showing that blindness was increasing in the United States in an enormously greater ratio than the population. The Society had appointed a committee—of which Dr. Howe was chairman, the other members being Dr. Andrews, of New York, and the speaker—to investigate and report on the question of preventable blindness. The committee was not yet ready to report, but Dr. Howe had visited Europe and Egypt gathering material, and before long it was hoped something tangible in the way of statistics and suggestions would be offered. But at any rate enough had been discovered to substantiate the statement of Dr. Grossmann that a very large part of the blindness was due to purulent ophthalmia of infants, which they knew now was preventable. Here, of course, the all-important thing was prevention, but this could only be carried out by the midwives, nurses, and general practitioners. How were they to second them? was the question. Much might be done by individual effort, but without doubt legislation of a very strict nature was essential to the proper and efficient carrying out of any plan. They, however, must do all in their power to arouse the people and the authorities from their apathy in the matter. Some such plan as that suggested by Dr. Grossmann was no doubt good as an initiative, but they must not relax their efforts until the strong arm of the law took hold of the matter and protected the community against a disease which was nothing less than a national calamity.—Mr. LINDSAY JOHNSON stated that he entirely agreed with Dr. Grossmann that it mattered very little what antiseptic was used, provided always that the eye were left uncovered and the pus immediately syringed out whenever it accumulated. He had repeatedly cured cases in a few days with the use of a 1 per cent. solution of common alum, and he thought most gentlemen present would agree that the rapid removal of pus was of far more importance than the kind of antiseptic used.—Mr. SIMMONS SNEEL said the importance of the subject could not be overrated. He thought it would be well for the Section at its first meeting next year to adopt a resolution urging the subject on the attention of the authorities, and to get it confirmed at a general meeting of the Association, as was done at the International Medical Congress in London in case of colour-blindness in sailors, railroad employes, etc. Besides any public or joint action much could be done by them as individuals. For instance, for some time he had distributed cards, setting forth the dangers of the disease, to parents or friends attending at the Sheffield General Infirmary with babies with purulent ophthalmia, and desired them to keep them in a prominent place in the house, and to draw their friends' and neighbours' attention to them. He had referred to these and also to other ways in a paper read before the Yorkshire Branch in February last year,² and had then travelled over much of the ground treated of by Dr. Grossmann. He gave there also statistics of the frequency of blindness from this disease in the children at the Sheffield School for the Blind carefully examined by himself, the percentage being 38.3. Whilst agreeing as to the value of Crédé's plan, he remarked that in the paper alluded to he had recorded the excellent results obtained at the Hospital for Women, Sheffield, by simply giving attention to the eyes immediately the head was born, and washing with pieces of lint and tepid water the eyes and adjacent parts. In the last 2,000 labours no case of purulent ophthalmia occurred. Korn had recorded also his experience, and had found this method sufficient after a trial of less simple methods.

MUSCULAR ADVANCEMENT.

Read in the Section of Ophthalmology at the Annual Meeting of the British Medical Association, held in Leeds, August, 1889.

By F. R. CROSS, M.B.LOND., F.R.C.S.,
Bristol.

IN cases of faulty position of the eye and its visual axis, where we should not expect tenotomy to do much good, the operation of advancement has deservedly grown in favour with ophthalmic surgeons of recent years. I have had many opportunities of doing this operation, and feel that it is a safe and satisfactory procedure, and one that can be widely applied. I therefore venture to make some remarks bearing upon it, although I cannot expect to add anything to the knowledge possessed by those present at such a meeting as this.

In the consideration of an operative procedure for the cor-

rection or improvement of any malposition in the visual axis sound anatomical knowledge of the orbital muscular mechanism and the structures supporting the globe and limiting its movements in different directions is of the first importance.

Each eye globe is part of a ball-and-socket joint, closely resembling the hip or shoulder in being supported partly by its capsule and partly by the periarticular muscles, which surround and are in most intimate connection with it. The socket, partly muscular, partly aponeurotic, is so fixed to the anterior half of the orbit that it suspends the globe in such a way that no shifting of the eyeball is possible beyond a rolling in the socket.

