A treatise on local inflammation, more particularly applied to diseases of the eye : wherein an improvement in the treatment of those diseases is recommended, which has been confirmed by numerous cases under the author's own care / by J. B. Serny.

A

TREATISE

ON

LOCAL INFLAMMATION,

MORE PARTICULARLY APPLIED TO

DISEASES OF THE EYE,

WHEREIN

AN IMPROVEMENT IN THE TREATMENT OF THOSE DISEASES IS RECOMMENDED,

WHICH HAS BEEN CONFIRMED

By numerous Cases under the Author's own Care.

By J. B. SERNY, M. D. Oculist.

" ——— Thus with the year
Seasons return, but not to me returns
Day, or the sweet approach of ev'n or morn,
Or sight of vernal bloom, or summer's rose,
Or flocks, or herds, or human face divine;
But cloud instead, and ever-during dark
Surrounds me, from the cheerful ways of men
Cut off, and for the book of knowledge fair
Presented with a universal blank
Of Nature's works to me expung'd and ras'd,
And wisdom at *one* entrance quite shut out." MILTON.

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PREFACE.

The idea of a single and proximate cause being present in every disease, and in its several stages, is the most glaring error and solicism that ever degraded the annals of medical science. Because the accessory and collateral causes are often of far more importance, than the supposed proximate cause.

I have in this work, treated of local inflammation in the first part, as the basis for the sequel, which treats of several very frequent diseases of the eye. It will be found that I have

subdivided the proximate cause of a local inflammation, when in an acute state, into fourteen collateral and accessory causes, or different successive actions, which must absolutely take place in the part affected, and those circumjacent to it; including the commencement of the disease, its course, and termination.

Cold applied to the body often produces an inflammation far from the part of its application; in consequence of which the system is much deranged, by a fever, which is technically called a symptomatic fever; and further, this fever frequently attends those local inflammations which are of considerable extent, although produced by other remote causes. This symptomatic fever in its different stages and symptoms, I have considered as passing

through nearly the very same actions in the extreme vessels of the whole frame, which I had defined to take place in a local inflammation, when cured by resolution.

A *belief* in the similarity of those actions, *forced* itself upon my mind, from the identity of the symptoms through their progress and termination, together with the general treatment appertaining to both complaints, being the same, and admitting of the same explanation. And it may be further added as a confirmation of the above similarity, that this symptomatic fever may often produce some other additional local inflammation in any other part of the body, which will run through the same fourteen different actions.

I have not thought it necessary to

give a minute description of the anatomy of the eye, because it may be found in those authors who have treated more particularly on *ophthalmography;* my intention having been rather directed to treat of the *diseased* and *curotive* actions of the vessels and fluids in the progress of inflammation, particularly applied to diseases of the eye.

As this is not intended to be a mere popular work, I must request the most indulgent attention of the Reader in the perusal of it; and it will readily be believed, that I do not pretend to have brought any ~~new~~ ideas to light which were not known before; but that being insulated and only hinted at, in a variety of medical works, but which modern discoveries have abundantly confirmed. I have only brought

into a closer point of view the scattered opinions of many authors, which will account for my not having been able to make a due mention of their names and pretensions.

Though I may not obtain the general assent in favor of what I have here advanced in point of theory, yet as my opinions are founded upon experience, attentive observation, and many years reading; I make no doubt they will hereafter be confirmed by others more capable than myself, who will corroberate what I have collected, by stronger proofs, and support them with a higher authority.

39, *Lower Brook Street,*
Grosvenor Square.

ERRATA.

Page 38,	line 1,	*for* choleric,	*read* caloric.
38,	3,	choleric,	caloric.
38,	4,	choleric,	caloric.
44,	6,	is,	are.
106,	16,	exist,	exists.
107,	7,	arise,	arises.

ON

LOCAL INFLAMMATION.

§ 1. The eye, in health, is the index of the passions; whether indicative of pain or pleasure: and good eyes contribute more to the enjoyment of life than any of the other senses, and therefore we cannot wonder that much labour has been bestowed on optics, and on the organs of vision, by many philosophers, in order to obtain clear ideas about this sense.

Anatomists have by no means neglected to submit the eye to their most close examinations, in order to study the different parts of its structure, and also the qualities and forms of its different fluids, both in their healthy and

diseased state. In consequence of the conjoint endeavours of so many authors, in addition to the history of different kinds of *ophthalmia*, and the various modes of treatment, the public may be congratulated on the many improvements in this part of medical science. But there are still further acquisitions of knowledge to be expected from time, in the discovery of new facts; and although many eminent oculists have given their labours to the world, the subject is very far from being exhausted. If we may judge by our daily observation of the great number of persons miserably afflicted by different kinds of ophthalmia, and their fatal chronic result; a wish naturally arises in a sympathetic mind that something might be discovered, that should arrest the progress and prevent the deplorable termination of the symptoms affecting so tender and precious an organ. But the most probable method of qualifying us to arrest or speedily relieve the most tedious or severe symptoms of ophthalmia, may be expected from our being fully acquainted with the minute anatomy of the parts, as well

as their general functions in a state of health, and the derangement of those functions when morbidly affected. Possessing this knowledge, it may be presumed, with some degree of confidence, that we might be able to suggest the most rational modes of treatment.

§ 2. Inflammation is said by authors to be either acute or chronic. The *remote* causes which produce inflammation in general, are external or internal violence; the external application of cold, chemical agents; and lastly, the application of animal poisons, whether communicated by inoculation or effluvia.

§ 3. The *proximate* cause of inflammation is commonly taught in the schools of medicine, and in books, to be an increased action and circulation in the vessels of the part affected; and the modes of cure are calculated to answer the above definition.

The proximate cause of acute inflammation, is on the contrary, the very reverse; and this can be proved, by a little attention to the symptoms and progress of a moderate inflam-

mation, in any part of the body. Suppose, for instance, a moderate bruise by means of a blow upon any muscular part, so as to produce a conspicuous discolouration of the skin ; there will follow redness, throbbing, heat, swelling, and pain in the part affected. In this instance, the redness is accounted as a proof of the increased circulation in the part, and the increased heat from the increased circulation; the pain from the conjoint irritation produced by these two causes; and the swelling is supposed to take place from the increased action of the arteries ; but the throbbing pain, and pulsation, remain unexplained. But by supposing the proximate cause to be a diminished action and circulation in the part affected, arising from the immediate laceration of minute vessels, receiving still further obstruction, from the effused fluid accumulating in minute cavities ; thereby occasioning a diminished action and circulation in the part affected, and with a tendency to produce an increased circulation in neighbouring sound parts, in consequence of the arterial circulating

equilibrium being deranged and diminished in the diseased part. The whole of the symptoms, on the above hypothesis, can be accounted for through the several stages of acute and chronic inflammation.

§ 4. As the most minute muscular parts of the body are composed of nerves, arteries, veins, exhalent and absorbing vessels, &c. it will follow, that upon a moderate bruise, as before supposed, without any external opening, there will inevitably succeed, in a greater or less degree, the following symptoms in the part injured.

A. Redness will take place in a little time after the injury. This kind of redness cannot come on suddenly; because it requires some time for the neighbouring anastomosing sound vessels to be enlarged, to admit the blood which belonged to the injured minute vessels, which no longer receive or give passage to the arterial blood as formerly, through their anastomosing veins; therefore the arterial circulating fluids which used to circulate through the part injured when sound, must

now find their new passage, and be propelled into some other vessels; and many small arteries will become enlarged, which were not before conspicuous; which will now appear very red, and this has given rise to the opinion of an increased circulation in the injured part; but it is only in the most adjacent or proximate to the parts affected that this takes place. The power which the arteries have of elongating and enlarging themselves in inflammation, depends upon two causes. The first is, that peculiar power in the arteries of propelling their contents forward, and emptying themselves at each pulsation in a greater or less degree; and being as often re-filled from the heart; and secondly, on meeting any partial obstruction in the course of the circulation, that part which is most contiguous to this obstruction will be inevitably distended, and overloaded with that superabundant quantity of blood, which belonged to the part now made impervious to the circulation. What I mean by that, or the part most affected, is, where some of the minute vessels are

completely bruised and lacerated, some partially so; all which will give the appearance of redness and swelling from the loss of continuity in the minute circulating vessels, which consequently deposit their contents in the many injured and impervious cavities, or cells. There is another cause for the discolouration of the part most centrally affected, that is, venous blood effused and completely incarcerated, and ultimately becoming red from the perforation and elongation of new arterial blood vessels shooting through it.

B. The *throbbing* appears plainly to be owing to a re-action or counter-stroke in the whole of the parts affected, circumscribing the injury, and produced by the total sum of the pulsation of all the arteries beating in the central part of the mass of the many impervious minute arteries, which are injured; these arteries striking at once on many impervious cells, yet forming one whole or central bottom, from a loss of continuity, which re-acts or returns instantaneously back again, by one large pulsation or counter-stroke,

the many minute pulsations it has received, and thereby gives the sensation of a throbbing, beating, or large pulsation, nearly circumscribed by the part affected.

C. The *heat* is increased in the part affected with inflammation, because a greater quantity of blood is arrested in its circulation, there depositing its latent heat more suddenly than it would have done if the circulation had been natural; by either remaining too long in the part, or meeting with carbonated blood effused from the injured veins, causing the heat of the blood to be evolved.

Every chemist knows * that the blood in the lungs can absorb a greater quantity of oxygen than usual, if the air inspired be made to contain more than the usual proportion. Thus the whole quantity of oxygen will in time, be chemically united with the carbon of the blood, provided the oxygen be held in perfect suspension, and in immediate contact with it, at the usual temperature of the

* Dr. Crawford.

system; and also propelled with the usual degree of velocity. The result necessarily will be a perfect chemical union of the carbon of the blood and the oxygen, with the evolution of sensible heat.

Now what takes place in the lungs, in consequence of the atmospheric air upon the blood, so as to furnish proof that there is an increase of heat in the extreme arteries of an intercepted circulation in an inflamed part?

The atmospheric air may part with its oxygen to the blood in the lungs; during inspiration, a part is chemically united and forms carbonic gas, but the greater part of the oxygen is merely held in suspension, and thus is carried to the heart and arteries. When this blood arrives at the extremities of the anastomosing arteries, and passes into the veins, it may be said there to complete the full chemical union of the oxygen with the carbon, and the evolution of the latent heat contained in the oxygen suspend in the blood. But I believe, that within the arteries themselves,

before the blood reaches the anastomosing veins, that the oxygen held in suspension and in immediate contact with carbon, will progressively form a chemical union with the evolution of heat. This takes place in consequence of a matter of *necessity*, from these substances continuing a proper time in immediate contact, and by the suspension of the oxygen in the arterial blood: although the process of chemical union is formed in a greater degree at the anastomosing of the arteries with the veins. Thus, when there is an intercepted circulation of arterial blood through a part inflamed, the heat may be increased by the above-mentioned complete chemical union of the oxygen suspended in the arterial blood with the carbon. In consequence of which, this new expression may be used, of the *compulsatory* evolution of heat in the arterial blood vessels themselves, when there is an intercepted circulation in any of their extremities. And the increased heat of the part ceases as soon as either the quantity of blood flowing to the part is diminished, by detraction, or that the free

circulation is re-established by the enlargment of the anastomosing arteries becoming vicarious, either in the parts affected, or those contiguous to them. If any red vessels should remain after the inflammation has subsided, they continue such from previous distension, but without any augmentation of heat in the part.

D. The *swelling* depends chiefly on the fluids effused from a great number of lacerated vessels, gradually emptying themselves into these incarcerated cavities; and which swelling, increases exactly in proportion to the number and size of the ruptured and lacerated vessels.

E. The *pain* which takes place in an inflamed part, is occasioned by the power which the nerves acquire, when wounded, of communicating more acutely to the whole nervous system, the least impression made upon them. And we find in general, that there are increased pulsations, heat, swelling; and several extraneous fluids acting upon an infinite number of nerves lacerated or bruised, and some of their neighbouring arterial vessels being highly distended, and augmented in their diameter, in

order to allow the re-establishment of the free circulation, which has been intercepted. What I have here laid down, will readily account for the morbid sensation in the nerves of the part inflamed. The force also which is constantly attempting to distend the nerves themselves, like the other parts with arterial blood, merely to re-establish the lost arterial circulating equilibrium in the most injured parts—the extraneous fluids acting probably chemically upon the nerves—the increased heat; and lastly, the tension on the nerves from the general swelling, are sufficient to account for the pain which is experienced in the parts inflamed.

§ 5. All these symptoms disappear, either by absorption, or by suppuration.

The tumour resolves itself by *absorption* in this manner. The effused fluids being divided into many small cavities or cells, and the further progress of the effusion and swelling being prevented, by the arterial blood finding passages in some newly enlarged vessels, through which the arterial circulating equilibrium is temporarily re-established; and by the con-

traction of the ruptured arteries themselves, or by some blood being taken away from the part, or from the system, as frequently as may be necessary, till the contiguous vessels have enlarged themselves so as to restore the circulating equilibrium. In this manner a further increase of the swelling is prevented, and may disappear gradually, by being taken up by the absorbents. These effused fluids being incarcerated in many small vesicles or cells, undergoing a particular change and are gradually absorbed; the minute arteries leading to these cells will elongate themselves, and shoot into granulations in all directions, till these cavities are completely filled up, in order to re-establish the arterial circulation in the same state, as it was before the injury. When that has taken place, or is actually taking place, the arteries most contiguous to the injured parts, which arteries were increased in diameter and elongated for the purpose of being vicarious or agents to the most injured vessels, re-assume their former natural size and contracted dimensions; since the causes which produced their augmentation

having ceased, or no longer exist in sufficient magnitude, to prevent their returning to their former healthy dimensions; all the inflammatory symptoms gradually disappear in consequence of this combination of actions.

