fold of omentum with the oval body in one piece, and preserved them for future study.

Three years later (1889) a woman was admitted under my care in the Middlesex Hospital with signs of intra-pelvic bleeding. I promptly operated, and found a movable body as big as a walnut with a smooth cavity at one pole, and at once recognized its similarity to the familiar uterine mole. The effused blood and clot were collected, and the operation completed. I then washed the clot in a glass vessel with a gentle stream of water from a tap. Suddenly I saw the head of an embryo rise to the surface in a gentle swirl. This clinched the evidence—I had found a *tubal mole*! The name soon became current in gynaecological literature.

When no embryo is forthcoming the presence of chorionic villi in the mole is now accepted as evidence of tubal gestation.

This lecture was opened with a recital of the Blood Trail. Let me end by reminding you that men who make original observations are often obdurate in accepting the discoveries of their contemporaries.

Harvey discovered the circulation of the blood, but did not believe in the existence of the lacteals described by Aselli (1622). The discovery of the lymphatic system was second only in importance to that of the circulation of the blood.

Baer found the human ovum, but would not accept the idea that the spermatozoon initiates development in the ovum. We may believe that the tail of the spermatozoon led to the discovery, "since things in motion sooner catch the eye than what not stirs."

Lawson Tait, in his vigorous Ingleby Lecture (1886) on Pelvic Haematocele, insisted that the blood came from the sac of an ectopic pregnancy. He not only ridiculed my discovery of the tubal mole, but warned teachers of midwifery against my transcendental notions relating to tubal abortion.

To-day a tubal mole is as familiar to a gynaecologist as a placenta to a midwife.

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SPONTANEOUS DETACHMENT OF THE RETINA.

BY

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As far as I have been able to ascertain no general account of Professor Gonin's work on the causation and treatment of spontaneous detachment of the retina has up to now appeared in English. His writings have been either in French or in German, and have been directed to explaining various aspects of his views, but there is no comprehensive article dealing with the matter. Having had the good fortune to see Professor Gonin operate, and to have his views explained to me personally, I think it may be of use to my colleagues and to the medical profession generally if I attempt to place on record what I understand to be the pathological conception on which he bases his mode of treatment.

By spontaneous detachment of the retina is meant the condition of retinal detachment found without evidence of any concomitant gross pathological condition, and excludes intraocular growths, definite inflammation, gross traumatism, etc., the detachment being unaccompanied by any of these factors and apparently having occurred spontaneously without any obvious visible cause. It is, however, generally allowed that some degree (not necessarily a high degree) of myopia may be present, or the condition may occur in old people where senile changes exist and without any traumatic history, or only a history of slight jarring, shaking, etc., of the eye or body.

Professor Gonin first visualizes a change in the vitreous, and subsequently in the retina, which may be unobservable to ordinary ophthalmoscopic examination. A partial liquefaction of the vitreous takes place, and a localized

or general thinning of the retina, also giving no definite ophthalmoscopic evidence. The retinal change, however, is often in the region of the ora serrata, and therefore not obvious to ordinary ophthalmoscopic view unless extraordinary means are taken, such as full dilatation of the pupil and pressure deliberately made outside by the finger, in the neighbourhood of the ciliary body.

The primary change in the vitreous is one of partial liquefaction. The evidence for this is the frequent presence of fine floating opacities in myopic and senile eyes, and the occasional presence of a deformation of the details of the papilla, which vary with movements of the ophthalmoscope, presenting a condition similar to that seen when viewing the fundus through an irregularly astigmatic lens or cornea; in addition we can sometimes see a diffuse opacity in the vitreous associated with "floaters" or streaks, but it is allowed that the ophthalmoscopic evidence of a liquefied vitreous may pass unnoticed or give only very equivocal signs. With regard to the retina, Professor Gonin suggests that the retina, like the choroid, may be subject to strain and stress, and may be the subject of thinnings, atrophic areas, holes, and tears. The retina as well as the choroid is more firmly attached at one place than at another. The optic nerve fibres secure the retina firmly at the optic disc, but the attachment at the ora serrata is thinner, more attenuated, and more apt to fail, either as the result of pathological conditions affecting the choroid, or a senile condition associated with the attenuation of the nerve fibres and its parenchyma. On the other hand, the choroid is more firmly attached to the ciliary body and yields in the region of the optic disc and macula.