The capsule is itself fixed to the wall of the orbit (being suspended from its roof), and strengthened by a network of aponeurosis from the recti muscles, whose tonicity tends still further to maintain its position.

The internal surface of the capsule is attached posteriorly to the groove on the surface of the scleral continuity of the optic nerve, and is further fixed by the ciliary vessels and nerves which perforate it. Just in front of these it is free from the sclerotic, except for the prolongation forwards from it of a little connective tissue, which, passing forwards, becomes more definite, and is known as the subconjunctival tissue, and at the circumcorneal margin unites capsule and sclera, so that they here form one structure.

The outer surface of the capsule is in close contact with the structures that lie outside it; posteriorly it rests on the fibrofatty mass in the back of the orbit; and in front it forms the subconjunctival tissue. Its intermediate portion lies underneath the orbital muscles, sending backwards fascial coverings over them. Anteriorly it is prolonged forwards, folding around the tendons to their insertion into the globe, and then passing still further forwards the prolongations reunite to form a fan at the outer edge of the cornea.

The prolongations of Tenon's capsule, forming the sheaths of the tendons, are in such intimate relation with the muscles that they act as auxiliary tendons, and require the fullest consideration in an operation, and so does the anterior attachment of the capsule, for an alteration in its position means an altered relation of the visual axis.

It is not sufficient merely to divide the tendon itself, except when the case is very slight, because these slips of Tenon's capsule also need division. Being in direct continuity of the fasciæ of the muscles, and enclosing their tendons, they act as auxiliary vincula between the muscles and the eyeball, whose relative position they are sufficient to maintain to a considerable extent after the tendon has been divided.

The ocular muscles lie outside Tenon's fascia, but their tendons are closely associated with it, and together are like the meshes of a net. Thus, when any change in the direction of the pupil is required they all act in unison, a proper tension is maintained throughout all the fibres of the capsule, and an equable pressure is exerted on the globe of the eye. The capsule also is prevented getting into folds under the varying movements.

The capsule with its intimately associated muscles is moreover rendered more perfect, and a more stable socket for the movements of the eye, by means of fanlike prolongations which pass all round to the walls of the orbit from the sheaths of the muscles. The most important and strongest of these passes out from the sheath of the external rectus, just as the muscle gets under it; it is directed to the outer wall of the orbit, 2 millimètres behind and a little above the external palpebral ligament. It contains muscular bundles and constitutes the "external orbital muscle."

This small muscle is of much importance in tending to draw the sheath of the external rectus out towards the wall of the orbit, and away from the globe of the eye. In the primary position of the eyes, the external rectus wraps closely round the globe, and is in actual contact with it from behind forwards for a distance of 13 millimètres; and this amount of contact is increased when for any reason the eye is rolled inward.

With efforts of extreme convergence, as in high degrees of myopia, the increase in contact surface produces an increase of pressure along the outside of the antero-posterior diameter of the eyeball, and causes a lengthening in the antero-posterior diameter of the eye. The abduction exercised by the external orbital muscle upon the sheath of the external rectus lessens this inward pressure upon the globe. It also acts as a stop tendon to excessive action of the muscle, and as a retractor pulley.

The degree to which each muscle of the eyeball wraps round

² *Lancet*, 1888, vol. ii, p. 413.

the globe is of much importance as regards either its freedom of movement, or its steadying action upon the globe.

The muscle which is most closely applied to the eye is the inferior oblique, being in contact with it for a distance of 17 millimètres, whilst, on the contrary, its antagonist, the superior oblique, has only a surface contact of 5 millimètres. Moreover, the inferior oblique is a good deal involved in the lower folds of the aponeurosis of the orbit, which becomes continuous with the "inferior orbital muscle of Muller," whilst the tendon of the superior oblique is very free.

Thus the latter muscle is capable of a very free range of action; it carries the pupil rapidly and extensively throughout the downward movements, which are of such constant importance for our safety in progression, and for a knowledge of what is going on around us. Whilst the skyward tendency of the inferior oblique is very limited (it is almost *nil* in the middle line), and requires no great freedom of action, the inferior oblique is mainly concerned in regulating and modifying the active tendency of its antagonist; and for the performance of this passive function its extensive fixation and its large contact with the globe of the eye is well adapted.

