

in the lungs, and on the mucous glands, which were supposed to become affected in the same manner as the sweat glands. In experiments, Rossbach observed that atropine acts very strongly upon the tracheal mucous membrane. He invariably found that the membrane, which had been secreting normally and was very moist, became absolutely dry. Gradually very decided hyperæmia supervened; yet no secretion occurred for an hour or longer, and afterward returned very slowly and feebly. The persistence of the dryness, notwithstanding the hyperæmia, proved that atropine acts on the mucous glands or secretory nerves. It is therefore an appropriate remedy in bronchial and pulmonary diseases, when the cough depends upon copious secretion in the trachea and bronchial tubes.

Morphine lessens cough in two ways—by diminishing secretion, and by lowering the excitability of the respiratory centre.

Rosbach observed that, normally, after removal of the mucus from the tracheal mucous membrane, about twenty seconds passed before the membrane was again completely moist. But after subcutaneous injections of morphine, the membrane did not become equally moist before the lapse of from eighty to one hundred seconds.

Cough may be very readily produced by slightly irritating the normal mucous membrane of the larynx and trachea, especially near the bifurcation of the bronchi. An hour after injecting morphine, Rossbach found that only very severe irritation produced cough, while gentle irritation had no effect.

When used simultaneously, both alkaloids act, lowering the excitability of the respiratory centre and notably lessening secretion. In chronic catarrhs, emphysema, and phthisis, with copious expectoration, they have been found of great utility. In phthisis, when the expectoration comes from cavities, no very marked diminution can be produced.

As a rule, the two alkaloids should be prescribed separately—atropine to be taken only in the evening, between six and ten o'clock; and morphine, in very small doses, during the day.

Codeine.—Codeine has recently come into use as a means of allaying cough. According to numerous reports, it is generally as effectual as morphine or the preparations of opium. Often it has been observed that the cough of mild forms of bronchitis ceased in a few days. But its principal advantage is that it does not depress the functions of the alimentary canal. The use of morphine is usually followed by a diminution of appetite, and often by constipation. Codeine, while it allays the cough, does not interfere with the appetite, or with the normal action of the bowels. This has been especially observed in phthisis, in which codeine was found to mitigate the cough without lessening the desire for food. When, to test the difference in action, Dover's powder was given to patients that had been taking codeine, the appetite, which had improved under the use of codeine, diminished again, showing the decided superiority of codeine. It has been found to be very useful in the bronchitis of children, and, in appropriate doses, has been given to infants, without any unpleasant effects.

Codeine should therefore be preferred to morphine in all cases of severe cough in which it is necessary to maintain a good appetite, as in bronchial catarrhs complicating chronic wasting diseases, in children, and in persons subject to constipation. Especially, should codeine be preferred to morphine to relieve the cough of phthisis; for if the means used to mitigate this tormenting symptom interfere with digestion and nutrition, little hope of saving life can be entertained.

The salts of codeine commonly used are the sulphate, phosphate, and hydrochloride. They all readily dissolve in water, and are usually prescribed in aqueous solution with a small quantity of syrup, or together with sugar in the form of powder. The dose for adults is gr. $\frac{1}{4}$ to gr. $\frac{1}{2}$; for infants, gr. $\frac{1}{16}$; and for children three or four years of age, gr. $\frac{1}{16}$ to gr. $\frac{1}{8}$, from three to five times daily.

Heroine, a derivative of morphine—diacetyl morphine—is rapidly coming into use as a cough remedy. It is a white powder, having a bitter taste, not easily soluble in water, but readily soluble in water acidulated with a few drops of acetic acid. Its salt, heroine hydrochloride, is soluble in two parts of water.

Heroine was introduced in 1898 by Prof. H. Dreser, of Elberfeld. In experiments upon animals Dreser had found that heroine notably slows the respiratory process and renders it deeper. He administered it in doses of 0.01 to patients having cough and found it to give much relief.

Harnack in experiments upon dogs observed also notable slowing of respiration, but it became decidedly weaker; hence he concluded that heroine is more poisonous than morphine and should not be given in doses larger than 0.005. Strubbe experimented upon dogs, cats, and rabbits, and obtained results agreeing essentially with those of Dreser. Sartissen, on the contrary, found the respirations shallower, although slower.

