Weekers, L. and Firket, J.—Ocular manifestations of spirochaetosis ictero-haemorrhagica. (Les manifestations oculaires de la spirochétose icéro-hémorragique.*)

The study of spirochaetosis ictero-haemorrhagica is of recent date; nearly all that has been written thereon has appeared during the war. The conditions of life at the front are favourable to its development, hence its comparative frequency among the troops. It may really be labelled a war disease, and as such has a special interest for members of Army Medical Services.

The earliest description of the disease in the French Army was given by Martin and Pettit in October, 1916. In August, 1916, it appeared in the Belgian Army. Its occurrence in an epidemic form has been noted on all fronts, among our enemies and among our allies.

While there have been numerous published descriptions of the general features of this disease, its ocular manifestations, although noted by most writers, have not been dealt with in detail. The present article endeavours to make good this omission.

In all probability few ophthalmologists have had an opportunity of seeing a large number of cases of this malady, and hence no systematic description of the ocular symptoms has been published.

It will not be without interest to begin with a brief sketch of the general features of the disease.

Towards the end of 1914 certain Japanese writers (Inadu, Ido, etc.) described as the specific cause of the disease, a spirochaete, morphologically allied to the spirochaete of syphilis; their investigations were made among coal miners. They proposed to call the affection caused by this micro-organism spirochaetosis ictero-haemorrhagica, a name which has the advantage of indicating not only the aetiology, but also two of the chief symptoms of the disease.

This discovery by the Japanese scientists threw much needed light upon the obscurity surrounding primary infective jaundice. As a matter of fact, the malady now described under the term spirochaetosis ictero-haemorrhagica had been identified by its clinical symptoms, before the war and before the discovery of the specific micro-organism.

In France it had been described as "Relapsing Febrile Jaundice of Mathieu," or as "Hepatic Typhus" (Landouzy). English and German writers called it "Weil's disease." But the many clinical forms of infective jaundice and still more the ignorance of the cause, rendered it impossible to consider the disease a definite pathological entity such as we now know it to be.

This disease does not conform to one type; it is polymorphous, and its gravity especially is very variable. Certain symptoms, however, are almost always present, and hence a positive diagnosis can generally be made. The most usual clinical type is the following:

The disease, rapid in its onset, attacks those in perfect health; the symptoms are shivering, headache, violent muscular pains, especially in the neck, the lumbar region and flanks, the posterior surface of the thighs and legs; hyperaesthesia of skin; pain on movement of the eyeballs. The temperature rises rapidly to 39° or 40° Cent. and remains there for five or six days. During this period the patient is much prostrated; the pulse is feeble but not very rapid; arterial pressure is lowered.

In addition there may be labial or nasal herpes, frequent epistaxis, moderate bronchitis with blood-stained sputum; a dry coated tongue and recurrent bilious vomiting. The stools are soft and coloured, diarrhoea is seldom noted. The liver and spleen show slight enlargement. The urine contains a trace of albumin, abundant urobilin, and some blood.

On the fourth or fifth day icterus develops, in some instances slightly, in others intensely.

Shortly after the onset of jaundice, the temperature drops to normal or thereabouts (sixth to ninth day). The patient's general condition improves, the pulse becomes stronger, the arterial pressure normal; vomiting and haemorrhage cease, and the muscular pains become less severe. The urine remains abnormal and contains in addition biliary pigment. But the end is not yet. After five or six days of apyrexia (usually about the twelfth to thirteenth day of disease) the temperature often rises, reaching, perhaps, 40°, and showing marked daily oscillations. This febrile relapse is accompanied by aggravation of the general symptoms, but at its termination rapid improvement is noticeable. During this recrudescence of fever the jaundice fades and disappears.

Subsequently, the asthenia and anorexia and the pain disappear, but convalescence is slow, and pallor, after the jaundice has faded, is very noticeable.

Cardiac failure is not uncommon. The mortality varies from 4 to 8 per cent.

