a new pregnancy is seen as the best cure for a former pregnancy loss, it is very probable that the mourning process does not take place, or does not get to the end. If so, one might expect that the baby born at the end of the new gestation will be affected by the psychological relation that the mother (and possibly the family) still maintains with the dead foetus.

Investigation about men's reaction to miscarriage shows a relationship between the observation of the baby's ultrasound scan and the vividness of visual imagery of the baby, and also an association between vivid imagery and higher levels of grief [76]. Surprisingly, Conway and Russell [77] have found that during the first three weeks after miscarriage men exhibit significantly higher levels of grief than women, but four months after the event the difference is not significant anymore.

The possibility that some cases of repeated spontaneous abortion have a psychological aetiology has been suspected for long time, and was firmly stated by Mann [78], based on experimental evidence that uterine contractions may happen in response to stressful stimulus, as formerly found by Alvarez and Caldeiro-Barcia [79].

In order to prove that a good number of miscarriages could be the result of pregnant women's emotional reactions, Mann [78] presents the results of systematic interviews to a group of women with a history of repeated abortion and who, after gynaecological diagnosis, were considered "to be free of gynecologically discernible abortigenic conditions". According to his data, these women were: a) very similar, to one another, specially in their proneness to react somatically to psychic situations; b) they were somatic reactors since childhood and until adult life (for example, as children they developed nausea and vomiting while facing family stressful situations; or they developed colitis after becoming engaged with their husbands; or they developed headaches after quarrelling with their mothers-in-law); c) they were delayed in their sexual de-

velopment and came from families with a typical structure (dominant mother with overprotective tendencies and, incompetent father as a consequence of death, desertion, divorce, alcoholism or passivity); d) they regarded themselves as poor achievers in womanly status, regarding motherhood as a property of ideal women far beyond their adaptive capabilities; e) always victimized by anxiety whenever pressured to achieve success in any kind of performance. In this context, Mann observes that nearly 50% of his sample seems to react psychosomatically in a big range of upsetting circunstances, the other part of the sample seems to react this way only to specific kinds of emotional conflict. In these last cases, the interesting aspect is the existence of premarital pregnancy or illegal abortion. As one can easily guess, guilt feelings are very powerful in these women's psychological lives and the occurrence of spontaneous abortion can be seen as the easiest way to self-punishment and emotional relief. According to this author, women suffering from repeated abortion respond to the emotional changes of pregnancy by developing uterine contractions which, in turn, generate decidual haemorrhage and, finally, miscarriage. Independently of the mechanism, the strongest argument for the psychological aetiology of spontaneous and repeated abortion is Mann's [78] report on the success of psychotherapeutic psychodynamic interventions with habitual aborters without identifiable medical factors: before the psychological treatment, in the obstetrical life of those women there were 91% of pregnancies ending in abortion, while, after treatment, only 19% ended the same way. Similar results were also found by Bevis [80] and by Berle and Javert [81], applying the dynamically oriented psychotherapeutic intervention described by Javert [82]. Women investigated by Mann were also submitted to psychometric diagnosis and compared on the one hand with women without habitual abortion and,on the other hand, with habitual aborters having an identifiable organic cause for miscarriage [83]. When comparing patients with and without repeated miscarriage it was found that: a) when tested with the Wechsler-Bellevue test, habitual aborters perform less well on the Picture Arrangement subtest; b) when tested with the Rorschach Procedure, a good number of habitual aborters produced much more color-form than form-color responses, a high number of popular responses, a high percentage of hostility responses, more indirect hostility responses than direct hostility ones, and used oral dependent symbolism more frequently than the norm; c) when tested with the TAT, a good number of habitual aborters produced more stories with helping themes and guilt themes, and also they had longer reaction times to card 8BM and to card 18GF. Attributing one point to each indicator, and taking a score of 5 as the cut point, it was found that only 11% of the comparison group was at or above this limit, while the same happen to 70% of ha-

bitual aborters. In this way, more than 75% of the subjects could be classified correctly according to psychometric data. When comparing habitual aborters with an identifiable organic cause and habitual aborters without an identifiable organic cause, and using again 5 as the cut point, it was observed that the former are much more alike women without abortion repetition. In this sense, it is easy to understand that the repetition of miscarriage *per se* is not enough to produce the psychological signs that characterize women suffering miscarriage and not having an organic cause to blame. It is interesting to compare habitual aborters before and after succeeding to carry a new pregnancy until the 35th week. Some of the psychological signs identified as typical of these women have changed in the direction of the comparison group, meaning that pregnancy, psychotherapy, or a combination of the two factors has turned these patients into much more healthy people. Too little attention seems to have been paid to the basic research here summarized, though psychotherapeutic endeavours should be grounded on those findings.

These results form the basis of Elaine Grimm's [83] statement that women with repeated abortion and without conclusive medical diagnosis are markedly: a) over reactive from an emotional point of view; b) prone to compliance in social relations; c) impaired by fear of rejection or guilt that limits the open and direct expression of hostility generated by frustrating situations and consequently, d) reveal a repressive type of psychological functioning, with growing emotional tension and psychosomatic reactions being expected.

A reasonable doubt exists in appreciating the above data. An alternative hypothesis is that differences mentioned between women with and without identifiable organic cause may be generated by the acquaintance with diagnosis (felt with relief) or by the lack of that information (felt as a source of anxiety about unknown events taking place deep in patients' reproductive life).

