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RETINAL DETACHMENT: A SERIES OF 78 CASES IN THE MIDDLE EAST FORCE

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In the war of 1914-18 the treatment of retinal detachment was a failure, and indeed this was so up till 1929, when Jules Gonin (Switzerland) described to the International Congress of Ophthalmology in Amsterdam his successes obtained surgically by sealing a retinal tear or tears and evacuating the interretinal fluid by means of puncture with a galvano-cautery. Before this discovery very few cases of retinal detachment underwent improvement and spontaneous recovery; such were quite exceptional.

Gonin's principles still hold good to-day, but the operative technique has changed. Accurate location of the retinal tear or tears in relation to the outside of the sclera is essential. The edges of the retinal tear and the choroid overlying this site are rendered adhesive by electro-coagulation. This is effected through diathermy, applied either to the surface of the sclera at the site of the tear or by a diathermy needle penetrating the sclera and choroid to reach the retina but not entering it. The interretinal fluid beneath the detachment is drained thoroughly either by penetrating diathermy needle punctures and suction or by trephining the sclera and puncturing the choroid, and secure choroido-retinal adhesions completely surrounding the tear are encouraged by placing the patient's head so that the retinal tear and the drainage puncture lie in the most dependent position obtainable. The effects of gravity of the vitreous assist this.

FIG. 1

The following statistics concern 78 officers and men of the Middle East Force suffering from retinal detachment and admitted to a military hospital in Egypt for investigation and treatment of this disorder from 1941 to 1943. Seventy-six were operated on; for one case surgical treatment was not advised, and another made a spontaneous recovery.

The operation performed in these cases was a combination of surface diathermy (90 to 100 mA for 8 seconds) placed around the edges of a tear or tears and penetrating diathermy;

one, two, and very rarely more punctures were made in the sclera with the diathermy needle carrying a current of 40 mA for 1 second (see Fig. 1). The interretinal fluid was sucked into a glass tube and rubber suction bulb applied to the sclera over the diathermy penetration. The patients were soldiers in good health between the ages of 20 and 47, the majority being in the third decade of life. This survey differs from a survey of retinal detachment in civil practice in two respects: (1) the incidence of myopia in retinal detachment would be appreciably higher than 3 in 78 cases; and (2) in civil practice injuries peculiar to war are of course not present. In the last the prognosis is adversely affected by the severity of the intraocular damage caused by blast and the ravages of high-velocity metallic missiles with ragged edges and rough surfaces.

I have classified the 78 cases as follows:

(1) Cystic degeneration	..	..	..	..	13
(2) Choroido-retinal degeneration	..	..	..	..	21
(3) Myopia	..	..	..	..	3
(4) Trauma (civil)	..	..	..	..	23
(5) Trauma (military)	..	..	..	..	18

Of these, 11 were officers—one a nursing officer (Q.A.I.M.N.S.). The remainder were other ranks, and included: Royal Navy, 2 cases; Royal Air Force, 2 cases; Royal Canadian Air Force, 1 case; and the Merchant Navy, 1 case. The following table shows the age incidence in decades in these five groups.

TABLE I.—Age Incidence

Age (Years)	Cystic Degeneration	Choroido-retinal Degeneration	Myopia	Trauma, Civil	Trauma, Military
20-30	9	16		18	15
31-40	4	3	2	5	3
41-47		2	1		

The nationalities were: British, 60; Canadian, 2; New Zealand, 1; South African, 3; Indian, 3; Greek, 4; Polish, 2; Czech, 1; German, 1; Italian, 1.

1. Cystic Degeneration (13 Cases)

The date of origin of the detachment was unknown in 11 cases. In these the condition was discovered in the course of routine examination. In two cases a sudden spread of the detachment from the limits of the cystic area caused separation of the macula so that the soldier noticed the visual defect. One sought advice one week after this event and the other four months later.

