An Address

ON

THE EXOTIC FLORA OF THE UTERUS IN RELATION TO FIBROIDS AND CANCER.

DELIVERED BEFORE THE BRADFORD MEDICO-CHIRURGICAL
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IN the year 1910, at the Middlesex Hospital, the uterus was removed for fibroids on 65 occasions, and all the women recovered. During the same period the uterus was extirpated for cancer of its neck in 17 women, and of these 4 died. The annual report for that year shows that 13 patients with cancer of the cervix uteri were examined under an anaesthetic and found to be "inoperable." In 5 more women with the same disease the condition of the pelvic organs was examined through an incision in the abdominal wall, and proved to be unsuitable for hysterectomy. Thus, out of 35 women with this terrible disease 17 were selected with extreme care as suitable for hysterectomy, and of these 4 died from the operation or its sequelae.

Although these facts are taken from the reports of one hospital, the results are by no means peculiar to it. An examination of the reports of some other hospitals in London reveals practically the same picture. In the year 1910 abdominal hysterectomy was performed for fibroids in seven hospitals in London on 370 patients with 9 deaths:

	Cases.	Deaths.
Middlesex	65	0
Chelsea (for Women)	113	2
Samaritan (for Women)	53	3
New (for Women)	41	1
University	14	0
St. Thomas's	50	3
St. Bartholomew's	34	0
	370	9

In that year (1910) abdominal hysterectomy was performed for cancer of the neck of the uterus in the same hospitals as in the preceding table on 81 patients with 13 deaths:

	Cases.	Deaths.
Middlesex	17	4
Chelsea (for Women)	12	2
Samaritan (for Women)	17	1
New (for Women)	12	0
University	9	2
St. Thomas's	11	3
St. Bartholomew's	3	1
	81	13

The explanation of the difference in the results of removing the uterus for fibroids and for cancer of the neck of the uterus is simple and interesting. It depends mainly on the flora of the uterus.

Bacteriology of the Female Genital Tract.

A large amount of patient labour has been expended in investigating the bacteriology of the female genital tract. The varieties of micro-organisms found there are numerous, but the chief are the gonococcus, streptococcus, staphylococcus, and the tubercle bacillus. Of these the gonococcus attacks mainly the mucous membrane, and is more destructive to function than to life. The streptococcus flourishes in loose connective tissues, and when this tissue is vascular, as in the neighbourhood of the uterus, the micro-organism enters blood vessels and lymphatics. It invades the uterine and periuterine tissues through breaches of continuity in the genital tract caused by childbirth, miscarriage, operations on the uterus, and criminal abortion. The streptococcus is especially destructive to life and often flourishes in company with the staphylococcus, *Bacillus coli communis* and *Bacillus pyocyaneus*.

Until the advent of puberty the uterus is functionless and free from micro-organisms. When the girl becomes pubic and sexual life is established, she runs risks from two sources: Infection when the male suffers from urethritis, especially gonorrhoea; and, if she become pregnant, the danger of accidental sepsis at the lying-in. The infection has unfortunate results; some of the patients die. In others the infective agents die, the inflammatory changes in the tissues subside, but the essential organs of reproduction are often so damaged that these infected women become chronic invalids, incapable of conceiving.

The common agents of wound infection are universal in civilized communities; they are present in dust, soiled clothes, dirty surgical instruments, and the like. They exist in suppurating sores on the fingers of doctors, midwives, and nurses, and on the body of the patient. The transmission of pathogenic micro-organisms can only be avoided by scrupulous cleanliness. The leading features of septic infection of the puerperal uterus are well-known. A woman with a submucous fibroid in her uterus, like a pregnant woman is very liable to become septic, but with this difference: Pregnancy terminates at some date within a period of thirty-six weeks, but a fibroid may be retained for thirty-six years, and during the whole of this period the uterus persistently endeavours to extrude it. These extruding efforts dilate the mouth of the uterus and open the door to pathogenic micro-organisms. In fact, a woman with a submucous fibroid is like a parturient woman with a retained piece of placenta and is menaced with the liability of septic infection as long as she retains it. When the uterus succeeds in extruding a submucous fibroid into the vagina and the condition is recognized, the surgeon promptly removes the tumour and no harm follows; but when the extruded fibroid is allowed to remain, it becomes oedematous because its circulation is interfered with, or the surface of the tumour may be abraded, or ulcerated. Breaches of continuity of its surface allow micro-organisms, present in the vagina, to colonize the tumour and convert its tissues into a stinking, decomposing slough. The infection extends to the endometrium and a condition identical with puerperal fever is established. An extruded uterine polypus the size of a golf ball infected with streptococci sometimes destroys life quicker than a virulent cancer.