Second only in freedom of movement to the superior oblique comes the internal rectus muscle. This has only a surface contact with the eye of 6 millimètres, and it is inserted 6 millimètres from the cornea. This forward insertion gives it a very powerful control over the inward movements of the pupil, which are of such constant importance in the maintenance of binocular vision; for normal vision is a continuous effort of the ocular muscles for binocular fixation of the pupils. In the constantly varying convergence of the eyes the external recti are only passively engaged, but they are always stretched in definite and steady antagonism with the more energetic interni. Their stability is largely due to the considerable surface contact with the eye that they possess, to a degree which is just double that of their antagonists.

Returning to the connections of Tenon's capsule with the wall of the orbit: a fibrous band passes inward and forward from the sheath to the rectus internus; this is thinner and of less importance than that already described on the outer side, but it also contains a few muscular fibres (the internal orbital muscle) which connect the sheath with the upper part of the crest of the lachrymal bone. The sheaths of the superior and inferior recti are attached respectively to the upper and lower lid, so that elevation and depression of the pupil is accompanied by a slight upward or downward movement of the lid.

In any surgical interference it is necessary to appreciate the association of the faulty muscle with the orbital capsule and with its associated prolongations, and also the conditions of the antagonist muscles. The capsule itself may be adherent to the eyeball, or contracted after inflammation, or it may be atrophied and imperfectly support the globe.

All the various movements of the eyeball consist of rotations within the capsule, about a point within the eye which is always fixed, and which is known as the centre of rotation of the eyeball. This point lies 13.5 millimètres behind the summit of the cornea, and is 1.7 millimètres behind the anatomical centre of the eye. The orbital muscles essentially act in pairs. The movements of the first pair (internal and external rectus) are simple; they consist of a pure adduction or abduction along a horizontal plane, around a vertical axis. This absolute simplicity renders surgical interference with them easy and definite.

Upward and downward movements in the vertical plane, on the other hand, are produced by the complex associated action of the superior and inferior rectus with its oppositely named oblique. Each muscle of the second pair draws its insertion inward as well as up or down; and this rotatory movement renders operations upon their tendons uncertain. If undertaken great care must be exercised to disturb the subconjunctival tissue as little as possible, and to divide merely the tendon itself, leaving the vincula from Tenon's fascia untouched. About 2 millimètre correction can be produced on each of these muscles. The third pair, or obliqui, roll the globe outward, and with this action the superior depresses the eyeball and the inferior elevates it. Their tendons are practically out of reach of the surgeon.

The muscular forces that act upon the globe of the eye are multiple, and their combinations complicated. Even adductions and abductions are not merely due to the contraction of the internal and external rectus. In fact, in every movement of the eye all its muscles are in action, one or more being extremely active, whilst the rest supply the necessary opposing pressure and con-

trol. Antagonist muscles are rarely completely counterbalanced, but any slight insufficiency is compensated by movement of the head. Normal vision requires a continuous effort on the part of the muscles of the eyeball to maintain binocular fixation of the pupils.

If any muscle or group of muscles acts irregularly, or if adhesions exist among the fibres of Tenon's capsule, or its proper relations be interfered with, there will be a want of coincidence of the visual axes, and diplopia or squint is the result. In slight errors it is difficult to detect the faulty muscle; it may be necessary to define the relative positions of the double images, and to correct them by means of prisms; but this subjective testing is less satisfactory, at any rate, when operative interference is contemplated, than some objective methods. The field of fixation may be mapped out by aid of the perimeter, or it is easy to record the range of the pupil, especially in the horizontal plane (which is practically by far the most important) by noting its relations to the external canthus or to the lower punctum lachrymale. Where abnormal position of the globe is due to excessive action of a muscle tenotomy is required; when it depends on defective action advancement is indicated; a displacement of more than 4 millimètres requires operation. I have never had any satisfactory result from passive stretching of the muscles of the eye.

