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COMMUNICATIONS

SIMPLE DETACHMENT OF THE RETINA

With a report on 75 cases treated at Moorfields
Eye Hospital by Gonin's Method

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Introductory

PROFESSOR GONIN began to publish his opinions on the pathology of simple detachment of the retina more than twenty-five years ago, and for the past eight years has been successfully operating on a high proportion of his cases, but not until recently did his method attract world-wide attention. In a paper read before the *Soc. franç. d'Ophthal.*, in 1928, he said: "Après avoir eu longtemps l'impression de prêcher dans le désert, j'ai la satisfaction d'avoir aujourd'hui rallié à ma conviction plus de mes confrères de Suisse et de l'étranger." A glance at the history of the surgical treatment for detached retina, recently reviewed by Stallard, will readily explain why Gonin for a long time encountered scepticism and indifference. Iridectomy, choroidodialysis, retinal suture, sclerectomy with or without attempts at permanent drainage by means of horse-hair or gold wire; injection of various chemical substances under the conjunctiva, into the inter-retinal space, or into the vitreous—these and numerous other methods had been

given a trial. The best that can be said about many of them is that they may have afforded the patient some relief from the monotony of prolonged decubitus. If the advocate of any particular operation could occasionally report a cure following his treatment, he had to be reminded that the literature already contained many examples of retinal detachment ending in spontaneous cure. But in the last few years two main causes have combined to establish the reputation of Gonin's method; first, Gonin himself has, over a reasonably long series of cases, achieved far better results than were obtained with any of the older methods; secondly, ophthalmic surgeons in several different countries have reported a large number of successes from the use of his operation.

Definition

Simple detachment of the retina means partial or complete separation of the layer of rods and cones from the retinal pigment-cell layer, arising either spontaneously or as the apparent result of some minor trauma to the globe from direct or indirect violence. Indirect violence may result from a fall, a violent fit of coughing, or, as in the case mentioned by Vogt, a jolt occasioned by the sudden starting of a railway train. Gonin's conception of its pathology is not intended to serve as an explanation for the detachments associated with violent trauma, intra-ocular foreign bodies or parasites, neoplasms or profuse exudations of the choroid. On the contrary, he has repeatedly admitted that different mechanisms are operative in the production of the various kinds of retinal detachment.

Gonin's Views

Gonin believes that simple detachment is produced by the passage of fluid from the vitreous into the inter-retinal space through one or more holes in the neural layers of the retina, and that the closure of these holes is essential for cure. He explains the origin of a hole in the following way:—Isolated or multiple foci of anterior choroiditis are a common finding on examination of the extreme periphery of the fundus. These foci, whether they be the result of myopia, senility, syphilis, sepsis, or of some unknown factor, cause degenerative changes in the vitreous body. The heavier portion or pulp of the vitreous becomes contracted forwards, while the rest of the vitreous chamber is filled with the remainder or more fluid portion. Moreover, the foci of anterior choroiditis promote localized adhesions of the vitreous pulp to the retina through the medium of epithelial cells shed from the ciliary body. When adhesions form below, they are often firm and

diffuse, because the pulp tends to sink downwards. Superior adhesions, on the other hand, affect smaller areas, so that the whole mass of the vitreous pulp may come to hang precariously from a small area of the upper retinal surface. Lister has already employed the analogy of a glass vessel containing fluid or semi-fluid substance. If such a vessel is rotated, the movement of the contents lags behind the movement of the vessel itself. Hence it is easy to imagine the result of a sudden, swinging movement on the part of an eyeball, the heavier portion of whose vitreous is suspended from the delicate retina. A slight tweak may merely produce photopsiae, but a smart tug may tear the retina. When once the retina is torn vitreous fluid passes into the inter-retinal space, but can rapidly undergo absorption if the rent is closed. The inter-retinal fluid in these cases has the same composition as the fluid portion of the vitreous, and shows by its behaviour under the influence of various fixative reagents that it differs greatly from the inter-retinal fluid found in exudative cases. Myopic eyes are predisposed to simple detachment, but the mechanism is not essentially different from that of simple detachment occurring in non-myopic eyes.

The importance of holes in the production and maintenance of simple detachment of the retina was recognized by Leber, Nordenson, and others before Gonin. In 1924, Lister admitted that, in his experience, no case of detachment associated with a visible hole in the retina had ever been improved, whether with or without treatment. Ignipuncture was in use before the beginning of this century, but Gonin's great achievement consisted in devising a method of applying ignipuncture to the hole itself, with a view to sealing it.

