ON A SUCCESSFUL PLAN
OF
ARRESTING THE DESTRUCTION
OF
THE TRANSPARENT CORNEA
FROM
ACUTE PURULENT INFLAMMATION
OF THE
CONJUNCTIVA.

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THERE are few medical men who have not witnessed the destruction of the eye for visual purposes by acute purulent inflammation of the conjunctiva, and most are aware that such an effect results from injury to the transparent cornea.

Those who have devoted their attention more especially to the study of ophthalmic diseases, know how rapidly fatal the purulent disease often proves to the cornea, in spite of the most assiduous and

prompt adoption of the ordinary remedies, and that the energetic employment of the most active means often fails to arrest the fatal progress of the complaint. Having myself witnessed the repeated failure of depletion, by local and general blood-letting, by nauseating medicines, by purgatives, abstinence, &c. ; of the influence of mercury, of the local application of powerful astringents and stimulants, and of all ordinary means ; I was induced to study the disease most attentively, conceiving that a perfect knowledge of its progress, and of the mode in which the destruction of the cornea takes place, might afford some explanation of the failure of the various plans of treatment which I have mentioned, and which have been hitherto employed ; nor was I deceived, for such investigation has afforded me most satisfactory evidence of the mode in which the cornea is destroyed in the most acute and severe cases, and it has, at the same time, enabled me to suggest and put into practice a remedy which has exceeded my most sanguine expectations in its beneficial results.

I have since had ample opportunity of testing the remedy : quite sufficient, I consider, to warrant my offering it to the profession, perhaps not as infallible, but certainly as one of extreme value in the treatment of this hitherto most destructive disease.

In order to make the subject plain to all my professional brethren, I shall first describe the mode of organization of the cornea ; secondly, explain how it is so rapidly destroyed in acute purulent ophthalmia ; thirdly, detail the mode of applying the remedy

which I have found so successful; and lastly, give some cases in illustration of its effects.

It is not my intention to enter into the history of the particular character and modifications of the purulent disease, but only so far to describe its symptoms or progress as may be necessary to render the plan of treatment which I have to propose clear and simple.

The situation, figure, and extent of the transparent cornea, are too well known to need description on the present occasion. The body consists of numerous thin laminæ, united together by a very delicate cellular tissue, which contains a perfectly colourless and limpid fluid. It is fixed at its circumference to the anterior edge of the sclerotic tunic, and the fibres of the latter are so intimately blended with the margins of the laminæ of the former, that the skill of the experienced anatomist fails to detect their precise mode of union. On the anterior or convex surface of the cornea is placed its conjunctival or mucous covering, continuous with that which invests the anterior portion of the sclerotic; but the mucous membrane is so firmly bound down immediately over the junction of the cornea and sclerotic, and its texture becomes so delicate where it covers the former, that it is very difficult to demonstrate it by the ordinary anatomical means. Its existence in connection with the cornea, and the continuity of the corneal portion with that of the sclerotic, become, however, most distinctly developed by morbid action, which also proves that the principal vascular supply of the cornea is obtained from the

vessels of its conjunctival tunic, for in all the diseases or injuries of the cornea, which cause distension of the vessels by red blood, so as to render them perfectly visible, the principal or largest vessels are invariably perceived ramifying in the conjunctival membrane, and from these large vessels more minute and extremely delicate ramifications can be frequently traced into the substance of the cornea itself; this is obvious in coroneitis or inflammation of the substance of the cornea, and again in the chronic diseases of this structure, such as result from continued strumous conjunctivitis, or from the irritation of the granular eyelid, also, in the healing of ulcers of the cornea. In pure inflammation of the cornea, I have frequently seen the vessels of the conjunctiva passing from over the sclerotic to the surface of the cornea, and then ramifying most minutely in the substance of the latter, and at the same time, I could scarcely discover a vessel filled with red blood in the sclerotic tunic itself, even when the vessels of the cornea have been extensively injected with red blood. I have been thus satisfied that the vascular organization of the cornea is principally derived from the conjunctival, and little, if at all, from the sclerotic vessels.

