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A
PROBATIONARY ESSAY
ON
CATARACT:
SUBMITTED,
BY AUTHORITY OF THE PRESIDENT AND HIS COUNCIL,
TO
THE EXAMINATION
OF THE
Royal College of Surgeons of Edinburgh,
WHEN CANDIDATE
FOR ADMISSION INTO THEIR BODY,
IN CONFORMITY TO THEIR REGULATIONS RESPECTING THE
ADMISSION OF ORDINARY FELLOWS :

BY
FRANCIS FARQUHARSON, M. D.

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PROBATIONARY ESSAY

ON

CATARACT.

IN the following pages I propose,

1st, To give a Sketch of the Anatomy of the
Lens.

2dly, An Account of the Disease : And,

3dly, To describe briefly the Operations for
its Removal.

I. ANATOMY OF THE LENS.

THE crystalline humour situated behind the pupil is received posteriorly into a depression on the fore part of the vitreous humor, and has its circumference opposed to the canal of Petit.

It is in the form of a double convex lens, with its posterior surface more convex than its anterior. Its specific gravity is not uniform, as its density increases from the surface to the centre ; in old age, however, its consistence becomes uniform. The lens is enveloped in a dense elastic tunic, called *Tunica Aranea*, which is quite pellucid ; between this and the lens, the humor of Morgagni is supposed to be placed. The texture of the lens is made of concentric lamellae, joined together by fine cellular membrane, and is probably organized as the other parts of the eye. At birth it is very soft, nearly spherical, and of a reddish colour.

II. DESCRIPTION OF CATARACT.

By Cataract is generally understood dimness or loss of sight, from an opacity of the lens, or capsule. Some, however, use it in a more extended sense : thus, BEER applies the term to every perceptible object to vision situated in the posterior chamber, between the vitreous humor and uvea.

When the disease is slowly formed, its most characteristic symptoms are the following :

1st, A gradually increasing dimness of sight, and objects appearing, as if seen through a mist. 2dly, An improvement of vision, on darkening the room, looking sideways, &c. and by the use of convex glasses. 3dly, A white cloudy halo surrounding the flame of a candle. These symptoms gradually increase, the patient often distinguishing only the outlines of bodies, or merely knowing light from darkness ; in more advanced cases, total blindness is induced. Upon examination, the eye looks slightly hazy. The iris is sometimes a little dilated in a moderate light, and its edge seems as if it were surrounded by a black ring ; this arises from its dark edge appearing distinct, contrasted with the opacity behind.

The opacity is soon perceived. It generally begins in the centre and spreads to the circumference of the lens, but sometimes it commences in the form of spots, in various parts of it, and assumes many shades of colour : they are generally whitish. The dimness of sight generally corresponds with the increasing opacity. It is commonly believed that the pupil dilates and contracts merely from sympathy with the reti-

na, and that therefore it serves as a good index to the state of the latter. This, however, is by no means invariably the case, as often, in complete Amaurosis, the iris acts when stimulated, and in Mydriasis the pupil is dilated, even when exposed to the strongest light. When we examine the iris of a cataractous eye, we must be careful to cover the healthy one, as owing to the strong sympathy, the motions of the one iris follow those of the other.

The diseases most liable to be mistaken for Cataract are, Amaurosis and Glaucoma. The symptoms of Amaurosis differ entirely from those of Cataract. In incipient Amaurosis, vision often fails for some time, and then returns, whilst the patient complains of severe pain in the forehead and eye. The application of Belladonna, use of glasses, and looking sideways, do not improve vision as in Cataract. The halo around a candle displays the colours of the rainbow, and the patient perceives flashes of light before his eyes. The cornea of an amaurotic eye is scarcely altered at first, but soon loses its clearness; the iris becomes sluggish, the pupil is dilated, and loses its circular form. The cloudiness behind the pupil is deep-seated, and appears concave; the lens and vitreous humor seem to have lost somewhat of

their black colour, and the bottom of the eye appears through them of a pale green hue. If any particularly opaque spot be observed, it is of a greenish cast, and changes its situation with the motion of the eye.

The following are the symptoms of Glaucoma, when fully formed : The cornea loses its clearness, and the sclerotica assumes a bluish or yellowish tint, whilst several dark tortuous vessels ramify on it. The iris changes colour, and the pupil dilates with an irregular edge ; the patient cannot distinguish light from darkness. As the disease advances, excruciating pains are felt in the eye and head ; the pupil becomes dull, and a yellowish hue is seen confined to the back part of the eye. At last the lens swells, becomes of a green colour, and thus a *Cataracta Glaucomatosa* is formed. Cataracts are commonly divided into the true and false ; by the first is understood simple opacities of the lens or capsule, and, by the second, obstacles to vision between the anterior capsule and uvea.