Numerous clinical observations of the action of heroine have been made in hospitals and in private practice, and with nearly uniformly good results. Perhaps the most careful observations are those of Brauser, made in Ziemsen's clinic. In eighty cases an accurate record was kept, and control trials were made with simple sugar, codeine, and morphine. The cases treated embraced phthisis, acute and chronic bronchitis, croupous pneumonia, pleuritis, cardiac dyspnoea, and patients having pain from other causes. In the great majority of the cases heroine promptly lessened the cough. Usually this result followed when 0.005 was given in the morning and at noon, and 0.01 in the evening. In most cases the respirations were slowed, often from five to eight in a minute, sometimes only two or three. In the same patients sometimes the respirations were lessened, sometimes uninfluenced. In about one-third of the cases no change in the frequency of respiration could be observed, especially in cases not presenting any marked acceleration. This occurred, however, also when the respiratory process was greatly accelerated, especially in pneumonia. In some cases of cardiac dyspnoea the action of heroine was notably beneficial, the breathing becoming slower and more nearly normal.

From these and numerous other cases Brauser concluded that heroine acts as promptly and effectually as morphine in relieving cough, and that it is very useful in dyspnoea, though not certain, giving decided relief in only about two-thirds of the cases treated.

Floret observed that heroine when given together with apomorphine produced disagreeable effects—vertigo and headache. In phthisis, when not far advanced, the combination of heroine and duotal (heroine 0.005-0.01; duotal 0.5, given four times daily) was followed by general improvement and a notable retrogression of the objective symptoms.

Samuel Nickles.

EXPECTORATION. See *Sputum*.

EXPERT MEDICAL EVIDENCE.—In the last few years the medical expert witness has figured prominently in many celebrated criminal and civil actions. At first his evidence was received by the court and jury with the deference and respect which honesty, intelligence, and learning always inspire. But in more recent times many things have conspired to place the medical expert witness on a much lower plane than he formerly occupied. The principal reasons for this degeneration may be found in the seeming partisanship of some of those who take the stand as experts; the employment of witnesses who are qualified neither by education nor by experience to act as experts; and the opinion, which has become impregnated in the public's mind, owing to the methods of procedure followed by the attorneys in the case, that the most able experts can be hired to swear to diametrically opposite conditions of facts. All of these things together have operated to prejudice the people, and consequently the jurors, against the introduction of medical expert evi-

dence. Indeed in more than one instance talesmen have been rejected as jurors because of their avowed disbelief in, and determination to reject, all expert evidence.

Medical expert evidence should, theoretically, often be of inestimable service in that it is perhaps the only way in which certain facts vital in importance can be brought to the attention of the jury, and the relation of these facts to the case explained. A medical expert is one who by study and experience has become especially learned or skilled in some branch of medical science and whose judgment and opinions therefore are sounder than those of the average physician. It is of the greatest importance, therefore, that one who poses as an expert should actually be qualified to act as such. Attorneys are not always careful in the selection of their medical witnesses, either from ignorance or because they cannot or will not pay the fees which the expert generally demands, and they often call to the stand physicians of excellent general knowledge but who are not at all prepared to meet the ingenious questions of a skilful cross examination. Again, the fault is with the physician who, tempted either by the pecuniary reward for his services or by the opportunity of achieving a certain degree of notoriety, places himself in a position which his limited knowledge and experience are inadequate to support. His answers to questions clearly show, to the expert at least, that he does not possess an intimate knowledge of his subject, and when confronted by an expert witness there often follows a flat contradiction of opinion. The evidence of the medical witness, like the evidence of any other witness, is addressed to the jurors and is for their consideration. They do not always know who are experts and who are not; so generally regard all the medical witnesses as possessing the same degree of skill and ability. They cannot, of course, be expected to detect the ignorance on the part of a medical witness which is so apparent to the expert. They simply recognize the contradictions which necessarily arise in a conflict between ignorance on the one hand and knowledge on the other; and confusion of mind and doubt naturally follow. For this reason medical evidence is sometimes completely ignored by the jurors and falls greatly in public estimation. The medical witness should never allow himself to act in the dual rôle of witness and associate counsel. The spectacle is seen at nearly every trial of prominence, and in many others, of one or more physicians sitting close to counsel, taking copious notes of the evidence, formulating questions to be used in direct and cross examinations, looking up references and in reality conducting the medical part of the prosecution or defence, and then when their turn comes taking their place in the witness chair to act as experts. Associate medical counsel is often of valuable assistance. No matter how skilful an attorney may be or how thoroughly he has studied his case, a well-trained medical mind can point out to him many features, and give him many suggestions which would otherwise escape him. A counsel often strengthens his case by the help of a medical associate and the employment of a physician as such is perfectly proper from every standpoint. But for such a one to take the stand as a witness stamps him as a partisan to the jury. It cannot help but regard him as a biased witness, who comes prepared to fight for "his side" of the case. The influence of his testimony is, of course, much less than that of the witness who confines himself to his duties as a witness only. It is, of course, incumbent on a physician who purposes to act as an expert witness to point out the medical aspects of the case to counsel and to suggest such questions for the direct examination as will enable him to express his investigations, deductions, and opinions in his own way and to his best advantage. He may also with propriety suggest the general course of the direct and cross examination of other experts, but further than this he should not go and cannot go without seriously compromising himself as an unbiased witness. Even the construction of hypothetical question which generally terminates the expert witnesses' direct examination, should not be performed by him. He may