Other projects have defended the psychosomatic aetiology of spontaneous abortion, proposing other intervening mechanisms: 1) in situations of great stress, increased secretion of adrenalin may induce dramatic changes in the uterus contractility, giving start to delivery of the foetus [81] and, 2) extreme hormonal (namely chorionic gonadotrophins) variations due to emotional problems of the patient [84-88] may induce the same result.

Several investigations have shown the existence of an association between spontaneous interruption of pregnancy and stressful life events [89, 90], particularly after the 10th week of gestation [91]. It has been argued that high levels of stress, among other consequences, induce significant rises of *ß*-endorphin, which have a negative effect on the blood-flow between the uterus and the placenta [92]. It has also been stated that stress has a negative influence upon pregnant women's behaviour as reflected by substance

abuse, food intake and also the way medical help is looked for [93]. Possibly linked with those observations is the fact that Ancel et al. [94] found a much higher risk of late abortion (14--21 weeks of gestation) among pregnant women living alone.

PRE-ECLAMPSIA AND ECLAMPSIA

Pre-eclampsia and eclampsia constitutes one of the major causes of medical concern during pregnancy. Usually high blood pressure and proteinuria are seen as the most important symptoms of pregnancy hypertensive disorders [95]. The usual consensus for these symptoms evaluation is around ≥90mmHg for diastolic blood pressure, ≥140 mmHg for systolic blood pressure and, ≥300mg/24 hours for proteinuria.

In cases where blood pressure continues to rise convulsions may appear, and then we speak of eclampsia. Nonetheless, problems like oedema, activation of the coagulation cascade, changes in sensitivity to vasopressors, higher vascular permeability [96], and trombophilia [97] should not be forgotten. The current definition brings about the problem of the validity of blood pressure measurements due to the lack of standardized criteria and also to personal variables of the observer [98]. Recent research suggests that pre-eclampsia is a multi--system clinical problem involving placentary dysfunction as well as lesions of the endothelial cells [99]. Despite increasing progress in medical intervention, pre-eclampsia remains a good predictor of severe maternal disease as well as a good predictor of pre-term birth and small for gestational age infants [100], intrauterine growth restriction and low birth--weight [101], and of neonatal death [102] and perinatal death [103]. The risk of small-for-gestational age infants seems to be higher among multiparous pre-eclamptic women than among nuliparous pre-eclamptic women [104]. Uncomplicated chronic hypertension is also related to a higher risk of having a small for gestational age, and this association tends to rise with age [105]. According to Naeye [106], it is only after the hypertensive range is achieved that increased levels of blood pressure become responsible for birth-weight decrements. As argued by Misra [107], studies that have failed to find a relationship between foetal growth and pre-eclampsia should be questioned due to lack of control upon variables such as smoking. This habit has a recognized negative effect on foetal development but, at the same time, a protective effect on gestational blood pressure has been suspected [108].

Among the most important predictors of pre-eclampsia we have second trimester mean arterial blood pressure [109,110], serum urate [111], nulliparity [112,113], pre-eclampsia in a previous pregnancy, high body mass, working during pregnancy, and having a family history of hypertension [112].

Several medical theories have emerged to explain pre-eclampsia as

a consequence of: immunological disfunction [114, 115]; an increase in sympathetic nervous vasoconstrictor activity [116] or an increase in sympathetic nervous tone [117]; low gluthatione levels [118]; high testosterone levels [119]; riboflavin deficiency [96]; genetic predisposition to trombophilia [97] and, genetic variability in biotransformation enzymes [120]. However, as stated by Dekker and Sibai [121], medical hypothesis about pre-eclampsia should be regarded as interactive and not as mutually exclusive; besides that pre-eclampsia aetiology is not yet fully understood. Despite all medical theoretical and practical efforts, pre-eclampsia prevention is still far from effective [122]. Since blood hypertension is notably influenced by psychological functioning [123,124], and since psychological functioning is associated with the evolution of pregnancy, it is easy to understand the interest that pre-eclampsia has raised among psychology researchers. Searching for the aetiological contribution of psychology to this problem, there are two different approaches, the retrospective and the prospective one. According to the retrospective examples (i.e., when psychological interviews take place after the diagnosis of pre-eclampsia) we may observe that pre-eclamptic women: a) describe a greater amount of stress (interpersonal, economic and occupational) during their pregnancies when compared with a control group, and describe themselves as more rejecting of pregnancy and making a negative evaluation of their husbands [125]; b) exhibit a higher number of psychiatric symptoms while pregnant, remember a more disturbed response to menarche, report higher premenstrual tension and poorer sexual adjustment, experience more disturbing events during pregnancy and express attitudes not as favourable to the future child as those shown by women in a control group [126]; c) have a higher chance of being employed in high-stress jobs and also a higher chance of being found working during pregnancy [127]. Comparing these conclusions to those drawn from prospectives studies (i.e., when the psychological interview occurs before the onset of pre-eclampsia), different but complementary information can be found. More frequent among pre-eclamptic women, than among control women who don't develop this condition, we have: a) abnormal results in MMPI protocols [128]; b) behavioral symptoms in childhood (enuresis, disturbance in mood control, insomnia, delinquency and repeated psychiatric consultation), marital problems (being single, divorced, widowed or separated during pregnancy), accident proneness and spontaneous abortions [129]; c) lower scores in intelligence assessment, presentation in personality tests as more introspective, depressed and uncommunicative, and less desire for pregnancy [130]; d) when compared with husbands of control women, husbands of women who develop pre-eclampsia show a tendency for dependence, immaturity and difficulty in coping with problematic situations

