

fleshy, firm, sensitive, and warm; he can breathe, blow, and sneeze with it; and the best proof in its favour is, that it pleases those who ought to be the best judges of what a manly nose should be, for since he left the hospital he has got a wife by it.

ART. VII. — *Observations on the Practice of "Écrasement Linéaire" in the Parisian Hospitals by M. Chassaignac; and an Incidental Notice of the Views of that Surgeon on the Employment of Chloroform.* By K. I. O'DOHERTY, F.R.C.S.I.

THE student of surgery will find an attendance at the clinique of M. Chassaignac more attractive than at that of perhaps any other surgeon in Paris. Apart from the varied range of disease he will find there at all times open to his investigation, he will be gratified to meet in M. Chassaignac himself a combination of the highest professional attainments, with a demeanour towards foreigners, especially British or Irish, characterized by the utmost friendliness and attention; and, moreover, a familiarity, the most intimate with the details of British surgery<sup>a</sup>.

He may fairly be ranked at the head of the "experimental," or perhaps, to speak more correctly, the "innovating" school of operative surgeons of that city.

A profound anatomist and skilful surgeon, he would seem to have availed himself of the discovery of chloroform to give full bent to his inventive genius, in devising novel improvements in the surgical treatment of disease. This zeal for improvement, for which his magnificent wards in the "Hôpital Lariboisière" afford him an unlimited field, is indulged in with an amount of daring, of *sang-froid*, well calculated to interest, if not amaze, those accustomed to the praiseworthy caution with which Irish hospital surgeons undertake surgical operations.

Prior to directing attention to the most important of his novelties—his method of operation by "*Linéaire Écrasement*"—I am induced to offer some observations on the results of his investigations into the action of chloroform, and on the principles he lays down for its administration. I do so chiefly because he tells us that the employment of his *écraseur* must be at all times subservient to the use of this agent; and likewise because of the very great importance of the principles he attempts to establish, which, if true, would enable the surgeon to avail himself of this agent without risk to his patient's life

<sup>a</sup> He has published a French translation of Sir Astley Cooper's works.

or his own reputation. Practitioners who use chloroform he distinguishes into two classes. The larger, or more timid, generally undertake their operations whilst the patient is yet conscious, content if, on pinching the integument, they find his sensibility somewhat benumbed. This mode of administration he condemns as worse than useless, because, in addition to being inefficient in relieving pain, it complicates the operation by acting as an excitant to the nervous and circulating systems. The other class, of a more daring type, push the administration until the full effect is produced, and occasionally only discover they have carried it too far by finding their patient in a condition of fatal coma. Now he insists that there is a happy medium between these two extremes, which is at all times attainable by the surgeon, if attention be paid to the rules he lays down.

The effects of chloroform he divides into three stages:—1st. That of Excitement. 2nd. That of Tolerance. 3rd. That of Collapse.

Each of these stages is marked by a train of well-defined symptoms, and they merge one into the other in the order here stated.

The surgeon, he states, should never operate unless in the stage of Tolerance.

When the chloroform is carefully administered, this latter will generally follow immediately upon the primary or excited condition. It will be at once recognised by the patient being unconscious, by his respiration being calm and composed—the heart's action normal in rhythm, and the pulse firm and regular in its beat, and it will be attended with complete loss of sensibility and muscular control. The patient, in fact, will be like one in a calm, profound sleep—if his limbs be raised, they will fall back like logs on the bed, and his countenance will generally exhibit a smiling aspect. The advantages of this very satisfactory condition M. Chassaignac states, and with great truth, are not confined to the patient. As the result of his very great experience, he affirms, that whilst in this Tolerant stage, no possible danger need be apprehended by the surgeon, who may, with confidence, devote himself to his operation—a matter of no slight moment, when we reflect that usually the surgeon's attention is quite as much directed to the effects of the anæsthetic agent as to the more immediate, and, it may be, embarrassing, work he has in hand.

