

frequent resort in our practice to the "cucurbitulæ cruentæ" than now obtains, would be good, and that in this matter to go "backward" would be to go "forward." In modern days the physician has difficulty in finding one who can cup, and greater difficulty in finding one who can do so rapidly and adroitly, "cito, tute, ac jucunde." As respects the fact of the student of the period not being, as a rule, able to bleed with the lancet, I am bound to say that I know of a house surgeon who a few years ago managed to break his instrument in opening a vein at the arm. So apposite was the remark of Watson, when comparing the relative merits and advantages of cupping and of leeches, he artfully remarks: "But, on the other hand, the leeches seldom bungle in the operation; while the surgeon often does."

Cavendish-square, W.

REPORT OF 104 CASES OF ENTIRE EXCISION OF THE TONGUE FOR CANCER.¹

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DURING the last twenty years my operations upon the tongue for cancer amount to 139 cases. I find that out of these 139 cases of which I have a record there have been 119 recoveries and 20 deaths, which gives a mortality of 14·3 per cent. As the main object of my communication, however, is to place before the profession an accurate and reliable record of my personal experience in excision of the entire tongue with scissors, I shall discard, in the first place, ten of the successful cases, as they were operated upon with the galvanic éraseur. I shall also exclude twenty-five successful partial excisions, for although the excisions were performed with scissors, I am anxious to adopt a definite standard by which the merits of the operation may be duly estimated, and more easily contrasted with the results of other methods of operating for the same object. Hitherto it has been the custom to place the results of total and partial excision in parallel columns, ignoring the palpable fact that the risks and difficulties in the two instances are certainly not identical. Where the disease has advanced beyond the tissues of the tongue the operation is also much more severe, and attended with much greater danger. By this arrangement I reduce the number of my total excisions to 104, with a mortality of twenty, or a percentage of 19·21, against 14·3 in the gross number of my cases. In estimating these results it has been thought desirable to draw a clear distinction between cases in which the tongue alone was excised, those in which the tongue was removed together with the glands, and those in which division or removal of portions of the jaw was an additional part of the operation. Unquestionably the risks and dangers of these different operations are not the same, and it is misleading and unjust to classify them together. Taking my own cases as an example, in excision of the tongue alone the death-rate is only 4·5 per cent., compared with 77 and 57 per cent. respectively when glands and jaw have been involved.

I cannot better illustrate the misleading influence of grouping together all these different and distinct operations than by referring to the statistics published by Mr. Butlin in his work on Diseases of the Tongue. Mr. Butlin stated, which is perfectly true, that I supplied him with my statistics of tongue excisions in 1884, and they represent forty-eight cases with nine deaths, but although the entire tongue was excised in every case, there was nothing to show or explain how much more than the tongue was removed. On referring to these cases, I find that in only two was the operation confined to excision of the tongue alone; in every other case it was complicated with either the removal of glands, portions of the jaw, or some other addition to simple excision. To show more clearly how valueless statistics compiled on this basis must be, Mr. Butlin contrasted the results of my excisions with those of Mr. Baker, who classifies amongst his returns cases in which a portion only of the tongue had been removed. If we may be guided by the tables I produce, it may be roughly estimated that the mortality from simple excision of the tongue amounts to only a point over 4 per cent.; for

they clearly show that sixty-six patients may lose their tongues with a possible loss of three. Now I consider that I am entitled to draw marked attention to the particulars of these three patients who died. In the first place, the youngest was fifty-six and the oldest seventy, and the average age of the three sixty-four. One was a man with advanced phthisis, who died on the second day from the rupture of a pulmonary abscess; another died on the twelfth day from syncope, after the floor of the mouth had completely healed; and the third was a woman seventy years of age, who died on the fourteenth day from inanition. When we take into consideration the ages and causes of death in these cases, I think that these tables very effectually show what a slight risk there is in excising the tongue when the operation is not complicated by the removal of contiguous structures.