[130]; e) emotion suppression plays an important role in the onset of pregnancy-induced hypertension [131]; f) surprisingly enough, thought not significant, Nisell et al. [132] found pregnant women with low life stress to have higher blood pressure than those with high life stress; g) anxiety and depression measured in early pregnancy are associated with increased risk of later pre-eclampsia onset [133]. Also important is the fact that war stress seems to be associated with higher levels of pregnant women's blood pressure, especially among younger women [134].

According to those data, one should expect that psychological intervention with pregnant eclamptic women would be a positive contribution for blood pressure decreases, when carefully articulated with medical care. Inside the world of psychotherapies, hypnotic procedures would be one of the first options, not only because of the possibility of obtaining results in a short time, but also because of their recognized impact with hypertensive patients. Surprisingly, published data on this matter is extremely difficult to find. More than that, when pregnant women are forced to stay in hospital because of pre-eclamptic complications, the most remarkable aspect to a clinician's eye is the fact that physical exhaustion is often associated to psychological suffering and despair, making it hard to understand why this condition does not push hospitals to provide psychological help. It is equally hard to accept that data on this matter should be so sparse.

PSYCHOLOGICAL LINKS

Psychological research has tried to demonstrate that patients prone to exhibit excessive vomiting, spontaneous abortion or pre-eclampsia during pregnancy are psychologically different from women not presenting such obstetric pathologies. The similarity between those psychological factors associated with the three different pathologies has not been sufficiently urderlined. The question is raised about how to understand the distribution of physiological pathology along time among pregnant women, given their similarities from a psychological point of view?

The first and easiest answer is the classical assumption of psychosomatic medicine; the development of psychosomatic diseases depends upon organic propensities of the individual: fragility in the organism of some patients making it easy for certain illnesses to emerge, while organic resistance makes it harder for the same diseases to progress in other patients.

In spite of the fact that this principle is still largely accepted by all clinicians, and in spite that physiological factors of pregnant women do play a role in the establishment of obstetric pathologies, we are here raising a different hypothesis.

This hypothesis is a developmental one, in the sense that it is based upon the theoretical stance that the psychological experience of pregnancy follows a sequence of developmental stages, with psychological

tasks to be performed and goals to be achieved at each stage. Thus, once a development task is reached, there is no returning to previous stages [135-138]. According to this principle, pregnant women experience stress in accordance to changes (anatomical, hormonal, etc.) taking place at different moments of gestation, and having distinct timetables. To integrate the meanings of those changes, the psychological functioning of the childbearing women will also be submitted to changes. It follows that the ability to undergo this process will enable the global balance required to master the inevitable reality of pregnancy, one of the best known and specific of all life crises.

From a psychological point of view, each stage in the gestational process carries with it a task: a) the goal of pregnancy's first phase is to accept gestation, and the proper task is to work-through former childhood relationships with the pregnant women's mother; b) the goal of pregnancy's second phase consists in differentiating the mother's self from the baby's self, for which the proper task is to work-through the pregnant women's relationship with the father of the future child and, c) the goal of pregnancy's third phase consists in preparing the separation between the mother's and child's bodies, and the proper task is to work-through the pregnant women's relationship with the identity of the baby to come (135--138). Though one cannot state with certainty the beginning and end of each of these stages, we must rely on the usual consensus about a rough correspondence between each of those three phases and each one of the three trimesters of pregnancy.

Keeping the mentioned stages in mind, and understanding the sequence of coping demands expected during gestation, we can think that it is the failure to perform tasks and achieve goals that prompts the pregnant women's organism to produce the kind of obstetric pathology related to the emerging stage. Possibly, working-through the psychological meaning of those critical relationships with the most important persons of their lives, as they fulfil the task required by mainstream goals, generates a feeling of relief and overall wellness. Thus, the required balance may be achieved in the process. In cases when adequate working--through flops and goals are not achieved, the probable result is a high level of anxiety. This experience is known to play a very negative role in respect to all levels of obstetric concern. In this sense, the display of obstetric pathology would be a possible psychosomatic expression of unbearable psychological conflict. Consequently, the moment for its emergence in some pregnant women would be understood as a result of psychological withdrawal from efforts to cope with the task at hand demanded by a gestational process.

If this hypothesis is accepted, one must still face the initial question: why are these women so similar psychologically, and their pathologies are so different?

We are highlighting the association between the moment of psychological inability to cope with gestational demands and the possible occurrence of certain kinds of obstetrical problems. Thus: a) severe vomiting and hyperemesis are much more likely to take place from the middle of the first trimester into the second trimester, than at other moments; b) spontaneous abortion in the absence of chromosomal abnormalities is much easier to happen during the second trimester of pregnancy; c) pre-eclampsia is much more frequent from the middle of the second trimester on, than before that period and, d) premature delivery is typical of the third trimester.