The position of the cystic area was peripheral in all cases. In 10 it was in the lower temporal quadrant, and in two of these it had spread to strip off the macula; in 2 cases the upper and lower temporal quadrants were affected at the periphery, and in 1 case the lower temporal and lower nasal quadrants were involved. In 9 cases there was a well-defined arc of pigmentary disturbance in the choroid and retina at the posterior periphery of the cyst up to the ora serrata, where these changes ceased. In 3 others this was faint. The ophthalmoscopic appearance suggested a line of adhesion between the retina and choroid, which was more marked in some cases than in others. In one case these changes were present in only part of the arc at the posterior periphery of the cyst.

In one case of haemangiogliomatosis retinae a retinal cyst was at the periphery of the lower temporal quadrant, remote from the neoplasm, which was behind the equator along the course of the

upper temporal vessels. There were no apparent degenerative and pigmentary changes in the retina and choroid at the edge of the cyst.

A *retinal tear or tears* were found in 12 cases; in the remaining one, which was associated with haemangiogliomatosis retinae, there was no tear. The retinal tears were at the ora serrata in 9 cases, in five of which a single tear was present; in 2 there were two tears, in 1 there were two tears at the ora serrata and two posterior to this, in another case four at the ora serrata and three posterior to this. In one case the tear was a single round hole about 1.5 mm. behind the ora serrata. In two instances no clearly defined hole was evident; in one of these there were two thin areas of atrophic retina and in another four such areas, two of which were minute. These were all placed about 1.5 to 2 mm. behind the ora serrata.

The right eye was affected in 9 and the left in 4 cases. The intraocular pressure was 1 to 2 mm. Hg below normal in 3 cases, in 1 it was 2 mm. Hg above that in the other (normal) eye, and in the remainder it was equal in both eyes. One month after operation it was 6 mm. Hg, often less, and it gradually returned to normal in 3 to 6 months after operation.

One operation in each case successfully replaced the retina, sealed the tear, and restored the visual field. There were no failures. This type of case is particularly favourable for surgical treatment. The danger of a sudden spread of the detachment justifies an operation in which the chances of success are, it seems, 100%.

The change in refraction from before to after operation was too slight to be of any significance. Between 3 and 6 applications of surface diathermy were made to the sclera, and the difference of 0.5 to 1 D of astigmatism and the change of axis up to 30° may have been due to subsequent contracture of the sclera at the diathermy sites and the effect of this on the cornea. The change in refraction was not constant until the intraocular pressure was re-established.

Visual Result.—In 11 cases the visual acuity was 6/9, 6/6, and 6/5, and it remained unchanged after operation. The two patients in whom the macula was detached improved to 6/24 (1 letter).

2. Choroido-retinal Degeneration (21 Cases)

Retinal detachment in this group was associated with areas of choroido-retinal scarring and degeneration. In many instances multiple small holes were present in the thin degenerate area of the retina. The duration of the detachment, so far as could be ascertained from the patients' history, was as follows: 2 to 8 weeks, 9 cases; 4 to 12 months, 4 cases; 2 years, 1 case; 5 years, 1 case; 6 years, 1 case; 8 years, 1 case; 13 years, 1 case; 17 years, 1 case; and unknown in 2 cases. The area of detached retina was: upper and lower temporal quadrants and lower nasal quadrant in 7 cases; the lower temporal and lower nasal quadrants in 9 cases; the lower temporal quadrant in 3 cases; the upper temporal quadrant in 1 case; and the upper nasal quadrant in 1 case.

The tears in the retina were single in 10 cases, and these were all placed at the ora serrata. Two holes were present in 3 cases; in two these were in the upper temporal quadrant and in one at the ora serrata. In one case there were three holes on the temporal side, and in another four holes at and near the ora serrata in the lower temporal quadrant. In 4 cases many minute holes were present in an area of choroido-retinal atrophy in the upper temporal quadrant in each instance. In 2 cases there were very thin atrophic areas of retina in the lower temporal quadrant at and posterior to the ora serrata, but no definite hole was evident.

The right eye was affected in 11 cases and the left in 10. The intraocular pressure was 0.75–2.25 mm. Hg below that in the other normal eye in 4 cases; it was 3.75 mm. Hg higher than the normal

eye in 1 case and 2.25 mm. Hg higher in another. In the remainder the intraocular pressure was equal in both eyes. In all cases the retina was replaced and the visual field restored.