The partial detachment and retraction of the vitreous turns that body into a heterogeneous system, consisting of (1) non-albuminous watery fluid, and (2) the unaltered or only slightly altered vitreous gel. This condition has an importance, Professor Gonin thinks, in causing an unequal strain on the thinned and degenerated retina, so that any sharp abrupt movements of the eye or body may result in a sudden pull on the friable membrane. Traversing the liquefied vitreous may be strands of vitreous jelly attached at one point more or less firmly to the membrana limitans interna, and any abrupt sharp movement may cause a definite localized strain or pull at a point in the retina. The presence of any fine adhesion, the result of a small localized inflammation, would fasten the retina at such a point to the underlying choroid and would form an attachment which, as a result of even very slight trauma, would allow a tear to take place if the surrounding area were only supported by a liquid vitreous.

Professor Gonin believes that detachment of the retina only takes place if a tear or hole exists in the retina, and that this hole allows the liquid vitreous to pass through it and so raise the retina from its bed on the pigment epithelium. These retinal tears are usually situated, in recent cases, on the convexity of the detachment, but if and when the fluid shifts further round or down, then the tear may be found at a spot where the detachment has become less raised. Another area where the tears are often found is in the region of the ora serrata, because it is here that the retina is thinnest, most vulnerable, and liable to degenerative and pathological changes either from cystic degeneration or choroido-retinal atrophy. Holes in the area behind the equator are less common, and more often than not are the result of gross traumatism or definite pathological change.

Professor Gonin observes that in macroscopical specimens of spontaneous retinal detachment there is no gelatinous clot behind the retina—that is to say, no coagulable exudate the result of inflammation. The preretinal and subretinal spaces are filled with an identical fluid of a watery nature. The vitreous gel is retracted forward, and is best and most abundantly seen between the equator and the ora serrata, and shows more or less extensive adhesions with the retina. These macroscopical specimens frequently disclose the presence of a hole or tear.

A simple progressive stretching is not sufficient to detach the retina from the choroid, as was originally supposed to be the case in myopic detachment; on the contrary, the retina can adapt itself better than the choroid to a gradual enlargement of the globe; the retina yields only to a sudden tension, and is torn either at the

ora serrata or at some point where vitreous bands are adherent to the retina, a condition which is pathological; normally, the retina is not displaced even in complete liquefaction of the vitreous, unless some pathological cause has produced adhesions between the vitreous gel and the retina, and if a contusion occurs it results in a sudden abrupt pull on the thinned degenerated friable retina.

Professor Vogt, writing recently in the *Klinische Monatsblätter für Augenheilkunde*, 1929, lxxxii, 619, says:

"It is fairly certain that *traumatic detachment* is caused by such a hole. Contusion produces a tear in the retina which is mostly situated peripherally, since there the retina is thinnest and more or less lacks nerve fibres which act as support. Through this retinal perforation vitreous fluid soaks and detaches the retina from its base, the pigment epithelium. In the cases I saw, a vesicle was formed, on whose summit the perforation was situated. In the course of days and weeks the subretinal fluid increases, and larger portions of the retina are detached. Finally total *detachment* results.

"Systematic investigation of *spontaneous detachments* makes it probable that in them also such a tear or perforation is the cause of the detachment. In a large number of such recent cases one finds a perforation, a tear, exactly as in the traumatic type. Here also in the detachment which is only a few days old the tear is placed upon a vesicle-like elevation, as in the traumatic type. Here also the detachment, originally circumscribed, is limited to the region of the tear. It would be denying simple facts to doubt the causal connexion between spontaneous detachment and perforation. I often found the retina in the neighbourhood of the perforation to be broken up into shreds and fibres, a sign that it is tearable and capable of little resistance.

"This weakness of the tissue is also seen in the fact that the retinal tear usually grows larger in the course of weeks or months and occasionally new tears result. This increase is probably caused by the swinging movements which the retina performs in the vitreous body during the movements of the globe of the eye and the body by reason of its greater specific gravity. One can, as you know, *control* these swinging movements ophthalmoscopically. I confirmed experimentally that the retina has a greater specific gravity than the vitreous body. Retinal fragments introduced into normal or liquefied vitreous fluid could be centrifugalized in it."

So much, then, for the considerations which have led up to the treatment. Professor Gonin had reached these conclusions with regard to the cause of spontaneous detachment of the retina long before he applied them to the question of treatment. If it is the hole or tear, however produced, which is the fundamental cause of the detachment, then if that hole can be closed the *status quo ante* ought to be obtained. Eventually he tried.