§ 6. *Suppuration* is said to take place in an inflamed part, when an abscess is formed, comes to a head, breaks, pus is discharged, and granulation follows; all which happen in this manner.

The fluids effused will commonly be greater here than in the former case, which was supposed to be cured by resolution. The number of blood vessels lacerated, or bruised, will be more numerous, and the sum of the injury will be greater in magnitude. The circulation of the arteries in the part will be more impeded, by the very pressure upon these arteries from the bulk and tension of the tumour. The effusing fluids will be increased in such quantities, that they will break through all the small vesicles or cells as before mentioned; and make one whole and single cavity, thereby increasing the effusion, laceration, and pain.

When this has taken place, and by the contraction of the wounded arteries, the arterial circulating equilibrium near the part has been established, by the enlargement of the anastomosing vessels, as I have before observed in the absorptive process; there will be a swelling with a cessation, in some degree, of pain and heat, perhaps the throbbing also will have subsided. The swelling may remain stationary for some time without breaking. It will in that case be necessary to increase the heat of the part, by repeated warm applications; such as are mild, soft, and moist, which frequently renewed will have the effect of bringing to maturity, or ripen, the effused fluid into good laudable pus. These hot and frequent applications will have this further effect, of abating the pains, heat, and general swelling, and also of circumscribing the tumour by augmenting the effusion and laceration with the contraction of the wounded arteries; and also of assisting the most contiguous arteries to the part affected to enlarge and elongate themselves, thereby sooner re-establishing the arterial and vicarious

circulating equilibrium. The swelling will then inevitably come to a head; first, by the enclosed fluid stretching the skin, and making it thinner, occasioned by the whole internal surface of the abscess filling gradually by granulation; chiefly in order to restore the former or natural arterial circulation. At the same time no perceptible absorption taking place, and a small effusion of venous blood still continuing in the part, (as evinced by the streaks in the pus,) the space for the enclosed matter becoming daily less capacious, by the increased surface and depth of granulation on the internal part of the cavity of the abscess, till at last the natural texture of the skin being lost, the matter completely perforates the external surface, and is evacuated.

If the arterial system be suffered to perform its own natural circulation, the cavity of the abscess will fill up in a short time, by the well-known two-fold power of arterial action. Those arterial vessels which were increased in their dimensions for the purpose of being vicarious or agents to the injured vessels, will re-assume

their former size and contracted dimensions, *exactly in proportion* as new granulations shall have filled up the cavity of the abscess. This is performed by the power that re-establishes the circulating equilibrium of the arteries which must have been greatly deranged, far beyond the part affected; and secondly, by the power of the new arteries of the injured part readily elongating themselves to the former dimensions of the part.

§ 7. But there are cases where from a very trifling affection, serious and dangerous symptoms may arise, independently of the partial laceration of tendons and nerves; which may happen when the circulation has been intercepted in a great degree by the rupture, or partial laceration of a great number of large blood vessels, arterial and venous. These continually pouring out their contents from a distance into the bruised or injured parts, increase the swelling and tension, with heat and pain; the more the swelling increases, the greater number of arterial and venous blood vessels will be compressed, so that those that

are very much bruised and lacerated will more readily give way in consequence of this compression, than those that are sound, although contiguous to the parts injured. The general swelling will become monstrously enlarged, merely from the above successive actions in the parts. In this case resolution or suppuration will hardly take place; there will be a permanent indolent tumour, which will be kept up in its magnitude by a weak circulation, chiefly arising from the diseased state of the absorbents and exhalents in the part affected. The permanency of the tumour will be more obvious, when the contiguous arteries and veins shall have re-established the circulating equilibrium by their increased dimensions, and shall become also permanently vicariously increased, merely from the great length of time, they have been vicarious to the most injured parts. Now in this case, the extravasation of the fluids being great, chiefly produced successively, and perhaps continually, by the ruptured veins only; for the arteries, by their muscular contractions, may have contracted

upon themselves, and ceased bleeding; no good matter will at first be formed, nor absorption take place, but when, in the course of time or by proper treatment, the returning veins shall have ceased to pour fresh blood into the cavity from their ruptured mouths, and the deposition of the exhalents also becomes diminished in the same cavity, then absorption, or suppuration, may take place.

§ 8. *Mortification* always certainly follows when the injury of the part is so great that the chief blood vessels are entirely bruised, and firmly agglutinated together, by means of their muscular fibres and the coagulable lymph; and thereby annihilate the circulation in the parts. But it may be better understood, if we suppose a certain portion of a muscle to be violently pressed down by a great weight, which weight shall at the same time of pressing down be made to slide gradually along the muscle and beyond it; in this case not a drop of blood will flow from the vessels of this highly injured part; because every vessel in the general bruising has lost its power of anasto-

mosing, and the swelling of the part cannot take place, and this augmentation is absolutely prevented by the total impervious state of the vessels no longer carrying any circulation into the bruise. The actions in the part soon become merely chemical, putrefaction follows quickly, the parts change their colour; becoming of a dark shining lead appearance, the fluids become thin and excoriating, and if any swelling take place, it is from a chemical cause, as air which is extricated, &c.

The reason that in mortification, arising from a severe bruise, no great pain is felt, is in consequence of the nerves being deprived of their sensibility, the violence of the injury not admitting the smallest quantity of arterial blood into them, by which they cannot *immediately* inflame, and acquire an increased sensibility.

Having supposed a certain part of a muscle thus much injured, there remains the other part, having become possessed of nearly the whole of the arterial blood, which before the injury circulated through the bruised part; this sound part has now or should partly become

vicarious to the injured one, and this increased circulation answers the purpose of expelling the mortified part: which I apprehend is done in the following manner. As soon as by the effort of nature assisted by art, the injured part shall have more or less lost all connection with the living parts or circulating medium, or which is the same, when by a great loss of blood or fluids from the whole system, sometime after the injury, either accidental or artificially procured by the lancet, the *contraction* of the minute arteries leading to the injured part, will by the loss of fluids be so far promoted and accelerated, that it will soon become permanent. Hence adhesive inflammation in their minute branches, thereby depriving the injured parts of arterial blood, and being deprived of circulation must soon put on perishable appearances, in consequence of the chemical action of putrefaction. It is at this period, when all cessation of connection of the living and dead parts has taken place, that new granulations arise on the surface of the internal parts which are sound and contiguous to the dead mass. These new

granulations expel or detach the sphacelated parts gradually, as in the breaking of an abscess. This power of removing the mortified part and filling up the cavity again, is owing, as I have before mentioned, to the property inherent or acquired in the adjacent vessels, of restoring the arterial circulating equilibrium, which is constantly kept up by the blood from the heart; which equilibrium had been destroyed by overburdening these adjacent and vicarious vessels, with the blood which used to flow into the diseased parts previous to their general destruction. And granulation will go on in the same manner as in filling up the cavity of an abscess; but requiring more time and art in preventing occasional hæmorrhages. These occasional hæmorrhages happen from the ruggedness of the wound after the sloughs are cast off, leaving the mouths of many blood vessels not completely contracted and healed. These are only to be prevented by proper management, in tying the largest blood vessels, and by regulating the regimen. I must observe, that these accidents will more frequently super-

vene, when the internal granulation is brought on before the whole of the injured mass is dead, or happen to be detached prematurely ; and as it is much in our power to retard this granulation, or separating inflammation ; which precaution if we neglect, we deserve to be reproached for the frequency of any such accident.

§ 9. *Of a punctured wound.* A punctured wound in a muscular part, will produce a laceration of many small vessels ; and at the same time the opening of the wound may be so small as to close and heal externally, while many vessels which have been cut partially will continue to fill the wounded cavity, and produce a considerable swelling ; and the consequence will be more or less dangerous, according to the depth and nature of the parts affected. I would here remark, that when the wound is enlarged freely by art, a little serous blood may come from the blood vessels not yet fully contracted, as well as from the veins and some lacerated lymphatics, which pour out their contents externally. These effusions may continue till the vessels are completely contracted, or till this

exudation has ceased, by the temporary action of the vicarious vessels.

In a short time after the part punctured has been freely opened by art, redness will make its appearance, owing to some arteries which have been intercepted, and particularly so, if any large blood vessels have been tied without much loss of blood, so that the quantity of blood which used to pass through the injured part, must now find another channel; and this redness is the natural attempt to re-establish the arterial circulating equilibrium in the part, and this will be most conspicuous after the vessels shall have been enlarged and elongated.

The swelling of the punctured wound, which has been freely opened by art, will abate, from two causes; first, by the continual discharge from the opening of the wound; secondly, from the full enlargement of the adjacent vessels being vicarious, and restoring for the time the arterial circulating equilibrium of the part. From the mere discharge, and the enlargement of the neighbouring vessels giving a freer circulation about the wounded part, all the other

symptoms generally abate or are much diminished, such as the throbbing, heat, and pain. Throbbing in an open wound, is much less than in a bruise, because in the former, the momentum of the infinite pulsations cannot be collected in a central point and circumscribed cavity, but are exposed to an open discharging surface, and in the latter, it is the very reverse. The heat is also much less, the blood not being stationary, on account of the discharge, which occasions a great diminution of pain and swelling.

§ 10. *Observations on cold applied to the body.* Having gone through the different stages of *inflammation*, generally, from external injuries; from a bruise to its various terminations favorably or fatally to the part; and from a punctured wound, externally closed up, and freely enlarged by art afterwards; I shall make a few cursory remarks on inflammation from cold applied to the body, or violent exertions in muscular motion.

F. *Cold* applied to the body may be so excessive as to kill the part to which it is applied,

or it may produce its effects on distant parts far from the place of application.

When applied to a part in excess, it destroys it by producing a total cessation of circulation in the blood vessels; the blood and fluids coagulate in them, and render them completely impervious, and consequently no animal heat can be evolved or sensibility remain. But loss of circulation, sensibility, and animal heat, is *death.*

If cold is applied to the body in a minor degree, merely sufficient to produce the sensation of cold, and continued for some time, it may prove very dangerous, depending much on the state of the person's health and heat of the body at the time, as well as the quantity of surface exposed to the cold; but generally, the effects will be found to be these.

a. The part or parts so exposed will contract, and the more so if they have been overheated before, and thus propel the blood from these parts to others which are more heated or less exposed to the cold, and by this increased impetus of blood in these vessels, they are

weakened by distension, some give way or may be lacerated, and hence produce many ruptures in a large mass of minute vessels, and thereby constitute a peculiar kind of bruise, which may bring on a symptomatic fever, as it is technically called, or inflammation of the whole constitution.

b. The accumulation of the propelled blood in the part inflamed, may continue merely from the above-mentioned lacerated vessels in the extremities of the arteries of the part affected; although the application of cold may no longer subsist, but on the contrary, a general and gentle perspiration may have taken place.

c. These inflammatory complaints when they affect some more important parts of the body, to so great a degree as to produce an inflammatory or symptomatic fever, the symptoms, or several stages of it, viz. the hot, sweating, and cold stages may be thus accounted for.

d. The accumulation of blood in the primary local part affected being great, rendering the free circulation impervious there, and the

neighbouring arteries not enlarging themselves rapidly enough to become vicarious and allow the arterial circulating equilibrium to take place, the chief or large arteries leading to the primary parts affected, become morbidly full and distended, so much so as to communicate their sense of distension to the oarta and left ventricle of the heart. But before this has taken place, a considerable portion of the general arterial system is inordinately distended. Then the left ventricle and left auricle finding themselves affected with the general distension of the arterial system, communicate their morbid action to the heart itself; then it naturally will follow, that the pulmonary veins must likewise be affected with this general distension. The pulmonary arteries become full, and communicate the same to the right ventricle and to the right auricle of the heart; lastly, to the vena cava superior, and the absorbents soon feel the effects of this general fulness. This may be further increased by the absorbents and lacteals carrying their contents into the thoracic duct, to be poured into the subclavian vein, and

thence into the vena cava superior. Thus then, a general affection or symptomatic inflammatory fever of the whole system, may probably follow a partial affection, in consequence of sympathy or communication of parts.

e. This general fulness from the above secondary actions, may be so much increased, as to be powerful enough to lacerate the extreme branches of arteries, and even to burst them in any part of the body; and produce another local inflammation there; and from hence, it is possible to account for the deranged state of the animal functions which often takes place, either in the increased force of muscular power, or great diminution of general strength in the whole system.