Before I proceed further I wish to acknowledge the debt of gratitude I owe to my colleague, Mr. Alexander Wilson, for collecting and arranging my statistics. In order to present my cases in as accurate and trustworthy a form as possible I handed to Mr. Wilson all my notes and memoranda. He communicated with every patient whose address could be traced, and with the representatives, when it was possible to find them, of those patients who had not survived. I am also indebted to Mr. Wilson for the several tables which he has compiled with infinite patience and industry. I think I ought to state, in justice to myself, that throughout my practice I have operated upon cases indiscriminately, and that I have never allowed the extent of the disease or the emaciated condition of the patient to deter me from operating when I have seen any reasonable prospect of prolonging life or giving even the slightest prospect of temporary relief to suffering. Had I selected my cases, and operated only in the more simple and hopeful, to the exclusion of others, I venture to believe that the mortality might have easily been reduced to a very much smaller percentage. I do not know that I have much to amend in the description I gave in 1881 of the operation for excising the tongue with scissors; but I will first of all briefly recapitulate the essential features of the operation, and later I will enter a little more fully into some of the important details.

1. The patient should be completely under the influence of the anæsthetic during the first stage of the operation, but afterwards only partial insensibility should be maintained.
2. The mouth should be securely gagged, and kept fully open throughout the operation.
3. The head should be supported in such a position that, whilst the best light is secured, the blood tends to gravitate out of the mouth rather than backwards into the pharynx.
4. A firm ligature should be passed through the tip of the tongue for the purpose of traction.
5. The first step in the operation consists in dividing the reflection of mucous membrane between the tongue and the jaw and the anterior pillars of the fauces.
6. Rapid separation of the anterior portion of the tongue from the floor of the mouth.
7. Securing, if possible, the lingual arteries with Spencer Wells' forceps prior to division.
8. Passing a ligature through the glosso-epiglottidean fold before finally separating the tongue.
9. The application of a mercurial solution to the floor of the mouth, followed by painting the surface with an iodoform styptic varnish.

When once it has been decided to remove a patient's tongue, the sooner it can be done the better; at the same time it may be occasionally judicious, especially with those who are in a state of feeble health, to sacrifice a few days for the purpose of generous feeding, and more especially to obtain a cleanly condition of the mouth. With such patients digestion is often deranged, the bowels loaded, the skin inactive, the teeth foul and coated, all influences which have a tendency to lessen the chances of recovery. For an anæsthetic I recommend the use of chloroform, although I know of no objection to ether, which I think has an advantage in feeble subjects. The important point is to obtain deep anæsthesia before commencing the operation. The effectual gagging of the mouth is a point of great importance, for on the one hand it is necessary to keep the mouth wide open, whereas on the other we must avoid so pressing back the jaw as to embarrass the respiration. In fact the aim in gagging the mouth should be to place the jaw, as it were, in the position it occupies in semi-luxation forwards. As much depends upon the position of the patient during the operation, I hope I may be excused if I dwell rather fully upon a detail which I have found by

¹ A paper read at the Medical Society of London, April 2nd.

experience to afford the greatest convenience to the operator. In the first place, the patient's head must be neither too high nor too low; the mouth ought to be, roughly speaking, on a level with the surgeon's axilla. The head should be firmly held erect with a slight inclination forwards, in such a position that the light will fall well into the mouth. It is, of course, always desirable to take advantage of the best obtainable light. Great inconvenience is generally caused by the persistent tendency of the patient to slip down on the operating table, and the best means to prevent this is for the patient to recline on an almost perpendicular back-rest, with the thighs bent at a right angle over the elevated central portion of an ordinary operating table. In private practice any joiner will readily improvise a substitute for this arrangement. A sand-bag makes a very convenient support for the head. The ligature passed through the anterior portion of the tongue is a great aid throughout the operation, and much depends upon the dexterity of the assistant in anticipating the intentions of the operator, and in always making traction in exactly the right direction, his aim being to make tense those tissues which are immediately to be divided.