In cases without characteristic clinical symptoms, the diagnosis can be made with certainty by the discovery of the causal agent in (1) the blood, (2) the fresh urine, centrifugaled. If the blood of the patient be injected into a guinea-pig, the disease is conveyed to the animal which dies in eight days; it is to be noted, however, that the blood is virulent only during the first seven days of the disease, and not after the jaundice has disappeared; also that the spirochaete cannot be found in the urine before the tenth day.
Redness of the eyes occurs very frequently in spirochaetosis ictero-haemorrhagica and is very obvious; it has been noted by most writers, but its significance has not been recognized.

The Belgian authors, Wilmaers and Renaux, in their work on this disease say, "The conjunctival congestion which is sometimes present in catarrhal jaundice is much more frequent and intense in the spirochaetal form — we have found it in 27 of our 47 cases, and it may have been present in a larger number, and have disappeared when the patient reached hospital. It is a transient symptom and seldom lasts longer than a week.

The French authors, Garnier and Reilly, Martin and Pettit, Costa and Troisier, Sacquepée and Boidin, all refer to congestion of the conjunctivae, and some of them consider the symptom of value in the diagnosis of doubtful cases.

Bloch and Hebert observed in two cases of pseudo-meningitic type an intense congestion of the conjunctiva accompanied by such severe pain that the least movement of the eyeballs was intolerable. This hyperaemia appeared at an early period of the disease and was persistent.

Stokes, Ryle, and Tytler, whose observations were very detailed and complete, did not dwell upon the ocular symptoms; they noted ocular pain and injected conjunctivae, and in two cases, subconjunctival haemorrhage.

A large number of cases of this disease has been recorded in the Italian Army; but the medical reports of cases by various writers contain no reference to ocular complications other than conjunctival congestion occurring as an early symptom.

In German literature at our disposal we have found but one note, in an article by Wessely, concerning ocular complications in war maladies: "in Weil's disease conjunctival haemorrhage has been frequently, and orbital haemorrhage rarely, noted."

Briefly it may be stated that all writers have reported the occurrence of conjunctival injection during the course of spirochaetosis ictero-haemorrhagica. In our view, this conjunctival injection is secondary, and coincides with a condition of greater importance, viz.:—ciliary congestion; this latter symptom is significant as indicating a localization of the disease (probably of the spirochaetes) in the uveal tract.

We have examined systematically, as far as circumstances have permitted, a number of cases of this disease. Our experience has shown that the ocular symptoms met with in the course of the malady are numerous and diverse. They include: simple hyperaemia of the anterior segment of the eyeball; congestion of the iris, iritis with exudation, sometimes forming synchiae; optic neuritis;
retro-ocular neuritis; ocular herpes with corneal lesions; conjunctival jaundice with blood extravasation beneath the conjunctiva, noted by the first observers.

In 50 cases of spirochaetosis ictero-haemorrhagica under our observation, these symptoms were present in the following proportion (omitting sub-conjunctival haemorrhage):—

<table>
<thead>
<tr>
<th>Description</th>
<th>Number</th>
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<tbody>
<tr>
<td>Cases without ocular manifestations</td>
<td>4</td>
</tr>
<tr>
<td>Simple hyperaemia of anterior segment</td>
<td>29</td>
</tr>
<tr>
<td>Congestion of iris</td>
<td>7</td>
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<tr>
<td>Iritis</td>
<td>6</td>
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<tr>
<td>Iritis and optic neuritis</td>
<td>1</td>
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<tr>
<td>Iritis and retro-ocular neuritis</td>
<td>1</td>
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<tr>
<td>Ocular herpes</td>
<td>1</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>50</strong></td>
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Ocular Hyperaemia.—This is an early sign appearing at the onset of the affection or during the first few days; it is rarely absent, and was noted in 46 out of 50 cases. It has, therefore, a certain diagnostic value.

It varies greatly in degree; when slight it may be little more than is often present in health, but in more severe cases there is intense injection of the anterior part of the globe, accompanied by severe photophobia and lacrimation, and occasionally by redness of the eyelids.