The posterior or concave surface of the cornea is lined by a portion of serous membrane, which is common to the whole anterior chamber; this also becomes evident under morbid changes, though it can hardly be demonstrated satisfactorily in the human eye by the most skilful dissection;—the blood-vessels of this serous membrane are derived principally from

those of the iris, and after supplying the membrane, some very minute ramifications pass to the posterior or internal laminæ of the cornea ; but these are few and insignificant to those which the cornea derives from its conjunctival layer. During the repair of ulcers, which have extended through the aqueous membrane into the posterior laminæ of the cornea, I have been able distinctly to trace the vessels of the aqueous membrane, and the delicate ramifications to the cornea.

Thus the principal corneal blood-vessels are derived from those of the conjunctiva, which covers it anteriorly, but it also receives a trifling supply on its inner surface from the vessels of the aqueous or serous membrane which lines it.

The nerves of the cornea are principally derived from the fifth cerebral, and I believe that their distribution follows very much the same course as the arteries. I adopt such opinions also from pathological observations, and from witnessing the effects of division of the fifth nerve, in the rabbit and dog, upon the cornea and conjunctiva. The source of the vascular supply is, however, at present, the most material point, and pathology gives us ample proof of its being such as I have described.

Acute purulent inflammation of the conjunctiva, whether of idiopathic or specific origin, presents similar characters, runs through the same stages, and leads to the same consequences, if unchecked. The morbid action commences in the palpebral conjunctiva, with itching, smarting, or burning sensa-

tions, a sense of grit and weight in the lids, and stiffness; a light yellow secretion at first is poured out in small quantity, which collects and coagulates on the cilia, and at the canthi; at this time, the membrane lining the palpebræ is found of a deep carmine colour, thickened, and its villi prominent, so that it presents an appearance somewhat resembling that of the mucous surface of a finely injected foetal stomach; the cilia are loaded with coagulated secretion, and the surface of the globe suffused with lachrymal fluid and purulent secretion. This may be termed the first stage.

Next some severe and continued pain is experienced, the eye feels exceedingly full or distended, the sense of weight and stiffness of the palpebræ augments, the morbid secretion becomes very copious, and of a deeper colour; the ocular part of the conjunctiva at this period participates in the disease; it first assumes a pink colour, from the injection of its vessels minutely by red blood, (this is, however, limited to the sclerotic portion of the membrane,) next it becomes thickened and villous, and afterwards raised by deposition in the cellular tissue between it and the sclerotic, so that it is elevated around the margin of the cornea; and this elevated condition of the membrane is termed chemosis. At the time in which this conjunctival change takes place, on the surface of the globe, the palpebræ become tumid, red, and painful; and the tegumental surface tense and shining, as if affected by erysipelas.

The deposit in the cellular tissue beneath the sclerotic portion of the ocular conjunctiva, is of serum or fibrin, or of both; it usually commences at the inferior part, and gradually extends upwards. The chemosis, therefore, may be incomplete or complete, as surrounding the margin of the cornea partially or entirely; when it is complete, the cornea is in momentary danger by destruction of its vitality, which takes place in the following manner: the elevation of the sclerotic part of the ocular conjunctiva by sub-jacent deposit, renders it tense, and creates so much stress and tension on that part which is firmly bound down over the junction of the cornea and sclerotic, that the circulation through its vessels becomes impeded and ultimately arrested, so that the principal vascular supply of the cornea is cut off, and it dies or mortifies in part or in toto. The cornea first assumes a nebulous appearance, but its brilliancy remains; this, I believe, to result from the deficiency of the interlaminar fluid, in consequence of impeded circulation; it resembles closely the appearance which may be produced by pressing the cornea firmly with a narrow body, so as to press the lamina together, and exclude the interlaminar fluid. This nebulous state is usually general, and of short duration, and is succeeded by a dull and dense opacity of a part or of the whole of the cornea, which, at the same time, loses its brilliancy. There is not, at any time, evidence of any inflammatory action, either in the cornea or in its conjunctival covering,

and the destruction of these parts is usually too rapid to be the result of such morbid action in the textures themselves.