f. In a fever produced from an acute primary local affection, it appears to arise in consequence of communicating mechanically a sense of fulness, from the primary inflamed part rejecting or refusing a passage to the arterial blood; and thereby distending more or less the arteries from the part affected to the heart, which mechanical sense of fulness in the heart

is communicated to the *whole system*. But as the arteries have a power of emptying themselves by their muscular contractions, it will happen that in this general attempt of emptying themselves, on finding as general a resistance in the whole of the venous system, by this increased impetus (1) on the part of the arteries and resistance on that of the veins, &c. some general congestion (2), laceration (3), effusion (4), intercepted circulation (5) with the elongation (6*) of new minute vessels must necessarily take place over the *whole frame*. Add to this, that no salutary vicarious action of any part of the system, by the enlargement of vessels to re-establish the general healthy circulation, can take place; and hence arise an increased heat and fulness of the whole vessels of the body. This will be further increased on account of the excretory ducts of those vessels which secret the insensible perspiration, being so peculiarly situated between the three layers of the skin, that on the extreme extension from fulness, and

* These figures will be referred to afterwards.

increased heat of the system, or, on the contrary, the extreme contraction from cold, they entirely lose the power of exhaling the insensible perspiration, which being retained, accumulates in proportion to the time of retention; and the heat as well as the fluids are thereby sensibly increased, which otherwise would have been expended in the natural discharge of that secretion.

g. The pulse is fuller and stronger, with a sense of throbbing, and sometimes more frequent, from the abovementioned great distension and fullness of all the vessels of the body, but most especially in consequence of the universally *diminished circulation* and retained perspiration. These are the causes which I believe to constitute the fulness of the pulse.

h. The throbbing is owing as in a topical inflammation (§ 4, B.) to the re-action or returning pulsation from a resistance to the passage of the arterial blood, through almost *impervious channels*, which now exist in the extremities of the arteries of the whole system in symptomatic inflammation. (§ 10, f.)

i. The heat of the whole system both in health and disease is increased in consequence of the blood passing through the lungs, where it is replenished with oxygen, which contains the latent heat, to be afterwards evolved. This evolution of the heat takes place much quicker in its comparatively *intercepted* circulation; which heat must be evolved from it in a certain given time in the regular course of health, and also as explained by § 4, C; but by meeting with those extraneous vessels and fluids, which the great impetus of the circulation, during the previous hot stage has produced over the whole system, in the most minute vessels, the heat is increased; and further augmented in consequence of the insensible perspiration being retained. (§ 10, f.)

k. The *duration* of the hot stage will be continued; first, as long as the arterial blood passing through the lungs shall have absorbed oxygen; secondly, while the arterial blood with the other fluids shall continue to be too voluminous for the vessels to allow them to *circulate freely;* and then by the operations

of the accessary causes (mentioned in § 10, l, m, n, o, and p,) to their full extent, will lessen the hot stage considerably, and bring on the sweating stage.

l. The heat being expended as a matter of necessity in a certain limited time, in its before intercepted circulation, the whole system in consequence of which becomes cooler. (§ 4, C. and 10, i.)

m. From the results and consequences of the hot stage, the fluids become less in bulk, by the loss of the caloric which expanded them.

n. The quantity of the fluids is diminished in their proper circulating vessels in consequence of congestion, laceration, and effusion into the minute vessels where it is incarcerated out of the circulation. (§ 10, f.)

o. The fluids acquire a new freedom of circulation, in consequence of many small new vessels which have been formed by elongation and enlargement during the hot stage; and in consequence of the above results, there will succeed a freer circulation through the whole system. (§ 10, f. No. 6.) And the exhaling vessels

becoming freer in their action, the general distension (§ 10, l.) being taken away from them, they will give out their fluids with greater freedom, on account of their previous accumulation. (§ 10, f.) This will go on constituting the sweating stage, in which a remission of most of the symptoms of the hot stage will take place.

p. The sweating stage may have expended a great deal of heat and moisture, from the excretory ducts of the vessels which give out the insensible perspiration. And as this perspiration may have been more profuse than in health, it must have been produced by the blood being, or becoming, different in its component parts during the hot stage; and this is evident, for the results of the hot stage, (by § 10, f. No. 2, 3, 4, 5, and 6,) have materially altered the state of the blood, some of the red particles remain *stationary*, being incarcerated, whilst some of the other parts of the blood, the particles of which being smaller, are *absorbed* and carried into the general circulation. And it is possible to believe that the excretory ducts of those

vessels which give out the insensible perspiration, have a power during the sweating stage, of producing that quantity of perspiration in proportion to the increased quantity of serous or watery fluids contained in the blood; and in this instance, there is doubtless, a preternatural quantity of serous fluid in the blood, which occasions the increased perspiration. The effect of which perspiration again leaves the blood different in the proportions of its component parts, from what it was previous to the hot and sweating stage. For it has now less of the red globules and of the serum, and comparatively more of the coagulable lymph.

q. The sweating stage will *ceasc*, when the excretory ducts shall be compressed by the great loss of ~~cholerie~~ caloric, (§ 10, f;) also from excessive perspiration, reducing the body down to a cooler temperature: and it is allowed by all authors, that the heat expended in the exhaling fluids must be very great; and therefore, that an increased perspiration, (produced by the causes mentioned in § 10, p.) must leave the body in a cooler temperature, and more

particularly so, from the accessary causes to be mentioned in the following sections.

r. This cooler temperature, may be said to be the preparation of the cold stage, which is visible at its height, by the contraction of the whole surface of the body; the nails become livid; the veins remarkably visible, while the arteries are small and weak. Now rigors of the whole system commonly occur, occasioned in this instance, as I suspect, by the deteriorated state of the blood, which is *now* circulating. And this state may arise in this manner. Matter may be formed in the human body in less than eight hours; first, by the effects of the hot stage (by § 10, f. No. 2, 3, 4 and 5; and § 10, i;) also during the sweating stage. (by § 10, p.) Now some of the blood being incarcerated from the above accessary causes and effects must soon die, being out of the circulation, and of course destitute of its oxygen, and consequently of its original heat, (as by § 4, C. and § 10, i;) and as one of its constituent part, viz. the serum, has been taken up by the absorbents (§ 10, p;) there remains the red globules

and a portion of coagulum. A part of these red globules are soon broken down into smaller particles, having lost their vital principle, and by the circumambient heat of the parts, soon pass into the matter of pus. This is soon absorbed and carried into the general circulation, either by the thoracic duct, or when the matter is in great quantity, it may also be pushed up into the veins, as I have often seen in dissections of the dead body after large abscesses. This mixture, in consequence of absorption will necessarily alter the nature of the blood now circulating, before it goes to the heart. Because it now possesses less of serum, (§ 10, p;) less of red globules, (§ 10, r, f.) but *comparatively* more of coagulable lymph; and this peculiar matter formed of the dead blood, decomposed and absorbed as above explained.

s. But this matter of pus is *limited* in its quantity, by the limited quantity of effusion formed in the hot stage (§ 10, f and i.), which again had been sufficiently prepared during the sweating stage, (§ 10, p.) and thereby limiting the cold in its progress.

t. Thus there will be a loss of ~~cholerie~~ during the hot stage. (as by § 4, C. and § 10, i.) There will be a loss of ~~cholerie~~ from excessive perspiration. (as by § 10. p.)

The matter of heat or ~~cholerie~~ is further diminished in consequence of the matter of pus absorbed and contained in the blood,(§ 10, r.) altering the attraction for oxygen; and as it successively arrives at the heart, it *contracts** in some degree its right auricle against this deteriorated blood; because it has not undergone a proper chylification, so as to diminish in the same degree the fulness of the arteries, which by their muscular contractions continue to emancipate themselves from their increased distension; and the new elongated and enlarged arteries, formed in the hot stage, (§ 10, f. No. 6.) re-assume proportionably their former size; †

* Drowned and suffocated persons have a morbid contraction of the epiglotis; and likewise the absorbents and their glands contract to resist the progress of the diseased absorption. Why may not any part of the heart also contract to resist deliterious blood?

† Every body knows that ulcers are dried up during the cold fit of a fever.

and the veins labour under a general resistance or congestion from the morbid opposition of the right auricle of the heart in a reversed direction to their usual course. These causes constitute the height of the cold stage; but the right side of the heart, although very strong, is not equal to resist the sum of all the forces of the arteries *continually* propelling blood into the veins; and also the absorbents and lacteals of the whole system, propelling their contents into the vena cava; therefore the heart must gradually diminish that resistance it gave to this contaminated blood, which must then pass through the heart and lungs more freely; but on account of its deteriorated quality, does not evolve any great quantity of heat to be dispensed by the arterial system, till this blood by the wonderful law of assimilation, is nearly converted into the nature of good blood, which conversion may be performed in a few hours. This being effected, the gradual cessation of the cold stage will take place. The return of the hot stage may be formed, from the

assimilation of this matter to blood, increasing the fluids and heat; also from the previous retention of the insensible perspiration during the cold stage, having accumulated latent heat as well as the fluids. The general contraction of all the arterial vessels during the previous cold stage, having propelled the blood from them in greater quantity to the veins and the heart. The primary local affection being the cause of the first hot stage (as by § 10, a, b, c, d, e, f, p, and r.), which local affection is not yet properly restored to its free arterial circulating equilibrium, and may be still ready to form another symptomatic hot stage, more or less severe. And lastly, the very effects of the first hot stage remaining on the extreme vessels of the whole system (as by § 10, p, r.) the second hot stage will then follow nearly the same progress as the first, although this second is compounded of all the above enumerated causes.

§ 11. The bounds of this paper do not permit me to explain the variations of the appearance of the blood, when drawn largely from

a vein in similar cases of inflammation, nor its different, but inevitable effects upon the constitution; nor to explain the nature of a salutary and critical perspiration; but I may here remark, that the buffy coat of the blood in such cases of inflammation, will be conspicuous when the perspiration has been very moderate under a great degree of general absorption, (as by § 10, p;) and so on the contrary from opposite causes.

From the general affection of a symptomatic fever, may arise several alarming symptoms; for if there is a want of free circulation through any part of the system for a certain time, these parts, and the blood itself, will be injured; and the nerves will lose the power of keeping up the contractility of the arteries; and when this takes place to a considerable degree life must soon be in great danger. Since where ever, and when ever, the blood ceases to be circulated, it will soon follow the laws of chemical decomposition, &c. And the free and unintercepted circulation of the proper fluids in the parts, consitute their living principle.

§ 12 Having gone through that inflammation which arises from cold applied to the surface of the body, causing a morbid affection in any particular part, and then a general affection or symptomatic fever, and the several symptoms attending these; it remains for me to account for that affection of the body produced by violent exercise of the mind, increased muscular motion, and also of corroding chemical substances.

a. Violent exercise of the body, or passions of the mind*, will propel the blood into the extreme vessels, distend and even lacerate them with an unusual force, and hence a symptomatic fever will succeed; that is, one of an inflammatory kind, if a great proportion of the extreme arteries and muscular fibres of the body are affected; but a general lassitude and nervous symptomatic fever will often follow, if the brain be the part where the congestion has taken place. But mostly in these cases, the arterial

* The reader may doubt this assertion, unless he recollects some well proved facts of sudden death, from great anger or excessive joy, and the appearance of the body after dissection.

circulating equilibrium may soon re-establish itself, unless some parts should be more seriously affected, and become vicariously deranged to relieve the constitution pro tempore; in consequence of which, a topical inflammation and general fever will come on and terminate the complaint; that is, when the vessels contiguous to this part affected, shall have been completely vicariously enlarged, or an abscess formed, &c.

b. Corroding or chemically acrid substances, produce inflammation when applied to the body; and amongst these substances hardly any two act precisely alike. Some for instance, act more quickly upon the solids, such are the more corroding chemical preparations; whilst others act on the absorbents more immediately. The absorbents by their glands being irritated, contract, and do not suffer the injurious substance to pass into the general circulation, till it has been properly diluted by those absorbents from other parts leading to the same gland, and pour their mitigating contents from more distant parts into that which is affected, pro-

ducing obstruction, swelling and inflammation*, and thereby in the course of time completely dilute and alter the injurious substance, and render it inert; or suppuration of the above gland may take place, &c.

By corroding substances is meant those things which have a great tendency to unite suddenly with the fluids of the body, acting sometimes with such a force as to destroy even the solids themselves, and contract the arteries, destroying the arterial circulating equilibrium, and thereby causing inflammation. The two fixed alkalies as well as the volatile, in a pure or caustic state, have that power in an eminent degree, as well as many other chemical substances.