The first step in the actual operation consists in the separation of the tongue from its attachment to the floor of the mouth and the anterior pillars of the fauces, and I would lay stress upon the way in which this is done, because the ease with which the operation is continued depends largely upon the freedom with which this separation is carried out. The two structures principally responsible for the retention of the tongue within the mouth are the frænum and the anterior pillars of the fauces, and if these are completely divided in the first instance, the tongue may be so freely drawn from the mouth that the operation is practically converted into an extra-oral excision. Extended practice has made me conduct this part of the operation with less deliberation and more rapidity than was my habit in my earlier cases. Instead of the cautious snipping I originally advocated, I now boldly cut until I get close to the vicinity of the main arteries, disregarding all bleeding, unless an artery distinctly spurts, when I twist it and proceed. The more profuse the general oozing the more rapidly I proceed, my object being to get as quickly as possible to the main arteries, as I have confidence that all subsidiary bleeding will cease immediately after their division. There is, in reality, no difficulty in determining the actual position of the lingual arteries, as they are practically invariably found in the same situation, and it requires very little experience to seize them with a pair of forceps before dividing them. If this be done, there need not be the slightest hæmorrhage from this source. When once the vessels are effectually twisted, the rest of the tongue may be removed without any further anxiety about hæmorrhage; but it is desirable, before finally severing the last attachments, to pass a loop of silk through the glosso-epiglottidean fold, as a provisional measure of security, in case it may become necessary to make traction on the posterior floor of the mouth either to assist respiration or to arrest any possible consecutive hæmorrhage. Traction on this ligature of itself arrests hæmorrhage, and makes it an easy matter to secure any bleeding vessel. As the retention of this ligature is a source of some annoyance to the patient, I always remove it at the end of twenty-four hours. As a matter of fact, I cannot recollect its having been required in more than two cases, and but for the certain sense of confidence it gives to those who are left in charge of the patient I should dispense with the precaution altogether, were I influenced solely by the amount of benefit I have derived from its use.

The treatment of the floor of the mouth after the tongue has been removed is a matter of considerable moment. The first object is to make the cut tissues as far as possible aseptic, and for this purpose I am still in the habit of swabbing the parts with a mercurial solution, and, after drying, finally painting the surface with the iodoform styptic varnish which I introduced in 1881. This preparation, in addition to its antiseptic properties, has the advantage of lessening the discomfort which follows when the surface is left unprotected, and it also enables the patient to take food in the ordinary manner almost immediately after the operation. The mercurial solution I prefer is that of the biniodide, and the strength I am in the habit of using is 1 in 1000. I have recently made, and I think with advantage, a slight addition to the iodoform varnish. My original custom was simply to substitute for the spirit ordinarily

used in the preparation of Friar's balsam a saturated ethereal solution of iodoform, but now I prefer to mix with the ether one volume in ten of turpentine. This addition has a very marked influence in promptly checking the capillary oozing, which occasionally prevents a dry surface being quickly secured.

I was at one time in favour of suspending all alimentation by the mouth for the first four days, and feeding the patient entirely by nutritive enemata; but for some years I have entirely abandoned this practice, and I now feed the patient with liquids by the mouth as freely and as early as possible, only using enemata when it is necessary to supplement the amount of food the patient is otherwise able to take; and I find that if a coat of the varnish is applied daily, patients rarely have any difficulty in taking an adequate amount of sustenance. It fortunately happens that the patients appreciate rather than object to the application of the varnish, and they will often ask for its use more frequently than once a day. Instead of keeping the patients in bed and recumbent, my aim is to make them sit up from the first, and in fine weather I encourage them to walk out, if there be sunshine, the day after the operation, and I have never seen any ill consequences, but great advantage follows the adoption of this plan. There is certainly no worse practice than keeping the patients lying on their backs in bed, and I am sure that I have seen the evil consequences of doing so in several of my earlier cases. Under the above treatment the average time of convalescence is about seven days, and in uncomplicated cases no patient need be detained in hospital after this time.