point out to counsel the medical facts which should be incorporated in the question. But should the fact be elicited from the witness that he was the author of the question he has just replied to, the force of his answer is lost and his value as a witness is greatly diminished.

It generally appears to the public, particularly in notorious trials, that a certain number of experts called by one side swear positively and diametrically opposite to the experts called by the other side. It is this feature which has called down so much and so unfavorable criticism upon the medical expert witness and upon the value of expert testimony in general. A great deal has been written and much thought given to the formation of a plan by which medical expert testimony can be employed without the objectionable features which now mar it and yet preserve the constitutional rights of the prosecution or defence. It is not a simple question for solution, and none of the methods which have so far been advocated seems to fulfil all the requirements of the case. The fault lies mainly with the attorneys and not with the experts. It seems, at first glance, as if the experts on one side flatly contradict the experts on the other. This may be the case in some instances, for two minds working upon the same assumption may come to different conclusions. But it is not generally so, at least, in medicine. In trials, as they are conducted at the present time, there is no possible chance for an agreement of the experts. The witnesses for the two sides are not asked to give opinions based upon the same assumptions; each counsel has his own hypothetical question which differs from that of his opponents as night differs from day. They are based upon absolutely different assumptions of facts, and the answers given are in accordance with the assumption in each question. Should the opposing counsel exchange hypothetical questions, the answer of every expert witness would be changed also.

The expert opinions are of no value at all unless the assumptions contained in the hypothetical question are proved to be true. If the jury believes the assumptions in one hypothetical question, then the expert opinions based thereon are worthy of consideration; otherwise not. If these points were generally understood, it would be comprehended that the seeming clashing of expert opinions is in reality nothing of the sort, but that the opinions given are nearly what they claim to be, honest answers to absolutely different questions.

Another feature which stands in the way of obtaining the best expert evidence is the purposeful and wilful interference with which one attorney in the action foils every attempt, to the best of his ability, of the expert called by his opponent to obtain those details of the case which are requisite for the establishment of a sound medical opinion, while every facility is freely granted for every investigation his own experts desire to make. Thus a man on trial for murder pleads insanity. The experts called by his counsel have frequent interviews with the accused, and on these occasions he talks freely and openly and submits willingly to any examination they may desire. The relatives and friends communicate the family history, the personal history, and any other facts which may be of service to the examiner, and he comes into court well informed in every detail of the medical features of the case. But how is it with the expert called by the state? Has he had an equal chance for rendering a truthful solution of the question? He certainly has not. When he interviews the accused he is not welcomed. The prisoner sees in him a man who is to assist in taking his life and therefore gives as little information as he can. He is often carefully coached as to the replies he is to make to certain questions, and the friends and relatives either give no information at all or else give that which is either false or misleading. As a rule the examiner obtains but little more information than can be derived from a study of the physical symptoms, which in many cases is absolutely insufficient for a satisfactory diagnosis. These defects in the present system of expert medical evidence are frankly admitted by both physicians and lawyers, and any method by which

an unbiased and uncontradicted expert opinion could be obtained without infringing upon personal rights, would be gladly welcomed by both professions. The plan most constantly urged is the appointment of a board of experts commissioned by the court to make a physical or mental examination, or both, as the case may be, and then to report the result of its findings to the court and jury. This seems simple, and no doubt it would prove to be a most satisfactory method if the question could be ended then and there. But it would not end there. A party to an action has a right to call any witness whose testimony will tend to prove his allegations. Should the report of the commission of experts be adverse to his interests he may call his own experts, who may not agree with the commission and then there is the same old story of expert against expert.