From a psychological point of view, we have here an interesting relation between the mentioned clinical problems and the meaning of the psychological stages of gestation:

I - severe vomiting is a symptom carrying a symbolic meaning of ambivalence (the natural feeling when the need for working-through the relations with the mother emerges, a task attributed to the development of the first stage);

II - spontaneous abortion is an objective demonstration that pregnancy cannot be accepted (and acceptance is the goal of the first phase);

III - pre-eclampsia is characterized by high levels of blood pressure (possibly induced by difficulties related with working-through the actual relation with the husband, the task of the second phase) and,

IV - premature delivery is an objective demonstration of not being able to carry pregnancy to its end (and the progressive separation between mother and child is the task attributed to the third phase).

According to this sequence, we would say that: a) the onset of hyperemesis happens when pregnant women are not able to initiate the psychological development involved in the first phase; b) spontaneous abortion (in the absence of chromosomal abnormalities) takes place when the psychological adaptation of the first phase is not accomplished; c) pre-eclampsia occurs if psychological evolution of the second phase is not achieved and, d) premature delivery will end pregnancy when requirements of the third phase are not met.

None of those relations is a mathematical one. First of all, we must state that we are not speaking of all women who suffer one of those clinical problems. We are only speaking of women for whom medical factors have been considered insufficient for etiological purposes. Secondly, we don't expect that psychological factors *per se* will cause obstetric pathology. We only expect that psychological factors may empower physiological ones, thus producing the symptomatic problems we are worrying about. Thirdly, we should believe that a good number of crisis prone women will not suffer such problems because external factors (marital, family and social support, etc.) play a positive role, counteracting some of the physiological consequences enabled by their emotional upset.

REFERENCES

1. Huxley R. Nausea and vomiting in early pregnancy: its role in placental development. *Obstetrics and Gynecology* 2000; 95: 779-782.
2. LaFerla J. Hyperemesis Gravidarum (Editorial Note). *Journal of Psychosomatic Obstetrics and Gynaecology* 1986; 5: 177-178.
3. Coppen A. Vomiting of early pregnancy: psychological factors and body build. *The Lancet* 1959; 24th January, 172-173.
4. Rayburn W, Hoffman K. Gestational nausea: a role for antiemetics? *Contemporary Obstetrics and Gynaecology* 1986; 28: 163-174.
5. Wheatley D. Treatment of pregnancy sickness. *Br J Obst and Gynaecol* 1977; 84: 444-447.
6. Sahakian V, Rouse D, Sipes S, Rose N, Niebyl J. Vitamin B6 is effective therapy for nausea and vomiting of pregnancy: a randomised, double--blind placebo-controlled study. *Obstetrics and Gynecology* 1991; 78: 33-36.
7. Klebanoff M, Koslowe P, Kaslow R, Rhoads G. Epidemiology of vomiting in early pregnancy. *Obstetrics and Gynecology* 1985; 66: 612-616.
8. Medalie J. Relationship between nausea and/or vomiting in early pregnancy and abortion. *The Lancet* 1957; July 20th: 117-119.
9. Brandes J. First-trimester nausea and vomiting as related to outcome of pregnancy. *Obstetrics and Gynecology* 1967; 30: 427-431.
10. Jarnfelt-Samsioe S, Samsioe G, Velinder G. Nausea and vomiting in pregnancy – a contribution to its epidemiology. *Gynecology and Obstetrics Investigation* 1983; 16: 221-229.
11. Tierson F, Olsen C, Hook E. Nausea and vomiting of pregnancy and association with pregnancy outcome. *Am J Obst Gynecol* 1986; 155: 1017-1022.
12. Klebanoff M, Mills J. Is vomiting during pregnancy teratogenic? *Br Med J* 1986; 292: 724-726.
13. Little R, Hook E. Maternal alcohol and tobacco consumption and their association with nausea and vomiting during pregnancy. *Acta Obstetrica Gynecologica Scandinavica* 1979; 58: 15-17.
14. Little R. Maternal alcohol and tobacco use and nausea and vomiting during pregnancy. *Acta Obstetrica Gynecologica Scandinavica* 1980, 59: 495-497.
15. Deutsch H. *La psychologie des femmes*, V. 1 & V. 2. Paris, P.U.F., 1949.
16. Chertok L, Mondzain M, Bonnaud M. Vomiting and the wish to have a child. *Psychosomatic Medicine* 1963; 25: 13-18.
17. Macy C. Psychological factors in nausea and vomiting in pregnancy: a review. *Journal of Reproductive and Infant Psychology* 1986; 4: 23-55.
18. Iatrakis G, Sakellaropoulos G, Kourkoubas A, Kabounia S. Vomiting and nausea in the first 12 weeks of pregnancy. *Psychotherapy and Psychosomatics* 1988; 49: 22-24.
19. Musaddiq J. Stress and complications of pregnancy. *J Indian Acad Applied Psychol* 1987; 13: 7-11.
20. Musaddiq J. Role of psychological factors in complications during first trimester of pregnancy. *J Personality and Clinical Studies* 1987; 3: 11-16.
21. Depue R, Bernstein L, Ross R, Judd H, Henderson B. Hyperemesis gravidarum in relation to estradiol levels, pregnancy outcome, and other maternal factors: a seroepidemiologic study. *Am J Obst Gynecol* 1987; 156: 1137-1141.
22. Källén B. Hyperemesis during pregnancy and delivery outcome: a registry study. *European Journal of Obstetrics, Gynecology and Reproductive Biology* 1987; 26: 291-302.