M. Chassaignac only permits his most trusted assistants to administer the chloroform. His directions to them are, to place the patient on his back; to remove all covering from the

neck ; to leave uncovered a sufficient portion of the chest to enable him to watch the respiratory movements ; and finally to leave the pit of the stomach also exposed, as there the action of the heart, if troubled, will be most readily perceived. Having thus prepared the patient, the administration of the chloroform is proceeded with, the assistant being cautioned to devote his attention altogether to his task : he will keep his eye on the patient's features ; on the motions of his chest ; on his stomach—all which he is in a position to do without difficulty. In favourable circumstances he will notice in two or three minutes symptoms of the stage of excitement. The patient will probably commence talking in a rambling and disconnected manner ; will possibly sing snatches of songs ; his respiration will be quickened ; his pulse will also increase in rapidity. As this stage progresses, spasmodic action of the voluntary muscles will take place, sometimes of so powerful a kind as to require three or four strong men to keep the limbs within bounds. This condition having lasted for a period more or less prolonged, according to the patient's powers of resistance, the second stage—that of *tolerance*—will gradually ensue. The muscles will cease to contract, and the limbs will fall back completely powerless and relaxed ; the patient will cease to give utterance to his feelings, and will quietly fall into an apparently profound slumber ; his breathing will become calm ; the heart's action, from being excited, will be normal ; the head and face will be free from all turgidity on the one hand, or abnormal paleness on the other, and his sense of feeling will have altogether disappeared. Now the period when danger is to be apprehended, M. Chassaignac states, is just when this stage is being developed. In unfavourable cases, or those in which the agent is being too rapidly administered, in lieu of this very satisfactory condition of tolerance we shall find a most alarming train of symptoms set in : the respiration will become laboured and irregular, and possibly stertorous ; the heart's action will intermit ; and the patient's features will either contract rapidly—exhibiting symptoms of collapse, the face being at the same time overshadowed with a deadly paleness—or it will become turgid and suffused ; and if, under these circumstances, the agent be still administered, fatal coma will rapidly set in. Such is the condition to which he has given the very appropriate title of anæsthetic collapse—the *third stage*.

He affirms that the surgeon need never apprehend the advent of this stage if the assistant be advised to take warning by the plain signs it will always give of its approach. If,

keeping his eye steadily on the three points previously named, he should perceive any evidence of it in the features, respiration, or circulation, he should at once remove the chloroform and allow the system to recover. He declares that it is of the utmost consequence to pay the closest attention to this point. Of such moment, indeed, that I have repeatedly heard him express his belief that so short a delay as that of ten seconds in removing it, after symptoms of intolerance have been manifested, will be attended with imminent risk to the patient's life.

In all cases, by removing the chloroform as thus recommended, the bad symptoms will speedily subside, and the assistant, having allowed a minute or two to elapse, may again administer it, still, of course, keeping his eye on the three signposts of danger. It will occasionally happen that the administration will require to be thus interrupted three or four times, but in all cases we shall ultimately triumph by inducing the condition of tolerance.

The apparatus employed by him is the simple one in ordinary use, viz., a fold of calico half a foot square, one end of which is "gathered," and a ligature fastened round it—within the hollow thus made a piece of sponge saturated with chloroform is placed. The assistant, holding the end enclosing the sponge in his left hand, places it over the patient's nose on a plane above the nostrils, whilst, with his right hand, he holds the free end as a veil over the lower portion of the face.

M. Chassaignac states that it was in the year 1850 he first conceived the idea of introducing the operation by "*Écrasement Linéaire*." Aided by M. Mathieu, the skilful surgical mechanist, he succeeded in giving practical effect to his idea by means of the instrument which has become familiar under the title of "*Écraseur*." I shall not occupy time by describing this instrument, as I have little doubt my readers are already well acquainted with it. I may state, however, that several attempts have been made to improve upon it: amongst the rest M. Charrière has produced one supposed by many to be preferable to M. Mathieu's. Such is not the opinion of M. Chassaignac himself, and in some experiments instituted by him, at which I had the advantage of being present, he clearly demonstrated the superiority of the original instrument.

In his *Memoir*<sup>a</sup> he advises all who purpose trying his form of operation, before using any of these *écraseurs*, to ascertain that the chain accurately fits the hollow leg of the handle

<sup>a</sup> *Memoire sur l'Écrasement Linéaire*. Paris: 1856.

through which it is to be pulled in the process of removing or dividing parts. Unless it be found to do so *most accurately*, instead of effecting a clean section of them, it will drag the last portion, probably integument, into the leg of the instrument, thereby most disagreeably complicating the operation, and necessitating recourse to the bistoury to accomplish the section of the retracted portion. Again he cautions us to test the power of the chain. This he does by placing within its loop some tough substance which it cannot crush. He then exerts all his strength in endeavouring to effect this, and by the manner in which it bears this severe strain he determines whether it be fit or not for use.