It is only reasonable that I should state the grounds upon which I prefer excision of the tongue with scissors to its removal by the galvanic or any other form of *écraseur*. In the first place, I consider that it is more in conformity with the elementary principles of surgery to make use of a sharp-cutting instrument, it being desirable to leave a clean surface—a surface which, it must be acknowledged, is in the best condition for healing. To employ an instrument whose purpose is effected by bruising leaves a surface in the very condition we are most anxious to avoid in the ordinary practice of aseptic surgery. The wound, in fact, left after the use of the *écraseur* embodies every condition calculated to engender those putrefactive changes which it should be our primary aim to avoid. I fail to see any special danger in the operation of excising the tongue which can justify such a departure from surgical practice, and I cannot recognise any good reason why we should employ an instrument for excising the tongue which no surgeon would at the present day ever think of making use of in any other region of the body—an instrument which almost every surgeon of eminence in the past has made a point of condemning. With scissors absolute precision can be obtained, whereas the erratic course of the *écraseur* wire is absolutely beyond the control of the operator. I am fully alive to the dangers which may result from blood gaining access to the lungs, even in small quantities, in patients with bankrupt constitutions; and although I am aware that some surgeons advocate a preliminary laryngotomy or tracheotomy, I believe that it is possible to guard against this danger by measures attended with much less risk than those incidental to either laryngotomy or tracheotomy. At any rate, my own cases conclusively show that better results can be obtained without than with these preliminary measures. It unfortunately happens that it is precisely in those cases in which the danger from blood getting into the air passages is the greatest, the risks incurred in opening the trachea are also at a maximum. In one of my own cases, in which I performed laryngotomy on the day previously to that fixed for excision of the tongue, the patient died during the night in consequence of the first operation. If the head of the patient is properly arranged during the operation, and if the tongue has been thoroughly detached as recommended, when the arteries are divided, the blood, unless the precaution has been taken to secure the vessels beforehand, will spurt directly out of the mouth, without any disposition to flow backwards. We must also bear in mind that the entrance of blood into the air passages is only one, and not the most important, determining factor in the causation of septic lung mischief. Patients suffering from cancer of the tongue with putrid discharges not unfrequently die from septic pneumonia apart from any operation or the entrance of any blood into the air cells, and, further, under an anæsthetic, large quantities of blood frequently finds its way into the trachea during the extrac-

tion of teeth; but how rarely do we meet with instances of septic pneumonia from such a cause. The skill with which the administration of the anæsthetic is conducted is also largely responsible for the amount of blood which may enter the trachea. For instance, as I have just stated, whilst it is desirable to have the patient thoroughly under the anæsthetic at the commencement of the operation, it is a mistake to give more than will just suffice to restrain his movements during the later stage. If this practice is adhered to, the patient's reflex power of guarding his own air passages is never altogether in abeyance, and no dangerous amount of blood will remain in the lungs at the termination of the operation, as it is practically completely expelled by the act of coughing. Take my sixty-six cases of simple excision of the tongue. In not a single instance were ill effects observed which could be attributed to the entrance of blood into the lungs—a record which tends conclusively to show that the tongue can be safely excised without a preliminary laryngotomy.