The object of treatment is (1) the restoration of binocular vision. Even after tenotomy this result is frequently not obtained, and it can scarcely be hoped for in the majority of cases of advancement. To give the eyes the appearance of binocular fixation, or so to improve the position that orthoptic exercises, or, still further, interference later on may end in the restoration of binocular vision. To replace a squint of 25° by one of 5° is of use to the visual sense as well as for cosmetic reasons.

Delicate children occasionally suffer from external strabismus, due to insufficiency of the interni, and not at present associated with myopia. All the muscles of such eyes are usually weak, and advancement of the recti interni gives good results. The external strabismus associated with myopia is usually cured by use of concave lenses, aided perhaps by prisms, but in such cases tenotomy of the interni is often indicated. The myopic eye is large and its axis elongated and not easily shifted, as the muscles wrap round it to an abnormal extent, especially the external rectus. The pressure of the muscles, although to some extent neutralised by the orbital muscles of the capsular ligament, tends still further to lengthen the axis of the globe, and to increase the myopia. Muscular advancement in those cases will increase the strangulation, which, on the contrary, will be relieved by section of the external rectus, and by this an increased convergence may be effected of about three millimètres for each eye. At the same time, it must be confessed that many myopic eyes possess a very good range of movement, and under certain circumstances advancement would be preferable to tenotomy.

The hyperopic eye is often associated, especially in extreme degrees, with ill-developed muscles and impaired movement. Where internal squint coexists in these cases, the external recti should be advanced with or without tenotomy of the interni. Where any malposition is entirely due to faulty anatomical arrangement in one eye only, the movements of its fellow being perfectly normal, operative procedures should be confined to the faulty eye.

The principle of muscular advancement has been applied by different methods to congenital or acquired ptosis with excellent result. The main application of advancement is, however, in those cases where extreme divergence has followed an injudicious operation for internal strabismus. Myotomy of the internal rectus is usually followed by divergence, and the same disappointing result also follows after a certain number of well-executed tenotomies in children. I believe it will be found in a good many of these cases that one or both eyes are myopic or will become so.

In the performance of this operation two main plans have been adopted: 1. *Vorlagerung*, rolling the eye-globe into the required position under the separated tendon, and maintaining it there by traction stitches through the sclerotic or the opposing muscle, without any section through the tendon. 2. *Vornähung*, the stitching forward of the tendon towards its new position on the globe.

Julius Guerin performed the original operation on the first method, which was modified and improved by von Graefe. For the second method we are indebted to the late Mr. Critchett, and his well-known operation is the basis of all the more modern procedures. The operation that I perform consists of two separate parts: 1, the application of the sutures to the tendon and to the

capsule, and the separation of these tissues from the eye-globe; 2, the application of the sutures to the globe of the eye, and the fixing of the globe and of the tendon in their proper relative position.

In the first step of the operation care should be taken not to interfere with the attachments of the tendon to the globe, until the former is securely fixed by one or more ligatures. I prefer to puncture the tendon, as in Snellen's operation for tenotomy, or even to stitch it in the middle line. A suture is then passed around each half of the tendon at a little distance from the sclera, and firmly tied. The tendon can now be severed from the eyeball, and the stitches should be passed through the capsule, one above and the other below the tendon, more or less deep according to the amount of advancement required. This will be sufficient for a moderate effect. In other cases a more definite hold can be given on the capsule and accessory bands by darning the stitches through them and any tissue that is subconjunctival. Catgut or silkworm-gut are the best materials for these anterior stitches. Still more effect can be produced by also involving the muscle towards the equator of the eyeball in a darning suture by the help of two or three needles; or this posterior suture may be effected by means of a silk thread, which is passed in and out from one edge of the muscle to the other, overlapping into the connective tissue on either side of it. This stitch may be used as a pulley to draw forward the muscle and capsule. With the exception of this one, I think all the sutures should be fixed, especially where they are attached to the globe.

The second part of the operation provides the attachments of the sutures to the globe. Much the best plan is to introduce two separate sutures underneath a moderately wide surface of the conjunctiva, and to tie this fold of conjunctiva tightly in a double knot. Two long ends are left at each ligature. Running loops, which some authors advocate, are, I think, wrong in principle; they are uncertain in action, and likely to cut through the tissue which holds them. A fixed tied knot round a good fold of conjunctiva cannot cut out in the same way, whilst it affords a fixed point for attachment of the tendon.