A woman with cancer of the neck of the uterus is in much the same condition as one with an extruded and septic fibroid, for the cancerous tissues soon become invaded with pathogenic flora; of these the streptococcus is the most deadly. The micro-organisms which flourish in cancerous tissue make this disease so destructive to life; the streptococci in uterine cancer are very virulent, especially for the peritoneum.

The Relics of Bacterial Invasion.

The tolerance of the tissues in regard to micro-organisms varies enormously. For example, the gonococcus thrives and multiplies for a time and then dies out, but leaves its mark in the pelvis in the form of occluded Fallopian tubes, pyosalpinx, and adhesion of the uterus to the bowels, the omentum, bladder, and adjacent peritoneum. A woman with subserous fibroids is as liable to contract gonorrhoea as one free from such tumours, but when the infecting exudate leaks into the pelvis, in addition to its damaging effect in cementing the ovaries and tubes to each other, and sealing up the tubal ostia, it glues the surface of a subserous fibroid to any adjacent viscous. In my early operations on acute chronically infected tubes and ovaries I was often astonished that patients recovered after a large pus sac had burst in the course of removal and drenched the pelvic organs with pus. This led me to have a careful bacteriological investigation made as a routine measure of all tubes removed for inflammatory troubles. They were, as a rule, sterile. Occasionally in a pyosalpinx, which had burst through the rectum and then refilled, the reaccumulated pus would contain the colon bacillus or the streptococcus. It was in the course of this investigation I obtained conclusive evidence that gonorrhoeal exudate leaking into the pelvic cavity sets up peritonitis; in the acute stage the gonococcus can be obtained in pure culture from the peritoneal exudate. This is no longer disputed.

Uterine Infections form Two Groups: Puerperal and Non-puerperal.

Clinically uterine infections form two groups—puerperal and non-puerperal. In the former group the streptococcus is the dominant organism and in the latter the gonococcus. Both organisms cause destructive changes in the tubal tissues; after the micro-organisms have died out, there is nothing in the lesions which enables us to decide whether the damage to the tissues was caused by a gonorrhoeal or a mild streptococcal infection. In clinical terms this means it is impossible to decide in a chronic case whether the trouble began as a puerperal or a non-puerperal infection. The tendency for micro-organisms to die out also applies to tuberculous lesions; it requires much patience to demonstrate the presence of the tubercle bacillus in tuberculous disease of the tubes and endometrium. This bactericidal power of the tissues explains the success which attends surgical enterprises on the Fallopian tubes and the uterus when they are damaged as the result of chronic infection.

Sixteen years ago I satisfied myself that in tubal lesions—such as pyosalpinx, tubo-ovarian abscess, and hydrosalpinx—it was rare in the chronic stages to find micro-organisms in the diseased tissues. This was a stumbling-block in determining the factor which caused the initial lesions. It interested me to find that Dr. N. F. Lock, in an excellent investigation carried out at St. Thomas's Hospital (1911), has come to the same conclusion.

I have again felt it necessary to inquire into the micro-organisms of the uterus in order to seek an explanation for the extraordinary frequency with which pulmonary embolism occurs after hysterectomy for fibroids and for cancer, whilst it is unknown to me after operations performed for lesions due to the gonococcus.

The Spectre of Convalescence after Hysterectomy.

Among the many advances in surgical art which have taken place since the foundation of this society in 1863 the establishment of pelvic surgery holds a foremost place. At that date the word "hysterectomy" was unknown. The principles concerned in the transport, destiny, and effects of emboli had just been made plain; pyaemia was endemic in every hospital and antiseptics unknown, and the surgical treatment of uterine fibroids was attended by such a heavy mortality that the removal of the uterus ranked as one of the most dangerous operations in surgery. To-day a subtotal hysterectomy for fibroids is one of the safest and most beneficent operations in the whole range of surgery; but I regret to add that there is one danger connected with this operation which invests it with peculiar anxiety—namely, fatal pulmonary embolism. Indeed, every surgeon who has had much experience of hysterectomy fears this sequel, for it occurs so suddenly and so unexpectedly in patients who are apparently making a satisfactory recovery that this tragic occurrence may be spoken of as the spectre of convalescence.