The cornea then mortifies from a strangulation of its blood-vessels, and this strangulation is produced by the chemosis or the elevation and tension of the conjunctiva, which covers the sclerotic. In proof of the rapidity with which the cornea is destroyed, I can state that I have ascertained it in one instance to be perfectly sound at eleven o'clock, and found its destruction complete at seven o'clock following; but I believe the mischief to be even more quickly accomplished in many cases.

Having ascertained thus much by careful observation, I could hardly fail to resort to such means as would immediately relieve the tension of the chemosed conjunctiva, or to try the effect of free division of it, having due regard to the course of its principal vessels, and I determined upon the following mode of doing it; to raise and secure the upper eyelid as far as possible, as in the operation for extraction, and then to make free incisions into the sclerotic portion of the ocular conjunctiva, and the subjacent loaded cellular membrane, without injury to any other textures of the globe. I considered it essential that the incisions should extend close to the margin of the cornea where the tension and pressure would be greatest, and that the direction of the wounds should correspond to the intervals between the insertions of the recti muscles, so that the principal vessels of the conjunctiva of the globe should not be injured.

My opinion of the probable efficacy of this proceeding was heightened by a knowledge of the excellent effect of a similar plan of treatment in cases which I consider to be somewhat analogous, viz., in cases of severe phlegmonous inflammation of cellular tissue in other parts of the body, having often witnessed the arrest of gangrene and mortification in such cases by making the incisions through the skin and loaded cellular membrane, which, no doubt, acts beneficially by relieving the tension of the former, and by partially unloading the latter, and thus removing a pressure which impedes or arrests the circulation.

I was aware that incision or excision of parts of the conjunctiva had been suggested and effected in the condition of chemosis, and that the result of such treatment had not been very satisfactory; this want of success, however, appeared to me as a consequence of the misapplication of the principle, and not from error in the principle itself; for the incisions in the membrane, or excisions of portions of it, had been generally made in a direction corresponding to that of the margin of the cornea, and frequently extended completely around it; thus the vessels passing to the corneal portion of the conjunctiva must have been in great part, if not entirely divided, and the supply of the corneal portion and of the cornea cut off or nearly so; the operation tended therefore rather to augment than diminish the mischief it was meant to arrest. This error arose from ignorance of, or inattention to the anatomy of the organization of the part.

My plan being decided upon I soon had opportunity of carrying it into effect.

A young man of robust make and of good constitutional power applied for advice at the London Ophthalmic Hospital, having acute purulent ophthalmia of specific origin (gonorrheal) in one eye. The palpebræ were excessively swollen, tense and shining, the morbid secretion thick, copious, and of a deep yellow colour mixed with green; the chemosis was complete, and the cornea generally hazy or nebulous; but its surface was brilliant except at one point, at its nasal side close to its margin, where mortification had begun. The disease had not existed twenty-four hours.

I immediately divided the chemosed conjunctiva freely from the margin of the cornea towards the orbit once or twice in each space between the attachments of the recti muscles, making in all six or seven incisions; they were effected by means of the knife used in the operation of extraction to divide the cornea; the point being inserted just over the junction of the cornea and sclerotic, and passed outwards, the back of the knife being kept close to the sclerotic, as its acute edge divided the affected membrane; each incision had a direction radiating from the centre of the cornea. The chemosis was firm and principally fibrinous. Directly after the operation hot water was applied to encourage the bleeding. Soon after, the patient was bled from the arm, to the extent of about fourteen ounces, sufficient to relieve the fulness and firmness of his pulse; he took fifteen grains of calomel

and colocynth, and was further directed to take calomel, gr. ij. opii, gr. ss. every six hours ; to apply leeches freely to the palpebræ if pain recurred, and to bathe the eye frequently with a decoction of poppy, warm ; his diet was to consist of gruel, tea, toast and water, or soda water.

On the next morning I found that the disease was checked, the largest portion of the cornea had recovered its transparency, but an oval spot equal to about one sixth of the whole was dead ; the chemosis and tumefaction of the palpebræ were much reduced ; the conjunctiva was but lightly coloured ; the morbid secretion was thinner and less copious, and he was free from pain ; his medicine had acted freely, and he had applied a dozen leeches to the eyelids on the preceding evening. A continuation of the plan was ordered.