It is better to use the conjunctiva as the *point d'appui* rather than the aponeurosis, which may become displaced by traction, or than the deeper tissues; for episcleritis, or even sloughing of the cornea, may be thus induced. Where only a slight advancement is required, the fixation knots may be put close to the inner edge of the cornea, but it will be usually better to put them in the central vertical line of the eye above and below the cornea.

The threads from the fixing knots are quite superficial, and it is now easy to tie on to them the several sutures that were passed through the tendon in the first step of the operation. By means of double surgical knots the eye can be firmly fixed upon the tendons in any required position; and where any change is likely to be needed, bow knots can be used. The deep pulley suture can be easily withdrawn after it has served its purpose. All the other stitches, being capable of absorption, are left until they loosen themselves, and the fixation knots are easily removed at any convenient time. This method is simple, and can be readily adapted to any case, however simple or however severe. It is, I think, nearly always necessary to divide the opposing muscle, except in very slight cases, or it keeps up a continuous reflex drag upon the stitches; and, when I have left it untouched, it has been necessary to cut it at a subsequent operation.

By the operation we aim to effect replacement of the position of the globe and re-establishment of binocular vision. We also require that a free action should be given to the advanced (internal rectus) muscle. It is of importance, therefore, that the tendon should be free from the eyeball, except at its insertion. Any excessive adhesions produce mechanical interference with free movements, and may cause pain. All unnecessary manipulation at the time of the operation must be avoided, especially towards the equator of the eye; for any development of granulation tissue may result in adhesions, which at the equator would distinctly interfere with the movements of the eye.

In very severe cases, however, the posterior stitches must be used, and the eyeball, which at first may be almost fixed in its improved position, will with time, and as the replaced muscle gains power, gradually become more movable and free, as is the case with other joints. There will be a continuous tendency to improvement and towards natural conditions, and eventually a very good result will be attained.

So long as there is a certain amount of muscle fibre remaining, and the nerve mechanisms that regulate this are in a healthy con-

dition, there is, in my opinion, no eye so misplaced—at any rate, in the horizontal plane—but that a combination of tenotomy and advancement will effect a practical cure. Five illustrative cases are appended. [Cases III and IV were exhibited at the meeting, and also photographs of Case V.]

CASE I.—E. M., aged 8. The tendons of both internal recti had been cut in March, 1887, for internal strabismus. In January, 1889, there was a wide divergence of the right eye; the left showed some incompetence of the internal rectus, but the right internal rectus was unable by any effort to adduct beyond the middle line. The right internal rectus was advanced by an upper and lower stitch through the tendon, and by a deep-running stitch through muscle and capsule and any subconjunctival tissue that could be caught up in the needle. These stitches of catgut were fixed above and below the cornea in the middle line. Considerable reaction followed. The external rectus was also cut. Now, seven months after the operation, the left eye fixes; vision, $\frac{5}{8} + 1$ D. $\frac{5}{8}$. The right eye diverges 2 lines, but careful examination shows that it is really the left internal rectus which is incompetent; it can only draw its cornea inwards to a line with the punctum, whilst the right eye can be adducted well under the caruncle. Right vision, $\frac{3}{8} + 4\frac{1}{2}$. Its internal rectus is thoroughly competent, and only a slight conjunctival swelling remains over the incision.

Fields of fixation:

	35°		40°
Right external	45° + 55°	internal	45° + 50° external.
	45°		40°

CASE II.—Miss T., aged 18. A very delicate young lady, who for seven years was laid up with spinal complaint, and could scarcely move. Has still very imperfect control over legs. At 10 years old left internal rectus divided for squint.

May, 1889. Right eye, muscles act well, $\frac{5}{8} - .25$; left eye, squints out 6 mm. $\frac{5}{8}$. The external rectus is very strong, but the internal can only by the strongest effort draw the pupil just beyond the middle line. Considerable neuralgia behind the globe.