The *écraseur* is not applicable to the removal of tumours in which bone exists, or fibrous structure to any considerable amount. As the result of a series of experiments, he found that tendinous structures will be compressed, but not divided, by it, unless an amount of force be exercised which no instrument as yet manufactured for the purpose will bear.

The advantage which M. Chassaignac claims for his form of operation over all others in the removal of tumours is, that it combines to the safety from hemorrhage of the ordinary operation by ligature, the rapidity of the bistoury in its action of separating the parts. But few tumours will need a longer period than from ten to fifteen minutes to be removed, which, as he truly states, contrasts most favourably with the tedious action of the ligature, extending as it does over a space of from four to seven days.

On the other hand, the advantage it possesses over the knife, in being attended with little or no hemorrhage whilst dividing or removing vascular structures, is self-evident.

A remarkable proof of its efficacy in this respect is adduced in the account given in his Memoir of a series of experiments on arteries, in which he found that the coats of these vessels became so completely blended together in the process of section by the *écraseur*, that no exertion of the lungs, by blowing into the vessels behind their divided extremity, could force a passage for the air through them. Its power of removing vascular parts without hemorrhage will be influenced by two circumstances—

1st. The vascularity of the parts to be divided.

2nd. The time employed in the operation.

The latter should, of course, be regulated by the former. The rule acted upon by M. Chassaignac is to allow, in the case of ordinarily vascular tumours, an interval of fifteen seconds to elapse between each movement of tightening, in

other words, between each "clicking" sound of the instrument, which indicates, to use a nautical expression, so much "paying in" of the chain. When he is removing portions of the tongue, or other parts equally vascular, he allows a very much longer interval to elapse. It is of some importance that this should be well understood, as I have witnessed instances in which surgeons cutting through vascular structures, almost as rapidly as the instrument would permit them, wondered at seeing a severe hemorrhage resulting. The fifteen or twenty seconds' interval will make a vast difference in the result, rendering what—without this precaution, would be almost as sanguinary an affair as if the knife had been in requisition—generally a perfectly bloodless one.

M. Chassaignac has employed his *écraseur* in the removal of an immense variety of tumours. He has already given, in the Memoir I have before referred to, an account of a large number of them. I shall not attempt following him there, but shall content myself by referring to some few special forms of disease, for removing which it is in my judgment most suitable. I shall of course speak of none but those in which I have seen it repeatedly employed with the best results.

*Tumours in the Anal Region.*—It will be readily conceived, from the very vascular nature of the tumours met with in this region, especially hemorrhoidal, that this instrument would be particularly adapted to removing them, and such is the case. Indeed, so well has its character been established in this respect in the opinion of the Parisian public, that, during my attendance at his clinique, he was never without a retinue of applicants eager to be relieved through its means; and no wonder, for I cannot conceive greater triumphs of surgery than I have been a witness to its effecting in some cases of the more distressing forms of hemorrhoidal tumour.

These were cases of aggravated internal piles, characterized by their extent of growth; the excessive pain caused by them; constant hæmorrhage; and were attended with the usual concomitants of general as well as local irritability.

The treatment of such cases, familiar to the practice of most surgeons, I believe I am correct in saying is frequently attended with much difficulty and embarrassment. Should their removal be effected by ligature, as recommended by the English surgeons, a second or third application, according to Copeland, will be necessary before the entire mass can be extirpated. I need not particularize all the annoyances to both surgeon and patient, arising out of this tedious form of procedure. Its very painful nature, too, especially in those cases