§ 13. *Recapitulation of the progress of a local inflammation.* I must again remark, that it would appear, that a local inflammatory affection occasioned by cold, checked perspiration, violent exercise of the body or mind, is

* As in the inoculation of any morbid animal, or vegetable poison.

at first produced by an increased impetus of blood to the part, which is become vicarious, for the time, of the whole system, (thus differing from those occasioned by other external causes); and this inflamed part if reduced by resolution or absorption, will run from the commencement, the following course, in fourteen stages or different actions. 1st, An increased impetus of blood to the part to be inflamed: 2d, congestion in consequence: 3d, laceration of minute vessels*: 4th, effusion and swelling in many incarcerated cavities: 5th and 6th, intercepted circulation with an increase of heat: 7th, the vicarious actions of enlarged and elongated vessels, with redness round the part: 8th, the contraction and healing of the lacerated vessels: 9th, the absorption of the thinner part of the blood effused: 10th, the death and decomposition of the effused and incarcerated particles of red globules: 11th, the absorption of the same: 12th, the gradual contraction and obliteration of the vicarious vessels near the

* Otherwise, how could an abscess ever be formed?

part affected, and the disappearance of the redness above mentioned; 13th, the re-production of entirely new vessels through the remaining coagulum of the blood unabsorbed, which was effused in the incarcerated cavities of the most injured parts: finally, 14th, the complete restoration of the circulation, and the perfect cure of the inflammation.

a. The intercepted circulation (5) and increased heat (6) are multiplied or augmented in the very same parts, by two causes. The first, by the vessels becoming impervious through a loss of continuity or laceration of their extremities, producing an effusion and intercepted circulation; and secondly, this effusion occasioning an additional compression on other minute arteries circumscribing it, and again intercepting the course of the arterial blood to this part.

b. The 7th, 8th, 9th, 10th, and 11th stages of local inflammation, from whatever cause, may take on the absorptive or suppurative action; although they are both nearly the same internally, yet forming some external

distinguishing characteristic appearances. I mentioned above the absorptive, but in the full suppurative, instead of the lacerated vessels continuing to form many small, detached, incarcerated cavities, containing their respective quantity of effused fluid, they soon communicate with one another, and forming at last one common, large, swelled cavity. Thereby, during that action, increasing the effusion, laceration, and contraction, with increased pain still further: shewing all the symptoms of a circumscribed inflammatory tumour. The solids of the internal surface of which tumour, undergo several actions or changes, and so also do its contents (5, 6, 7, 8, 9, 10); and upon which internal surface, new vessels spring up called granulations, in proportion as the vicarious vessels are obliterated. So that these new granulations, by becoming very numerous and thick, force the contained fluid in the cavity, called an abscess, to break through the external integuments which have lost their texture. And these granulations (13) continue, and must continue, till the complete obliteration

of the vicarious vessels (12) has been perfected; and thereby the circulation through the injured part restored (14). The circulating equilibrium will then be re-established, and the cure completed, as far as the nature of the injury committed will permit.

§ 14. Here ends the short sketch of the proximate and accessary causes of inflammation, and the mode of treatment must be regulated by them. The advantages will unquestionably be proportionably greater on those organs which are of a very tender and delicate structure; such are the eyes.

I am much afraid that the incurable blindness of many persons, may be, in a great measure, attributed to errors in the treatment; arising from a misconception of the nature of the proximate cause of inflammation. For as long as the belief exists, that an inflammation in a part depends upon an increased action of the arteries and increased circulation, and such a belief, when so delicate an organ as the eye is affected with acute inflammation, before a timely remedy is judiciously applied, a mal-

conformation may have already taken place, between the ruptured and lacerated vessels, and the organ may be irreparably injured. That such an adhesive inflammation may take place in less than twenty-four hours, by the mere contact of recently lacerated vessels, is known to every Surgeon. Doubtless the same may take place in affections of the eyes, as well as in other parts of the body.

I am well aware that many preparations made from subjects who may have died in consequence of inflammation in any part of the body, will be held universally to militate against my present opinion. But we ought to make a distinction between the primary disease of any part, and the disease of the constitution re-acting upon that part, as well as the whole system, thereby causing the death of the patient. And as for the injections of arteries, they are made to penetrate into the diseased parts and others, with more or less force, merely to ascertain inflamed vessels; but in my opinion, they shew the elongation and enlargement of some arteries

leading to the parts proximate to those diseased, which I call the vicarious vessels to the diseased parts. But the *truly affected* parts receiving the injections in such small and irregular cavities or incarcerated cells, are *neglected* as not presenting a *beautiful appearance* of ramifying enlarged arteries. I therefore maintain that a truly inflamed part, cannot be injected, being impervious to the healthy arterial circulation, and it must also necessarily be so to wax and other substances used for injections.

§ 15. Inflammation of the *eyes* more particularly.

The nature of acute inflammation being ascertained, the mode of treatment becomes very obvious. The first thing is to prevent the parts from being *disorganised* by too great an accumulation in consequence of the intercepted circulation. We must also prevent as much as possible the enlargement and elongation of the arterial vessels over the transparent cornea, by which derangement vision might be impaired, or the vessels of the membranes may be so

much dilated as to prevent them from returning to their former dimensions, and thereby terminating in a chronic affection.

§ 16. *On ophthalmia.* An inflammation of the eye may be produced by exposure to cold, in two different ways; first by its propelling the blood from the surface of the body and the lungs themselves during inspiration, to that organ; and secondly, also from the cold acting powerfully on the parts by abstracting the heat from the circulating fluids on the surface of the eyes, supposing them to have been previously exposed to a greater degree of heat, or otherwise weakened by fatigue. The membranes and vessels will contract, but the blood cannot contract in the same proportion, and therefore must soon make its way to the contiguous parts; elongating and distending other arterial branches, by which several of them will be necessarily *broken by extreme distension**. This will occasion a great deal of irritation, and increase the existing inflammation.

* Ware on Ophthalmia, page 20.

§ 17. *The symptoms of ophthalmia* or inflammation of the eyes, are these. Redness, swelling, and obstruction in the blood vessels, pain, heat, and throbbing; sometimes the rays of light cause great pain, and a symptomatic fever may occasionally attend it.

§ 18. *The treatment of ophthalmia.* This requires topical bleeding, about the temples and eyelids with leeches; scarifying the enlarged vessels themselves; keeping up a discharge near the part by means of blisters; and when a symptomatic fever takes place, venæsection must be ordered according to the pulse and other symptoms. Mild cathartics must be occasionally administered, nor must we neglect to keep up a constant, but gentle perspiration.

§ 19. In a very acute inflammation of the eyes, besides the above treatment, some local applications are necessary; these are of two kinds; the nightly and the daily. During the night a cataplasm rather large, (about three ounces,) composed of some soft vegetables boiled, or the conserves, with the addition of a little oil of sweet almonds opiated, sixteen

parts of the former to one of pure extract of opium.

The daily applications are repeated three or four times in the day, the eyes being ever exposed to a moderate light, and always *uncovered.* These topical applications should be made to agree with the period or stage of the inflammation; in the first stage, they should be *very mild*, such as pure distilled water, mild preparations of any tonic applications; keeping in mind to increase daily and very gradually the strength of these applications, as the complaint recedes from its most active state. In this manner almost any inflammation of the eyes from *cold only*, may be successfully treated.

These medical treatments and applications are absolutely necessary, when the inflammation runs high; and as I conceive, act in this manner. The abstraction of blood from the part inflamed or from the system, *when taken in time*, prevents the distension and laceration of many of the vessels of this very delicate organ, which may otherwise injure or destroy

vision, perhaps for ever. The blood may have been propelled into the part from the whole surface of the body and lungs, as before mentioned, and forming in the parts which become afterwards most diseased, a peculiar injury or bruise; and as these tender organs are supplied with an infinite number of small vessels anastomosing with each other, the inflammation that attends is more universal on the eye, which being near the brain, a nervous irritation and symptomatic affection may follow from the proximity of parts, which might be prevented by the above treatment.

The continual discharge near the part, by means of blistering, kept up by the savin or other suitable ointment, acts in the same manner as the abstraction of blood, in preserving the vessels from being too much distended by their fluids. Scarifying properly done, with a suitable lancet, when performed on the blood vessels of the *(tunica albuginea)* white of the eye, prevents the transparent cornea from becoming inflamed, the result of which may be an opacity or speck on the cornea. Mild

cathartics prevent the accumulation of chyle, its absorption, and the conveyance of it into the blood. The gentle but general and constant perspiration, has its share in preventing or abating the inflammation of the whole system. The nightly applications to the eyes (which are not to be long continued) tend to remove tension, and of course the pain and the throbbing sensation, by their moisture and moderate heat assisting the neighbouring vessels to become vicarious, thereby removing or diminishing the tension in the most diseased parts. The daily applications, as they increase in strength gradually, act by their tonic and astringent power, to enable the vicarious vessels to contract to their former dimensions.

Let this remark once for all be remembered, that whoever has his eye or eyes covered up day and night, for a short time only, may have the transparent cornea destroyed, by the matter confined between the eyelids, and corroding it, so as to form a thick speck. This observation alone, I am confident, if duly attended to, will prevent the blindness of thousands.

But if from neglect or improper treatment of this acute ophthalmia, the disease has become chronic, and some of the vessels of the membranes may have put on a disfiguring appearance, or the organs of vision may be much impaired by specks on the transparent cornea; or the shape and bulk of the eye may have been much altered; in such cases, it will require a great deal of time to perform a cure. The treatment of the chronic state of ophthalmia, will be hereafter described, when chronic affections of the eyes come to be considered.

§ 20. Inflammation from a blow, producing a mere bruise or contusion of the parts of the organ of vision, must be treated nearly similar to the last ophthalmia, with this difference only, that when the inflammation is severe, the treatment must be more vigorously antiphlogistic.

§ 21. If inflammation arise from a cut or puncture of the eye, penetrating through the coats, in such cases the parts injured are every thing to be attended to by the Surgeon. The loss of the major part of the different humours,

or the wounding of the transparent cornea; as the former may completely destroy, so the latter may much injure vision. But the degree of inflammation following large wounds of the coats of the eye, is much less than what attends small punctured wounds of that organ. The free exit of the different fluids from the vessels, give less cause for an impervious circulation and obstruction, which may attend smaller wounds. Punctured wounds, in general require the antiphlogistic treatment and regimen to be carried much farther, than the free open wounds.

The loss of the different humours of the eye may happen, either from their being forced out by the large opening of the wound in the coats of the eye, and at the same time violent spasmodic contractions of the muscles; or from the great tension and swelling of the whole of the membranes containing the different humours, thereby completely emptying the internal cavity.

Hence it is, that from the first appearance of an inflammation in so delicate an organ as the

eye, the first treatment is every thing; and if this be judicious, the organ of vision will be preserved: and if unfortunately ill-managed, not only that organ first affected, but the other eye also may be likewise lost.

§ 22. Inflammation in the eyes produced by corroding substances of a chemical nature, act first by destroying the texture of the external surface of the part, and the whole if they are suffered to remain long in contact. For they corrode, produce irritation, permanent spasms, and swelling in the absorbents; and the consequent inflammation will arise from an impervious circulation, irritation, and the destruction of parts.

The most efficacious method of preventing the parts from being much affected by any corroding substances, is by timely and frequent ablution, till the whole of the extraneous irritating matter is entirely removed; then if any inflammation has supervened, it will give way to the treatment I have mentioned above. (§ 18.)

But if the corroding substance be of the

animal kind, having the power of regenerating itself, by the law of assimilation, then the treatment must be as follows: first destroy the acrimony of the matter, by timely and frequent ablution with distilled water (always made luke warm, and injected with a syringe,) as fast as it is regenerated; and prevent the regeneration of it by topical and general bleeding. The intention being to allow the blood vessels as little blood as possible, in order to prevent or put a stop to any further increase of this peculiar secretion, and also to prevent the *obstruction* of many vessels which would otherwise take place, by *diseased absorption*.

But if the disease pass to the chronic state, by neglect or improper treatment, then there may arise much malconformation: as first, an opacity in the cornea; abscess in the coats of the eye; and abscesses in the different humours, or other chronic affections.

The ophthalmy of Egypt is a similar affection to the last mentioned, produced by the actual contact of the contagious matter with the eye; but arose at first from the specific contagion

contained in the night air of Egypt, and other accessary causes; which matter, when once applied to the eyes, has the power of regenerating itself by assimilation, during which action the vessels sometimes undergo such a change in their structure, as ultimately to destroy vision in both organs. The matter corrodes the parts as fast as it is secreted, and when confined between the eyelids, its effects are destructive to the parts, in proportion to the continuance of its application to them. Therefore no time ought to be lost in the first stage of this complaint: and I am confident the treatment I have laid down, will seldom fail, if adopted in time and to the full extent of the urgency of the case.

§ 23. A *cataract* is an opacity either of the crystalline lens or of its capsule; it varies in its visible appearance, from white, grey, bluish, and of an ash colour, which produce various degrees of impaired vision, till the sight is entirely destroyed. The causes which may occasion a cataract are not accurately ascertained; and there have been various opinions

upon this subject; such as that it may be of an acid nature; others, that it depends upon an alkaline quality; some persons believe it to depend upon an acrimonious state of the fluids; as infants have been born with this disease. Cataract often proceeds from previous inflammation of the parts, from whatever cause it may have been produced. It is also known to proceed from too vivid or too long an impression of light on that organ. It is moreover observed, that this is the probable cause of that affection in His Majesty. Those persons whose business it is to cast metals, in founderies, or working forges, are more frequently affected with this malady, than persons employed in other occupations. Lastly, old age alone, may produce it; this disease is therefore a chronic affection of these parts.

The proximate cause of a cataract, I conceive to be as before observed, a malconformation, either in the crystalline lens or of its capsule; chiefly produced, by the unequal distribution or circulation of the proper fluids in the part. If the cataract has been produced by previous

inflammation, I consider the resulting opacity which forms the cataract, as depending upon vessels which have been lacerated, the continuity of the circulation there obstructed, and the fluids remaining out of the circulation, becoming either partially or completely coagulated. And the opacity will increase exactly in proportion to the very increase of this coagulation, which is continually added by the vessels leading to the part, till the crystalline capsule becomes highly thickened; and sometimes the crystalline lens puts on the appearance of cartilage or bony matter. From hence arises the almost physical impossibility of curing a complete cataract, either by the application of medicines to a distant part; or by waiting for the hopeless operations of the efforts of nature. The only means therefore of removing this complaint is an operation.