A most simple and effective method and one which, while it preserves the rights and liberties of all the parties concerned, would result in more harmonious expert evidence, is the following: Each party to the controversy shall select such expert or experts as they may desire. When this has been accomplished to the satisfaction of both parties, it shall be obligatory that every examination of the plaintiff or defendant, as the case may be, shall be made in the presence of all the experts together and shall be participated in by all the experts. And that at each examination counsel for both parties shall be present, and an official stenographer who shall report verbatim what was said and also what was done by each examiner in the line of his examination, and that a copy of the report of each examination shall be furnished to each counsel and to the court to be used by counsel on the direct and cross examination of each expert; and that all information relating to the question supplied to or acquired by any expert shall be furnished to every other expert. By this means all the experts will have an equal knowledge of the case and each will have every opportunity for forming a correct opinion. The stenographer's report, showing each expert's complete examination, in the hands of counsel will do more to secure a unanimity of opinion than anything else could do.

When everything has been said, however, and the question has been considered from all its standpoints, it must be admitted that expert medical testimony, which should be a valued, scientific, and honored method of assisting justice to know the truth, has been prostituted by those attorneys who are willing to use any means to save a client or secure a verdict, and by physicians who are willing to lend themselves for such a purpose. The medical expert should be regarded as a scientist, and expert evidence should be received by court and jury with respectful consideration. It is the medical expert himself who is to blame. When he recognizes this fact the remedy will quickly follow. The medical profession is respected everywhere but in the courts. Let it be seen that it is respected there also.

Graeme M. Hammond.

EXTRA-UTERINE PREGNANCY.—By extra-uterine pregnancy we mean those instances in which the fertilized ovum is arrested somewhere in its course from the ovary to the uterus and there undergoes development. The term ectopic gestation has a somewhat broader meaning than extra-uterine pregnancy, and has reference not only to such cases as mentioned above, but also to those instances in which the pregnancy occurs in some abnormal diverticulum of the uterus.

Until as recently as 1883 the condition was of interest chiefly from its pathological standpoint; and few or even no cases were recognized clinically. But from that date, at which time Tait operated on his first case of ruptured tubal pregnancy, the clinical interest in the affection has been markedly increasing, as is shown by the decided increase in the literature on the subject and the apparent increase in the frequency of the condition.

FREQUENCY.—Before extra-uterine pregnancy came to be recognized clinically and at autopsy, observers were much misled as to its frequency; and consequently such

statements as that made by Hennig, in 1876, to the effect that the affection is so rare that the directors of large obstetrical clinics might never see a case of it, were not to be wondered at. On the other hand, the data now available might readily lead one to suppose that the frequency has markedly increased since that time. Thus, for example, Parry, in 1876, was able to collect only five hundred cases that had been reported up to that time, while in 1892 Schrenck collected six hundred and ten cases which had been reported in the five previous years.

This apparent increase in frequency has also been noted in the experience of individual operators and in single clinics. The increase, as a matter of course, is more apparent than real; it is due unquestionably to our improved methods of diagnosis and greater knowledge of the subject.

ETIOLOGY.—So many theories have been advanced to explain the occurrence of extra-uterine pregnancy that it is impossible to make any very definite statements as to its etiology. J. Whitridge Williams, after a most exhaustive review of the literature, gives the following classification, which, although somewhat complicated, is probably the best which, in the present state of our knowledge, can be offered. He divides the etiological theories into four groups:

I. *Conditions which Interfere Mechanically with the Downward Passage of the Ovum.*—(a) Peritoneal adhesions. This is one of the earliest explanations for the occurrence of extra-uterine pregnancy and is still held by many to be the principal one. The adhesions act either by directly compressing the lumen of the tube, or by interfering with its muscular action; both of which conditions are sometimes verified at operation or at autopsy.