complicated (and how few of them are not) with more or less inflammation and excessive tenderness, renders it so unpleasant as to have compelled Sir A. Cooper to give it up for a time in favour of the less painful though more dangerous operation of excision. Such cases prove equally unsuitable to the various other remedial means which have been devised. The actual cautery, the favourite remedy of the French surgeons, never can come into repute in this country. And Curling states that the application of nitric acid, as recommended by Houston, which he considers the most efficient method of treatment in the general run of hemorrhoidal cases, will yet be inefficient in those worst forms I am at present considering. I need scarcely speak of excision by knife or scissors, as I believe all surgeons at present agree in condemning it in such cases. Now it is precisely in such that the "écraseur," in my judgment, will be found a most valuable aid to the surgeon. Assuredly in several cases of the kind, in which I witnessed its employment, the effects were all that could be desired. The tumefied mass, as large in some of them as the closed hand, and growing from the entire circle of the rectum, was removed without any hemorrhage, without the patient being conscious of the removal—without, in fine, any single disagreeable complication either during or after the operation.

A very important feature also in favour of the 'écraseur' in these cases is, that it can with safety be employed, although the tumour and parts surrounding it be more or less inflamed. On this point I am induced to quote from M. Chassaignac himself. In the Appendix to his Memoir, p. 471, after recounting the history of a remarkable case of this kind in which he operated, he states: "Notwithstanding a subacute inflammatory condition of the tumour, with even some gangrenous points on its surface, I did not fear to operate immediately after the patient's admission into hospital, so urgent did it seem to me to get rid of the hemorrhoidal affection. It is not the first time I have thus operated in the midst of an inflammatory condition of the tumour. I have always done so with success." And he goes on to say, "if we recall to mind the numerous instances in which the tonsils are removed in a similarly inflamed state, we may well doubt the universal application of the therapeutic rule, in virtue of which we should await the disappearance of the inflammatory state before undertaking the removal of diseased parts."

Before employing the *écraseur* in the removal of hemorrhoids, M. Chassaignac impresses the necessity of having the patient completely under the influence of chloroform. Indeed

he admits that without this the successful performance of the operation would be impossible. No human being, however courageous, could endure the pain attending it without more or less writhing and contortion, which would be fatal to the success of the operation.

Having accomplished this essential preliminary, he proceeds in the following manner:—Gently turning the patient upon his left side, and flexing the right leg upon the thigh, and the thigh on the pelvis, he brings the parts fully within his command. He first passes into the rectum his "*Érigne*," having the hooks sheathed, introducing it sufficiently deep to be certain of grappling the entire tumour, he unsheathes it and draws it forcibly out, of course carrying with it the hemorrhoidal mass. He then includes the entire within a firm twine ligature, and round the track of this latter he places the chain of the *écraseur*, which he proceeds to shorten until it constricts the tumour. At this period he desires an assistant to note the time, and to make a sign to him as every fifteen seconds elapse—on every such sign he tightens the chain until the click is heard. As a general rule, the tumour will be separated in a space of time varying from ten to twenty minutes, leaving an almost bloodless surface, on which the track of the wound will be scarcely discernible. The after-treatment consists in graduated pressure retained firmly against the anal opening by means of the usual perineal bandage; the patient is removed quietly to bed. Of course precautions are taken before operating to have the bowels cleared, and in such a condition that a motion will not take place for seventy-two hours after. M. Chassaignac considers it of much importance to secure this, and with that view gives strict injunctions respecting the patient's dietary, confining him to food of the simplest kind, and especially interdicting vegetables, or anything calculated to generate intestinal gases, &c.

In one of his earlier operations he found, from not having adopted proper precautions, that the wounded surfaces of the intestine became partially adherent in the process of healing, thereby most disagreeably complicating the operation by a partial stricture of the rectum. This accident he now always prevents by the following method, which I quote from the Appendix to his Memoir:—

"On the day following the operation I introduce a catheter into the intestine with much gentleness. I renew this manœuvre the two following days, after which I daily introduce an elastic bougie, each of larger caliber than the preceding one, taking care to have them well greased before introducing them."



The wound will heal by granulation, and M. Chassaignac affirms, and certainly, as far as I could judge, with perfect truth, that the amount of suppurative inflammation will be comparatively very slight. In favourable cases it will be healed in a fortnight.

*Rectal, Uterine, and Nasal Polypi.*—The employment of the *écraseur* in these forms of tumour needs no remarks from me, as it is evident how admirably it is adapted to the operation of removing them. I shall, therefore, simply state that in numerous cases of one or other of them, in which I saw it used, the result was everything which the surgeon could desire.