The symptoms of a cataract shew themselves by an alteration in the colour of the crystalline lens, which is perceivable in its centre frequently, coming on by degrees; the opacity augments in density and extent, till the crystalline lens

is rendered completely opaque. At first the person affected complains of his sight declining, and objects appear as if seen through a mist, or thick cloud, and these become more obscure as the complaint advances towards the complete obstruction of the rays of light.

When the cataract is in its incipient state, it is possible for it to be removed by means of internal medicines, and external applications; such as very mild doses of mercury, cicuta, blisters, and even bleeding performed in different parts of the body, and more especially near the part affected. Electricity and galvanism have been employed with considerable success.

Electricity and galvanism act either as applied by sparks, vibrations, shocks, or the electric aura, which is either taken from, or given to, the part affected.

As the electrical fluid is extricated or drawn from a part of the body, by means of a point, the animal fluids in the vessels of that part, will be diminished by the increased insensible perspiration; which is very much augmented

by the action of the stream of the electrical fluid (the patient being insulated). And hence in active inflammation, the advantages attending this use of electricity, may arise from the diminution of the fluids in the vessels of the part affected.

Sparks, vibrations, or shocks, act nearly in the same manner, depending on the degree of the electrical charge. They all act both on the solids and fluids at the same time. The fluids of the part affected, in immediate contact with the spark, may be *decomposed*, and the solids stimulated to increase the action of the circulating and absorbent system, sufficiently to remove the deranged organization. But this remedy must be long and patiently persevered in, according to my experience, to effect such important changes.

When the cataract is confirmed, nothing can cure it but an operation, either by couching or extraction. The operation may be said to be likely to succeed ; first, when the person affected can distinguish between light and darkness, although it may be impossible to discriminate

the different shapes and colours of objects; secondly, when the eye preserves its natural shape and bulk; thirdly, when the cataract is of a pearl colour; finally, when the patient has from the beginning seen objects as appearing through a mist, which appearance has gradually increased, till vision has been nearly destroyed: in which cases some *well-founded* hope may be entertained of the success of the operation. Should one eye only be affected, the operation for the cataract should be declined, as one eye may be fully sufficient for tolerable vision, and by the operation on one eye, the focus of vision would become dissimilar in the eyes, and the patient derive very little benefit from the operation.

The uncertainty of the operation proving successful will be known; first, when the patient is not conscious of the difference between light and darkness; secondly, when the pupil is immoveable; thirdly, when there is a distortion in the shape of the eye; and its bulk is either augmented or diminished; fourthly, when the cataract is of a red, blue,

yellow, dark brown colour; or where it is as white as snow. Fifthly, when it has succeeded to sensations and appearances similar to those which result from moleculæ, cobwebs flying in the air, or placed before the eyes; sixthly, when very severe head-achs, or some other chronic complaints have affected the whole eye. Finally, children should not be operated upon, till they are old enough to be able to bear the operation with sufficient courage.

Both the operations of couching and extraction require the patient to be previously prepared; by proper bleeding, if plethoric, or subject to inflammation; and also by the exhibition of suitable purgatives; and the patient must submit to the antiphlogistic regimen, for a few days at least.

The operation of couching or depressing of the cataract, is the most prevalent practice in this country, although there are several eminent Oculists on the continent who give a preference to extraction. To decide between the two modes of operation is difficult or impossible in a written treatise; as much depends on the

operator; the age, health, and previous preparation of the patient.

The crystalline lens or its capsule having become opaque, when properly depressed or couched have no longer the power of retaining their form and colour, and therefore in the course of time, they both dissolve and are absorbed. But if afterwards the opacity should return, in consequence of the crystalline rising again, or what is called a secondary cataract, the operation may be repeated.

For the above reasons some Oculists give the preference to the operation of *couching*, and the unfavorable symptoms which sometimes attend, depend frequently on the nature of the parts injured, by the repeated motions of the instrument. After having pierced through the conjunctiva, the extremity of the aponuroses of the straight external muscle of the eye, the sclerotica, and the choroid coat, then perforating through the vitreous humour, it must lacerate many of its vesicles, thereby causing various derangements of the ciliary processes, and the anterior part of the hyloid membrane; so that

this operation was reported to be frequently followed by violent pains, vomitings, inflammations, fever, &c. The operation succeeds better in young and middle-aged persons, because the absorbents are *more active* in them than in elderly people. In the latter part of life, the fluids become *thicker and more phlegmatic, and the absorbents weaker, or obstructed;* therefore less liable to absorb the crystalline lens, when it has been depressed and dissolved, in consequence of the operation of couching.

The *danger* attending the operation of extracting the cataract, consists in some few instances of the loss of the vitreous humour, either partially or totally; which may arise from the unskilfulness of the operator and assistant; and from the violent involuntary contractions of the muscles of the eye; thereby occasioning the loss of vision, deformity, specks, and inflammation of the whole eye, (called *chemosis*).

The *needle* most proper for couching or depressing the cataract, should not be straight, but rather curved at the point, for the purpose

of destroying the structure of the anterior capsular membrane, and more effectually educing the crystalline lens out of the axis of vision. It should be convex on the outside of the curvature near to the point; and concave on the opposite side.

§ 24. *Description of the operation for couching or depression.*

For the depression, the Surgeon will place the patient rather lower than himself, sideways, near a window; the light must not be too glaring, and it must strike laterally upon the eye to be operated on. The other eye of the patient is to be covered. The operator being thus situated, and having a chair or stool to rest his foot upon, so that by means of his knee he may give a support to his elbow and arm, for every particular movement which may be required in the operation. An assistant is placed behind the patient, with one hand under his chin; and of course his head is steadied upon the assistant's breast; whilst with the other hand placed on the forehead, he will elevate the eyelid and keep the cartilaginous

edge steady upon the orbital rim immediately under the eyebrow. The operator himself (supposing the left eye to be operated on) lowers the inferior eyelid with the fore and middle finger of the left hand. He holds the curved couching needle as he would a writing pen ; and carrying the convex side of the point in a direction parallel to the left temple of the patient, resting his fingers upon this temple, he perforates the sclerotic coat near the external angle of the eye, at the distance of a little more than one tenth of an inch from the transparent cornea, a little below the transverse diameter of the pupil. He then brings the extremity of the handle of the instrument gradually forwards from the left temple of the patient, and thus gives to the whole progress of the needle a curved motion, till its point has completely penetrated the globe of the eye. The operator is then to carry the convex surface of the needle to the summit of the crystalline lens, where he will depress it a little, at the same time he will carefully pass the curved point between the ciliary process and the

capsule of the crystalline, so that it may appear distinctly through the pupil, betwixt the anterior convexity of the capsule and the iris. After which, the crooked point of the needle being turned backwards, towards the internal angle of the eye, is to be pushed forward carefully, and in an horizontal direction, between the posterior surface of the iris, and the anterior convexity of the capsular membrane, till it has been carried as near as possible to the edge of the crystalline lens, and of its capsular membrane; being the most approximate to the internal angle of the eye, and consequently beyond the centre of the opaque crystalline lens. Then the operator, by inclining the handle of the instrument towards himself, will press the curved point of the needle within the anterior convexity of the capsular membrane, at the same time into the substance of the opaque crystalline; and by a curved motion of the needle, he will effectually separate the anterior convexity of the capsular membrane, and remove the opaque crystalline lens out of the axis of vision, and then bury it in the vitreous

humour. Having waited a few seconds in this position, if there is any cloud or membraneous obstruction, the operator will immediately carry the point of his needle to detach these membraneous substances by a few rotatory motions of the instrument, and carefully roll these membranes round the point and transport them into the aqueous humour. Should the pupil appear perfectly clear when the crystalline lens has been buried in the vitreous humour, the needle is then to be withdrawn in a contrary direction to that in which it entered; having first disengaged it from the lens by a few small rotatory motions of its handle betwixt his fingers, he is finally to withdraw it, with its handle towards the left temple of the patient.

§ 25. *The operation of extraction.* For the operation of extraction, the patient, operator, and assistant, being exactly seated as for the operation of couching, (the left eye being still supposed to be operated upon,) the operator takes the scalpel proper for such an operation, in the same manner as before: he rests upon the patient's temple with the other two dis-

engaged fingers, and when the eye has become steady, the point of the instrument is made to enter the anterior chamber, by piercing the cornea at the distance of one-twentieth part of an inch from the sclerotic coat, and at its superior and exterior edge. Having brought the point before the pupil, he introduces it into the capsular membrane, and then pushing the instrument forward, he makes a similar incision in this membrane to that which he is to make in the cornea; both which represent the segment of a circle, whose convexity is turned obliquely outwards and downwards. This incision being finished, he disengages the point of the instrument, and carrying it forward gently and lightly, he pierces the transparent cornea a second time, from within outwardly, and at the same distance from the sclerotic coat, towards the inferior and interior part of the eye, and completes the section of the cornea, without changing the position of the instrument or the direction of its motion. It usually happens that the section of the cornea and that of the capsule of the crystalline lens has been completed before

the aqueous humour has had time to escape; and before the iris has become flaccid and presented itself under the cutting edge of the instrument. If this should happen, the finger is pressed upon the cornea, and a gentle friction is made upon this membrane, which causes the iris to contract itself from under the cutting edge of the scalpel. The same finger serves to sustain the globe of the eye, and is made a convenient point of support for the instrument in those cases where the cornea has a preternatural resistance and is more difficult to be penetrated.

In following the plan which has here been described, the section of the cornea is oliquely from above downwards, and from without inwardly. By these means the operator avoids wounding the caruncula lachrymalis, the angle of the eye, and the side of the nose, which is difficultly prevented, when the incision is from the small angle towards the great angle. The section of the cornea is almost concealed by the superior eyelid; and if the eyelids should happen to swell, which frequently takes place,

there need not be any apprehension that it will press upon this segment, or separate the edges of the wound made in the cornea. It is not always possible to lay hold of the crystalline membrane at the same time that the section of the cornea is performed; as for instance, if the eye is full of motion, as if it were convulsed; or if the pupil is very narrow; or finally, if the crystalline membrane should be too hard, which is often the case when it has become opaque; then the section of the cornea only, should at first be completed, and we may then proceed to the opening of the capsule. The other extremity of this instrument, being shaped like a very small scoop, is perfectly proper for those cases where the crystalline membrane has acquired some opacity. This disorganized membrane must be taken out by means of a small forceps, which could not have been easily performed if it had been cut in the first stage of the operation. It is necessary to know these cases; they are distinguished by the presence of points and specks larger in one place than in another. These specks may be found, however,

without the capsule being altered, and depend upon the morbid state of the crystalline only; but then they are deep seated, whereas those which belong to the capsule are superficial, as if detached from the crystalline, which is usually of an uniform colour.

The section of the cornea and of the anterior capsule of the crystalline lens having been performed at once, or at twice, as before described, the assistant is careful to lower the superior eyelid gradually, as the instrument advances to perform the complete section of the cornea. This successive lowering of the eyelid, permits the crystalline lens to come out slowly, and prevents a portion of the vitreous humour from escaping at the same time with it. If this body should have much difficulty in making its way out, the scoop is to be used to facilitate its extraction. It is then proper to make a few circular motions with the last instrument to unite together in front of the pupil, the remnants of the opaque membranes, &c. which the crystalline humour often leaves behind, and might give rise to a secondary

cataract. This instrument is also very convenient for replacing the iris which is generally sunk down and flaccid, and which may sometimes engage itself betwixt the lips of the wound of the cornea.

When the cataract is of long standing, it has very often contracted adhesions to the iris, which will give way to compressions applied to the globe of the eye ; but if these compressions are too strong, the operator would have the misfortune to press out the greatest part of the vitreous humour. To prevent this inconvenience, it has been recommended to separate the crystalline lens from the iris, by means of a proper needle ; and afterwards to facilitate its extraction with the scoop abovementioned.

The section of the cornea should never be made in a part that has any opacity ; but should rather be performed from below upwards ; and it is almost impossible to do otherwise, when the cornea is extremely small. For many observations have confirmed the fact, that the crystalline lens is at the same time very large, and a large opening is absolutely necessary,

which might produce dangerous staphylomatous affections, if the section be performed from outwards downwards.

A cataract sometimes is purulent, and contained in its capsule; in such cases the crystalline detaches itself very readily, under the form of a small bladder or hydatide, and is frequently followed by a large portion of the vitreous humour, which has fallen into a state of dissolution. If this was found out in time, it would be preferable to make the opening upwards, instead of downwards. The characteristic symptoms attending such cases, are, the total exclusion of the light, and the mobility of the pupil being much weakened, and the colour of the crystalline being uniformly white; also the great degree of projection which the crystalline makes outwardly, as if it were an hydatide, will prove that the cataract is of a purulent quality, and indicate the proper method of operating. It is sometimes necessary to extract the whole of the vesicular membrane of the crystalline lens, which has become morbidly opaque, and adhering strongly to some

part of the iris; which last circumstance requires the greatest attention in the operation, in carefully detaching the morbid adhesion, by means of the scoop or curette beforementioned.