The operation is not difficult and carries no greater risk than is incurred by the time-honoured cauterization of the globe, which is done for the purpose of establishing drainage for the subretinal fluid and a possible anchoring of the retina to the choroid by the production of a contracting scar. But Gonin's whole point is that it is useless to attempt this cauterization anywhere save in the immediate proximity of the tear. The cauterization must involve the tear, the whole tear, and as far as possible only the tear, and effectively close the hole and "nail" the retina to the choroid by means of a contracting cicatrix. Much time and care must be exercised to locate the spot where the cautery is to enter. The operation is not applicable if the hole is in the region of the optic disc or macula. If the hole is large or multiple then more than one cauterization will probably be necessary, and if it cannot be reached by reason of its position in the eye then the case is not one for his operation. About 22 mm. from the corneo-scleral margin seems to be the practical limit of attempt, and even such a point would be difficult to reach with precision.

Search long and diligent must be made to locate the hole, and until it is found it is useless to attempt the operation. When it has been found, it should be accurately localized and the meridian in which it lies marked by a definite technique, so that no hesitation occurs at the operation. The globe is divided for localizing purposes into various planes indicated according to a clock face: vertical, XII-VI; horizontal, III-IX; down and out, and down and in, II-VIII; IV-X, etc.

The meridian, being decided on, is indicated by two small points made at the corneo-scleral margin just under the conjunctiva by means of a pin dipped in Indian ink.

Having fixed the meridian, the next point in the localization is to decide how far back the hole is from the ora serrata or from the most extreme point visible to the ophthalmoscope with fully dilated pupil and the eyeball rolled out to the extreme periphery. Professor Gonin has laid down certain figures for our assistance here, also a very explicit and practical paper has been written by Dr. Marc Amsler,¹ a clinical assistant of Professor Gonin's, which gives very useful suggestions for carrying out this task of localization:

"... la question que nous nous posons est celle-ci: combien de diamètres papillaires peut-on compter entre la déchirure et l'ora? En d'autres termes, combien de diamètres papillaires peut-on aligner au delà de la déchirure jusqu'à l'extrême limite visible du champ ophtalmoscopique?"

The diameter of the optic disc represents 1.5 mm., the distance from the ora serrata to the limbus is taken as 8 mm., so that if the tear appears to be 4 discs' breadth from the extreme periphery of the visible fundus, with the pupil widely dilated, the tear would be 8 + 6 mm. from the corneo-scleral margin = 14 mm.

Having found the tear, aligned the meridian, and measured the distance from the corneo-scleral margin along that line, and having marked externally on the limbus of the cornea two spots representing the meridian, the surgeon is in a position to decide if he can reach the spot indicated with his cautery. The operation is done under a local anaesthetic and the ordinary surgical technique is carried out.

Before operating Professor Gonin marks his meridian by passing a fine silk thread through the conjunctiva, immediately over the further spot of the two, thus marking the meridional alignment. This thread is knotted and drawn through just as a seamstress does when starting to sew, and is used to indicate the meridian, because, with the manipulation of the tissues, blood and fluid appear inevitably when the operation starts, and the mark previously quite obvious may become obscured; whereas the thread can always be found and made to connect the two spots indicating the meridian, so that the surgeon is never at a loss to recover his alignment during the operation should his marks become obscured. The thread is inserted on the inked spot furthest from the tear, and should eventually connect three points—namely, the two marked with Indian ink and the exact point at which the cautery is to enter the globe.

The sclerotic is laid bare over the area which has been found to correspond with the tear seen within the eye, and by means of callipers the distance from the corneo-scleral margin along the meridional line is measured to a fraction of a millimetre. This spot is marked by the pointed arm of the callipers being dipped in an alcohol solution of gentian violet, so as to mark definitely the exact spot which the surgeon, after prolonged care and calculation, has concluded represents the external point immediately over the hole in the retina. A Graefe's knife is now entered through this spot, the cutting edge of the knife being directed towards the cornea, and the depth to which it is inserted being dependent on the condition of the detachment; if subretinal fluid begins to flow out, the knife must have reached the space just external to the retina and the loss of some of the fluid may allow the retina to fall back nearer the sclera. The knife is withdrawn now, and if the operator inserts his glowing cautery he will produce a "sphere of influence" that is likely to involve the retina at the position of the tear. That this happens in some cases, probably in many, is now, I think, definitely established. The heat is sufficient to burn the margin of the sclera, the choroid, and to radiate through the intraocular fluid and inflame the retina. This cauterization produces an area of inflammation which in a few days' time—nine to twelve—causes a contracting scar which ultimately settles down after the inflammation has ceased. In this way it is certainly possible sometimes to close the hole, "nail" the retina to the choroid and sclera, and, if Professor Gonin's conclusions are correct, cure the detachment, the subretinal fluid being absorbed, provided that the communication with the vitreous chamber through the hole is completely closed.

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