It is difficult to determine the actual frequency of pulmonary embolism as a sequel of hysterectomy, for surgeons are very reluctant to publish their experience; but there is sufficient evidence available to give some notion of its relative frequency and the variations met with in the practice of different surgeons. Baldy states that among 366 operations for fibroids in the Gyneccean Hospital, Philadelphia, there were 13 sudden deaths attributed to embolism. In the Middlesex Hospital from 1896–1906, both years inclusive, there were 212 abdominal hysterectomies for fibroids, and of these patients 3 died from pulmonary embolism. At the New Hospital for Women, London, during 1901–1910 hysterectomy was performed for fibroids on 189 patients, and of these 2 died from embolism.

In the practice of individual surgeons the frequency of fatal pulmonary embolism varies widely. Lyle, among 8 subtotal hysterectomies for fibroids, lost 1 patient; H. R. Spencer lost 2 patients from this cause out of 85 total hysterectomies, and Olshausen lost 5 patients among 366 who had hysterectomy performed for fibroids. Among 1,500 abdominal operations for fibroids I lost 3 patients from pulmonary embolism. A broad study of statistics indicates that in the practice of some surgeons fatal pulmonary embolism occurs in at least 1 per cent. of the patients who have abdominal operations performed for

fibroids. This tragic mode of death is more frequent after total than subtotal hysterectomy; it is a recognized sequel of hysterectomy, and the risks of its occurrence after abdominal hysterectomy for cancer is higher than for any other pelvic operation. These figures refer to fatal pulmonary embolism. It is not uncommon for women recovering from hysterectomy to be seized with sudden pain in the chest severe enough to fill them with alarm. Such attacks are usually followed by fever and the ejection of bloodstained sputum. The symptoms gradually subside. These attacks are often due to the lodgement of small emboli in branches of the pulmonary artery.

Thrombosis from the use of Buried Sutures.

At the Hunterian Society, London, in 1909, I attributed the frequency of pulmonary embolism after hysterectomy to infection of the buried sutures used to close the abdominal incision, the channels of infection being the epigastric veins. Being desirous of ascertaining the bacteriologic condition of the cervical canal and the uterine cavity of women with fibroids, I had a series of observations made in cases of subtotal hysterectomy. The investigation was conducted by two independent observers (Mr. Somerville Hastings and Mr. C. H. S. Webb) and their findings tallied uniformly and were confirmed by the clinical course of the patients. In the majority, especially nulliparous spinsters, the cervical canal and uterine cavity were sterile; in married women who have had children, and in whom the mouth of the womb is patulous, staphylococcus, *Bacillus coli*, and Döderlein's bacillus occur. The proportion of cases is small in which micro-organisms are found, but they are more common in a uterus containing a submucous fibroid in a woman who has had children than in that of a nulliparous spinster with a narrow cervical canal.

In regard to the fibroids, I have had very many examined, especially those which have undergone degenerative changes, such as softening and red degeneration. In all cases except one they have been sterile, the exception being a subserous fibroid in a gravid uterus; the tumour was in the condition known as red degeneration, and contained staphylococci. The comparative freedom of the uterus from pathogenic micro-organisms explains the great success of subtotal hysterectomy.

Femoral thrombosis and fatal pulmonary embolism are recognized sequels of hysterectomy. In this operation, if the retaining sutures traverse the endometrium and it be septic, the sutures will become infected and cause trouble. A study of thrombosis occurring under such conditions led me to believe that the factors which produce changes leading to thrombosis of the external iliac or the femoral veins are the buried sutures in the abdominal incision. I made a series of trials in which a number of abdominal incisions were closed with buried silk sutures, also a series of cases in which through-and-through sutures were employed. However carefully the suture material is prepared and inserted with hands covered with sterilized rubber gloves, now and then a buried suture will give trouble. Even when the sutures appear to settle down without disturbance they often cause slight rises of temperature.