In forty-eight hours after I had divided the chemosed membrane, the acute stage was annihilated, and he left off the calomel and opium ; partook of a more generous diet, being allowed a moderate portion of animal food, and he began to use a solution of alum, (gr. ij. ad ʒj.) and a very weak preparation of the citron ointment at night (ʒss. ad ʒij.) to the affected eye ; at this time the secretion had become thin and white, the swelling of the palpebræ and the chemosis were but trifling, and the mortified part of the cornea had begun to separate ; the patient recovered rapidly under a gradual augmentation of these means, and escaped with a small, dense, opaque cicatrix in the cornea, which did not interfere with vision.

The result of this case was extremely satisfactory

and gratifying to me, for I had not previously seen a single case in which the eye had been saved when the disease had made the same extent of progress.

I have since had numerous opportunities of testing the soundness and advantage of dividing the chemosis in a similar manner, and have found it successful beyond my expectations; indeed it effects more than I had contemplated, for it prevents the necessity of severe general depletion, which I have known patients to suffer from the effects of for weeks and months afterwards.

I shall select a few other cases in illustration, and then take the liberty of offering a few remarks on the subject.

Two young men, each about nineteen or twenty years of age, of good constitutional power, and robust make, applied at the Ophthalmic Hospital in the same week, being, however, strangers to each other. Each suffered from acute purulent ophthalmia, and the disease had reached the second stage, chemosis being complete, and the palpebræ swollen and florid. The cornea in one was slightly hazy, but in the other clear. The diseases were of gonorrhœal origin, and had not existed more than forty-eight hours, and the affection was confined to one eye in each patient. There was no constitutional disturbance in either, and each had a good natural pulse.

The chemosed membrane was freely divided in each case, as I have described; and the bleeding resulting from the incisions was encouraged by the use of hot water for some time. Afterwards each patient

took an active dose of calomel and colocynth, and was directed to apply twelve or eighteen leeches to the palpebræ in the afternoon ; to continue the use of fomentation, and to pursue the most simple plan of diet, and take only toast and water or gruel. Calomel, gr. ij. and opium gr. ss. were prescribed for both patients every six hours.

In three days, the disease in each was so far subdued, that the calomel and opium was left off, and a more generous diet, consisting of a small quantity of animal food daily, was allowed, and the local applications were made astringent and slightly stimulating, and under a gradual augmentation of these means the patients rapidly got well. The most unfavourable case, or that in which the cornea had a hazy appearance at first, recovered perfectly, and the cornea regained its usual transparency in a few days from the commencement of the treatment.

A young man, twenty-three years of age, of strumous habit, and enfeebled by want of proper nutriment, (he having been unable to procure employment,) was attacked with violent purulent inflammation in both eyes, in consequence of exposure outside a coach during a wet and cold night, as he was coming to London to seek for work. Two days after the commencement of the ocular disease, he was brought to the Ophthalmic Hospital ; and at this period the palpebræ were very much swollen, red, and tense. There was a profuse purulent discharge, and when the globes were exposed, chemosis was discovered complete in each eye, and in the right eye

mortification of about one fourth of the cornea, with a general haziness of the remaining portion, but in the left eye the cornea was clear. He was pallid and his pulse feeble. I incised the chemosis in each eye freely, and prescribed a brisk purgative; small doses of calomel and opium night and morning; leeches to the palpebræ in the afternoon of the same day; frequent use of poppy fomentation, and a moderate diet, with broth or beef tea, milk, &c. Two days afterwards, the tumefaction of the palpebræ was so much reduced, that he could open the eyes so as to expose the cornea without aid. The secretion was white and thin; the conjunctivæ of a pale pink colour, and the chemosis had greatly subsided. The mortified part of the right cornea had begun to separate, whilst the remaining portion of this tunic, and the entire of the left, presented a clear and healthy character. His diet was improved, and some quinine was prescribed; at the same time the local applications were made astringent or stimulating, alum lotion and citron ointment being employed. The recovery was rapid, but an indelible white spot exists on the right cornea.

