readily allows contagion to pass to it; and this condition of nature and necessity mainly explains the height of the tuberculosis curve in the first five years, and its drop in the later years of childhood, when there is increasing freedom and separation.

Efficient prevention of pulmonary tuberculosis in the young child demands, first, the detection of phthisis in the parent or adult relative; next, measures to guard against the danger of their close contact with the child. Even so, notwithstanding all the advantages of a special service and of trained nurses who point out the dangers and how they may be guarded against, the risk of infection of the child in a crowded home must remain high. And in the young child infection is followed by disease with its high mortality. Not seldom it is the appearance of active tuberculosis in the child that gives the clue to the existence of unsuspected phthisis in one or other parent. This is one of the great benefits of notification of all forms of the disease—that from many sides information is gathered that may lead to the detection of cases of adult phthisis. The key to the problem of prevention of pulmonary tuberculosis in childhood lies in the early detection of cases of phthisis in the middle period of life, in their isolation, in their instruction in hygiene, and, above all, in reduction of their numbers. The segregation of young children from tuberculous parents and insanitary homes, as in the Grancher system in France, is not feasible as a general policy; in the few cases where it is practicable it is, of course, the most effective safeguard.

With regard to the children in a family where phthisis in a parent has been discovered and dealt with, what further preventive measures are available? Is it possible to detect and arrest early infections? This is a difficult but important question, and one that receives much attention from tuberculosis officers. In the infant and younger child it seems to me that little can be done here, for latent or dormant infections are very rare, and active disease is nearly always fatal. In abdominal tuberculosis from milk infection the case mortality is lower, and latent abdominal infection, although uncommon, may occur. The occurrence of latent pulmonary infection in the older child, its detection, its relation to phthisis in the adolescent and adult, are all important questions, which, however, lie outside the scope of our subject.

CHRONIC CERVICITIS (LEUCORRHOEA):

ETIOLOGY AND SYMPTOMS.*

BY

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CHRONIC cervicitis (leucorrhoea) forms one of the commonest conditions met with in both hospital and private practice. The discharge is often persistent; not infrequently it is neglected; it is resistant to treatment, and the results of treatment are often disappointing. The condition may, moreover, give rise to complications, not only locally in the pelvis, but also in other parts of the body. Chronic cervicitis is therefore a subject of great practical interest and importance, and is deserving of careful study.

Chronic cervicitis may be defined as an inflammatory affection which involves the mucous membrane of the cervical canal and of the os uteri externum. It is characterized by leucorrhoea and the presence usually, but not invariably, of a cervical erosion. It is due to infection, and is accompanied by microscopic signs of inflammation.

In order to understand the condition it is first necessary to study the anatomy and development of the normal cervix. The two Müllerian ducts by their fusion form the Fallopian tubes, uterus, cervix, and vagina. At first these structures are lined by columnar epithelium. Changes occur at a later date whereby the tubes are lined by columnar ciliated epithelium, the uterus by columnar epithelium, and still later the tubular glands appear. In the cervical canal is a mucus-secreting epithelium with many racemose

glands. It is not ciliated. It does not pass through the menstrual changes of the uterine endometrium. In the vagina we see the greatest change in the original epithelial lining of the Müllerian ducts, for squamous epithelium, growing from below upwards, replaces the original columnar. Normally this squamous epithelium comes to line the whole vagina; it also covers the cervix and tends to invade the cervical canal. It is found there in a sixth-month foetus, but is later replaced by the columnar epithelium. Occasionally the columnar epithelium of the cervical canal spreads out beyond the external os over the cervix, thus producing the so-called congenital erosion or pseudo-erosion. These congenital anomalies rarely cause trouble in later life, and become covered again by squamous epithelium.

It is known that the vagina may contain organisms in its lower part within forty-eight hours of birth. The lower part of the vagina, therefore, even in a virgin, is not sterile. The upper part of the vagina normally contains the vaginal bacillus of Döderlein. This is non-pathogenic. It is believed to produce an acid substance which, with the secretion from the vagina, forms an acid medium hostile to the growth of pathogenic organisms. Thus pure cultures of streptococci and staphylococci injected into the vagina and cervical canal have been found to be destroyed within a few hours. Winter, Stroganoff, and Menge have shown that bacteria are not normally found above the external os. Curtis confirmed these observations, and has demonstrated that the cervical glands are susceptible to chronic infection.