For a period of two years I buried no sutures in an abdominal incision, except in one patient. During that period I had no post-operative thrombosis, and only one case of pulmonary embolism, and this happened to the patient in whom I closed the wound with buried sutures. She was a midwife on whom I performed hysterectomy for a big submucous fibroid, and as this woman was very stout and led an active life, it seemed expedient to take every precaution to secure a sound scar. This patient seemed to be making a satisfactory recovery, but on the eighth day her temperature rose to 103° F. On examination some hardness could be felt in the lower portion of the wound. I warned the house-surgeon that there was probably thrombosis of the deep veins, and impending danger of pulmonary embolism. She died suddenly a few hours later, and an embolus was found at the post-mortem examination firmly plugging the pulmonary artery.

In 1902, Clark, of Philadelphia, published some observations on post-operative femoral thrombo-phlebitis, especially as a sequel to coeliotomy. He believes that it has its origin as a primary thrombus of the deep epigastric

veins due to injury of the edges of the incision by metal retractors. The thrombosis is slowly propagated along the vessel to the external iliac vein, and by retrogressive thrombosis to the femoral vein. He also published a very convincing case. A woman aged 32 had hysteropexy performed for retroflexion of the uterus. The vermiform appendix was removed at the same operation. Thirteen days later there was well-marked femoral thrombosis. Two months later, the patient's condition being unsatisfactory, the abdomen was reopened; the right ovary and tube, being inflamed, were removed. In the course of the operation the right epigastric veins were found to be varicose and inflamed. They were "like dense cords as large as goose-quills." The epigastric vein was obstructed at its entrance into the iliac vein.

It will be obvious to any one who has studied the flora of the uterus that the surgeon's fingers must become contaminated by handling the tissues of the cervix in the course of a total or subtotal hysterectomy, when the uterus contains pathogenic micro-organisms. It is, of course, true that the uterus, in a large proportion of patients, is sterile, but micro-organisms are present in a sufficient number of cases to account for the frequency of inguinal thrombosis as a sequel of hysterectomy.

The excessive frequency with which inguinal thrombosis follows total abdominal hysterectomy, performed for cancer, is worth bearing in mind, for cancer in the neck of the uterus almost invariably teems with streptococci and staphylococci. Of these cocci, the former are notorious agents in causing thrombi to form in blood vessels. The deep epigastric veins are in intimate relation with the wound area when the abdomen is opened by a median sub-umbilical incision, whether the cut be made in the linea alba or to one side of the middle line in the belly of the rectus muscle. The branches of the vein collect the blood from the subcutaneous as well as from the subserous tissue in the parts adjacent to the linea alba. Some of the branches bleed freely when they happen to be transfixed by a needle in the process of suturing the wound. The deep epigastric artery is accompanied by two veins (venae comites) and they become confluent immediately above the spot where the conjoint vein enters the external iliac vein.

Pulmonary embolism is more frequent after abdominal than after vaginal operations; useful evidence is furnished by Klein, who collected the statistics of the Bettina-stiftung (Vienna), and found 9 fatal cases of pulmonary embolism in 1,720 abdominal sections. During the same period there was no instance of fatal embolism among 1,992 vaginal operations. Wertheim in a recent discussion on this matter admitted that in his practice thrombosis was three times more frequent after abdominal section for myoma than after vaginal myomectomy and hysterectomy for fibroids. It is unnecessary to adduce further figures, because this opinion is accepted by most surgeons who have had a wide experience in this class of surgery, but the evidence furnished by Klein is good circumstantial evidence towards implicating buried sutures as causative agents in the production of the primary thrombosis. Having satisfied myself that the fingers of the surgeon do become contaminated in the course of abdominal hysterectomy when the cervical canal contains micro-organisms, and in this way infect the suture material in the course of the operation, I adopt the following preventive measures:

After amputating the body of the uterus I apply iodine by means of a piece of cotton-wool on a probe to the cervical canal, and also lightly swab the cut surface of the stump with tincture of iodine before tying the vessels and introducing the mattress sutures. In a total hysterectomy I carefully swab the cut edges of the vagina with tincture of iodine before ligaturing the vessels. This trifling modification in procedure has a great influence for good on the post-operative course of the case.

After completing the pelvic part of the operation I wash my gloves with warm soap and water, and rinse them thoroughly with warm water and dip them in a solution of perchloride of mercury (1 in 5,000) before introducing the sutures. In clean cases I insert three or four silk sutures (No. 2) to bring the fascia together, and the wound is closed by a series of through-and-through sutures.

In operating for conditions known to be septic no sutures should be buried in closing the abdominal incision.

Suture Material.