Visual Result and Refraction.—In 18 cases in this group the macula was detached. Two of these recovered 6/12, two 6/18, one 6/24, and the remainder 6/36 to 6/60. The 6/60 was obtained eccentrically by a few. Two patients had visual acuity of 6/5 and one 6/6. In 4 cases astigmatism of 1.25 D—two myopic and two hypermetropic—was present after operation.

3. Myopia (3 Cases)

The degree of myopia was 8 D in one case, 5.5 D with 2.5 D astigmatism in another, and 3.75 D in the third. The duration of the detachment was two to three weeks in all cases. *The area of detachment* was in the upper temporal quadrant in 1 case, the upper temporal and upper nasal quadrants in 1 case, and the upper and lower nasal quadrants in the other.

Retinal Tears.—In one case there were seven tears between the equator and the ora serrata in the upper temporal quadrant. Two of these were crescent-shaped and larger than the others, which were ragged and irregular. The line of tears in this case was continuous with a zone of choroido-retinal degeneration about 2 mm. wide in the lower temporal quadrant. In another case there was a single arrowhead-shaped split at the ora serrata in the upper temporal quadrant in the 11.30 o'clock meridian. Also in this case there were two linear areas of atrophic retina in the 10 o'clock meridian between the equator and the ora serrata. In the third case there were three holes just in front of the equator in the upper nasal quadrant. One of these was in the 3 o'clock meridian, 4.5 mm. in length and kidney-shaped. Another, about 2 mm. in length, was crescent-shaped in the 2 o'clock meridian, and close above it was the third hole, which was round and about 0.25 mm. in diameter.

The intraocular pressure behaved similarly to that in the other groups of retinal detachment. In the eye with the retinal detachment it was 1 to 2 mm. Hg below the other eye. One month after operation it was less than 6 mm. Hg in

2 cases and 6 mm. Hg in 1 case. In three months it had risen to 8.75–10 mm. Hg.

Two cases were successfully treated by operation. The third had a vitreous haemorrhage on the fourteenth day, and subsequently a shallow localized retinal detachment associated with a fold in the retina appeared in the upper nasal quadrant.

Visual Result.—In the two cases with the retinal detachment in the upper temporal quadrant the macula was detached and vision was less than 6/60 before operation. One of these, a myope with 8.25 D, recovered 6/36; the other, with 2.75 D of myopia, had 6/9 (4 letters) after operation. The recovery of the visual field was complete in the latter case and apparently so in the former, although indeed the physiological conformation of the lower nasal field must have masked the peripheral scotoma resulting from the applications of diathermy to the upper temporal quadrant. In the third case, in which a retinal fold recurred in the upper nasal quadrant, the visual field was substantially improved by operation.

4. Civil Trauma (23 Cases)

In these cases the cause of the detachment was a blow from a blunt object or a severe contusion around the eye—e.g., in boxing and football, from a door handle, the corner of a bed-post, a "kenneke" stick, a fall from a motor vehicle, and the explosion of a battery accumulator. *The duration of the detachment* was unknown in 1 case, 9 to 21 days in 5, 1 to 9 months in 8, 1 year in 2, 3 years and 5 months in 1, 5 years in 1, 6 years in 2, 8 years in 1, 10 years in 1, and 27 years in 1.

LEGENDS FOR FIGURES

FIG. 1.—Retinal detachment operation. Exposure of the sclera at the site of a retinal tear in the upper temporal quadrant of the left eye. The flap of conjunctiva and Tenon's capsule is held reflected by two sutures. Two traction sutures pass through the tendon of the adjacent recti muscles. Surface diathermy has been applied to the sclera and penetrating diathermy is being made at the posterior edge of the tear about the equator.

FIG. 2.—Drawing of left fundus of Dvr. H. E. Intraocular contracting scar tissue on nasal side from 6.30 to 10 o'clock. In the 3 o'clock meridian there is a dense fibrous band which runs posteriorly behind the equator. The retina is detached above and below this band.

FIG. 3.—Dvr. H. E. Diagram of operation. The internal rectus is divided. The small shaded circles represent the sites of surface diathermy applications, and those with the dark point in the centre are the positions of penetrating diathermy. Two sutures retract the posterior edge of the conjunctival incision. Two mattress sutures have been passed through the external rectus muscle, and one is acting as a traction suture in the tendinous insertion of the muscle. The scleral wound is exposed.