In chronic cervicitis bacteriological investigation reveals the presence of pathogenic organisms. The organism most commonly found is the staphylococcus, either alone, but usually in combination with the *Bacillus coli*, the streptococcus, and gonococcus. Diphtheroids may also be found, but it is not certain that these should be regarded as pathogenic, for they may be found in the lower part of the vagina during health.

How is the normal protective barrier broken down and access given to these pathogenic organisms?

The invasions of organisms may be the result of a direct infection—for example, gonococcal infection. Indirect infection may follow after injuries to the cervix, such as lacerations of the cervix accompanying childbirth or abortion; or from the upward spread of infection from disease or inflammation of the vulva. The protective acid medium may also be swept away or destroyed by discharge from the uterus, the presence of vaginal pessaries, and by the use of contraceptives and vaginal douching.

Chronic cervicitis is very common. The incidence in a series of 6,483 women examined by Fulkerson was 2,150, or 33.15 per cent. Fulkerson found that the condition occurred in 78 per cent. of cases between the ages of 20 and 40. Burns found it most commonly between the ages of 30 and 40, and next most commonly between 20 and 30. That is to say, it occurs usually during the child-bearing time of life, which supports the view that traumatism of labour or abortion is an important factor in the production of the disease.

The chief symptom is leucorrhoea. This was present in 74 per cent. of Fulkerson's cases. The discharge varies greatly in colour, consistence, and quantity. It is usually of a viscid white mucoid variety, like unboiled white of egg. It may be slightly yellow or green. The discharge is usually more profuse in the morning, on resuming the erect attitude probably, and also just before and after menstruation. In cases in which the infection is of gonococcal origin it may be noticed sometimes that the discharge is more definitely yellow, and is usually muco-purulent. There may be a slight blood-stained discharge on examination or after coitus if a vascular erosion is present. General debility, anaemia, and constipation are not unusually accompanying symptoms. It is not improbable that these are the direct consequence of the absorption of toxic substances from the infected cervical canal. Not infrequently the patient complains of pruritus vulvae due to the vaginal discharge.

Sterility may result from chronic cervicitis. Burns, in a series of 84 cases, found that 37 per cent. were sterile; 39 per cent. had one or more children, no miscarriages; 25 per cent. had one or more children, one or more miscarriages; 2 per cent. had miscarriages only. Disorders of menstruation and backache do not occur unless the infec-

* Read in opening a discussion in the Section of Obstetrics and Gynaecology at the Annual Meeting of the British Medical Association, Manchester, 1929.

tion involves also the endometrium or the uterine appendages. Chronic cervicitis of itself does not cause irregular uterine haemorrhage or pain.

It is when we consider the complications which may be consequent upon chronic cervicitis that the importance of the condition is realized. The cervix has been described as the tonsil of the pelvis, and it may act as a focus of infection. The experimental work of Laura Moench has shown that organisms grown from the chronically infected cervical glands of patients suffering from arthritis will produce joint lesions in rabbits, and culturally these organisms are identical with the anaerobic streptococci found in patients suffering from arthritis.

It is known that puerperal pyosalpinx and peritonitis may follow in patients suffering from chronic cervicitis of gonococcal and streptococcal origin. Finally, cervical trauma and cervical erosion may be associated with malignant disease. Bailey has recently reported upon the examination of 850 specimens of the cervix uteri in a paper entitled "An inquiry into the basic cause of cervical cancer; the pathology of cervicitis (cervical erosion) and the relation between cervicitis and cancer of the cervix," in which he was able to trace the changes from erosion to malignant disease.

THE PATHOLOGY OF CHRONIC CERVICITIS.*

BY

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CHRONIC infection of the cervix is by far the most common lesion met with in gynaecological practice. Authorities differ only slightly in their estimates of its frequency, and it is safe to say that, alone or in combination with other lesions, it is present in from 70 to 85 per cent. of all patients seen. British gynaecologists have not given this lesion the attention that it merited, although the recent exhaustive research by K. V. Bailey¹ of Manchester is a most important contribution to the subject. In America and on the Continent, on the other hand, great attention has been paid to the condition in recent years, and a very extensive literature has grown round the subject.

The condition has received many names, such as cervical endometritis, ectropion of the cervix, cervical erosion, cervical catarrh, proliferative adenoma (B. P. Watson⁵), pseudo-adenoma (Eden and Lockyer²), cystic disease of the cervix, chronic cervicitis (Moench⁴), and several others. Some of these names are given to different appearances met with at different stages of the disease, while others are based on erroneous ideas of the pathology. The condition is found most commonly in women who have borne children; less commonly it is found in nulliparae; and less commonly still is it present in virgins.

STRUCTURE OF THE CERVIX.