The following are the divisions of true Cataracts : 1st, Lenticular ; 2d, Capsular ; 3d, Capsulo-lenticular. An important distinction, both as indicating the mode of operating and influencing the prognosis, is founded on the consistence

of Cataracts ; and accordingly the lenticular are subdivided as follows: 1st, The hard ; 2d, The fluid ; 3d, The soft.

I shall briefly distinguish each variety. The Hard Cataract is generally small, of an amber colour, densest in its centre, and appears deep-seated. The eye is generally healthy, and the iris moves freely : there is a narrow shade cast on it, owing to its distance from the iris. The patient can distinctly discern light.

The Fluid Cataract is generally white and large, and approaches close to the pupil ; its surface is often covered with irregular spots which frequently change their places, disappear and reappear. The lower part of the pupil seems more opaque than the upper ; the iris moves slowly, and light can be with difficulty distinguished from darkness. In this variety the capsule is generally opaque. The Soft Cataract is of a light grey or greenish tint, vision is much impaired, and the iris moves sluggishly. It acquires a large size, so that sometimes the lens is double its usual dimensions. The capsule is generally opaque, and may be seen of a mother-of-pearl colour covering the lens.

CAPSULAR CATARACTS.

LENTICULAR Cataracts seldom remain long without in course of time involving the capsule. The opacity generally begins in the form of white shining points or striae ; as the disease advances, the capsule thickens, and depositions take place on its surface. When the capsule alone is affected, the motions of the iris are altered very little. Capsular cataracts are divided into the anterior, posterior, and complete. The anterior cataract may be distinguished by its light grey, and in some places chalky colour, interspersed with shining streaks. Vision is often quite impeded. The posterior cataract is a very rare disease. BEER says, that in this variety the lens sooner becomes opaque than in the anterior ; this, however, is contradicted by experience in this country. In the posterior cataract, a muddiness may be observed in the situation of the lens, but it is deep-seated, so that the thickness of the lens may be seen anterior to it. On examination from the side of the eye, the opacity appears concave, and has a yellowish tint with lines crossing it. When the lens is implicated, it generally becomes hard, the sight is more

or less weakened, but the motions of the iris are little disturbed. When the capsule becomes opaque after operations, it is called the secondary capsular cataract. The Cataracta Morgagniana is a very rare form of the disease. When the capsule is so much wounded as to prevent the union of its edges, the lens is gradually absorbed, the capsule thickens, shrinks, and its two surfaces unite and often enclose a portion of the lens: This constitutes the Cataracta Siliquosa.

False Cataracts are divided by BEER into the Lymphatic, Purulent, Sanguineous, and Choroid. It will be quite unnecessary to enumerate symptoms and appearances, as they are all the results of iritic inflammation.

CONGENITAL CATARACT.

By this is generally understood an opacity in the lens or capsule, coëval with or preceding the birth of the infant. German writers, however, suppose the opacity to be caused after birth by a rupture of the capsule from the violence of convulsions. SAUNDERS and others state, that the majority of congenite cataracts are capsular, that the lens has been absorbed, and that the two layers have approximated, forming a white

opaque, highly elastic membrane. This statement is opposed to the experience of GIBSON, WARE, &c. who assert the cataract to be generally fluid. In a rare form of the disease, the centre of the lens is affected, and the circumference transparent. Children, when affected with Cataract, enjoy vision in various degrees—some seeing objects indistinctly, whilst others can discern only bright colours. Most authors state the exciting causes of Cataract to be exposure of the eye to strong reflected light, or great heat, especially when engaged in any minute work; irritation from lime, &c.; wounds piercing the capsule and lens: Also contusions on the eyeball, old age, and the abuse of spirits, seem to be conducive to its formation.

The hereditary nature of Cataract is well ascertained. Professor WALTHER supposes Congenital Cataract to be the primitive state of the lens, and that no alteration has taken place in it, owing to some check given to the development of the embryo. He considers Cataract always to arise from acute or chronic inflammation of the capsule; and, by the aid of glasses, he has discovered in Cataract a morbid vascular connexion between the lens and capsule.

Many have supposed, that, by means of reme-

dies, they have removed well-formed Cataracts ; but probably, in some, spontaneous absorption has taken place, and, in others, the opacity has been merely capsular. BEER thinks, that in several cases of the disease, arising from Scrofula, Syphilis, &c. he has arrested their further progress by internal remedies ; but he declares that often no benefit was obtained, except in so far as the patient's health, and the condition of the eye were concerned. The chief remedies in use are, bleeding, general and local, blisters, &c. Cathartics and emetics have been much recommended. Mr WARE was, at first, disposed to attribute much in the case of Cataract to the application of ether to the eye, and mercurial liniment to the eye-lid ; but, latterly, he changed his opinion, and supposed the opacities to be absorbed in the aqueous humour, as they had been caused by rupture of the capsule. On the whole, little reliance can be placed on any form of medicine, and the operation affords us the only rational hope of restoring vision.