FIG. 4.—Fundus drawing of right eye of Soldat R. K. (German Army). Dense white contracting fibrous tissue from 4.30 to 7.30 o'clock. A sheet of this fibrous tissue extends posteriorly to a point between the equator and the optic disk. In this band is a mass of proliferated choroid which resembles a foreign body. The lower half of the retina is detached. Just below the optic disk there are some vertical retinal folds and a transverse arc of pigment deposits. In the upper nasal quadrant above the upper level of the retinal detachment and near the optic disk are two choroidal splits. On the surface of the retina in the lower nasal quadrant are some interlacing bundles of fibrous tissue.

The Area of Retinal Detachment.—The retina was totally detached in 2 cases—one a Greek and the other an Italian—and in both there was a large tear at the ora serrata in the upper nasal quadrant. In the latter the retina was cobbled up in a mass of scar tissue, an organized haemorrhage in the course of the superior temporal branches of the central retinal vessels about 4.5 mm. from the optic disk. The former showed opacities in the upper nasal quadrant of the lens. The detachment was present in the upper temporal, lower temporal, and lower nasal quadrants in 10 cases, the upper and lower temporal quadrants in 2, the lower temporal quadrant in 2, the upper temporal quadrant in 1, the upper temporal and upper nasal quadrants in 1, the upper temporal and upper and lower nasal quadrants in 1, the upper and lower nasal quadrants in 1, the upper and lower nasal and lower temporal quadrants in 1, the lower temporal, upper nasal, and lower nasal quadrants in 1, and the lower nasal quadrants in 1.

Retinal Tears.—The tear in the retina was single in 18 cases. In 10 it was at the ora serrata in the lower temporal quadrant, and in three of these the tear extended into the lower nasal quadrant. A tear at the ora serrata in the upper nasal quadrant was present in 2 cases and in the lower nasal quadrant in 1 case. A long elliptical tear, with its long axis horizontally, ran across the equator of the upper nasal quadrant in 1 case and was accompanied by a vitreous and retinal haemorrhage. In another case a large rent at the ora serrata extended into both the upper and lower temporal quadrants. A round hole was present between the equator and the ora serrata in the 9 o'clock meridian on the temporal side in one case. A large crescent-shaped tear occupied most of the upper temporal quadrant between the equator and the ora serrata in one case. In one case there was a round hole in the upper nasal quadrant between the equator and ora serrata. In the 5 multiple cases the number and disposition of these tears were as follows: upper temporal quadrant, five tears between the equator and ora serrata, one of which was arrowhead-shaped and the other four smaller and irregular; lower temporal quadrant at the ora serrata, two tears in one case, in another case between the ora serrata and the equator six tears, one of which was crescentic and the other five smaller than this and irregular; lower temporal and lower nasal quadrants, two tears—one at the ora serrata and the other a round hole about 1 mm. posterior to it. In the fifth case two large rents each ran obliquely across the equator and along the course of the upper temporal and the lower nasal branches of the central retinal vessels respectively. The upper temporal tear was the larger, and extended to within 1 mm. of the optic disk.

The right eye was affected in 9 cases and the left in 14. The result of operation was successful in 20 cases. Of the three failures, two were cases of total retinal detachment—the Greek and the Italian described above. In the case of the Italian there was little chance of success on account of the cobbling together of the retina in a mass of organized blood-clot. At the best we hoped to give him some slight improvement of visual field. The failure of the Greek to co-operate in post-operative postural rest may or may not have been responsible for failure in this serious case. In the third case two large rents were present; one extended from in front of the equator to within 1.5 mm. of the edge of the optic disk along the upper temporal vessels, and the other was long but less extensive along the course of the lower nasal vessels. The retina was detached in the nasal half of the fundus and part of the upper temporal quadrant. The retina remained in place for 25 days after operation and then the detachment recurred in the lower nasal quadrant.