Subjective symptoms, as a rule, are but slight; occasionally, no discomfort is complained of, but generally a pricking sensation and tenderness on pressure are noted and not infrequently there is pain on movement of the eyeballs.

On careful examination it will be found that hyperaemia involves both the conjunctival and ciliary vascular systems, the latter evidenced by a more or less pronounced circumcorneal capillary injection.

The congestion extends all over the anterior segment of the eyeball; frequently it spreads to the inferior palpebral conjunctiva, the superior being almost always unaffected. Moderate lacrimation is the rule, but there is seldom a trace of conjunctival secretion.

During this early stage of hyperaemia, no other abnormal conditions are present in the eyes. The media are clear, the vision is unimpaired, the pupils are equal and react normally. The iris is free from visible lesion.

The evolution of this hyperaemia is noteworthy, and runs a course nearly parallel to that of the general symptoms. Appearing at the onset, or very early in the disease, it persists in the same degree for several days, then rapidly abates, but seldom disappears entirely until convalescence is established.
About the twelfth or fifteenth day, the date of the usual relapse, characterized by a fresh rise in the temperature, a recrudescence of the ocular hyperaemia commonly occurs. At other times during the persistence of this symptom, there may be numerous variations in its intensity, usually dissipated by the application of atropin drops.

Congestion of the iris.—Simple hyperaemia of the anterior segment of the globe may, in certain cases, give place to congestion of the iris. This often coincides with recurrent fever, but we have noted it apart from this symptom; sometimes it is rather a late incident. In addition to the ciliary and circumcorneal injection, its presence is indicated by contraction of the pupil. In the disease under discussion the congestion is unaccompanied by recognizable change in the tissue of the iris, and disappears without leaving any trace, even when untreated.

There is usually bilateral miosis, often unequal in degree. The pupils dilate to atropin more slowly than in health, but attain full dilatation. No trace of exudation is found on close examination.

Iritis and irido-cyclitis.—In a certain proportion of cases (nine out of fifty in our list) irisitis develops; it is characterized by the presence of exudation and the formation of posterior synechiae, and accompanied by well marked symptoms. These symptoms vary in degree; although generally prominent, they occasionally pass off speedily and spontaneously, and for this reason have sometimes escaped the observation of earlier writers. Exceptionally the formation of synechiae is so extensive as to constitute a real danger to the eye. Irido-cyclitis has been observed. Under local treatment by atropin the lesions of the iris and the inflammatory symptoms pass off in a few days. In most instances the application of atropin breaks down the synechiae and leads to full dilatation of the pupil: it is then seen that a fairly abundant exudation has been deposited on the anterior capsule of the lens over the area previously covered by the iris. The front surface of the iris, examined by focal illumination, seldom shows any noticeable change. The fundus oculi remains normal.

Later examinations prove that the deposit on the lens capsule undergoes a slow but usually complete absorption.

The clinical signs described above, hyperaemia of the anterior segment, congestion and inflammation of the iris, are probably manifestations, in varying degree, of the local development of spirochaetosis in the uveal tract, and result from the circulation of the spirochaete in the bloodstream.

The micro-organism has been found in the renal and hepatic tissue; it is therefore not surprising that it should become localized in a richly vascular structure such as the uvea.

It is clear that ocular hyperaemia, so easy to detect and so frequent
in this disease, should not be overlooked by the medical man. Although the congestion, and even actual iritis, may disappear spontaneously in the absence of treatment, a severe and dangerous iritis may develop and hence, except in the slightest cases, atropin should be systematically employed.

**Optic Neuritis.**—In two cases we have observed optic neuritis, bilateral but unequal in the two eyes. The papillae were congested, and their outlines lost; the retinal veins dilated and tortuous for a short distance beyond the discs. There was some loss of visual acuity, but no limitation of the field and no central scotoma. Complete and fairly rapid recovery, with full integrity of ocular functions ensued. How is this neuritis to be explained?