23. Chin R, Lao T. Low birth weight and hyperemesis gravidarum. *European Journal of Obstetrics, Gynecology and Reproductive Biology* 1988; 28: 179-183.
24. Levine M, Esser D. Total parenteral nutrition for the treatment of severe hyperemesis gravidarum: maternal nutritional effects and fetal outcome. *Obstetrics and Gynecology* 1988; 72: 102-107.
25. Katon W, Ries R, Bokan J, Kleinman A. Hyperemesis gravidarum: a biopsychosocial perspective. *International Journal of Psychiatry in Medicine* 1980-81; 10: 151-162.
26. Fitzgerald J. Epidemiology of hyperemesis gravidarum. *The Lancet* 1956; May 12th: 660-662.
27. Vanden Bosch M. ACTH in the treatment of hyperemesis gravidarum. *American Journal of Obstetrics and Gynecology* 1951; 62: 456-457.
28. Crépin G, Decocq J, Caquant F, Querleu D. Les vomissements de la grossesse. *Gynécologie-Obstétrique* 1976; 26: 3779-3787.
29. Menninger K. Somatic correlations with the unconscious repudiation of femininity in women. *J Nervous and Mental Disease* 1939; 89: 514-527.
30. Fairweather D. Nausea and vomiting in pregnancy. *Am J Obst Gynecol* 1968; 102: 135-175.
31. Guze S, DeLong W, Majerus P, Robins E. Association of clinical psychiatric disease with hyperemesis gravidarum. *N Eng J Med* 1959; 261: 1363-1368.
32. Uddenberg N, Nilsson A, Almgren P. Nausea in pregnancy: psychological and psychosomatic aspects. *J Psychosomatic Research* 1971; 15: 269-276.
33. Harvey W, Sherfey M. Vomiting in pregnancy: a psychiatric study. *Psychosomatic Medicine* 1954; 16: 1-9.
34. Caruso S, El-Mallakh R, Hale M. Systems dynamics in hyperemesis gravidarum. *Family Systems Medicine* 1990; 8: 91-95.
35. Apfel R, Kelley S, Frankel F. The role of hypnotizability in the pathogenesis and treatment of nausea and vomiting of pregnancy. *J Psychosomatic Obstetrics and Gynecology* 1986; 5: 179-186.
36. El-Mallakh R, Liebowitz N, Hale M. Hyperemesis gravidarum as conversion disorder. *J Nervous and Mental Disease* 1990; 178: 655-659.
37. Angelo L. Vomitos incoercibles del enbarazo curados por hipnotismo. *Rev San Mil Habana* 1942; 6: 65-70. Quoted by Giorlando and Mascola, 1957.
38. Kroger W, DeLee S. The psychosomatic treatment of hyperemesis gravidarum by hypnosis. *Am J Obst Gynecol* 1946; 51: 544-552.
39. Giorlando S, Mascola R. The treatment of hyperemesis gravidarum with hypnotherapy. *Am J Obst Gynecol* 1957; 73: 444-447.
40. Kroger W. The conditioned reflex treatment of alcoholism. *J Amer Med Association* 1942; 120: 714.
41. Henker F. Psychotherapy as adjunct in treatment of vomiting during pregnancy. *Southern Medical Journal* 1976; 69, 12: 1585-1587.
42. Latimer P, Malmud L, Fisher R. Gastric stasis and vomiting: behavioral treatment. *Gastroenterology* 1982; 83: 684-688.
43. Callahan E, Burnette M, DeLawyer D, Brasted W. Behavioral treatment of hyperemesis gravidarum. *J Psychosomatic Obstetrics and Gynaecology* 1986; 5: 187-195.
44. Fuchs K, Paldi E, Abramovici H, Peretz B. Treatment of hyperemesis gravidarum by hypnosis. *The International Journal of Clinical and Experimental Hypnosis* 1980; 28: 313-323.
45. Hammerslough C. Estimating the probability of spontaneous abortion in the presence of induced abortion and vice versa. *Public Health and Reproduction* 1992; 107: 269-277.