Visual Result : Visual Field and Refraction.—In 4 cases vision improved from 6/60 to 6/9, 6/60 to 6/12 (4 letters), 6/12 to 6/6, and 6/6 to 6/5. In 7 cases it remained the same; in three of these it was 6/5, in one 6/6, in one 6/12, and in two others 6/36. In 9 cases the macula was detached, and in all these the vision was less than 6/60; it improved to 6/9 in one case and 6/60 in eight. In the three failures it remained "hand movements" in two cases and was 6/60 in the other. The visual field was improved in all the successful cases. The alterations in refraction were small in the majority and amounted to the appearance of +0.5 D and -0.75 D astigmatism, with axis variations of 15° from before operation. In two instances when seven and nine applications of surface diathermy had been made respectively at the ora serrata in the lower temporal quadrant it seemed that subsequent contracture of the sclera produced two months after operation an increase of corneal curvature opposite the site of application, so that -1.75 and -2.25 cylinders set at an oblique axis (20-30°) were necessary to correct this.

5. Military Trauma (18 Cases)

The area of retinal detachment was extensive in a number of these cases. Large splashes of blood on the retina, in the choroid and vitreous, exudates, subsequent fibrous organization of intraocular blood, the presence of blood between the retina and the choroid, and the lowered intraocular pressure as the result of severe concussion of the eye from blast were factors against successful treatment. It is probable that vitreous gel passes through some of the large ragged

rents in the retina and is a mechanical factor in preventing choroido-retinal adhesions from forming after diathermy.

In one case in this series of 18 the intraocular changes were such that surgical operation seemed to hold out no hope of effecting any improvement. The soldier had sustained a blast injury from an aerial bomb which exploded 200 yards to his right front. Three months after the injury the retina was totally detached; dense white broad sheets of organized blood-clot were adherent to it in the lower half of the eye, over the macula, in the upper nasal quadrant, and in front of the equator above. The inferior branches of the central retinal vessels immediately below the optic disk were kinked and tortuous. There was much pigmentary disturbance in the retina, and the intraocular pressure was 6.5 mm. Hg. Vitreous had herniated forwards into a coloboma of the iris in the lower temporal quadrant, the suspensory ligament having been ruptured at this site.

Spontaneous recovery of retinal detachment in the upper temporal quadrant occurred in an officer who was wounded by a fragment of shell which struck the temporal end of his left supraorbital margin. There were a severe contusion of the left eye and a rupture of the choroid at the macula, and large splashes of blood and exudate were present on the retina and in the choroid and vitreous of the upper temporal quadrant. One month after this wound the retina in the upper temporal quadrant became detached. There was no hole evident. The intraocular pressure was 6 mm. Hg and visual acuity less than 6/60. Postural treatment was tried for three and a half weeks. The detached area became slightly smaller and some of the interretinal fluid was absorbed. Within two months of the onset of the detachment the retina was completely restored to its normal place.

In this group of 18 cases 3 had lost one eye (the left in each case), which was destroyed beyond hope of repair at the time of wounding. In 8 cases the right was affected, and in 10 the retina was detached in the left eye. In most the actual duration of the retinal detachment was difficult to assess accurately. In some instances it was apparent a few days after wounding; in others it was obscured by intraocular haemorrhage and did not become evident for several weeks, while in a few it occurred as a late sequel, 6 to 14 months after the injury. In the latter the contracture of fibrous tissue attached to the retina and the lowered intraocular pressure were likely causes. The times, taken from the date of wounding, were: 1 to 11 days, 6 cases; 1 to 4 months, 8 cases; 4 to 6 months, 3 cases; and 14 months, 1 case.

Retinal detachment occurred in association with an intraocular foreign body in 5 cases. The detachment happened immediately in one case, 53 days later in another, and in a third 6 weeks after the extraction of an intraocular foreign body, at another hospital, by the posterior route, in which diathermy was not used at the site of sclerotomy. In the other 2 cases the date of onset of the detachment was not known. Of the intraocular foreign bodies, three were extracted by the magnet through the posterior (scleral) route, one was removed by a snare and forceps guided under ophthalmoscopic view, and another was too small and non-magnetic, and so was left.