After the operation, either of couching or of extraction, the eyelids should immediately be suffered to close themselves, and we should then cover them gently with a piece of lint impregnated with rose water holding in solution the smallest quantity of ceruss: acetat: and with this to keep the eyelids constantly cool, moist, and clean: and the eye should be constantly covered with a bandage to keep the whole steady. The patient should be put to bed, and suffered to lie upon his back, the head rather low, to prevent the vitreous humour from escaping through the wound. The bed-chamber should be kept completely dark, for fear of increasing the inflammation likely to follow. The diet should be low, for the first few days, that is, as circumstances may suggest. If no disagreeable symptoms should follow after three or four days, the regimen and confined posture of the patient may be made more

agreeable. The removal of the dressings may be permitted, but the complete exclusion of light must still be persisted in. At first, the sight will be dim, tears will flow in abundance, and the eyelids will be much swelled, but without pain; and the patient will perceive the light through them. These symptoms may pass away more or less quickly in the course of about a week. Symptoms of a more alarming nature may succeed to both operations, such as violent shooting pains, inflammation, and fever; in such cases the antiphlogistic regimen and treatment must be carried very far; evacuants in general, and topical discharges, permanently continued, till the violence of the symptoms are abated. Rest also, and every means should be used, which may be likely to prevent the inflammation from destroying the organization of the parts.

The operation of extraction, is sometimes followed by affections called *staphyloma*, *hypopyon*, or *unguis*. Staphyloma is formed by the iris, or by part of the aqueous membrane getting between the edges of the wound. In

the first case, the appearance is of a black colour, in the second it is of a bluish. These tumours are often very painful, and they cause a troublesome lachrymation. They are recommended to be restrained by means of astringents; and if necessary the excision of them may be proper, or the repeated application of the lunar caustic, when they are obstinate and stationary; but it is fortunate that the pressure and friction of the eyelids alone, are generally sufficient to subdue the disease in the course of time.

§ 26. *Chronic affections.* A violent inflammation of the eye from any cause, may be followed by an abscess, the matter of which may occupy the whole anterior cavity of this organ, or may be deposited amongst the aqueous humour, or between the coats of the cornea. These abscesses may be absorbed in time, or the matter may be let out by means of an operation, which restores the eye to its usual functions. Large abscesses are preceded by the most violent symptoms, such as deep seated pains in the eyes and the whole head, with fever, watchfulness, and delirium;

there are throbbing pulsations, very strongly marked, shewing the arteries to be striking or sending the blood against an impervious cavity or cavities. The symptoms of inflammation after having been at their summit, become less violent without any diminution of the bulk of the eye, which augments in all its dimensions; irregular shivering, and pains from tension and other causes, succeed to those of the throbbing pain which the patient first felt. These symptoms will certainly prove that there is an abscess formed, the matter of which must be evacuated. Several persons have suffered themselves to perish for want of a proper resolution to have an outlet made; and others have survived from these dangerous affections, solely from nature having opened an outlet externally.

The operation is performed with a small scalpel, in the most prominent and pending part of the abscess. The eye becomes less, and suppuration gradually subsides; the wound diminishes in size and closes, and the eye is so much lessened in bulk, as to admit of an

artificial eye, to remove the deformity consequent upon the loss of this organ.

In order to prevent these most alarming symptoms from taking place, (from whatever cause they might have been occasioned,) we must adopt the antiphlogistic regimen and evacuating treatment, both carried to a proper degree, according to the urgency of the symptoms, in order to assist the vicarious actions of the arterial vessels near the part affected. Topical evacuations contribute greatly to answer this purpose, also the auxiliary use of emollient cataplasms or other mild applications.

An *hypopyon*, as it is called, being a collection of matter in the aqueous chamber, may frequently be resolved by means of emollient applications, but if in the course of time, the matter contained in the eye should increase in quantity so as to injure the sight, it is then proper to make an opening in the most depending or lower part of the transparent cornea, near the edge of the sclerotic coat, large enough to accomplish the evacuation, even if the crystalline lens were to make its way out through

the passage. It would be preferable for it to be forced out, than to suffer the matter to remain, which might in time destroy the whole organ, if not the other eye also.

Any inflammation may be succeeded by the disease called *unguis*, and is different from that called hypopyon and other diseases of the eyes, in consequence of the situation it occupies; and derives its name from the resemblance to a finger nail. It is an accumulation of pus between the coats of the transparent cornea. If the matter be in a small quantity, it may be absorbed by means of repellents and absorbents; but if it is rather large, or has the appearance of being pointed, it may corrode the membranes of the cornea, either inwardly, producing an hypopyon, or externally, producing an ulcer, or both at the same time, producing a fistula of the cornea. In the latter case, it may give rise to a staphylomatous affection, which would alter the appearance of the eye very considerably. For the most part, the matter between the coats of the transparent cornea becomes thick and hard, thereby occasioning specks

almost of an incurable nature. This complaint frequently succeeds the small pox, especially that of the confluent kind.

After the inflammatory symptoms have been made to subside, the giving an outlet to the matter of the unguis is very proper: and this is performed by means of a small scalpel, so as to perforate into the abscess only, for fear of letting the pus into the cavity of the globe, and there producing a new inflammation. After this operation, it is necessary to use mild detergent lotions, and afterwards to substitute some of the tonic kind.

§ 27. Specks may affect the transparent cornea in three different parts of it, viz. upon the internal surface, within its coats, and upon its external surface. The first as being out of the mechanical power of the Oculist is frequently incurable. The second, requires a long time to affect a perfect cure; and the last, can always with certainty be cured, provided no other malconformation exist. This will be evident, if we consider specks as the effects of previous inflammation in a part of particular

structure and organization. As I have said before, in what is called an inflammation, and in whatever manner it may have been produced, some vessels will be overloaded, and even in their vicarious elongation and enlargement; and as the red particles of the blood are of a larger bulk than the diameter of the exhaling vessels of the sclerotic coat or cornea, independent of the size of the red particles of the blood, there is also the impervious state of the vessels, (from inflammation, &c.) so that they cannot be transmitted through the inosculating mouths of veins which do not exist in the extremity of the new and *violent* elongations of the arteries. The quantity of red particles continues to increase in the impervious vessels till they form an abscess, by breaking their cells and communicating with one another between the coats of the cornea, called *unguis;* or produce an internal abscess in contact with the aqueous humour, called *hypopyon;* or by the breaking of these individual vessels or cells outwardly upon the surface of the cornea, there form a compound disease and discharge

partaking of a phlegmonous and erysipelatous character; which discharge excoriates the neighbouring parts, unprotected by a circulation powerful enough to defend them from its action.

In this manner the transparent cornea is corroded, its surface becomes rough and irregular, surcharged with particles of blood and matter, which never could, by the structure of the parts, be produced in them unless in consequence of a violent disease. And although the inflammation may entirely subside, yet these minute alterations of structure in the parts themselves, remain permanent; for arteries are seen within the coats of the cornea after the inflammation has subsided. There also exists after suppuration is over, a thickened, discoloured, and indurated matter, within those pores or apertures which before discharged the matter suppurated. This thick, discoloured, and indurated matter, continually increases in dimensions and thickness, till a complete opaque body is formed, called a speck: and only ceases to increase in all its dimensions,

when the vicarious blood vessels and others newly formed by the late inflammation shall have been contracted to their former diminutive size, thereby cutting off the further increase of the speck; but at the same time leaving it in its actual state. Therefore a speck of the cornea, (that ought to be transparent,) is a disorganization of structure in the vessels composing it, and formed of extraneous, opaque, hard, and incarcerated particles, which are sometimes continued in their accumulation, by some small arterial branches newly formed, which have not any inosculating veins, &c. to receive their blood, the consequence must be a speck, with red vessels radiating from its centre or most opaque point.

Happy are we to find that this is the true nature and formation of specks of the transparent cornea. Because with time and patient assiduity we certainly can remove those of the two last kinds particularly. For by procuring near the part affected, a constant vicarious discharge of fluids, not regarding the nature or quality of the discharge, but merely to unload

the vessels; secondly, to cut through or across those external arterial branches leading to the centre of the speck, or most opaque points, thereby preventing the further increase of the opacity: and by using at first some weak tonic and detergent lotions, three times a day, applied to the very centre of the speck itself, so as at first to produce a sensation of warmth and a little smarting, which should subside in two or three minutes or more; but never to exceed twenty minutes; otherwise it would create an inflammation of too long a period. This application is to be increased in strength gradually, so as to produce the above effects of a temporary inflammation. And every third day, in the morning, a powder, at first of a mild escharotic nature, is to be applied over the whole speck only; and the whole of the powder applied, is immediately to be washed away by dropping a few drops of the lotion upon the very centre of the speck. The temporary effect of this powder should be an inflammation to continue an hour or two. And the said powder is to be likewise increased in strength gradually, so as to keep

up the constant effects of a temporary inflammation in a similar degree and sensation, after each individual application. And when a perfect cure is apparently obtained, it is necessary to discontinue the whole inversely as it began, till at the end the same powders and lotions are finally to be used which were at first employed. At this period no return of the complaint need be apprehended. It may be a long time before a person completely blind with specks of the two last kinds, can recover his sight; but I have known several instances of complete blindness from the above cause, (reckoned incurable,) cured by this treatment in a few months, without leaving any visible mark of previous disease.

The cure is thus accounted for. The discharge artificially made near the part, about the temples, behind the ears, kept up till a cure is made, acts only as an auxiliary, by removing any fulness of the vessels. Even a very small discharge near the temple may allow a vicarious action, thereby removing and stopping the further increase of the bulk

of the speck, by causing the new formed arteries leading to its centre to contract, and if this contraction is kept up for some time, it is likely to become permanent, as that of any other part of the body.

The further increase of the speck may be greatly prevented by dividing entirely the red vessels leading to it with the point of a lancet; wherever these vessels appear of sufficient size; this being the most topical discharge which can be made.

The tonic and astringent lotions are intended to contract the lax vessels of the part, and the degree of temporary inflammation which is to be produced, is in consequence of this contraction of the vessels, particularly in their extremities, thereby preventing for the time, the due circulation. Hence arises an increased redness, fulness, and heat. In this short and minute temporary action, new vessels are produced very *gradually* and permanently; which are very small, and which are to be highly valued, as they have their anastomosing veins, &c. accompanying them, giving

an healthy circulation where they exist; particularly within the body of the speck. At the same time this temporary inflammation, duly managed, will enlarge those superficial arteries which lead more immediately to the formation of the speck, by which means they can be scarified most effectually.

These escharotic powders act upon the body of the speck only, considering it as a substance which can and must be worn down gradually. It can less resist any mechanical and chemical action, than those sound parts near it. I have said that a speck was an accumulation of indurated, discoloured and incarcerated minute particles, chiefly formed from red globules, which in time have become a thick membrane, with very little circulation through it; and thus would the powders act on a comparatively dead substance, as the speck. The powder will wear away those superficial surfaces or particles, which have little or no circulation in them, and those surfaces or points where there is any *sensibility*, there will be a degree of circulation produced to save it, which circulation will be

in the course of time created, by the temporary inflammation often repeated. And the escharotic powders, when applied at the end of the disease, although stronger than at first, and middle stage of using them, will be inert upon the cornea, and but little felt. Because the cornea will have recovered a great many new vessels, performing their due circulation; and if I may be permitted the expression, will resist the irritation actually produced upon them.

The reducing of the lotions and powders gradually, after the cure, will keep down those external vessels to their diminished diameter, which had occasioned the disease when increased in size; and keep those vessels which have been newly formed in full circulation, thereby preventing the return of the disease.

§ 28. An inflammation may be succeeded by a *cancerous affection* of the eye. Sometimes the eye-lids are solely affected, at other times the globe itself, and frequently both these parts partake of the injury. This complaint is often the result of some small *carbuncle*, which

at first resembles a mole; or of fungus excrescences, which have formed themselves between the eye-lids, and in time become large enough to cover the whole eye; or violent and tedious ophthalmy, which may have been terminated by partial abcesses; or staphylomatus affections of the cornea; and tubercles of a schirrous nature. A cancer may also arise from the injudicious use of sharp and acrid substances, employed with a view of removing them, but more especially from those applications which are of a corrosive nature. But it is believed that the cause of a cancerous affection always depends upon the internal constitution of the patient which can neither be prevented nor corrected.

If the part likely to become cancerous can be operated upon in due time, by means of the scalpel, it should not be neglected; for fear of the cancerous disposition being communicated to some of the neighbouring parts, or to the whole fluids of the system.

The manner of proceeding in this case, is various, according to the different parts of the

eye which may be affected. But when the globe of the eye is become cancerous, and the operation has been determined upon, the patient should be seated, and his head reclined upon the breast of the assistant. The operator should also be seated at his ease, rather above the patient, to have a full command over the parts to be operated upon. The sound eye should be covered with a bandage; and a broad ligature is passed through the cancerous eye, to enable the operator to have a perfect and secure hold of it; so that he may remove the whole of the eye if he pleases; being careful neither to leave any of the diseased parts behind, nor to wound the bones. The latter accident would produce a tedious exfoliation of some of the orbital plates; the former would give rise to a re-production of the disease; which may endanger the contamination of the whole constitution.