When we come to consider what we can fairly and reasonably claim to be gained by excising the tongue, we have two questions to answer, Does excision prolong life? Or, failing this, does it render the remainder of his life more endurable to the patient? From my own experience, I can bear the strongest and most emphatic testimony that in the majority of cases excision gives very great relief; and in support of this I could produce numerous letters I have received from patients and preserved for the purpose of answering this question. As to the prolongation of life, it is only necessary to turn to the statistics I produce, when it will be clearly seen what proportion of patients lived beyond the ordinary tenure of life after the advent of malignant disease of the tongue. It has been shown that twenty-six patients out of the eighty-four successful cases were traced, and found to have lived a year and upwards after excision; and I think that we are reasonably entitled to add to this number a certain percentage of the forty-one of whose fate nothing could be ascertained, and not to take it for granted that in every instance the patients had succumbed. Although cases unsuited for operation, and those where the disease has recurred after removal are not exactly within the scope of my communication, I cannot avoid taking advantage of this opportunity to make a few remarks upon this much-neglected subject. We have it on good authority that in cancer of the tongue death generally takes place before dissemination has extended beyond the limits of the cervical glands—that, in fact, up to the very end the extent of the disease is within the range of eradication. Surgeons not unreasonably feel deterred from operating by the contemplation of the important vessels and nerves occupying the region traversed by the lymphatics, and it is no matter of surprise that so few efforts are ever made when the glands in the neck are invaded. In addition to this, patients have usually been reduced to such a degree of emaciation that by the time the glands are affected the prospects of recovery are very discouraging. If attempts are never made to follow the disease to its utmost limits, the possibilities of surgery can never be ascertained. I have on several occasions in desperate cases, and in response to the wishes of patients, cleared out the anterior triangle of the neck, and in two instances excised a portion of the common carotid artery, with, however, fatal results in both cases. This experience is naturally disappointing; nevertheless I have not altogether abandoned the idea that I may yet meet with more common results. In fact, I have recently operated upon a gentleman brought to me by Dr. Vaudrey of Derby, which has stimulated my hopes. The patient had his tongue excised in May last under most unfavourable circumstances, there being at the time extensive gland infiltration. The operation temporarily fulfilled the purpose for which it was performed, and relieved him from a foul mass of sloughing tissue within the mouth. He received so much benefit that he afterwards consented to have the glands removed, and this was partially carried out by another surgeon. The wound rapidly healed, but his sufferings were not entirely relieved by what had been done. At the request of Dr. Vaudrey I again saw the patient, and proposed as a means of relief that I should attempt to remove the tension which was apparently the origin of the pain. With this object I removed the sterno-mastoid muscle from its origin to its insertion, and cleared out large quantities of diseased glands, and it appeared possible to have removed every visible particle had it not been found

that the œsophagus was too extensively implicated to justify any further proceedings. During the course of the operation the external and internal jugular veins had to be sacrificed, and the full extent of the carotid sheath exposed. The patient recovered from the operation, and lived absolutely free from pain for several months. It is an interesting fact, and worth mentioning, that the loss of his sterno-mastoid did not appear to occasion him the slightest inconvenience or in any degree interfere with the movements of his neck.

There is another subject in connexion with cancer of the tongue which is constantly and painfully being brought under our notice, and that is, the singular view held by a large section of the profession, that in cases of cancer the means of relieving pain are limited by the maximum dose of any sedative authorised by the British Pharmacopœia. It is a constant experience to find that a patient suffering incessant and intolerable agony is ordered the paltry dose of a grain of opium at bedtime, and it is the rare exception to find sedatives administered on lines proportionate to the amount of suffering. In contrast to this I may mention one of my own cases. A gentleman suffering from cancer arrived at the stage when he began to suffer pain, and he commenced with a quarter of a grain of morphia, which at first gave relief; by degrees this dose had to be gradually increased until he eventually took as much as *thirty* grains three times daily. This kept him entirely free from pain, without at any time interfering with his intellectual interest in his daily surroundings. The total amount of morphia this patient consumed during the twelve months preceding his death amounted to 3512 grains. He also inhaled during the last four days of his life five pounds weight of chloroform, and my firm belief is that this patient would have died much sooner had not this sedative treatment been adopted from the first.

Tables which I have prepared show that out of 104 cases a history of cancer in the family was only obtained in six cases. A definite history of syphilis was obtained in seven, and a doubtful account in another seven cases. In sixteen patients the origin of the cancer was attributed to an injury. Sixty-one out of the 104 were ascertained to be smokers, and in the majority of these the cancer commenced on that side of the tongue on which the pipe was usually smoked. In thirty-three cases the irritation of teeth is recorded as being the exciting cause of the disease. In marked contrast to these cases one man had never smoked in his life and had not possessed a tooth for twenty years. The difficulties of ascertaining the duration of life after operation are very great. Patients, especially hospital cases, rarely remain for any length of time in the same house or even in the same locality. Mr. Wilson has succeeded in obtaining positive evidence in sixty-one cases; fifteen patients survived the operation one year; four, two years; two, three years; four, five years; and one, six years; and I may incidentally mention that the patient whose case I published in 1880 lived fourteen years, notwithstanding the fact that she was sixty-two years of age at the time of operation. If we believe that cancer of the tongue can be permanently cured by early excision, and that there are no other effectual means of eradicating the disease, we cannot too persistently urge these convictions upon those who have the earliest opportunity of detecting it, with the object of inducing them to adopt prompt measures and give the patients the only possible opportunity of having their lives saved. It cannot be too frequently reiterated that the loss of time in the interval between the discovery of the disease and its removal by operation bears a direct ratio to the death-rate, and, conversely, that the earliest excisions give the most favourable results. The sooner patients can be made to realise how insignificant is the loss of their tongue compared with the loss of life, and that they have to weigh the two in the same balance, the quicker they will be to decide in favour of operation. This resolution will be taken with less reluctance when they are assured that the risks from excision are comparatively slight, and also that the inconveniences of being without a tongue are of small moment, as this organ is neither essential to speech nor to the sense of taste.