In 3 cases tangential cuts in the sclera were caused by a shell fragment, which did not remain in the eye but passed on into the orbital tissues. Blast from a shell and an aerial bomb caused retinal detachment in 3 cases; hand-grenades were responsible for 5, land mines for 2, a rifle-butt for 1, a bullet traversing the orbit for 1, and a fragment of mortar bomb for 1.

The site of the retinal detachment was total in 2 cases, almost total in 2, involved the lower half of the retina in 4, the upper and lower temporal quadrants in 2, the upper and lower temporal quadrants and lower nasal quadrant in 4, the upper and lower nasal quadrants and the lower temporal quadrant in 2, the upper temporal quadrant in 1, and a curtain-like detachment affecting the upper nasal and upper temporal quadrants and the lower nasal and lower temporal quadrants in 1 (see Fig. 2). There was no hole present in this case. Fig. 3 is a diagram of the operation. The internal rectus muscle was divided temporarily at its insertion in front of two mattress sutures. Beneath the muscle belly was seen a tangential wound in the sclera just in front of the equator in the 9 o'clock meridian. The wound was linear, 3 mm. long, vertical; and, gaping, it revealed the choroid. The application of surface diathermy on either side of it closed it by contracting the sclera. A line of surface diathermy applications was made at the equator between the nasal borders of the superior and inferior rectus muscles. From the upper and lower ends of this line applications of diathermy were made forwards to the ora serrata. Thus a frame was made just clear of the scar tissue inside the eye and with the object of pinning down the retina. The interretinal fluid was drained by penetrating diathermy at two points—one at the equator just above the upper margin of the internal rectus and the other at the equator in the lower nasal quadrant.

A retinal tear was present in 5 cases; in one of these there were three tears and in another two tears. In two of these cases the retina was torn by the passage of the foreign body through it. In

two instances the tear and detachment were the result of blast, and in a third these were caused by the contusion from a blow with the butt end of a rifle. In 2 cases there was doubt as to the presence of a minute tear. In the remaining 11 cases no tear was evident.

Vitreous.—There was prolapse of vitreous at the site of a penetrating wound in one case; a knuckle about 3 mm. in diameter was lost. Some vitreous haemorrhage was present in 5 cases at the time of wounding, and in 1 case it occurred 9½ months after an operation for retinal detachment. A moderate vitreous haemorrhage was evident in 7 cases. The contracture of organized bands of fibrous tissue was a factor in producing the detachment in 9 cases. Fig. 4 shows, like Fig. 2, the result of contracture of fibrous tissue

FIG. 2

FIG. 4

FIG. 3

bands in a contused eye. Fig. 3 is the fundus of the right and only eye of a German prisoner. He was wounded in the face with multiple shell fragments. The retina became detached 14 months after he was wounded. Operative treatment was successful in this case. A line of diathermy applications was made to the sclera beyond the limits of the scarred area, the interretinal fluid was drained, and the detached retina pinned down to the choroid. The retina remained in place.

Intraocular Pressure.—In 6 cases of severe contusion of the eye the intraocular pressure was reduced. In two of these with total detachment of the retina the intraocular pressure was less than 6 mm. Hg in one case and 6.5 mm. Hg in the other. In one case of severe contusion with retinal detachment on the temporal side the intraocular pressure was less than 6 mm. Hg. In the 3 other cases it was from 1.25 to 9.5 mm. Hg lower than that in the normal other eye. In 2 cases the intraocular pressure was higher in the eye with the retinal detachment than in the other (normal) eye. This amounted to 1.25 mm. Hg in one case and 4 mm. Hg in the other. After operation the recovery of the intraocular pressure was slower than in the other groups of this series. The normal was not reached until 10 to 11 months after operation, and in some instances the intraocular pressure remained 1.5 to 3 mm. Hg below this.