After the operation, the hæmorrhage is seldom great; the wounded arteries being numerous and small, they contract, and the circulating equilibrium is soon restored, by means of

the immense number of contiguous arterial branches. But should there be any loss of blood to require attention, the hæmorrhage will always subside, by means of gentle compressions, with pieces of lint, inserted within the cavity; and the application of bandages, to keep the whole of the vessels of the orbit properly compressed. Those vessels which are large enough to be tied, must not be neglected. It is further proper that a small discharge be daily solicited from the cavity, to diminish the whole of the inflammatory symptoms, which may be expected to follow the operation, till a free suppuration takes place; when the lint and bandages may be changed, and the compression removed altogether.

The dressings should be of the most mild kind, and rather of a detergent quality; repeated thrice a day, according to the nature of the symptoms, and the quality and quantity of the discharge; till a perfect cure is completed; when an artificial eye may be placed in the socket, to prevent the deformity attending the loss of so conspicuous an organ.

What is called the *resection*, is a modification of the above operation ; and it is recommended in the *buphthalmus* and staphyloma, accompaniedwith very thick specks, and the humours completely opaque; by which the sight is totally lost. There is constantly a general and permanent inflammatory affection of long standing; from the continual irritation, occasioned by the bulk of the part, and proving a source of great distress to the sufferer.

Resection is a very simple operation, the consequence of which need not excite the least apprehension in the patient. He should be seated upon a chair, and kept perfectly steady, as in the operation for a cancerous eye. The Surgeon separates the eye-lids, and by means of a curved needle, armed with a silk ligature, he perforates the fore part of the eye, or that part which is most prominent, thereby acquiring a secure hold, to keep the organ steady. He is then to cut out with a proper scalpel, a circular piece from the edge of the transparent cornea, and quickly remove the part which he intends to separate.

The eye-lids are immediately closed, and the eye gradually empties itself of its humours. There is nothing further to be done to the parts, but occasional ablutions, with some weak astringent lotions, made luke warm, and the applications of pieces of lint, or linen, dipped in the same lotions, which are kept fast upon the parts by means of bandages. These applications should frequently be repeated in the course of the day; and in the space of a few days, the eye will contract upon itself, become consolidated; having the appearance of an irregular cone, in size less than the other eye, and admitting of an artificial one being placed upon it which will correct the deformity so far, that no one would suspect the difference unless previously informed.

§ 29. A dropsy of the eye, or *hydrophthalmy*, is the increase of the aqueous humour; and it may increase to such a quantity, as to enlarge the whole organ which is appropriated to receive it. It then spreads itself beyond these parts, and enlarges the whole bulk of the eye; and then becomes a complete dropsy of that

organ. The cause of this complaint is not very certainly known, but it often follows obstinate inflammations, and sometimes it attacks persons without any known cause.

Hydrophthalmy is certainly occasioned like all other dropsies, in other parts of the body, either by a diminished action of the absorbents, or the increased secretion of the exhalent vessels; or both these causes acting conjointly. A dropsy of the eye frequently proceeds from an inflammation, which has injured some of the absorbents, by completely breaking through their continuity, within the aqueous chamber. These being overpowered by vicarious distension or remote compression, pour out from their open orifices their contents into the aqueous chamber, which they have absorbed in some other distant parts, even from within the cavity of the globe itself. *These wounded absorbents, partake of the office of exhaling vessels*, and continually add to the bulk, forming hydrophthalmy: although every symptom of inflammation may have long

subsided ; but may return again, from the *tension* of the general bulk of the tumour.

A dropsy of the eye proceding from the effects of a former inflammation, may have so injured the exhalent vessels as completely to have broke through their continuity within the aqueous chamber. In the preceding inflammatory affection, some of them became vicariously distended, and the resistance in their extremities, within the aqueous chamber, has been overcome by the enlargement and elongation of these exhalent vessels ; thereby occasioning an increased morbid secretion ; which may have continued so long as to produce hydrophthalmy.

The symptoms of a dropsy of the eye are as follow. The increase of the bulk of the whole eye, with the projection of the cornea and depression of the iris ; an alteration in the opening of the pupil, which loses part of its contractile power ; and a partial, or total, loss of vision. When this humour of the eye augments, and its transparency is

much vitiated, the patient complains of obtuse pains in the bottom of the eye, produced by the tension, which brings on a kind of stupor on that side of the head where the complaint lies. Finally, this organ looks as if it were driven out of the cavity of the orbit; which is no longer capacious enough to contain it, and the eye-lids become stretched, separated, and often turned inside outwards, called *ectropium*.

§ 30. The augmentation of the bulk of the eye, called *buphthalmy*, occasioned by the swelling of the vitreous humour, is the only complaint which has any similarity to the above hydrophthalmy. The difference consists in the vitreous humour, which propels the iris forwards, and brings the crystalline nearer to the cornea, and which appears as if it were girded by the iris, thereby obstructing the rays of light. The eye is more painful, the sight more seriously affected from the commencement, and suppuration and the dissolution of the eye are much to be feared.

§ 31. The cure of hydrophthalmy may be accomplished as all other dropsies in different parts of the body, by the use of medicines increasing absorption; by maintaining a vicarious action by means of a perpetual discharge near the part affected, and by topical applications of tonic and repellent lotions. All these properly and timely employed, will probably produce a cure.

But the operation of the paracentesis or puncture of the transparent cornea is recommended, when the complaint does not yield to the foregoing treatment; but on the contrary, increases very rapidly, or has arrived at an unusual large size. The operation for hydrophthalmy, is performed in the same manner as for evacuating the matter of an abscess in the anterior chamber. And the treatment is precisely the same. (See page 83.)

The operation for buphthalmy or a dropsy of the vitreous humour, is performed in the same manner as that for evacuating the matter of an abscess deeply seated in the eye; and the after-treatment is the same; both of

which have already been mentioned. (See page 82.)

§ 32. There is a complaint often occurring in persons advanced in age, called *amblyopia;* which is a dimness of sight, produced by an alteration in the nature of the aqueous humour, now become more opaque. In those cases where the thickening of this humour, and the loss of its transparency are the sole causes which injure vision, an attempt may be made to restore the sight by the paracentesis of the cornea. (See page 83.)

§ 33. There is a complaint called *synizesis pupillæ*, which is the closure or contraction of the iris, preventing the rays of light from falling on the retina, and thereby occasioning blindness. This complaint may proceed from original malconformation at birth; but it is more frequently the consequence of violent inflammations of the eyes, whether they arise from internal causes, or are produced by external injuries. It has frequently succeeded the operation for the cataract.

When it is absolutely necessary to make an

artificial pupil, it may be done, after having first cut the transparent cornea as in the operation for the cataract, by means of a curette, or grove like probe, to raise up the flap of the cornea; and then we must take hold of the middle of the iris, by means of a pair of proper forceps, and separate, with a suitable pair of scissars, that portion of the iris which has been brought forward by the forceps. We shall then have an opening with loss of substance, the edge of which cannot easily impede the rays of light in their progress to the retina.

It is absolutely requisite for the patient who is to undergo this operation, to be previously prepared, afterwards confined, and treated in the same manner as after the operation for the extraction of the cataract.

§ 34. *Gutta serena* is a disease which frequently annihilates vision, without any remarkable external appearance. This complaint may supervene suddenly or progressively.

The causes supposed to give rise to this malady are many. Such as fulness of the

blood vessels in general; preternatural compressions on the arterial blood vessels leading immediately to the optic nerve, or from it; producing by the first a palsied state of the optic nerve, and by the second producing a preternatural fulness of its blood vessels, on account of the returning veins being obstructed; thereby morbidly distending these minute organs of the optic nerve, and vitiating both its symmetry and functions. Gutta serena may succeed ruptured blood vessels in the brain, in consequence of the effusion pressing directly upon the optic nerve. Which may be produced either by the contiguous pressure of an effusion or collection of a fluid about the optic nerve; or by the contiguous pressure of an exostosis; or the disordered state of the stomach and alimentary canal; or from the effects of poisons, either of the animal, vegetable, or mineral kind; from previous inflammations of the eyes, or the effects of a continued fever; repelled eruptions; or the suppression of some accustomed evacuation.

The symptom attending this affection, is the immobility of the iris, that is, it does not contract upon the admission of a strong light; nor dilate upon its abstraction.

The success of the treatment is doubtful, as the causes which may produce this complaint are many and of an opposite nature; and the parts affected, as well as the causes of the disease, are too deeply seated, in most cases, to admit of any certain decision. It must be admitted, that the success of the practitioner, may frequently depend upon his just discrimination of the true state and causes of the disease; and in which he may be much assisted by the candid confession of the patient himself.

If a plethora of the whole system exist, bleeding and evacuations in general are recommended; also local and permanent discharges as near the part as possible; such as blistering the temples and the back of the head and neck; the frequent use of *errhines* to solicit a discharge from the nostrils.

If there is a partial plethora in the part

affected, attended with a general debility, topical bleeding, and topical discharges kept up, are highly proper; with occasional emetics to unload the stomach of any undigested substances; and the administration of tonic and corroborating medicines internally.

If the complaint arise from extreme debility, or palsied state of the optic nerve, applications tending to rouse the parts, and propel the blood into them gradually, both topically and internally applied; such as antispasmodics, acrids, stimulants, and electricity or galvanism, will produce the most salutary effects, if long enough persevered in, and properly applied.

If there are ruptured vessels from external injury; the letting out of the fluid, if possible, by trepanning the part, will be the only indication for giving instant relief.

If any extraneous fluid in the brain press upon the optic nerve; in this case the knowledge of the cause which occasioned this latter complaint may lead to some indications of cure. If any venereal exostosis exist, (which

may be surmised, if not perfectly ascertained, by other symptoms existing at the same time, or having existed in other parts of the body;) in this case, mercury rigidly administered for the cure of the secondary symptoms of the venereal disease, must be necessarily persevered in for a few months.

If animal, vegetable, or mineral poisons have been taken into the stomach, the immediate evacuation of them is the first thing recommended; which is performed by emetics and cathartics; to be repeated till the cause of the complaint, if possible, is removed.

Metallic poisons taken into the stomach, or absorbed daily in small quantities from the surface of the body, produce their morbid actions slowly on the nerves, occasioning chronic diseases, which generally may have lasted long enough to exhaust the whole strength of the best constitution; and it is not often till the patient is arrived at this extreme state of the decline of his health, that he can prevail upon himself to take advice. At this period the complaint is so deeply rooted

as to require a very long time for its complete eradication.

When gutta serena arises from violent inflammation, it is then certainly occasioned by a disorganization of the parts; or when from a continued fever, in both these cases relief may be expected, by persevering a long time in the methods of cure which the peculiarity of those cases may suggest. When from eruptions, or accustomed evacuations, which may have been suppressed; in such cases, the restoration of these will probably cure the disease.

Mercury in its different preparations has been administered in these complaints with various success; and when used with discretion, and with other auxiliary applications, much benefit has always been the result.

§ 35. *Amaurosis* is a modification of gutta serena. The symptoms are a decay or loss of sight, where scarcely any defect is visible in the eye. The patient sees but imperfectly; sometimes part of the object only is seen with the diseased eye, while the whole of the object is seen perfectly by the sound eye. At other

times the object appears as if it were seen through a cloud or fog, and sometimes a total loss of sight takes place for a short time.

This complaint is produced by nearly the same causes which occasion gutta serena; but the deranged state of the stomach and bowels are in this complaint the more to be attended to; as the effects of emetics are rather peculiar; for on the first which is administered, hardly any thing but clear water in a small quantity will be brought up; but the other succeeding emetics evacuate both upwards and downwards, an astonishing quantity of thick phlegm; which can scarcely be rendered miscible with water, unless by long agitation. These emetics and cathartics should be often administered as the strength of the patient will permit. Afterwards the internal exhibition of tonics, bitters, and corroborants, conjoined with gentle alteratives, will be necessary to prevent the return of this malady.

The external applications, as well as the general treatment, for amaurosis, is nearly the same as in gutta serena, particularly, when it

does not absolutely depend upon any malconformation of the organs of vision.

§ 36. *Ectropium*, is the eversion or turning outwards of the edges of the eye-lids, which not closing completely together, produces deformity and distress to the patient. This complaint is produced by many causes; particularly in old age; such as tumours and swellings of all kinds, seated upon the eye-lids. By relaxation of the inner coat from previous inflammation, or from an inflamed state of the glands of the tarsus, rendering the eye-lids unable to cover the bulk of the globe; or from a cicatrix producing the same effect.

Whatever may be the causes, they should be removed as soon as possible; tumours, by the scalpel chiefly; anasarcous swelling, by several punctures with a lancet; if from relaxation of the inner membrane, by scarification of these vessels; if from inflammation of the glands of the tarsus, it should be treated according to its nature, whether it be acute or chronic, or approaching to *psorophthalmy* or *epiphora*.

If it arise from an external cicatrix, it may

be relieved either by making an incision upon it, so as thereby to increase the length of the eye-lids, or by making a small incision in the external angle of the eye-lid, which will increase its length and remove the complaint.