Probable predisposing and exciting causes.—A probable family history of cancer was obtained in six cases out of the 104:—1. The patient's brother died from cancer of the tongue. The patient himself smoked cigars to excess, and there were indications of the tongue having been irritated by a tooth. 2. Patient's father died from cancer of the

oesophagus. The patient himself was a smoker, and had carious teeth. 3. Patient's mother died from cancer. Patient was a moderate smoker. 4. Patient's uncle died from cancer of the lip. In this case there was no apparent exciting irritation—the patient did not smoke—the teeth had disappeared long before the onset of the disease. 5. Patient's mother's uncle had cancer of the lip. Patient smoked a clay pipe. 6. A cousin of patient's mother died from cancer. Patient had irritating teeth.

Syphilis.—Out of the 104 cases of cancer a definite history of syphilis was obtained in seven cases, and a doubtful history in seven. In five cases actual syphilitic disease preceded the epithelioma. In one of these cases the ulcer was first brought on by irritation of decayed teeth, and subsided under treatment with iodide of potassium; three years later an epithelioma developed in the scar.

Exciting causes.—Out of the 104 cases, in sixteen instances the patients distinctly traced the origin of the disease to some injury. 1. In five cases the tongue had been bitten. 2. In three instances the disease originated in dyspeptic ulcers. One of these patients was a glass-blower. 3. The repeated irritation of a simple ulcer with caustic gave rise to the disease in one case, and in another the scar left after the application of creasote was the site of the growth. 4. In five cases a definite history of repeated laceration of the tongue by carious teeth was obtained. This was well marked in the case of the youngest patient, a woman aged twenty-five years. 5. In one case the irritation of a plate of false teeth was the assigned cause.

Smoking.—In the 104 cases a note as to smoking or non-smoking is made in seventy-nine. Of these, sixty-two were smokers, of whom forty-one habitually smoked clay pipes, and thirteen are described as "very heavy smokers." In some cases it was reported that the disease began on that side on which the pipe was usually held. In thirty-three cases the existence of carious teeth is mentioned as well as the habit of smoking, and in the fifteen cases in women two occurred in smokers.

SOME POINTS ON THE RELATIONSHIP OF THE EYE TO THE CARDIO-VASCULAR SYSTEM.

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(Concluded from page 981.)

II. With regard to myopia, I find that it is usually associated with some form of cardiac and vascular change.

(a) The pulse is a comparatively slow one, and is not readily accelerated by conditions that would naturally quicken it. The artery is large and full, the pulse tension is often raised, and I have frequently noticed a recurrent pulse. (b) The heart's second sound is accentuated, and some form of cardiac murmur is not unfrequently found. (c) The heart measurements show a slight increase in size, the apex beat being in or outside the nipple line. (d) In high and progressive myopia, with an unhealthy fundus, and with vision not greatly improved by glasses, the pulse is sometimes very rapid, and palpitations frequent.

Of elderly myopes, my experience is too limited to warrant my drawing any definite conclusions, but vascular changes are generally found. The action of atropine, locally applied, I at first thought would have been of much help to me, but I have found it most difficult to know which symptoms to attribute to its local and which to its constitutional effect. The rapid hypermetropic pulse atropine generally slows, and sometimes in a very marked degree, a pulse of 120 dropping to 88 under its action. A slow pulse, on the other hand, is sometimes quickened or generally left much as it was. In myopia the slow pulse is but little altered by atropine, and I have not seen the slowing of the rapid myopic pulse under its action.