Results of Operation.—Sixteen out of 18 cases in this group were operated on. In 10 the retina was completely replaced. Of the

6 failures, 3 were at first successful but later showed a recurrence localized to part of a quadrant of the fundus, the onset of this after operation being 6 weeks in one case, 5 months in another, and 8 months in the third case. The patient whose retinal detachment recurred 5 months after operation had for military reasons to be evacuated 18 days after operation, and the long journey from Egypt round the Cape of Good Hope to the United Kingdom may have been a factor in causing this misfortune. A spontaneous vitreous haemorrhage 8 months after operation was probably responsible for another case. In one case it was difficult to account for a shallow residual detachment in the lower part of the eye. This patient had an intraocular foreign body extracted by the giant electro-magnet and the

detachment treated by diathermy. No definite hole was found in the retina, and despite the recurrence of the detachment his vision was 6/9 and the intraocular pressure within physiological limits. In another case a shallow detachment persisted in the lower part of the eye up to two months after operation, when the patient was last seen. Vitreous bands were probably the cause. In the sixth case the operation failed to seal off a large rent at the ora serrata which occupied most of the lower temporal quadrant and to secure replacement of over half of the retina. A further operation is necessary in this case.

Vision: Visual Field: Refraction.—Vision improved after operation in 6 cases. In one it was 6/36 before operation and was reduced to counting fingers at 1 ft. as a result of a late vitreous haemorrhage 9½ months after operation. In the remaining cases the vision was made neither better nor worse by operation, whether this was successful or not. In 7 cases the visual field was improved. In one case in which there was a vitreous haemorrhage 9½ months after operation it became 10° worse than it was before operation, and in the others there was no appreciable change. In 16 cases in this group the intraocular changes as a result of severe trauma made it impossible to estimate the refraction with any measure of accuracy before operation. In one case astigmatism amounting to +1.250 axis 15° was evident after operation; but there was a posterior cortical traumatic cataract in this case, so it is difficult to be sure whether the altered refraction was the result of operation or not. In this instance the operation of pinning back a curtain-like detachment in the upper and the lower half of the fundus (see Fig. 2) was successful, and the visual result was 6/9, with an unavoidable sacrifice of 30° in the temporal field.

In the other case there was no change in the refraction.

Results of Operative Treatment

TABLE II.—Summary of Results

Retinal Detachment Group	Successes	Failures
(1) Cystic degeneration	13 (100%)	—
(2) Choroido-retinal degeneration	21 (100%)	—
(3) Myopia	2 (67%)	1 (33%)
(4) Trauma (civil)	20 (87%)	3 (13%)
(5) Trauma (military)	10 (62.5%)	6 (37.5%)
-Total	66 (86.8%)	10 (13.2%)

In Table II I have included as a failure any recurrence of retinal detachment, however limited and slight, as indeed this was in 4 cases.

The prospect of successful surgical treatment depends much on the type of case. The prognosis is reasonably good in early cases when the retinal tear is relatively small, easily accessible, the ocular tissues are in a good state of health, and an operation by a skilled surgeon is done within a month of the onset of the detachment. It is generally better when the retinal tear is in the lower half of the eye than when in the upper. Successes in early cases are about even in hypermetropes, emmetropes, and low and moderate degrees of myopia.

Large and multiple retinal tears are generally unfavourable, but not always so. One patient with 26 holes in a band of degenerative choroid and retina from 12 to 6 o'clock near the equator on the temporal side recovered after one operation and retained 6/9 vision. Other retinæ with large ragged rents occupying a quadrant of the eye have become reattached after operation and remained so.

The prognosis is slightly worse in deep detachments than in shallow ones on account of the distance of the retinal tear from the choroid. This is met and to some extent effectively dealt with by passing penetrating diathermy needles through the sclera and choroid sufficiently long to reach the retina but not perforate it. Interretinal fluid drains away and the detachment is shallower for subsequent diathermy applications. The prognosis is bad in long-standing cases. The incidence of success falls appreciably three months after the onset of detachment, but reattachment may occur after 4 and even 10 years, particularly when the lower half of the retina only is involved.

Extensive intraocular degeneration affecting the choroid, retina, and vitreous, total retinal detachment, high myopia, very low intraocular pressure and detachment in an aphakic eye, particularly when vitreous has been lost in the course of cataract extraction, and vitreous shrinkage are bad prognostic signs.

Detachment on the nasal side is less serious as regards rapid extension than is the case with detachment originating on the temporal side. In the former the attachment of the retina at the optic disk affords a barrier against sudden involvement of the macula, a complication which may occur within a day or two of a detachment originating in the upper temporal quadrant. When the macula has been stripped off vision is rarely better than 6/24, and is often less than this in spite of successful reposition. Metamorphopsia may also distress the patient for some months after operation when the macula has been involved.