§ 37. *Trichiasis*, is the inversion of the edges of the eye-lids and eye-lashes being turned upon the globe of the eye, and producing much irritation and consequent inflammation. The causes of this complaint are many ; such as small ulcers of the glands of the tarsus ; chronic ophthalmy ; scrophulous and venereal affections ; it is also believed to depend upon the contraction of the orbicularis muscle.

The removing of the eye-lashes by means of a proper pair of forceps, is the most important step ; and the dividing a proportionate quantity of the skin is said to be all that is necessary for the cure, when it depends solely on a spasmodic contraction.

This complaint, from whatever cause arising, should be seriously attended to, as the inflammation which takes place, generally runs high,

in consequence of the matter or discharge not having any outlet, it must accumulate between the eye-lids, and become very acrid, and corrode the cornea in the course of a short time; occasioning specks of great density and difficulty of cure. In the first stage of this disease, frequent syringing under the eye-lids with a mild lotion, made luke-warm, will so far clear the parts and abate the inflammation, as to subdue the most dangerous symptoms, and enable us to examine the parts more readily, and treat them more successfully. See ectropium, (page 111.) psorophthalmy, (page 113.) epiphora, (page 118.) specks of the cornea, (page 85.)

§ 38. *Psorophthalmy*, is a preternatural adhesion or concretion of the edges of the eye-lids together; characterised also as a psorous or scorbutic disorder of the edges of the eye-lids; which render them sore and sometimes ulcerative, occasionally producing ophthalmy.

The disease may be seated in the ciliary glands, which have acquired a morbid secretion, of a corroding nature. This may arise either

from a local or constitutional affection; or it may be occasioned by eruptions or discharges of some other parts of the body which have been suppressed.

There are two stages of this disease, the acute and chronic; and in both cases it is necessary, if the matter collect in great quantity, that it should be washed away assiduously, by means of a syringe and any mild lotion. Moreover the antiphlogistic treatment and evacuations are to be carried as far as the case may require.

When the disease has become chronic, in addition to the frequent ablution as above recommended, an escharotic and tonic lotion should be applied with a hair pencil, twice or three times a day, after a few days of the first application, to the edges of the eye-lids; so that it may be found to produce a degree of excoriation even on the adjacent sound skin. The application may then be suspended for a short time, till this sore skin is quite healed or nearly so. The ciliary glands will during this process, have undergone a new inflam-

mation ; or which is the same thing, have acquired a new set of vessels, forming a more healthy action. If any more of the ciliary glands should still appear diseased, the same thing is to be repeated, till a perfect cure is effected.

It is difficult to say how secretion is performed in any part of the body, and if psorophthalmy is a disease of the secreting organs of the ciliary glands, we little know the proximate cause affecting any particular part of them. But if we allow the secreting vessels to be composed and possessed of the same number of vessels which constitute every muscular part of the body ; it will then appear that psorophthalmy is a chronic affection succeeding inflammation, or something approaching it, in which action, an increased impetus of the blood, at first produced the lasceration of the extreme vessels of the ciliary glands, in the attempt to re-establish the arterial circulating equilibrium. The blood would then be propelled into new vicarious vessels, and occasion some malconformation in all their extreme vessels,

so as to break or lacerate their extremities. Hence arises the continual drain and ulceration which are kept up, by a diseased absorption, produced by the wounded extremities of the absorbents themselves, which have been separated in the branches of their continuity of absorption, and which produce on the surface of the sore, and on the external surface of the ciliary glands, *an increased effusion from their open orifices.* This fluid uniting with air &c. is again taken up by the neighbouring wounded absorbents, and by its thus acquired acrimony, is soon arrested from going further, by many minute glands, which first contract and then swell themselves, to resist the absorption of this noxious fluid, which must therefore regurgitate. This would be sufficient to produce psorophthalmy, independent of the increased effusion or action of the injured exhalent vessels through the secreting organs of the ciliary glands, &c. That this mode of accounting for the proximate causes of psorophthalmy, either as assuming the character of an acute and chronic affection, will certainly be supported by

the means of cure in either stage of the disease. For if we make an artificial and permanent vicarious discharge, near the part affected, and with the local application daily or more often, to the edges of the eye-lids, on the ciliary glands themselves, by means of a hair pencil, of some tonic and escharotic lotions, to be gradually increased in strength; we shall soon see, that the thick glutinous discharge is become thinner and less tenaceous; the edges of the eye-lids and ciliary glands less turgid, and the blood vessels less enlarged. And if the tonic and escharotic applications be gradually increased in strength, and applied as before, so as now to produce at each application, a temporary redness or inflammation, on the organs the most affected, to continue not less than five and not more than fifteen or twenty minutes; this temporary inflammation will principally furnish the diseased surface of the absorbents, and the diseased secreting vessels of the ciliary glands, with a new series of enlarged and elongated arteries, as well as other vessels. These will appear red, turgid

and painful for the time ; at which period such applications are to be discontinued or much reduced in their strength, till this inflammation has been so modified and increased repeatedly, till by perseverence the open orifices of the absorbents and diseased secreting vessels of the ciliary glands shall have become completely closed up and swelled : and this artificial inflammation must be continued so long, till new vicarious vessels of the absorbent kind, and of the secreting ciliary vessels, &c. may have been formed ; which shall have definitively become permanent within. Then the above treatment ought to be abated gradually, by reducing the strength of the local applications, and diminishing the vicarious discharge, which had been produced near the part affected. In this manner a permanent cure may and will certainly take place, if the constitution be otherwise completely sound.

§ 39. *Epiphora* is a defluxion of tears upon the eye, arising from a preternatural secretion of them ; or from a contraction or obstruction of the *puncta lachrymalia*.

This complaint is very troublesome to the patient, from the continual discharge of tears, which fall upon the cheek, instead of being carried into their usual channel by means of the puncta lachrymalia, in order to pass through the lachrymal duct. This complaint may bring on a morbid secretion, irritation and swelling to a degree, which may produce a symptomatic inflammation near the part affected.

The proximate and accessary causes are supposed to be an increased secretion of tears from all those vessels which can secret them; or from obstruction of the puncta lachrymalia sometimes extending beyond the lachrymal duct &c. or from the conjoint actions of these morbid affections; which certainly take place, when the complaint has arrived at a great height; for it has been known to bring on the eversion of the eye-lashes, which has been before mentioned under trichiasis; also their inversion, under ectropium; concretion of the eye-lids under psorophthalmy, and many other affections of the eye.

The mode of cure, is first to check the increased secretion, if it exist, by means of astringent and tonic lotions. Secondly, should the puncta lachrymalia be in any manner obstructed, the inferior punctum should be forcibly injected, and repeatedly so, with simple distilled water, made luke-warm; so that by perseverance, the water will make its way through the punctum into the nasal duct and then through the nose; by which means the tears will follow their natural channel.

As the difficulty of curing epiphora is chiefly owing to our want of success in forcing our injections through the inferior punctum; the first thing to be done, is to make an artificial enlargement of the aperture of the punctum, by means of a piece of highly dried whalebone, very pointed, polished, and curved at its cuniform extremity. The other end should be very thin and broad, and its body long enough, the whole conveniently constructed to be fastened upon the cheek, by a piece of sticking plaster, for twenty-four hours or more. The conical point must be gently introduced into

the punctum, and secured as above directed, which may be sufficient for the full enlargement of the punctum. The next object will be to produce a discharge * from that side of the nose, which will diminish the turgescence of the vessels, pro tempore, and allow the lachrymal sac more freedom in its functions. Then the repeated injections may have a fair trial; but should there remain any impediment in the lachrymal sac, to prevent the water from making its way into the nose, a *proper* dry cupping glass syringe should be applied over the lachrymal sac only, and when it is sufficiently swelled, at that moment it should be syringed, which may fill the inside of the lachrymal sac, and then with a little attention in pressing upwards and downwards with a finger, the fluid may be made to pass into the nose, after a few trials.

The syringe should be peculiarly adapted to the operation, by having its extremity which is to enter into the punctum, curved; the point

* By errhina.

very small and conical. The depth of its entering into the punctum should be limited, by a rim or edge; which will serve the double purpose of preventing the return of the water injected; and by which also a proper degree of compression may be made upon the external edge of the punctum, without endangering an increase of the disease, by injuring the internal surface of the duct.

§ 40. *Fistula lachrymalis*, is an obstruction of tears which accumulate in the lachrymal sac, instead of passing through the nasal duct into the nose; this accumulation forms a small tumour in the cavity of the lachrymal sac, which in time breaks; forming a fistula, discharging tears mixed with matter, which continually fall down the cheek. The proximate cause of the disease is an obstruction in the nasal duct. Those causes which may give rise to this complaint, are various diseases of the constitution; such as scrophula; the venereal disease; frequent colds; and blows are known to have produced this complaint in innumerable instances.

This complaint is very troublesome to the patient, from the continual irritation occasioned by the constant discharge down the cheek; which is of an excoriating nature, creating an erysipelatous kind of affection on the part; and thus proving very disfiguring.

This complaint should be treated if possible before the fistula lachrymalis is completely formed. Many cures have been performed by removing in time the obstruction of the nasal duct; by the use of medicated injections, according to the causes of the disease.

When the fistula is already formed, the mode of cure indicated, is by enlarging the wound through the whole length of the sac; and then by trying to find the opening of the nasal duct, which lies in a groove in the *os unguis*, by means of a piece of cat-gut, bougie, or a piece of flexible metal of a proper diameter and length. If we succeed in introducing either of these, it must be left in the nasal duct, for a few weeks, in general. We must also inject frequently with a syringe into the nasal duct, and without removing the bougie inserted, till every obstruc-

tion may be fairly supposed to be removed. The foreign body may then be removed, and the edges of the wound brought to unite by producing a small degree of adhesive inflammation.

Sometimes, however, the complaint is not so readily cured; from the impossibility of finding the nasal duct; which is particularly the case when the affection has been of long standing: or if a malconformation has taken place, by the exfoliation or caries of bones. On such occasions, the cure is performed by an operation perforating the os unguis, by means of a small trocar; which must be pushed in towards the nose in an oblique direction downwards, from the inferior part of the lachrymal sac. Afterwards the treatment is to be the same, as when the passage through the nasal duct was found, by means of the bougie, &c.

The effects of the bougie remaining in the nasal duct, to produce a perfect cure, I conceive will be as follow.

The nature of the disease in the nasal duct is defined to be a disorganization in the ossifica-

cation and vessels of the os unguis, rendering the passage of the nasal duct completely impervious to the tears. The perforation through the os unguis in the direction of the nasal duct, with a trocar, is to restore the above channel. Now in this operation, several vessels are separated; which separation must necessarily alter the arterial circulating equilibrium. Hence an inflammation must succeed, from the above intercepted circulation in the injured part, and an attempt to produce an increased circulation in the neighbouring vessels, which increased circulation, is become vicarious, pro tempore.

The bougie is now introduced into this artificial nasal duct, to remain till the cure is perfected. Suppuration and granulations must take place on the external surface of this new nasal duct, for the purpose of restoring the parts to their natural circulation, and also of reducing the vicarious vessels to their former healthy dimensions. The bougie remaining permanently in the said nasal duct, will prevent the above granulations from taking place; and the suppuration, by its continual discharge,

will produce a further loss of substance from those surfaces where the bougie is in immediate contact, which is assisted by frequent injections. In consequence of a free granulation being thus prevented from taking place, by the bougie remaining in the nasal duct; so likewise the vicarious vessels near the part affected are prevented from returning to their former natural and healthy dimensions.

These vicarious vessels by remaining a long time thus morbidly distended, will become much larger and much more extended beyond the part affected, and thereby produce new vessels in their extremities, which are the same as granulations; being exactly equal in quantity to that which is intercepted by the bougie; by which means, *permanent vicarious channels* to the fluids will be produced which used to flow in the diseased parts previous to the disease and the operation. And after suppuration shall have long ceased, a membrane may have been formed on the internal surface of the nasal duct, chiefly from the *pressure* of the bougie causing the granulations, as far as they had taken place, to be com-

pressed down into the form of a membrane. After the completion of the above actions the bougie may be removed altogether, and a cure of the external wound brought on, as before mentioned, by adhesive inflammation.

From the above considerations, we shall be able to judge of the probable success of an operation for the fistula lachrymalis; which operation will be successful if the patient is young, and no very great malconformation has taken place in the nasal bones beyond the nasal duct. The state of the parts in elderly persons, as well as from malconformation from injury, would absolutely prevent the cure, or the full play of the actions, above explained.

The tonic and escharotic lotions and powders are composed of the well known metallic salts contained in the materia medica; but which for the treatment of the diseases of the eye ought always, if possible, to be composed from their radicals, and in large quantities, so as to leave no doubt respecting their degrees of strength, which may often be required to be varied during the progress of the same cure.

It has been my object in this treatise, to discourage every thing that borders on quackery, I have therefore avoided giving formulæ for eye waters, lotions, powders, drops, tinctures, &c. For I wish this work to attract the notice of the Faculty, and particularly that of the Oculist, who I am well assured will not want more minute detail than is herein contained. But if it should appear to be the general opinion, that a more particular account of the remedies would be acceptable to practitioners, it shall be given in an appendix, or in the next edition.

FINIS.

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