A married woman, about twenty-eight years of age, mother of three children, was sent to my house from the country, in the autumn of 1837, having suffered severely from acute purulent ophthalmia for five or six days. The palpebræ of both eyes were very much swollen, red, and tense. There was a copious thick purulent discharge. There was complete chemosis in each eye, and both corneæ were

hazy, and a dull opaque spot existed on each, but of greatest magnitude on the left eye. She had been actively treated by bleeding, generally and locally, by purgatives, abstinence, &c., and was pallid, with a feeble, quick, and easily compressible pulse. She suffered from continued pain and uneasiness, but not so severely as she had done a day or two previously. From the extent of local mischief, and the feeble condition of the patient, my prognosis could not be otherwise than very unfavourable; but I considered it to be my duty to make every exertion to preserve even part of one cornea. I therefore immediately, (in my own room,) incised the chemosis very freely, and applied hot water with a sponge for fifteen or twenty minutes, and then sent the patient off to the Ophthalmic Hospital in a coach, with written directions for her to have a good diet of animal food, and a moderate quantity of porter; two grains of sulphate of quinine, with a little acid and infusion of roses every six hours, and locally to use poppy fomentation and a simple ointment; to be blistered behind the ears, and to have leeches applied to the palpebræ in case of return of pain. She had been freely purged before I saw her, and the secretions were in good order when she came up to town, except, perhaps, that of the skin, which was somewhat inordinate; and this induced me to prescribe the mineral acid with the quinine, whilst the very low condition of power, and weak circulation, determined me at once to begin with tonic remedies generally. A very rapid change took place, for on the next day the palpebræ were

very much reduced in size and colour; the discharge was thinner, the chemosis greatly lessened, and a line of demarcation apparent around the mortified part of each cornea, whilst the parts retaining vitality had lost much of the haziness which had existed the day before. The alum was now added to the poppy decoction for a lotion, and the plan previously prescribed persevered in. In a few days the mortified parts of the cornea separated, nearly one half in the left eye, and about one third in the right, and the separation of each slough opened the anterior chamber, so that the aqueous fluid escaped, and the iris protruded in each eye, and plugged the opening through the cornea. The openings into the anterior chambers were not of serious magnitude, that in the right eye being about as large as a small pin's head, and that in the left rather larger than the rounded end of a probe; for the inner laminæ of the cornea, and the aqueous membrane, had not suffered to the same extent as the conjunctiva corneæ, and the superficial layers of the cornea itself; but in tracing from without to within, the extent of destruction gradually lessened, as is usually the case, except when the entire cornea mortifies.

As the sloughs separated from the corneæ, a more generous diet was given, and the strength of the local applications increased, citron ointment being used instead of the spermaceti; and when the separation was completed, a weak solution of nitrate of silver was applied to the surface of the eye daily, for a few days, till the healing action was fairly established in

the cornea. Belladonna was also applied to the eyebrows during the same period to restrict the protrusion of the irides. The patient gradually recovered, with opacities of each cornea, and disfigured and diminished pupils. The opacity of the left cornea occupied above two-thirds of the space of the texture, and completely covered a small pear-shaped pupil, which was drawn beneath the opaque part. The opacity of the right occupied about one half of the cornea; and the pupil, of a pear-shape, and diminished nearly one half, was in great measure covered by the opaque cornea.

She has returned home, and will come to town again in the spring of 1838. I expect much of the opacity existing when she left the Ophthalmic Hospital, will be removed by absorption, so as to afford her tolerable vision with the right eye; whilst I feel satisfied of being able to extend the small pupil of the left eye, so as to bring it beneath the remaining transparent portion of the cornea, which exists in the most favourable position, viz. downwards and outwards; but she can, even in her present state, guide herself about, and perform common domestic duties*.

The following case will be found highly interesting in several respects.