46. Clifford K, Rai R, Watson H, Regan L. An informative protocol for the investigation of recurrent miscarriage: preliminary experience of 500 consecutive cases. *Human Reproduction* 1994; 9: 1328-1332.
47. Kline J, Stein Z, Susser M. *Conception to birth: epidemiology of prenatal development*. New York, Oxford University Press, 1989.
48. Malpas P. A study of abortion sequences. *J Obstetrics and Gynaecology of the British Empire* 1938; 45: 932-949.
49. Reginald P, Beard R, Chapple J, Forbes P, Liddell H, Mowbray J, Underwood J. Outcome of pregnancies progressing beyond 28 weeks gestation in women with a history of recurrent miscarriage. *Brit J Obst Gynaecol* 1987; 94: 643-648.
50. Seibel M, Graves W. The psychological implications of spontaneous abortions. *J Reproductive Medicine* 1980; 25: 161-165.
51. Friedman T, Gath D. The psychiatric consequences of spontaneous abortion. *Br J Psychiatry* 1989; 155: 810-813.
52. Jackman C, McGee H, Turner M. The experience and psychological impact of early miscarriage. *The Irish J Psychology* 1991; 12: 108-120.
53. Turner M, Flanelly G, Wingfield M, Rasmussen M, Ryan R, Cullen S, Maguire R, Stronge J. The miscarriage clinic: an audit of the first year. *Br J Obst Gynaecol* 1991; 98: 306-308.
54. Garel M, Blondel B, Lelong N, Papin C, Bonenfant S, Kaminski M. Reactions depressives après une fausse couche. Contraception, Fertilité et Sexualité 1992; 20: 75-81. Quoted by Lee and Slade, Miscarriage as a traumatic event: a review of the literature and new implications for intervention. *Journal of Psychosomatic Research* 1996; 40: 235-244.
55. Neugebauer R, Kline J, O'Connor P, Shrout P, Johnson J, Skodol A, Wicks J, Susser M. Determinants of depressive symptoms in the early weeks after miscarriage. *American Journal of Public Health* 1992; 82: 1332-1339.
56. Thapar K, Thapar A. Psychological sequelae of miscarriage: a controlled study using the general health questionnaire and the hospital anxiety and depression scale. *British Journal of General Practice* 1992; 42: 94-96.
57. Prettyman R, Cordle C, Cook G. A three-month follow-up of psychological morbidity after early miscarriage. *British Journal of Medical Psychology* 1993; 66: 363-372.
58. Lee C, Slade P, Lygo V. The influence of psychological debriefing on emotional adaptation in women following early miscarriage: a preliminary study. *British Journal of Medical Psychology* 1996; 69: 47-58.
59. Leppert P, Pahlka B. Grieving characteristics after spontaneous abortion: a management approach. *Obstetrics and Gynecology* 1984; 64: 119-122.
60. Nikcevic A, Tunkel S, Nicolaides K. Psychological outcomes following missed abortions and provision of follow-up care. *Ultrasound Obstetrics and Gynecology* 1998; 11: 123-128.
61. Nikcevic A, Tunkel S, Kuczmierczyk A, Nicolaides K. Investigation of the cause of miscarriage and its influence on women's psychological distress. *British Journal of Obstetrics and Gynaecology* 1999; 106: 808-813.
62. Conway, K. Miscarriage. *Journal of Psychosomatic Obstetrics and Gynecology* 1991; 12: 121-131.
63. Smart L. The marital helping relationship following pregnancy loss and infant death. *Journal of Family Issues* 1992; 13: 81-98.
64. Worden J. *Grief counselling and grief therapy: a handbook for the mental health practitioner*. New York, Springer, 1982.

Quoted by Conway, 1991.
65. Oakley A, McPherson A, Roberts H. *Miscarriage*. Fontana, Oxford, 1984. Quoted by Conway, 1991.
66. Campbell C. The impact of miscarriage on women and their families. *Nursing* 1988; 3: 11-14.
67. Stack J. The psychodynamics of spontaneous abortion. *American Journal of Ortopsychiatry* 1984; 54: 162-167.
68. Leon I. Psychodynamics of perinatal loss. *Psychiatry* 1986; 49: 312-324.
69. Stirtzinger R, Robinson G. The psychologic effects of spontaneous abortion. *Canadian Medical Association Journal* 1989; 140: 799-805.
70. Pizer H, Palinski C. *Coping with a miscarriage*. London, Jill Norman, 1981. Quoted by Conway, 1991.
71. Leroy M. *Miscarriage*. London, Optima, London, 1988.
72. Flandermeyer A. Women's coping with a spontaneous abortion occurring in early pregnancy. *Chart* 1987; 84: 7.
73. Floyd C. Pregnancy after reproductive failure. *American Journal of Nursing* 1981; 2050-2053.
74. Herz E. Psychological repercussions of pregnancy loss. pp.292-299 In Dennerstein and Senarclens (Eds.) *The young woman: psychosomatic aspects of obstetrics and gynaecology*. Amsterdam, Excerpta Medica, 1983. Quoted by Conway and Russsell, 2000.
75. Cole D. It might have been: mourning the unborn. *Psychology today* 1987; 21: 64-65.
76. Johnson M, Puddifoot J. Miscarriage: is vividness of visual imagery a factor in the grief reaction of the partner. *British Journal of Health Psychology* 1998; 3: 137-146.
77. Conway K, Russell G. Couple's grief and experience of support in the aftermath of miscarriage. *British Journal of Medical Psychology* 2000; 73: 531-545.
78. Mann E. Habitual abortion: a report in two parts, on 160 patients. *American Journal of Obstetrics and Gynaecology* 1959; 77: 706-718.
79. Alvarez H, Caldeyro–Barcia R. *Proceedings of the First World Congress on Fertility and Sterility*. May 1953, International Fertility Association. Quoted by Mann, 1959.
80. Bevies C. Treatment of habitual abortion. *The Lancet* 1951; 2: 207. Quoted by Weil & Stweart, 1957.
81. Berle B, Javert C. Stress and habitual abortion: their relationship and the effect of therapy. *Obstetrics and Gynecology* 1954; 3: 298-306.
82. Javert C. Repeated abortion: the results of treatment in 100 patients. *Obstetrics and Gynaecology* 1954; 3: 420. Quoted by Weil and Stewart, 1957.
83. Grimm E. Psychological investigation of habitual abortion. *Psychosomatic Medicine* 1962; 24: 369-378.
84. Tupper C, Moya F, Stewart L, Weil R, Gray J. The problem of spontaneous abortion: I. A combined approach. *American Journal of Obstetrics and Gynecology* 1957; 73: 313-327.
85. Gray J. The problem of spontaneous abortion: II. changes in the placental villi. *American Journal of Obstetrics and Gynecology* 1956; 72: 615-621.
86. Weil R, Stewart L. The problem of spontaneous abortion: III. Psychosomatic and interpersonal aspects of habitual abortion. *American Journal of Obstetrics and Gynecology* 1957; 73: 322-327.
87. Gray J. The problem of spontaneous abortion: IV. *American Journal of Obstetrics and Gynaecology* 1957; 74: 111. Quoted by Weil and Tupper, Personality, life situation, and communication: a study of habitual abortion. *Psychosomatic Medicine* 1960; 22: 448-455.
88. Gray J, Tupper C, Rowse J. The problem of spontaneous abortion: V. the