III. OPERATIONS.

THE proper period for operating is important. Age appears to offer no obstacle, as successful

operations have been performed after the 80th year. Before proceeding to operate, we should ascertain the state of our patient's health. If liable to gout, the fit should be allowed to pass over before operating. Those troubled with dyspepsia, hysteria, &c. should be strengthened by good diet, tonics, &c. When the patient is in good health, all the necessary preparations will be, abstinence from animal food, and a gentle cathartic given a few days previous. When the eye-lids are swollen, red, and relaxed, with a morbid secretion from the Meibomian glands, it will be necessary to touch the eye-lids with the sulphate of copper, or the ointment of nitrate of mercury; or, if severe, to apply a blister to the nape of the neck. There is great diversity of opinion with regard to the propriety of operating when only one eye is affected. The generality of surgeons are of opinion, that when both eyes are affected with Cataract, the operation may be performed on them at the same time. Mr STEVENSON recommends the removal of Cataract by absorption, as "soon as its character is sufficiently disclosed to enable us to decide upon the real nature and tendency of the disease."

We may reasonably expect a fortunate result to our operation under the following circumstan-

ces: *1st*, When the disease is not complicated; *2d*; When the conformation of the eye, behaviour, and domestic condition of the patient, and skill of the surgeon, are such as to throw no difficulty in our way. Still we must not expect uniform success, as, even with every advantage, sight is often made worse, or even sometimes entirely lost. On the other hand, the operation will probably prove unsuccessful: *1st*, When the above advantages are wanting: *2d*, When the disease has begun with violent headaches: *3d*, When the patient is liable to attacks of erysipelas; and, *4th*, When, with motionless iris, light cannot be distinguished from darkness.

The operations commonly practised for the removal of Cataract are, 1. Couching; 2. Extraction; 3. Absorption.

The operation of couching is divided into simple depression, reclinacion, reclinacion through the cornea. Simple depression consists in pushing the opaque lens from the axis of vision into the vitreous humour.—I shall briefly describe the operation from GUTHRIE. After the preliminaries are arranged, the needle is to be introduced into the sclerotica, about a line and a half from the edge of the cornea, and half a line below its horizontal diameter to avoid

the long ciliary artery : the point is then to be directed towards the centre of the eye, and one flat surface of the instrument should be upwards. The point is then to penetrate in this direction, until its neck has entered the wound, when its direction must be changed to the nasal edge of the pupil ; and it must be passed on, until it is seen advancing behind the pupil. The handle should now be depressed so as to raise the point to the upper edge of the Cataract, on which its flat surface must rest ; and the operation is completed by raising the handle, and firmly pressing the lens downwards, and a little backwards. The needle should be kept steadily in its place a few seconds, to prevent the rising of the lens ; if this should happen, the depressing motion must be repeated. Care must be taken not to transfix the lens, as this impedes, and sometimes effectually stops the progress of the operation. The division of the capsule is essential to the proper performance of the operation. The second variety, or reclinacion, is merely a modification of the first, and differs from it in placing the needle so as to press the Cataract backwards, downwards, and outwards ; its anterior surface looking upwards, and its upper edge backwards.

RECLINATION THROUGH THE CORNEA.

THE needle is to be introduced in the middle of the lower part of the cornea, with its convexity upwards ; it is then to be pushed on until it touch the lens. The convex part of the instrument is to be turned against the upper edge and face of the lens ; the handle is then to be raised so as to produce the reclination. These operations are adapted for hard Cataracts, and are more expeditiously and easily performed than extraction. The breaking up of the texture of the vitreous humor is the serious objection to this operation ; this often causes a slow inflammation, attended by turbid humors, flaccid iris, &c. whilst the sight often remains dull, or fails entirely.

AFTER-TREATMENT.

THE eye should be properly bandaged, and the patient kept in a dark room for several days. The antiphlogistic regimen must be strictly enforced. Sometimes the edges of the wound do not unite, but protrude : this may be removed

by the application of the wine of opium, or nitrate of silver. Occasionally severe vomiting supervenes; this should be combated by opiates, as it may cause the lens to rise. Inflammation of the different tunics must be removed by the usual remedies.

EXTRACTION.