A medical gentleman, aged nearly forty years, contracted acute purulent ophthalmia in the left eye, in consequence of some matter spirting into it from an abscess of one of the lacunæ of the urethra, which

* June 8th, 1838. The operation contemplated above has been performed, and the patient now has good vision.

he punctured for a patient under his care. Ophthalmia did not appear for some days after, but then came on in a very acute form. He was treated most actively, by general and local blood-letting, blistering, purging, abstinence and mercurials ; but in spite of all this, the cornea became hazy, and the disease commenced in the right eye. I was then requested to see him, and found him pallid and feeble ; with a quick, small, compressible pulse ; much feeling of debility, little or no appetite, the bowels acting freely, and his gums and tongue swollen and tender from the influence of mercury, of which the foetor of breath and the discharge of saliva gave further evidence. The palpebræ were swollen, red, and shining, but most so in the left eye ; the discharge of thick yellow matter was copious ; complete chemosis existed in each eye, the cornea of the left was hazy at the outer part, and dull and opaque at the inner, almost to half its extent ; the cornea of the right eye was perfect.

I first freely divided the chemosed membranes in each eye, and encouraged bleeding from the part by application of hot poppy decoction ; and then prescribed nutritious diet, some quinine, with infusion of roses and acid, and an astringent gargle ; and locally, the alum with poppy decoction and a simple ointment. This treatment succeeded in arresting the mischief. In less than forty-eight hours the acute local symptoms had subsided, the tumefaction of the palpebræ and conjunctivæ being much reduced ; the discharge lessened and thinner ; the left cornea exhibited a defined slough of mortified part, and the

right cornea remained clear and perfect. The recovery was very slow in consequence of the extreme debility induced by treatment previous to my seeing the patient. The slough separated from the left cornea, and caused a large opening into the anterior chamber, which became plugged by the iris at first, and I concluded the eye would be saved from further mischief; but from some slight blow, or sudden effort in sneezing, a further prolapse of iris occurred; the lens became displaced, and eventually escaped through the opening in the cornea, after which the opening gradually closed, and absence from business in the country for a few weeks restored the general health. This gentleman has now a perfect right eye, and in the left, the inner half of the cornea is opaque, but the pupil has been destroyed by the prolapse of the iris, which is united in the cicatrix of the cornea. Useful vision might be obtained by forming an artificial pupil.

A case of very severe gonorrheal ophthalmia has occurred in the person of a delicate and feeble scrofulous young man, aged 19, and been treated at the Ophthalmic Hospital during the last month. He applied about nineteen hours after the first appearance of disease in the eye, yet the palpebræ were excessively swollen and red, and the chemosis complete, but the cornea fortunately clear. I was obliged to use the speculum, to expose the globe, before I could effectually divide the chemosed part, and could then only make five incisions. Bleeding was encouraged by warm water, and he took a mild aperient; in the

afternoon a few leeches were applied to the eyelids, and the eye was frequently bathed with poppy decoction, containing a small portion of alum. I prescribed calomel gr. i., opii gr. ss. night and morning, and directed that he should have a moderate quantity of good nutritious food. The treatment has perfectly succeeded in saving the eye, but the patient still has some slight chronic affections remaining.

Several other cases have been submitted by me to this plan of operation, and with equal success, so much so, that in every instance in which the eye could be saved, it has been saved. In no one instance has the disease extended, or the mischief increased, after the adoption of this treatment. Some of my colleagues and pupils have tried this plan, and speak in the highest terms of its efficacy. It enables me to look with satisfaction and confidence to the treatment of a disease, which I could not view previously without distress and horror.

In conclusion, I beg to observe, that I do not claim the merit of being the first to propose division of the chemosed conjunctiva, as a means of relieving the cornea from risk under acute purulent inflammation, for, as I have observed, I was previously aware of such a plan having been proposed and effected, but I trust that I have given a satisfactory explanation of proper principles and effects of the operation, and shewn that it is adopted on a scientific basis, is safe and easy of performance, and more efficacious than any plan hitherto proposed. Besides, it possesses these advantages :—

It renders unnecessary active depletion, or the adoption of any severe general or local measures, likely to injure the general health, or to produce severe suffering.

It cannot increase the risk of the case.

It has been tried sufficiently to warrant my stating that it will rarely be found to fail ; and I offer it with confidence to those, who, I feel satisfied, will give it a fair trial, and decide candidly and honestly on its merits.