genesis of spontaneous abortion. *Am J Obst Gynecol* 1958; 75: 43-52.
89. O'Hare T, Creed F. Life events and miscarriage. *Br J Psychiat* 1995; 167: 799-805.
90. Neugebauer R, Kline J, Stein Z, Shrout P, Warburton D, Susser M. Association of stressful life events with chromosomally normal spontaneous abortion. *Am J Epidemiol* 1996; 143: 588-596.
91. Boyles S, Ness R, Grisso J, Markovic N, Bromberger J, CiFelli D. Life event stress and the association with spontaneous abortion in gravid women at an urban emergency department. *Health Psychology* 2000; 19: 510-514.
92. Sandman C, Wadhwa P, Dunkel-Schetter C, Chicz-DeMet A, Belman J, Porto M, Murata Y, Garite T, Crinella F. Psychobiological influences of stress and HPA regulation on the human fetus and infant birth outcomes. *Annals of the NY Acad Sc* 1994; 739: 198-210.
93. Lederman R. Relationship of anxiety, stress, and psychosocial development to reproductive health. *Behavioral Medicine* 1995; 21: 101-112.
94. Ancel P, Saurel-Cubizolles M, Di Renzo G, Papiernik E, Bréart G. Risk factors for 14-21 week abortions: a case-control study in Europe. *Human Reproduction* 2000; 15: 2426-2432.
95. Davey D, MacGillivray I. The classification and definition of the hypertensive disorders of pregnancy. *Am J Obst Gynecol* 1988; 158: 892-898.
96. Wacker J, Fruhauf J, Schulz M, Chiwora F, Volz J, Becker K. Riboflavin deficiency and preeclampsia. *Obst Gynecol* 2000; 96: 38-44.
97. Kupferminc M, Fait G, Many A, Gordon D, Eldor A, Lessing J. Severe preeclampsia and high frequency of genetic thrombophilic mutations. *Obst Gynecol* 2000; 96: 45-49.
98. Steer P. The definition of pre-eclampsia. *Br J Obst Gynaecology* 1999; 106: 753-755.
99. Chappell L, Poulton L, Halligan A, Shennan A. Lack of consistency in research papers over the definition of pre-eclampsia. *Br J Obst Gynaecology* 1999; 106: 983-985.
100. North R, Taylor R, Schellenberg J-C. Evaluation of a definition of pre-eclampsia. *Br J Obst Gynaecology* 1999; 106: 767-773.
101. Xiong X, Mayes D, Demianczuk N, Olson D, Davidge S, Newburn-Cook C, Saunders D. Impact of pregnancy-induced hypertension on fetal growth. *Am J Obst Gynecol* 1999; 180: 207-213.
102. Sibai B, Watson D, Hill G, Spinnato J, Anderson G. Maternal-fetal correlations in patients with severe preeclampsia/eclampsia. *Obstetrics and Gynecology* 1983; 62: 745-750.
103. Sibai B. Eclampsia: VI. Maternal-perinatal outcome in 254 consecutive cases. *Am J Obst Gynecol* 1990; 163: 1049-1055.
104. Eskenazi B, Fenster L, Sidney S, Elkin E. Fetal growth retardation in infants of multiparous and nulliparous women with preeclampsia. *Am J Obst Gynecol* 1993; 169: 1112-1118.
105. Haelterman E, Bréart G, Paris-Llado J, Dramaix M, Tchobroutsky C. Effect of uncomplicated chronic hypertension on the risk of small-for-gestational age birth. *Am J Epidemiol* 1997; 145: 689-695.
106. Naeye R. Maternal blood pressure and fetal growth. *Am J Obst Gynecol* 1981; 141: 780-787.
107. Misra D. The effect of the pregnancy-induced hypertension on fetal growth: a review of the literature. *Paediatric and Perinatal Epidemiology* 1996; 10: 244-263.
108. Klonoff-Cohen H, Edelstein S, Savitz D. Cigarette smoking and preeclampsia. *Obst Gynecol* 1993; 81: 541-544.
109. Page E, Christianson R. The impact

of mean arterial pressure in the middle trimester upon the outcome of pregnancy. *Am J Obstet Gynecol* 1976; 125: 740-746.