Diagnosis

The differential diagnosis between simple and other varieties of detachment is adequately described in the standard text-books, and need not be detailed here. Whenever the diagnosis of simple detachment is made, the condition of both eyes is investigated. The vision, visual fields, state of the iris and of the media must be noted, and observations made upon the shape, size and situation of the detachment, as well as upon any landmarks in its neighbourhood, *e.g.*, pigment accumulations or retinal haemorrhages. Both fundi should be explored up to the extreme visible limit of the periphery with the aid of mydriasis. Then follows a careful search for one or more holes in the retina of the affected eye. If the case is considered suitable for operation, an attempt is made by means of ignipuncture to close the holes after their position has been calculated.

The Significance and Morphology of Retinal Holes

Holes in the retina may be difficult to detect, especially in long-standing cases. Meller's observation that they are found in a larger proportion of recent than in old cases may be taken as evidence against the view of Deutschmann and Sourdille, who say that holes are the results, not the causes of simple detachment. If, even in the absence of any considerable opacity of the media, it should be impossible to detect a hole at the first examination, there is no reason to assume that a hole is lacking. It may be hidden behind a fold of detached retina. A further search may reveal it, especially if in the meantime the patient has lain at rest for a day or two. In any case, repeated and painstaking examinations ought to be made until the hole is found, as it nearly always is found by those who have persevered with the method. The periphery of the retina, between the equator and the ora serrata, is the favourite situation for a hole, and, of the four quadrants of the globe, the supero-temporal is the one most commonly involved. The proximity of a hole is often betrayed by a focus of old choroiditis in the neighbourhood. It need not necessarily be situated in that portion of the retina which is detached at the time of the examination. A detachment that begins above may sink down, so that the hole, representing the position of the original detachment, is now seen on the flat portion of the retina. Hamilton has pointed out that a detailed account of the initial symptoms will sometimes indicate the original position of the detachment, and incidentally of the hole, provided that those symptoms included the appreciation by the patient of a black spot in a definite direction. Vogt finds that examination by means of red-free light is useful for accentuating the edges of a hole against the background of the choroid. In Gonin's experience the length or diameter of a hole may range from 0.3 mm. to 18.0 mm.

The following types of hole are recognized :

1. Arrow-head shaped, in which the base of the arrow forms the attached end of a tag of retina, and is peripheral to the point of the arrow.
2. Horse-shoe shaped.
3. Rounded, punched-out holes, suggesting the possibility of a pre-existing cystic degeneration of the affected portion of the retina.
4. Festoon-shaped, situated at the extreme periphery, and corresponding to a peripheral disinsertion of the retina. This type differs from the rest in being commoner below than above, and is often associated with direct trauma. It tends to increase in size.
5. Holes with irregular outlines.

Prognosis

It is impossible to lay down rigid rules as to which are the cases suitable for operation. Certainly the demands upon the endurance and co-operation of the patient are greater in this than in any of the other ophthalmic operations that are performed under local anaesthesia. Therefore the difficulties are increased in the very young, the very old, or in neurasthenic patients. Prognosis is best in cases where the detachment is of only a few weeks' duration. Gonin claims success in 70 per cent. of a series of over 30 cases seen within three weeks of the onset of detachment. Cases of one to three months' duration show a 50 per cent. proportion of success. After three months the chances of benefit from operation fall still lower. Other favourable factors in prognosis are singleness and small size of the hole, absence of gross vitreous opacities or of extensive uveal disease. Nevertheless, good results have sometimes been unexpectedly obtained in longstanding cases showing large or multiple holes which necessitated several separate cautery operations. It is, therefore, worth while to make an attempt to cure cases that hold out only a slender hope of success. The fact that a useful degree of functional restoration is possible in some cases after several months of detachment is curious. It proves that the inter-retinal fluid provides a good substitute for the nourishment that is normally supplied by fluid transuded from the choroidal capillaries, although Weekers' investigations in rabbits' retinæ revealed definite histological changes in the rods and cones as early as two weeks after the onset of detachment.

Topography

Calculation of the position of the holes before operation requires examination of the fundus under full mydriasis. It is necessary to know (a) the distance of a hole from the ora serrata, and (b) the meridian passing through the middle of the hole. In this country the direct method of ophthalmoscopic examination is generally favoured, but Gonin and many other continental surgeons prefer the indirect method. Lindner uses a special Gullstrand apparatus for localizing the hole. Amsler and Dubois have proposed several topographical modifications and elaborations. Vogt chooses to estimate the distance of a hole from the macula rather than from the ora serrata. The ora serrata is assumed to be visible to ophthalmoscopic examination when, with the pupil fully dilated, the eyeball is rotated as far as possible in the required direction. In an eye of average size it lies at a distance of 8 mm. from the limbus. The diameter of the optic disc is 1.5 mm., and 1 D.D. (disc-diameter) is the conventional unit of measurement in fundus topography. The soldering action of the cautery extends,

especially in recent cases, beyond the area to which it is immediately applied, so that a favourable result is not inevitably prevented by failure to hit upon the middle of the hole. In peripheral disinsertion it is actually better to apply the cautery rather to the central side of the gap. In nearly all cases it is advisable to aim 0.5 to 1.0 mm. to the central side of the estimated position.