It is the fashion to lay the blame for stitch abscess after hysterectomy upon the suture material, or on the method employed for sterilizing it. I have endeavoured to show that, in spite of every precaution, buried sutures are liable to be infected in the course of this operation when the cervical canal contains micro-organisms. For many years I have employed silk thread as suture material exclusively. The thread, wound on a spool, is boiled for an hour, reboiled immediately before use, and inserted with the hands protected by sterilized rubber gloves.

As evidence that buried sutures used to close the abdominal wall in pelvic operations are liable to become infected by the surgeon's fingers and thus become the cause of suture abscess, I will describe what happens in operations for the removal of the breast. When this organ is amputated for a non-ulcerating cancer, if the cancerous focus be examined with the caution usually displayed in bacteriological investigations it will be found

Posterior view of the rectus abdominis muscle below the level of the umbilicus. The origin of the deep epigastric artery and the termination of the vein is shown. Venous branches are seen coming through the muscle.

free from micro-organisms. Therefore, if the surgeon has taken care that the skin overlying the operation area has been carefully treated with the antiseptic solutions usually employed for this purpose, and his hands, tools, and material used for haemostasis have been rendered germ free, the wound heals speedily and soundly. During the past fifteen years I have used fine silk thread exclusively for ligatures.

During this period I have removed the breast more than 300 times, and each operation requires on an average ten ligatures. This experience concerns 3,000 pieces of silk. Throughout the whole of this period I have had no trouble from these buried ligatures; and throughout the whole of my surgical work, in hospital and private, I have never had a patient die in consequence of amputation of the breast. I mention these facts because they support my contention that buried sutures, used to ensure a firm scar after abdominal hysterectomy, often defeat the purpose for which they are inserted because they become infected by the surgeon's fingers when the cervical canal contains infective organisms.

One of the most conspicuous features connected with pulmonary embolism, apart from its suddenness and the rapidity with which it sometimes causes death, is its unexpectedness. Inguinal thrombosis after abdominal

pelvic operations is by no means uncommon, but it is an extremely rare event for pulmonary embolism to happen in this form of thrombosis. The oedema of the leg associated with this common form of thrombosis is usually attributed to obstruction of the iliac and femoral veins by internal clot, but there is in addition infection of the lymphatics, and this causes a hard painful swelling of the thigh in consequence of interference with the lymphatic circulation. Surgeons know well that during operations in the armpit the axillary vein is occasionally cut. This accident is easily repaired by the application of a ligature to the vein above and below the opening. No oedema of the limb follows. When the axillary lymphatics are blocked by perilymphangitis due to an extension of mammary cancer, a solid oedema of the limb ensues. This is true of the lower limb. The femoral vein is sometimes wounded accidentally by the surgeon in the course of an operation, but it is safely controlled by an encircling ligature placed above and below the hole in the wall of the vein. No oedema follows, nor is the circulation in the limb impaired.

Reservoirs of Clot.

It often happens that a *post-mortem* examination is made on a patient who has died in consequence of a pulmonary embolism, and the source of the embolus cannot be found. In considering embolism of the pulmonary artery in relation to hysterectomy it is necessary to point out that the pelvis contains two potential reservoirs of blood clot—the iliac veins and the ovarian veins. Experience, however, teaches that the external iliac veins are the common source of the fatal clot.

An embolus large enough to fatally plug the pulmonary artery comes, as a rule, from large vessels like the iliac veins, the caval veins, or the right auricle. Virchow pointed out that it is not uncommon for an entire thrombus to slip out of a vein, and an elongated thrombus from a venule may appear to be too thin to obstruct a large vessel, but, when such an elongated thrombus reaches its destiny, it is doubled up by the blood stream and serves as an effective plug. An embolus too small to occlude the pulmonary artery may lodge on the ridge separating the right from the left branch, becoming what is called a riding thrombus; such a clot may act as an autochthonous thrombus, and induce the formation of additional clot such as will fill and fatally occlude the main trunk and both branches of the pulmonary artery, as well as many of its subdivisions in the lungs.

Pulmonary embolism may occur as a sequel to hysterectomy at any time from the hour of the operation onward to the thirtieth day. In the majority of instances it happens about the twelfth day, and many observers have noticed that the detachment and transit of the clot is usually preceded by movement, such as getting out of bed for the first time after the operation, even sitting up in bed, but more particularly in straining during defaecation; sometimes it is deferred until the patient is apparently well, and when about to leave the hospital she may fall dying across the bed, on the floor of the ward, or in the courtyard of the hospital. The periodical literature of surgery and gynaecology contains many instances of these dramatic forms of sudden death due to post-operative pulmonary embolism.