June 24th. Advancement of internus. The result not being quite perfect and a feeling of strain existing, the external rectus was cut on July 6th.

July 16th. Slight inward turning of right eye; spectacles ordered. R. + .25. L. + 1.25 = +1 cyl. / 45°.

July 27th. Eye straight and keeps 10. No one could notice any defect of internal rectus, which can move the edge of the cornea barely into contact with the caruncle. Outward, the edge of the cornea barely can reach the external canthus. The neuralgia complained of before the operation has ceased. The operation is a complete success.

CASE III.—C. W. H., aged 29, at 4 years fell upon the sharp point of a ninepin, and internal squint followed. Five years afterwards (twenty years ago) the right eye was operated on for the squint. He says that almost directly afterwards the eye turned quite outwards, and remained there; that fearful pain followed the operation and lasted several weeks. [The eye continued for some time inflamed with proud flesh, and was much affected by dust or exposure. This operation was evidently a myotomy.] Until now the site of the wound has been tender, and very sensitive to conditions of health. In February, and again in September, 1888, efforts were made by an ophthalmic surgeon to explore the eye by an operation on the inner side (advancement); no improvement followed; but in October, 1888, he cut the external rectus with some improvement (as shown in the photograph). The efforts made on the inner side of the eye had caused the formation of much cicatricial tissue, over which the conjunctiva was irregularly puckered; this gave a very unpleasant appearance, and rendered the operation difficult to do and to finish neatly. I advanced the right internal rectus on March 31st. The patient remained in hospital fourteen days.

August 1st. Subconjunctival tissue still swollen, but less than before the operation. In extreme action of the external recti, the right cornea is short of the external canthus two lines, whilst the left underlies the canthus one line. On looking across the nose with each separately, the inner edge of the pupil of the left eye reaches the punctum; of the right eye, the inner edge of the cornea reaches a line beyond the punctum. When he looks at 20 feet the visual axis appear rather divergent, but no homonymous diplopia can be detected. The right eye image six inches on the right of, and the same distance above that of the left. The internal rectus is a little too fixed inward, and the globe is a little tied down by adhesions. The diplopia gives him no trouble; he

corrects it by the position of the head. He occasionally sees night-lights double. Vision is perfectly binocular at 4 to 6 inches from the eyes, and a little in the lower field. L., $\frac{1}{2}$ +3.50 cyl. /; R., $\frac{1}{2}$ +4.50 cyl. / . There is a slight feeling of weakness in the eye, but all discomfort has ceased. (Patient shown.)

<p>A. Sutures through conjunctiva.
B. Sutures through the capsula.
C. Sutures through divided tendon.
D. Internal rectus tendon.
E. Internal rectus muscle.</p> | <p>F. Tendon slit into two, and to each part a suture is fixed.
G. Internal rectus muscle.
H. Sutures darned through the muscle.</p> |
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CASE IV.—W. D. J., aged 30, a compositor, a delicate, nervous man, says that he squinted when 2 years old, and that an operation was done to correct this at 6 years old. He believes that soon after this operation the left eye turned out. For twenty years he has done all his work in the printing trade with his right eye. He considered the left eye practically useless. He has not worn any glasses.

On June 20th, 1888, W. D. J. came to me with marked external strabismus. Left eye fixes distant objects $\frac{1}{2}$ 16J, barely improved by +1 D+1 cyl—slight conus. Inner edge of left cornea only just with an effort reaches the punctum as left fixes object in the middle line. Right squints outward 9 millimètres, and by extreme effort can converge just inside the middle line. Vision of right, $\frac{1}{2}$ —5D $\frac{1}{2}$.

June 29th. Tenotomy of external recti.

July 16th. Muscular advancement of right internal rectus, with perfect result as regards this muscle, but the left internus being incompetent, this was advanced on November 2nd.

The cosmetic result is now excellent, and the movements of all muscles in each eye is quite perfect. (Patient shown.)