In the practice of individual surgeons the operative technique recommended by Gonin has been subjected to various alterations in detail. Different answers have been given to the questions: What is the best form of cautery? To what depth should it penetrate? For how many seconds should its application be maintained? The technique in use at Moorfields will be presently described, and an account given of the results so far obtained there. It is not proposed to offer a detailed analysis of the results so far reported abroad. Until further evidence has accumulated, and become standardized in interpretation, no valid statistical comparison can be made. The significance of a group of results cannot be assessed without a knowledge of several important features, *e.g.*, the ratio of easy to difficult cases, the extent of the patients' co-operation on the operating-table and in after-treatment. It is at present sufficient to mention that successful results have been recorded by many foreign ophthalmologists including Vogt, Arruga, Lindner, Meller, Perez-Buñill, Rubbrecht, Schoenberg, Wiener, Bruckner*, Weill*, and Igersheimer*. Dubois has recently urged that Gonin's operation is suitable not only for simple detachment, but also for a few selected cases of detachment occasioned by a perforating injury unattended by gross destruction of the globe.

The Operation as performed at Moorfields

On the eve of operation two marks are tattooed with Indian ink at diametrically opposite points of the limbus in line with the estimated position of the hole.

The eye having been cocaineised, about 0.5 c.c. of a mixture of equal volumes of 4 per cent. novocaine and 1/5000 adrenalin solutions are injected beneath the ocular conjunctiva at the site determined for cautery puncture. After an interval of five minutes a knotted guiding thread is passed through the episcleral tissue at the limbal pigment mark remote from the side of the retinal hole. The ocular conjunctiva is now divided at a point about 0.5 cm. from the pigment mark on the side adjacent to the retinal hole, and is incised for a length of about 1.5 cm. so that the incision is parallel to the tangent to the arc of the limbus at the pigment mark. Tenon's capsule is opened and the sclera bared over the required situation. The guiding thread is passed through a hole punched in the centre of the blade of a

Desmarres' retractor which is placed in the conjunctival wound and retracted, thus giving access to a wide area of sclera. The guiding thread is now arranged so that it passes from the first tattoo mark across the centre of the cornea over the second pigment spot, so that its prolongation crosses the site of the retinal hole. The pre-determined distance of the retinal hole from the limbus is marked on the exposed sclera with a pair of callipers, one point of which has previously been dipped in sterilized Indian ink. Two or more conjunctival sutures are inserted in the cut ends of the ocular conjunctiva, and the guiding thread withdrawn. An electric cautery at white heat now sears a way through the sclera at the point determined, and, as soon as the subretinal fluid has escaped, it is again heated up to white heat and plunged through the opening in the sclera so made, and immediately withdrawn, the average depth of penetration being 1 cm., and duration two seconds. The conjunctival sutures are immediately tied off, the speculum removed, and double bandages applied.

After Treatment

The patient is nursed with the head placed so that the situation of the hole is the most dependent part of the eye. Thus, if the rent was at 6 o'clock, an upright posture is adopted; if it was at 12 o'clock the end of the bed is raised on 18-inch blocks and no pillows are allowed. The patient is warned of the necessity for absolute rest. On the fourth day after operation the bandages are removed, the lids cleaned, and a drop of 2 per cent. atropine instilled into the affected eye, after which both eyes are again bandaged.

On the eighth day a further drop of 2 per cent. atropine is put in the operated eye, the conjunctival sutures are removed, and the fundus examined. If the detachment is as extensive as before operation and there is no sign of improvement, bandages are not re-applied, and the patient is allowed up. If, on the other hand, the detachment is less extensive, or if the retina is in place, then both eyes are again bandaged and absolute rest secured for a further three days, after which the affected eye is again atropinised and its fundus examined. Whatever the condition of the retina, a start is now made with getting the patient up, and both eyes are uncovered.

A fortnight after the cautery puncture the operated eye is thoroughly examined in a dark room, and special note made of the site and size of the cautery scar, its relation to the retinal rent, the extent of retinal detachment (if any), and the state of the vitreous. If the retinal hole has been sealed and the detachment is back, the field of this eye is charted, and the patient discharged. In the

majority of cases, however, one cautery puncture fails to effect a cure, owing to faulty localization or to the retinal tear being too extensive to seal with one cautery puncture, in which case one or more additional operations have to be undertaken.

Four illustrative cases will now be described.