THE proper position of the patient, surgeon, and assistant, is of much moment in this difficult operation. The following is BEER's method of operating. The point of the knife should be introduced into the cornea about $\frac{1}{8}$ th of a line from its edge, and $\frac{1}{4}$ th above its transverse diameter, and directed obliquely towards the iris, with the edge turned downwards. The point should project from the place of its entrance nearly in a direct line towards its intended exit. The knife is now to be slowly directed across the anterior chamber till the point is pushed through the cornea, and, in proportion as it passes out, the handle ought to be inclined more downwards and backwards. A few seconds after the semicircular section of the cornea, a needle is to be introduced under the flap into

the pupil, when the capsule is to be cut through by repeated strokes in different directions with its sharp edge ; it may then be withdrawn. The Cataract now advances into the pupil, and, should there be any action in the eye, is generally discharged at once. Should any portion of the lens be detached in its passage through the pupil, it should be brought away by DAVIEL's spoon. When the removal of the Cataract is not so readily accomplished, and when the difficulty is not owing to any error in the operation, we ought to promote its discharge by allowing the eye to turn quickly upwards for a little ; and if this fail, by gently pressing the lid against the lower part of the eye-ball, till the lens has passed through the pupil. DAVIEL's scoop will assist much. The patient ought to be allowed to close his eye for a few minutes. It may then be opened, to know the state of the pupil, and whether the edges of the incision be in contact ; after this, however, a bandage and proper dressings ought to be applied, and the patient put to bed. The eye should seldom be opened before the fifth day. The same treatment should be used as after couching. Unfavourable extraction is often followed by the following symptoms, viz. violent iritis, ulceration, and opacity of the Cor-

nea, separation of the edges of the incision by protruded iris, &c. redundant depositions of lymph, and coalition of iris and cornea; secondary cataract also frequently occurs. These symptoms are generally caused by too small a corneal incision, wounding the iris with the cornea knife, and allowing the escape of the vitreous humour.

THIRD DIVISION.

Operations for breaking up the Cataract.

1st, Anterior to the iris; 2d, Posterior to that membrane.—These operations are applicable to Cataracts, which can easily be divided by the needle. 1. Anterior to the iris. By this operation, either the capsule may be destroyed with or without an opening in the lens, or the whole of the lens may be broken up, the fragments brought into the anterior chamber, and the capsule destroyed. The second mode is preferable, and is performed as follows: After proper dilatation by Belladonna, the needle is to be introduced at the inferior part of the cornea, so as to allow it to pass into the pupil without in-

juring it ; it is then to be carried to the upper part of the lens, and by repeated incisions, the capsule and lens are to be freely divided and brought into the anterior chamber. 2. Posterior to the iris. The operation of breaking up the lens, and pushing the fragments into the anterior chamber, is considered preferable to merely opening the capsule, and allowing the lens to be removed by absorption. Sir W. ADAMS operates in the following manner. The needle is to be passed through the sclerotica about a line behind the iris, with its flat surface parallel to that membrane ; it is then carried through the posterior chamber. When the point has reached the temporal margin of the pupil, it is directed into the anterior chamber ; the edge is then turned backwards, and the lens and capsule divided into many pieces by repeated cuts, detaching the capsule at the same time from its ciliary connexions. After this, the instrument is to be turned as at first, and the fragments brought into the anterior chamber by its flat surface. When the lens is so firm as to resist its division, reclinacion may be performed, or it may be brought into the anterior chamber, and then extracted. The removal of the *Cataracta Arida Siliquosa* is best effected, by first separating the capsule as much

as possible from its attachments, by the introduction of the needle posterior to the iris, and afterwards extracting it through a small opening in the cornea. In the case of a secondary membranous cataract, Scarpa's needle may be introduced posterior to the iris, so as to separate any adhesions, and lacerate the capsule. When this however is too much thickened to admit of it, our best plan is to detach it, and then attempt depression; if this fail, it must be extracted through the cornea. Various modifications of the above operations have been recommended, particularly the compound one of displacement and extraction.

ON OPERATING FOR CONGENITAL CATARACT.

THE proper age for operating is much disputed; but no definite time ought to be fixed, as so much depends on the constitution of the infant. We may operate with every hope of success at six months, if the child be healthy. SAUNDERS states, that the most fortunate results attend the operation between eighteen months and four years. The operation for Congenital Cataract consists in lacerating the central part of the capsule, without disturbing the lens. This may be

done either anterior or posterior to the lens. Mr Saunders prefers the former mode. When we operate on children, they must be completely under control, for which purpose several assistants are required. One operation frequently suffices, but sometimes four or five are necessary. The after-treatment is very simple, as childrens' eyes after operations are little liable to inflammation and its consequences.

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