CASE V.—T. J., a sea captain, trading on the West Coast of Africa, first consulted me in December, 1881. He was then aged 41. There was external strabismus of the left eye to such an extent that the pupil looked out at the external canthus when the right eye was in the first position. In fact the visual axes formed with one another a right angle (when the right eye was looking north the left eye was looking east), and there was scarcely perceptible movement possible with the left eye inwards. Vision, right, $\frac{1}{2}$ 16 J. + 4.50, $\frac{1}{2}$ 1 J. Left, $\frac{1}{2}$ 16 J. + 4.50, $\frac{1}{2}$ 4 J.

He said that an operation for inward squint had been done ten years before, and that since that time he had always squinted outwards. In 1877 he was ordered spectacles, and he thinks since that the squint outward is more pronounced.

The cast was so extreme that I did not advise any operation, but it was evident that great discomfort existed from severe conjunctival irritation at the middle of the eye, where the cornea should properly have been.

In May, 1889, Captain J. came back with corneal inflammation of the right eye, and as this required to be covered up, I recommended him to have an attempt made to straighten the left eye.

A wide vertical conjunctival incision was made; a ligature then passed around the stronger central portion of a thin aponeurosis which represented the internal rectus, and side stitches were

passed above and below this; also a deep stitch by means of three needles involved the muscles far back; a free separation of all the parts from the globe was then made on the outer side; strong cicatricial bands representing the external rectus. The tissues on the inner side involved in the sutures were then separated from the globes, and attached to fixation knots above and below the cornea.

A month afterwards there was displacement outwards of only 2 millimètres; a good deal of thickening and granulation tissue occupied the site of the advancement. He could no longer, by the greatest effort, diverge the outer edge of the cornea beyond the external canthus; and the internal rectus could draw the centre of the pupil 3 millimètres across the middle line. There was some ulceration of the cornea on the inner side of the left eye from strangulation, but the eye was now quite comfortable and free from neuralgia and irritation which had for years before troubled him much.

Three months after the operation, eye movements distinctly improving. Cosmetic effect excellent.

A DISCUSSION

ON

THE REMOVAL OF BONY GROWTHS FROM THE EXTERNAL AUDITORY CANAL.

In the Section of Otology at the Annual Meeting of the British Medical Association held in Leeds, August, 1889.

I.—This discussion was introduced by the President of the Section, Mr. GEORGE FIELD, in an address which was published in the JOURNAL of August 24th, p. 415.

II.—SIR WILLIAM DALBY, M.B.Cantab., F.R.C.S.

Aural Surgeon, St. George's Hospital.

A BRIEF account of the circumstances under which the removal of bony growths from the external auditory canal by means of drilling came into use may, I think, possess some interest to this Section. Previous to the end of the year 1874 it had been present to my mind that the occasion would some day present itself when the immediate removal of a bony growth in this situation would become imperative, in consequence of the obstruction which it formed to the escape of pus behind it, pus which came from a tympanic cavity through a perforation. I had previously removed bony growths in four urgent cases by a method suggested by Dr. Clarke, of Bristol, namely, by passing into the growth through three needles a continuous current of electricity from six pairs of plates of a Stöhrer's battery. By this means the life of the growth was destroyed, and in a few weeks the dead bone became so loose as to be readily extracted. This process however occupied too much time to be of any use in cases where it was necessary at once to give relief. The difficulty which I had anticipated came under my notice in January, 1875.

A gentleman, aged 30, consulted me under the following conditions: A thick fetid purulent discharge from the right ear blocking up the canal, pain in the ear, dull pain and uneasy sensations in head. The perforation took place when he was 4 years old, after scarlet fever. It being quite obvious that the growth should be removed without delay, I obtained the assistance of Mr. George Edgelow, who was at that time dental surgeon to St. George's Hospital. After seeing what was required, he had several drills made for the purpose such as he thought would be most useful, and on January 9th I drilled away the chief part of the bony growth and gave free egress to the discharge; after which all unpleasant symptoms passed away. I may say that the base of the tumour being broad it was not cut away at the base, but the upper three-fourths ground away; the first part of the proceeding consisted in drilling a hole into the centre, and, by a process of enlarging this, drilling away the upper part and then grinding down this surface.

Within six months of this date I operated in a similar manner on three other cases, but in each one the circumstances and the conditions were in several respects different. One was where a