(b) Tubal polypi, projecting into the cavity of the tube and therefore impeding the downward passage of the ovum, have been found by certain operators. Williams in his analysis is of the opinion that only a few of the cases in which this condition was stated to have been the cause are at all convincing, and he agrees with Ahlfeld in thinking that in many cases the "tubal polypi" are merely decidual ingrowths, the result rather than the cause of the extra-uterine pregnancy.

(c) Tumors of the tube wall and in some instances tumors of adjacent organs have been said to play a similar part by compressing the lumen of the tube.

(d) Salpingitis. The suggestion was made by Schroeder and Tait that inflammation of the lining of the tube so damaged the cilia of the mucous membrane that a downward current was no longer produced and consequently no obstacle was offered to the entrance of the spermatozoon into the tube. This view presupposed that fertilization normally took place in the uterus and that the ciliary currents favored a meeting of the male and female cells at the fundus. We know now, however, that the currents throughout the utero-tubal tract run in the same direction, viz., from above downward, that the spermatozoon has to work against the stream from the time it enters the internal os, and that as fertilization normally takes place in the tube all pregnancies are primarily tubal. Microscopic examination, furthermore, has not confirmed the view put forward by Schroeder and Tait, for in these cases of tubal pregnancy ciliated epithelium is usually found covering the mucosa.

(e) Obstruction by twin ova. The comparative frequency of the coexistence of extra- and intra-uterine pregnancy has led certain observers to suggest the possibility of the mutual interference of twin ova as a cause for tubal pregnancy.

(f) Fetal twisting of the tube. While the Fallopian tube in adult life is a comparatively straight canal, that of the fetus is a convoluted one. These convolutions may persist in adults, and may then stand in causative relation to certain forms of tubal disease, notably extra-uterine pregnancy.

(g) Diverticula of the lumen of the tube. The occasional presence of these diverticula was demonstrated by Williams in 1891, and he at that time suggested that they might be shown to act as a causative factor in certain cases

of tubal pregnancy. While he is still of the opinion that such a state of affairs may exist, he admits that he has been misled by some of his specimens in which he found the fertilized ovum lying outside of an apparently intact tubal lumen. Since Peters has demonstrated in the uterus that the ovum burrows down beneath the epithelium, which finally closes to form an intact surface over it, there is reason to believe that the same thing occurs in the tube; thus explaining the fact that in early cases of tubal pregnancy the ovum may be entirely outside of the lumen of the tube.

(h) Puerperal atrophy of the tube. Dührssen has reported cases of extra-uterine pregnancy which have occurred in an incredibly short time after labor, in some instances even while the mothers were nursing their children. In these instances he considers the cause to be a puerperal atrophy of the tube which interferes with its peristalsis. In one case operated upon by the author this factor may have been present. The pregnancy probably began six weeks after the birth of a dead child, and tubal rupture took place six weeks later.

(i) External migration of the ovum, which is quite a common occurrence in extra-uterine pregnancy, has been given as a causative factor by some investigators, they holding that the fertilized ovum in its transit through the peritoneal cavity attains such a size that its transmission through the opposite tube is an impossibility.

II. *Abnormal Conditions Resulting from Inflammatory Diseases of the Tubes, Ovaries, and Pelvic Peritoneum.*—Mention has already been made of the part that the absence of cilia is supposed to play in the causation of extra-uterine pregnancy and little need be added to this statement. Most cases of tubal pregnancy will reveal a history of pre-existing inflammatory trouble, and it is the rule to find some other abnormality besides the pregnant tube at operation or autopsy. This has given rise to the statement that an inflammatory condition of the pelvic organs is the principal cause of extra-uterine pregnancy, but, unfortunately for the correctness of this statement, actual examinations, at operation or at autopsy, show that such an inflammatory condition is not present in all cases. On the other hand, the fact that tubal pregnancy occurs repeatedly in women suffering from gonorrhoea certainly favors the above statement.

III. *Physical and Developmental Conditions which Favor Decidual Formation in the Tubes.*—This theory was originated by J. C. Webster, who was not satisfied with the numerous etiological views that had been advanced. He recalls the fact that as the uterus and tubes are both developed from the same embryonic structure, the Müllerian ducts, there is no reason why the ovum should not be implanted upon the upper as well as upon the lower portion of the tract. Normally, the lower portion of this duct becomes differentiated from the upper, so that in the latter the conditions are not such as to favor the formation of a decidua. Abnormally, on account of some developmental anomaly or reversion to an earlier type, the condition of the tubal mucosa is such that a decidua can form, and in such instances we can get an extra-uterine implantation of the ovum. This view has been adopted by a number of observers, but, as is readily seen, it is based upon a theoretical rather than upon a practical basis.