The Bacteriology of the Clot.

The bacteriology of the clot is an interesting matter in relation to thrombosis and embolism. In the opening remarks it was mentioned that the common organisms found in infected uteri are streptococcus, staphylococcus, gonococcus, and the colon bacillus. The common micro-organism found in thrombi and emboli is the streptococcus; it is sometimes mixed with the staphylococcus, the *Bacillus pyocyaneus*, or the colon bacillus, but never the gonococcus. This is a matter of great interest. Extensive pelvic operations are often performed for damage caused to the uterus and the Fallopian tubes by the gonococcus, sometimes in the acute, but more often in the chronic stage of the disease. I have never had a case of pulmonary embolism as a sequel of an operation on the uterus or tubes when the lesion was the consequence of a gonorrhoeal infection. This seems to show that the gonococcus causes great irritation of tissues, and produces masses of adhesions,

but does not coagulate blood. The facility with which the streptococcus causes blood to coagulate in the living vessels is well known, and the extreme frequency with which thrombosis and its sequel, embolism, occur in connexion with cancer of the uterus is explained by the partiality which streptococci manifest for exposed cancerous tissue.

M. B. Schmidt found that when cancer particles enter the blood streams by invading lymphatics and veins they excite thrombosis, and the thrombus contracts upon and may ultimately destroy them. This prophylactic power of the blood prevents colonization of the blood stream, but I hold the opinion strongly that the thrombosis around the cancer particles is incited by the micro-organisms or their toxins which these cancer fragments contain.

It is undeniable that death from pulmonary embolism is especially frequent after abdominal hysterectomy performed for cancer of the uterus; it is far more frequent than after the removal of the uterus for fibroids, and the evidence indicates that the greater frequency of this catastrophe in operations for cancer of the uterus depends on the greater luxuriance of the flora in cancerous tissue, and that the streptococcus, of all the forms of micro-organisms which abound in such uteri, holds the greatest "enmity with blood of man."

In order to improve the results of abdominal hysterectomy performed for fibroids, surgeons must be more careful and more moderate in the use of buried sutures when closing the abdominal incision.

The risks of operations for cancer of the neck of the uterus will be lessened when surgeons, with the aid of bacteriologists, devise means to rid cancerous tissues of noxious organisms before undertaking hysterectomy. The widespread tilling of the pelvic connective tissue inseparable from the operation ironically called radical abdominal hysterectomy favours the sowing, growth, and rapid multiplication of streptococci, with the result that in many instances Death becomes the reaper.

It must be obvious to all thoughtful men that the surgeon in the operating room, as well as in the clinical ward, must look to the bacteriological laboratory for guidance, in the same way that the navigating officer on the bridge directs the ship, under the tutelage of the astronomical observatory, across the trackless ocean.

REMARKS ON ATYPICAL EXOPHTHALMIC GOÏTRE.*

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THE recognition of a well-established case of Graves's disease is one of the easiest tasks of a medical practitioner. The classical signs, with which we are all familiar, leave no room for doubt as to its nature. The chief of these are: Rapidity of heart beat, protrusion of the eyeballs, enlargement of the thyroid gland, tremor, sweating, flushing, sleeplessness, and other evidences of nervous excitement.

Functions of the Thyroid Gland.

It has been established both by clinical and experimental evidence that the thyroid secretion is necessary for the proper development of the bony structures and their maintenance, and also for the due development of mental power, for the growth and maintenance of fatty tissue, skin, hair, and nails. The sexual functions are stimulated by thyroid secretion. In myxoedema, where the secretion is deficient, amenorrhoea is the rule, while excessive menstruation is usual in the contrary condition of exophthalmic goitre. In pregnancy also the symptoms of Graves's disease, if previously present, become accentuated. A notable result of excessive thyroid action is stimulation of the sympathetic system, and it is from this action that many of the classical symptoms arise, and in particular irritability of the vasomotor system. This was well exemplified in cases No. 7 and 15, where a patch of hyperaemia, lasting for a considerable time, resulted from the slightest stimulation of the skin. In a lesser degree it was noticed in

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