The structure of the cervix is important in this respect. It is covered on its vaginal aspect by stratified squamous epithelium, which contains no glands and which is continuous with the general squamous lining of the vagina. This squamous epithelium is in its deeper basal layer composed of cylindrical cells; superficial to this the main substance of the epithelium is composed of several layers of polygonal "prickle" cells, while the superficial layer or two are composed of flat cells, which are cast off from time to time. From the cylindrical layer are produced by cell division the more superficial layers.

At the external os the squamous epithelium suddenly changes to a high columnar-celled epithelium, with deeply placed nuclei. At numerous sites this epithelium is invaginated deeply into the mucosa, and into the innermost muscular layers of the cervix, to form compound racemose glands. The secretion from these glands and from the epithelium is thick, mucoid, and viscous, and forms the

characteristic cervical secretion. Deep to the epithelium on both aspects of the cervix is a scanty stroma which contains few cells, and which merges into the fibro-muscular substance of the cervix.

The high columnar epithelium lining the cervical canal can be followed up to the internal os, when the appearance again suddenly changes as the uterine cavity is reached. Here the epithelium is similar but not so high, the glandular depressions are simple tubules, and the stroma is thick and cellular.

Between these two epithelium-covered surfaces of the cervix is the main muscular and fibrous structure of the viscus. The muscular layers are described as three—an outer and an inner, both longitudinal, and an intermediate one, circular in direction—but in an ordinary section it is difficult to see any regular arrangement of this sort. Fibrous tissue strands lie between the muscular bundles, and thick-walled blood vessels and smaller endothelium-lined lymphatic spaces are also present.

The anatomical relations of the cervix are important from the point of view of its pathology. Above it is continuous with the corpus uteri, and the intermuscular lymphatic spaces of the two communicate. It lies embedded in the pelvic cellular tissue, which stretches out on each side at the bases of the broad ligaments; posteriorly this cellular tissue is incorporated in the utero-sacral ligaments, which are attached to the sacrum on each side of the rectum, while anteriorly the less marked utero-vesical ligaments connect the cervix with the bladder.

THE INFECTIVE PROCESS.

The essential lesion in cervicitis is irritation produced by infection, and this may be brought about in several ways, but the most usual mechanism is chronic pyogenic infection after laceration of the cervix at childbirth. It has to be understood that the extent of the laceration matters not at all; it is the incidence and degree of infection of even a small lacerated surface that counts. The conditions after labour rather predispose to infection. The cervix is patulous, lacerated, and bruised, with the vagina bathed in alkaline lochia instead of the normal acid secretion, and in this way the normal resistance to infection is definitely impaired.

The most commonly found organisms in these cases are the staphylococcus, streptococcus, and *B. coli communis*, but the gonococcus is responsible in a certain proportion of cases. In cervicitis occurring in nulliparae the gonococcus is a more common agent, and here it exercises its well-known ability to penetrate and infect an intact mucous surface. It is very difficult to estimate the exact proportion of all cases which are of gonococcal origin, as the gonococcus soon becomes reinforced and masked by a mixed pyogenic infection, and also tends to disappear into the depths of glandular acini, and so is not obvious in swabs from the cervical canal. It is probable, in our opinion, that the incidence of gonorrhoea as a causative agent in the production of cervicitis is exaggerated.

As a result of infection the changes of inflammation soon appear. While in some cases the inflammation may be acute in the early stages, it is usually only in the late chronic stage, which is discussed here, that the condition is first seen. But it is more than probable that the majority of cases are chronic in type from the onset.

There is oedema of the subepithelial stroma with outpouring of lymphocytes and plasma cells, especially round the blood vessels and the glands, and under the surface epithelium. The blood vessels dilate, the surface columnar and glandular epithelium becomes irritated, so that glandular hypertrophy and distension occur, and the cervical secretion becomes increased in amount and of a muco-purulent appearance from mixture with inflammatory products. This increased inflammatory cervical secretion is known as leucorrhoea. It always retains its thick, viscous tenacity, and it is to be emphasized that, in general, *leucorrhoea is almost always a sign of cervical infection*. Partly as a result of maceration by continual leucorrhoeal discharge, partly by being raised and devitalized by subepithelial oedema, and partly on account of trauma, a plaque of squamous epithelium surrounding the external os becomes separated and cast off in the discharge,

* A paper read in the Section of Obstetrics and Gynaecology at the Manchester Meeting of the British Medical Association in opening a discussion on chronic cervicitis. The paper was illustrated by lantern slides showing the conditions described.