During the first two days of the disease weakness and headache are two almost constant symptoms. Occasionally this stage is marked by great restlessness and delirium suggestive of meningitis.

Cost and Troisier have demonstrated the presence of spirochaetes in the cerebro-spinal fluid and have induced jaundice in the guineapig by the injection of cerebro-spinal fluid from patients from the fifth to the seventh day of the disease.

The cerebro-spinal fluid reaches the sheath space of the optic nerves. It is not surprising, therefore, that the presence of spirochaetes in the fluid should set up changes in the nerve, which give the ophthalmoscopic appearances of a benign optic neuritis, such as we have noted.

**Retro-bulbar Neuritis.**—A single case under our observation suggests that spirochaetosis ictero-haemorrhagica may cause retro-bulbar neuritis. In one patient we noted a transient failure of sight with central scotoma, but without ophthalmoscopic changes. This was probably a form of retro-bulbar neuritis attacking the papillo-macular bundle of fibres. Full recovery of vision ensued in our patient in the course of a few days.

**Ocular Herpes.**—Facial herpes is often seen as an early symptom in spirochaetosis (in 20 per cent. of our cases). It occurs most commonly on the lips and the alae of the nose, and exceptionally on the lobe of ear. As an ocular lesion it is apparently very rare; we have observed it in only one case, and believe it has not previously been noted. In our patient the eruption involved the cornea and conjunctiva, as well as the eyelids. It is a complication deserving attention, as it may lead to permanent damage to sight.

**Conjunctival jaundice and sub-conjunctival blood extravasation.**—The two symptoms have no special significance by reason of their localization. The jaundiced condition of the conjunctiva may be present without other ocular manifestations of the disease or it may co-exist with the usual hyperaemia or with iritis. It produces no subjective symptoms.

Blood extravasations beneath the conjunctiva have been infrequent
among our cases; we have seen them in only 3 patients. In each instance they occurred in both eyes, chiefly towards the internal and external canthi. The blood appeared to be deeply situated, rather in the episcleral than the sub-conjunctival tissue. In no case have we discovered evidence of orbital or intra-ocular haemorrhage.

The authors conclude this interesting communication by clinical notes of five selected cases, in two of which charts of the temperature and pulse rate are given. The ocular lesions in these five cases were: Case 1, irido-cyclitis; case 2, iritis; case 3, iritis and optic neuritis; case 4, iritis and retro-ocular neuritis; case 5, ocular herpes.

A list of recent literature on spirochaetosis ictero-haemorrhagica is appended.

J. B. Lawford.

ANNOTATIONS

Qualifications in Ophthalmic Surgery

There is now a more or less general feeling amongst ophthalmic surgeons that there should be some degree or qualification commensurate with the position which they hold in the profession.

The present system of education of an ophthalmic surgeon ensures a general knowledge of surgical principles and pathology, but does not necessarily ensure a knowledge of ophthalmic surgery, the science and art in which he is subsequently going to practise. For example, a young man decides that he will practise as an ophthalmic surgeon in the metropolis. After spending at least five years in qualifying, he has to obtain his F.R.C.S. (England), as this is the only qualification which will entitle him to become a candidate for practically any special or general hospital in London. The same qualification is also required in many of the big provincial centres. It will take him an additional one or two years to accomplish this, so that, having spent seven years upon his medical education he will have to start his ophthalmic training which, it is generally recognized, should comprise at least two years' work at a special hospital. It will, therefore, be some eight or nine years at least before he is fit to practise as an ophthalmic surgeon.

During his first seven years there is little to stimulate the student to do ophthalmic work, and he is not likely to do more than the very meagre minimum of three months' attendance in the ophthalmic out-patient department of a general hospital. This attendance is often of a perfunctory nature, nor is it likely that there will be any alteration in this respect until ophthalmology becomes a recognized part of the qualifying examinations of Great Britain as it already is in Ireland.