As regards the treatment of the two conditions by glasses and its after-effects, I regret that I am unable to give you any full information, for the hospital out-patient, having obtained his glasses, generally disappears. I have, however, seen the pulse fall and cardiac irregularity disappear in hypermetropia with their use. But in the reverse cases, by which I mean those in which patients have come under

treatment for cardiac symptoms and in which I have found well-marked hypermetropia, which I assigned as the cause of the cardiac symptoms, I was disappointed to find that the correction of the hypermetropia by glasses or the paralyzing of the accommodation with atropine did not markedly slow the pulse. This at first appeared to me to be fatal to the theory that hypermetropia was the cause of the heart hurry. But with the view that the cardio-vascular system itself is hypermetropic, it seems reasonable that, although the use of atropine and glasses might remove the source of irritation, it could not alter the structure of the cardio-vascular system.

Mr. Mills, chloroformist at St. Bartholomew's Hospital, kindly answering my letter, writes as follows: "During the operation for the division of the internal rectus in squint cases, I have very often noticed an alteration in the pulse. In some cases one beat was omitted, in others two or more. In some cases the beats became very feeble, and remained so for some seconds; in many cases there was very severe syncope, lasting some minutes. This always came on suddenly; in most cases at the moment of division of the internal rectus; in a few it occurred when the tendon was put on the stretch before division. There have been many deaths under chloroform during operations for strabismus." These cardiac intermissions, then, appear to occur only on division of the internal rectus, and only in internal strabismus cases—i.e., only in cases of hypermetropia, or at all events mainly so. Hence there would appear to be some condition of heart, or nerve connexion with the heart, special to hypermetropes, rendering them liable to this form of cardiac irritation.

Mr. Priestley Smith,¹ speaking on the causes of myopia, compared it to a kind of rickets, but apparently considered it as a local rickets, dependent on local causes. I would also consider myopia a kind of rickets, but, like rickets, having a constitutional cause, and producing its effects on other structures besides the eye; and that the treatment of myopia by glasses alone is much on a par with treating rickets with irons and splints alone. Of course, hygienic defects are often referred to as the cause of myopia; but, as far as I know, no attempt has been made to classify or state what the effects of this faulty hygiene are, what class of concomitant symptoms we are to expect. In fact, the eye, as the main symptom, has completely overshadowed all others, and until we have a more thorough knowledge of the causes and symptoms, other than the eye, of this disease, I do not think much progress can be made towards its treatment or its prevention. Myopia, with its local and general changes, has, like the rickets of bone, its period of activity, runs its course, and produces effects more or less severe, and as the period of its active progression comes to an end, the tissues, more or less damaged and altered in shape, recover their condition, and are more or less capable of carrying on their functions. But, again, in later life, in a few myopes, I have known cardiac and vascular changes to assert themselves, and in one case to progress to a fatal termination, along with increase of the myopia. Of course I do not mean to hold that a general constitutional cause of myopia can be found in all cases, as it is obvious that many must be due to some local cause—e.g., those in which one eye is myopic, whilst the other is emmetropic or hypermetropic. Also the causes which lead to astigmatism would seem of necessity to be local.

I have already expressed my opinion that the hypermetrope reaches his full development later than the myope, and he appears to carry some of his youthful characteristics far into adult life, and as far as my experience goes I should say attains a greater age. All young children are said to be hypermetropic, and I think it is reasonable to consider that when the condition persists into adult life the eyes may be said to retain their youthful characteristics. And if it can be proved that the cardio-vascular system is associated in any way with the eye in its development, it does not seem unreasonable to me that the hypermetropes should be liable to take their illnesses with youthful characteristics, or, at all events, with differences from those in whom the cardio-vascular system is fully developed or over-developed, as in myopes.

And here I would like to ask whether the usually received theory as to the sedentary habits of the myope is wholly correct. The reason commonly given is that he sits still

¹ Cause and Treatment of Myopia: Brit. Med. Jour., Sept. 27th, 1890.