110. Ales K, Norton M, Druzin M. Early prediction of antepartum hypertension. *Obst Gynecol* 1989; 73: 928-933.
111. Sagen N, Haram K, Nilsen S. Serum urate as a predictor of fetal outcome in severe pre-eclampsia. *Act Obstet Gynecol Scand* 1984; 63: 71-75.
112. Eskenazi B, Fenster L, Sidney S. A multivariate analysis of risk factors for preeclampsia. *J Am Med Ass* 1991; 266: 237-241.
113. Caritis S, Sibai B, Hauth J, Lindheimer M, VanDorsten P, Klebanoff M, Thom E, Landon M, Paul R, Miodovnik M, Meis P, Thurnau G, Dombrowski M, McNellis D, Roberts J. Predictors of pre-eclampsia in women at high risk. *Am J Obst Gynecol* 1998; 179: 946-951.
114. Willems J. The etiology of preeclampsia: a hypothesis. *Obstet Gynecol* 1977; 50: 495-499.
115. Zeeman G, Dekker G. Pathogenesis of preeclampsia: a hypothesis. *Cl Obst Gynecol* 1992; 35: 317-337.
116. Schobel H, Fischer T, Heuszer K, Geiger H, Schmieder R. Preeclampsia – a state of sympathetic overactivity. *N Eng J Med* 1996; 335: 1480-1485.
117. Lewinsky R, Riskin-Mashiah S. Autonomic imbalance in preeclampsia: evidence for increased sympathetic tone in response to the supine-pressor test. *Obst Gynecol* 1998; 91: 935-939.
118. Knapen M, Mulder T, Van Rooij I, Peters W, Steegers E. Low whole blood glutathione levels in pregnancy complicated by preeclampsia or the hemolysis, elevated liver enzymes, low platelets syndrome. *Obst Gynecol* 1998; 92: 1012-1015.
119. Acromite M, Mantzoros C, Leach R, Hurwitz J, Dorey L. Androgens in preeclampsia. *Am J Obstet Gynecol* 1999; 180: 60-63.
120. Zusterzeel P, Visser W, Peters W, Merkus H, Nelen W, Steegers E. Polymorphism in the glutathione S-transferase P1 gene and risk for preeclampsia. *Obst Gynecol* 2000; 96: 50-54.
121. Dekker G, Sibai B. Etiology and pathogenesis of preeclampsia: current concepts. *Am J Obst Gynaecol* 1998; 179: 1359-1375.
122. Sibai B. Prevention of preeclampsia: a big disappointment. *Am J Obst Gynecol* 1998; 179: 1275-1278.
123. Spielberger C, Krasner S, Solomon E. The experience, expression and control of anger. pp. 89-108. In Janisse, M. (Ed.) *Health psychology: individual differences and stress*. New York, Springer Verlag/Publishers, 1988.
124. Spielberger C, Crane R, Kearns W, Pellegrin K, Rickman R, Johnson E. Anger and anxiety in essential hypertension. pp. 265-283. In Spielberger, C. & Sarason, I. (Eds.) *Stress and Emotion*, V. 14. New York, Hemisphere/Taylor & Francis, 1991.
125. Hetzel B, Bruer B, Poidevin L. A survey of the relation between certain common antenatal complications in primiparae and stressful life situations during pregnancy. *J Psychosom Res* 1961; 5: 175-182.
126. Coppen A. Psychosomatic aspects of pre-eclamptic toxaemia. *J Psychosom Res* 1958; 2: 241-265.
127. Klonoff-Cohen H, Cross J, Pieper C. Job stress and preeclampsia. *Epidemiol* 1996; 7: 245-249.
128. Ringrose C. Psychosomatic influences in the genesis of toxemia of pregnancy. *Canada Med Ass J* 1961; 84: 647-651.
129. Glick I, Salerno L, Royce J. Psychophysiologic factors in the etiology of preeclampsia. *Arch Gen Psychiat*

1965; 12: 260-266.
130. Pilowsky I, Sharp J. Psychological aspects of preeclamptic toxaemia: a prospective study. *J Psychosom Res* 1971; 15: 193-197.
131. Poland M, Giblin P, Lucas C, Sokol R Psychobiological determinants of pregnancy-induced hypertension. *J Psychosom Obst Gynecol* 1986; 5: 85-92.
132. Nisell H, Larsson G, Wager J. The relation between life stress and hypertensive complications during pregnancy. *Act Obst Gynecol Scand* 1989; 68: 423-427.
133. Kurki T, Hiilesmaa V, Raitasalo R, Mattila H, Ylikorkala O. Depression and anxiety in early pregnancy and risk for preeclampsia. *Obst Gynecol* 2000; 95: 487-490.
134. Rofé Y, Goldberg J. Prolonged exposure to a war environment and its effects on the blood pressure of pregnant women. *Br J Med Psychol* 1983; 56: 305-311.
135. Bibring G. Some considerations of the psychological processes in pregnancy. *The Psychoanalytic Study of the Child* 1959; 14: 113-121.
136. Bibring G, Dwyer T, Huntington D, Vallenstein A. A study of the psychological processes in pregnancy and of the earliest mother-child relationship – I. Some propositions and comments. *The Psychoanalytic Study of the Child* 1961; 16: 9-24.
137. Bibring G, Dwyer T, Huntington D, Vallenstein, A. A study of the psychological processes in pregnancy and of the earliest mother-child relationship – II. Methodological considerations. *The Psychoanalytic Study of the Child* 1961; 16: 25-72.
138. Colman A, Colman L. *La grossesse: expérience psychologique*. Paris, Editions Robert Laffont, 1973.