Other observers, among whom may be mentioned Moericke and Fehling, have elaborated Webster's idea in that they claim that the occurrence of extra-uterine pregnancy is a reversion to an earlier type, brought about by poor hygienic conditions. The former authority, basing his conclusions upon a large number of gynecological patients who were under his care in Chili, states that extra-uterine pregnancy is a very rare occurrence among them, whereas at the Clinic in Stuttgart it was observed quite frequently. He attributes this marked difference to the fact that the Chilean women lead an outdoor life, while those of Stuttgart are subjected to very poor hygienic surroundings.

External migration of the ovum, the frequency of which in extra-uterine pregnancy has already been referred to, has led Sippel to put forth a view that is more

or less closely allied to that of Webster. Sippel claims that it is necessary for a certain length of time to elapse between fertilization and decidual formation. Thus, when external migration occurs, the ovum is delayed in reaching the genital tract, and then finds in the tube conditions favorable for the formation of a decidua. This view is an interesting one, but is purely theoretical.

IV. *Conditions of the Ovum which may Favor its Arrest in the Tube.*—A few years ago, when the general opinion was that the uterine and tubal epithelium was converted into syncytium, Strassman was of the opinion that as the ovum entered the tube covered by the cells of the membrana granulosa, it could not become attached to the syncytium of the tube until this layer of granulosa cells had disappeared; but if the layer of granulosa was diminished in amount, or if for any reason it was absent, the naked ovum came into direct contact with the syncytially changed tubal mucosa and there became attached, while normally the layer of granulosa prevented this occurrence until the ovum had reached the uterus. This view is no longer tenable, for opinion is now unanimous that the tubal and uterine epithelium does not undergo this change,—i. e., into syncytium,—but that the latter is derived from the fetal ectoderm.

It is therefore very evident that there is no lack of theories as to the causation of extra-uterine pregnancy. The mechanical theories must be given a certain amount of consideration, but they are open to the objection that while mechanical obstacles are frequently present, the existence of extra-uterine pregnancy is of comparative rarity. On the other hand, recent experimental work on animals—ligation of the tubes and uterine cornua—has failed to cause extra-uterine development of the ovum, after the animal under consideration has been put to the male. Thus these experimenters believe that the supposed extra-uterine pregnancy in the lower animals is really uterine, the mistake being due to confounding the tubes and uterine horns with one another. Tubal diverticula may play an important part, and in some cases undoubtedly exist; but this again cannot hold good for all cases. The same may be said of inflammatory conditions.

We had best close this portion of the subject by quoting from Williams, who summarizes as follows: "The etiology of extra-uterine pregnancy is not a simple matter, and there is no universal cause for all cases. Careful study of the specimen and of the patient's history will give us a satisfactory explanation for its occurrence in the majority of cases, but in a small number we cannot account for the production of the affection, and its cause will remain to us as great a problem as to our predecessors."

CLASSIFICATION.—The fertilized ovum may be arrested at any point between the ovary and uterus. We may thus distinguish between ovarian and tubal pregnancy according as the development occurs in either of these organs. To these two forms some add a third, viz., abdominal pregnancy; but there is considerable doubt as to whether a primary implantation can take place on the peritoneum and thus give rise to this form of pregnancy.

Ovarian Pregnancy.—Ovarian pregnancy was first described early in the seventeenth century, and in the eighteenth was pretty generally recognized. In 1835 Velpeau made the statement that many of the cases described as ovarian pregnancy were open to objections, and he took the rather radical view that none of the cases reported gave to him conclusive evidence as to their ovarian origin. Observers in general agreed with him, and at present there are few who believe in the existence of ovarian pregnancy.

There is evidence, however, that the condition undoubtedly does exist, although very rarely; and, since Spiegelberg reported a case of this nature in 1878, we are in possession of certain criteria by which an ovarian pregnancy can be recognized. Spiegelberg demands that the following conditions be noted before we can make a diagnosis of a given extra-uterine pregnancy being ovarian: (1) The tube on the affected side must be intact. (2) The fetal sac must occupy the position of the ovary. (3) It must