Illustrative Cases—Results at Moorfields

Case I.—A. F., a man aged 26 years, admitted on April 5, 1930, gave a history of the right vision becoming suddenly blurred four months previously. There was no history of injury, but he had

CASE 1. Before operation.*

always been short-sighted. The right eye had a fairly extensive detachment infero-temporally with a retinal disinsertion extending from "6 to 7 o'clock." The macula was involved in the detachment and visual acuity was reduced to finger-counting at two feet. The visual field showed a large defect supero-nasally. The left eye was normal and its vision with correction - 1.25 D. sph. - 0.5 D. cyl. 70° was 6/5.

On April 7, 1930, cautery puncture was performed upon the right eye at "6.30 o'clock," 9.5 mm. from the limbus.

* In all cases the 1° moving white object of a Lister perimeter was used.

On April 16, 1930, the right eye was examined. The cautery scar was beautifully placed in the centre of the dis-insertion, the rim of which could be seen round the periphery of the scar. The detachment was back, the visual field full and central vision with correction - 0.75 D. sph. - 1.25 D. cyl. 90° 6/24.

CASE 1. After operation.

Case II.—A. P., a woman aged 30 years, was admitted on June 14, 1930, with a history of sudden failure of vision in the right eye three weeks previously. There was no history of trauma, but she was myopic and had worn glasses for 15 years.

The right eye had an extensive detachment down and out with a round hole at "7 o'clock," about 1 disc diameter from the ora serrata. There were patches of old choroiditis scattered round the fundus periphery. The visual field was much constricted nasally, and the visual acuity was reduced to fingers at two feet. The left eye was normal and its vision with correction - 8.5 D. sph. 6/6 partly.

On June 20, 1930, a cautery puncture was performed upon the right eye at "7 o'clock," 10 mm. from the limbus.

On July 3, 1930, the detachment was back, the retinal hole sealed, and the field full. Visual acuity with correction - 3.5 D. sph. - 2.5 D. cyl. 180° had improved to 6/36.

CASE 2. Before operation.

CASE 2. After operation.

Case III.—L. S., a boy aged 15 years, was admitted on November 11, 1930. He gave a history of normal vision in both eyes until three months previously, when a mist appeared over the right eye. There was no history of recent trauma, and the boy was emmetropic.

In the right eye there was a shallow detachment of the retina inferiorly with a horse-shoe-shaped disinsertion at "6.30 o'clock." The macula was just involved in the detachment. Visual acuity of this eye was 3/36, not improved, and the field showed an exten-

CASE 3. Before operation.

sive defect supero-nasally. The left eye was normal and its vision was 6/5. On November 12, 1930, cautery puncture was performed upon the right eye at "6.30 o'clock," 9.5 mm. from the limbus. On November 28, 1930, there was still a small, shallow peripheral detachment down and out. The cautery scar was well placed in the disinsertion, but there was a very small portion of the latter still visible to the nasal side of the scar. The visual field was full, and central vision $\bar{c} + 2.5$ D. sph. 6/36. Further operative measures were considered unnecessary, and the patient was discharged on the following day. A month later, when examined in the out-patient department, the retina was found to be completely in place.

CASE 3. After operation.

Case IV.—A case showing remarkable improvement in field and central vision is :—

J. M., a man aged 62 years, who had noticed a black spot in front of the left eye two months previously. For the last three weeks the vision of this eye had become generally blurred. There was no history of local or general trauma, but the patient was a myope.

The right eye had a normal myopic fundus and its visual acuity with correction -3.5 D. sph. -3.0 D. cyl. $110^\circ = 6/9$. In the left eye there was a shallow but practically total detachment of the retina with a horse-shoe-shaped rent at "10 o'clock," about 2 disc diameters from the ora. Visual acuity was reduced to fingers at 1 metre, and the field was down to the fixation point.

On September 6, 1930, cautery puncture was performed at "10 o'clock," 15 mm. from the limbus, but this scar overshot the hole by about a disc diameter. A second cautery puncture on September 17 sealed the upper limb of the rent, and a third on October 1 effectually blocked the lower limb.

On October 14, the detachment was back and the hole totally sealed. Central vision with -3.5 D. sph. -3.5 D. cyl. 70° had improved to 6/12 partly, and the visual field was nearly full.

CASE 4. Before operation.

CASE 4. After operation.

Results at Moorfields

During the year 1930, 75 cases of retinal detachment were submitted to the operation of cautery puncture by Gonin's method at Moorfields Eye Hospital. Of these 75 cases, 24 were discharged with the retinal detachment back, and the visual field full; 12 showed improvement either in visual field or visual acuity; the remaining 39 were either unchanged or made worse. To obtain 32 per cent. of cures and 16 per cent. of improvements in such a serious and hitherto almost hopeless condition as detachment of the retina is indeed striking, especially as the method was an entirely new one, and but little attempt had been made to select cases during the first six months of the year.

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