The prognosis is bad in cases of retinal detachment associated with persistent inflammatory lesions of the choroid, sclera, and orbital tissues (orbital cellulitis). Such cases are unfavourable for operation, and if an operation is done through mistaken diagnosis the condition is aggravated and the detachment made worse.

Poor co-operation by the patient after operation and the persistence of marked local reaction with pain are unfavourable prognostic signs. The chances of success are also less favourable in operations which are repeated, although in some cases a fourth operation has resulted in reposition of the retina, the restoration of visual field, and a fair measure of sight.

Although the number of cases due to trauma peculiar to war is small (18 in this series) these few afford an indication of the seriousness of the prognosis and the difficulties which confront the surgeon in planning an operation on an eye which is often severely damaged as a result of either contusion or a penetrating wound, or both. The large splashes of blood on and sometimes beneath the retina which may organize into fibrous tissue bands and ultimately contract, the presence of large rents in the retina through which vitreous gel may have herniated into the interretinal space, and the lowered intraocular pressure are factors which militate against surgical success. In civil practice the counterpart of such cases is found in eyes with degenerative changes in the intraocular membranes and vitreous, commonly as a result of high myopia and senility. As the above statistics show, such cases are, for obvious reasons, rare in military practice.

Summary

This paper reviews 78 cases of retinal detachment occurring in officers and men of the Middle East Force from 1941 to 1943. The cases have been divided into five groups according to the main feature of their pathology. Seventy-six were operated on by the same technique; in one case operation was contraindicated and another underwent spontaneous recovery.

The prognosis is favourable in cases of retinal detachment due to cystic degeneration and to choroido-retinal degeneration, at any rate in young men of military age. It is least favourable in war injuries. The reasons for this are discussed.

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NUTRITIONAL IRON DEFICIENCY ANAEMIA IN WARTIME

PART III: THE HAEMOGLOBIN LEVELS OF SCHOOL- CHILDREN AND PREGNANT WOMEN IN 1944, COMPARED WITH THE LEVELS IN 1942 AND 1943

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In previous papers (Davidson *et al.*, 1942, 1943, 1944) the haemoglobin levels of various groups of people representative of different sections of the Edinburgh population have been reported. Of these groups the two that showed the highest incidence of anaemia were the municipal primary-school children and the pregnant women. They have therefore been investigated further, the last examination in the summer of 1944 being made two years after the original one. The estimation of the haemoglobin was made with the Haldane haemoglobinometer under standard conditions recommended by the Haemoglobin Survey Committee of the Medical Research Council and using apparatus which had been standardized by the National Physical Laboratory.

School-children (7-13 Years in 1944)

Children from two schools (Schools I and III, Davidson *et al.*, 1944) have now been investigated on five occasions in the past two years. It has not been possible to test all the children each time, but none have been included in the present report who were not tested on the first occasion.

The mean haemoglobin levels found for the two schools on the five dates, together with the number of children tested, are shown in the accompanying Table and also graphically in the Chart.

Table showing Mean Haemoglobin Levels of School-children and Pregnant Women on Various Dates in 1942-4

	1942	1943		1944 June
		June	Dec.	
<i>School I:</i>				
Mean Hb % ..	82.9 (347)	83.1 (149)	87.1 (40)	86.0 (110)
St. Dev. ...	7.2	6.8	4.8	8.8
				6.1
<i>School III:</i>				
Mean Hb % ..	77.5 (96)	81.9 (42)	87.5 (28)	85.8 (56)
St. Dev. ...	4.6	6.7	6.6	8.1
				5.4
<i>Pregnant women:</i>				
Mean Hb % ..	77.0 (64)			86.8 (61)
St. Dev. ...	7.3			7.2

Numbers of children in parenthesis.

It will be seen that there has been a considerable rise in the mean haemoglobin level in the past two years, School I having risen from 82.9% to 87.5%, and School III from 77.5% to 90.8%. Both these increases are statistically significant—that is, more than twice the standard error of the mean. For the greater part of the time there was no significant difference