*Anal Fistula.*—Next to the class of hemorrhoidal tumours, I should be inclined to place this affection as “fit and proper” for this instrument. In the operation for fistula it in truth fulfils every indication that could be wished. In all the cases in which I saw M. Chassaignac use it, the section of the parts was effected without any hemorrhage whatever, and the wound inflicted by it was precisely of that description most desirable in these cases; the amount of contusion of the parts necessarily caused preventing the possibility of the wound healing in any other way than from the bottom; and the comparatively small amount of suppuration, which M. Chassaignac claims as one of the results most characteristic of the action of the *écraseur*, will be found of no slight importance in the cases of debilitated and broken-down patients ordinarily afflicted with this complaint.

I remarked him operating with it in one or two cases of this disease in which he seemed to think it very questionable if any other form of operation would have been available for the patients' relief. They were cases in which, combined with general debility and marasmus, there was an exaggerated amount of local disease. The anal region was permeated, in various directions, with fistulous sinuses, and the constitution of the patient, where it had not developed organic disease, was yet so broken as to be unable to make a vigorous effort to set up healthy action. In these cases he stated that the ordinary operation, by bistoury, would be hardly available. The low state of vitality of the parts; the extent of the wounds required in laying open the sinuses; the amount of hemorrhage that would result; finally, the severe suppuration, would all speak trumpet-tongued in favour of the *écraseur*.

In employing it in such cases, a somewhat different mode of proceeding is required than for removing tumours. In M. Chassaignac's words:—“The *Écrasement Linéaire*, applied to fistula in ano, comprehends two operations,—the one prepara-

tory, the other definitive. The one has for its object to establish a conductor for the chain of the instrument round the part to be divided, the other is the act of division."

He first passes a very flexible bougie through the fistulous canal, and, by means of his forefinger introduced within the rectum, conveys it out through the anus. If the sinus be large enough to permit the chain to follow the bougie, he attaches it at once to the end of the latter, and is thus enabled to finish the operation at the one sitting. Generally, however, it will be necessary to expand the fistula somewhat before the chain can be got through, and this he accomplishes by passing, at the first sitting, a piece of flexible gum-elastic tubing—such as he employs in his novel method of "surgical drainage"—through it. He leaves it there for a day or two, and always finds that it has the effect of expanding the sinus sufficiently to enable the chain to be passed. From my observation of its effects in a number of cases in which I was fortunate enough to witness its employment, I can most fully endorse the following remarks, with which M. Chassaignac concludes the section of his *Memoir* treating of this affection:—

"By the *écraseur* we can cure fistula in ano with more certainty, and much less danger, than by any other means yet devised.

"A complete absence of the usual accidents, the excellent nature of the wound, the simplicity of the ulterior treatment, the very slight amount of suppuration, and the more rapid cicatrization than results from the use of a sharp instrument,—such are the advantages of the *écraseur* in this disease."

*Congenital Phymosis*.—In no cases will the peculiar advantages of this instrument, as an "anti-hemorrhagic," be rendered more striking than in those of circumcision. I have seen it used in many such, and can most fully bear out M. Chassaignac where he terms it an absolutely bloodless operation. Notwithstanding, however, this very desirable feature of its action in these cases, I imagine it will not be likely to supersede the scientific operation of M. Ricord. Were we to form a judgment of the two methods by the results attending their immediate performance, everything would be in favour of the *écraseur*: bloodless, in the most absolute sense of the word, and comparatively painless, the removal of the prepuce by the *écraseur* would seem to be the triumph of surgery; in this respect, no doubt, contrasting most strikingly with the bistoury, the operation with which is both exquisitely painful and sufficiently bloody. It is, however, when both wounds

are in the process of healing that M. Ricord's operation will be found to be the real "triumph." This is at once evident from the fact, that in the one case no provision can be made for the accurate adaptation of the edges of the wound to each other, a point of the greatest importance to the ultimate comfort of the patient, and for which provision is made, with almost mathematical precision, by M. Ricord.

It is but right, however, to say, that M. Chassaignac does not apprehend any ultimate inconvenience to the patient from his operation; and certainly, up to the period of their leaving hospital, there was no evidence of any disagreeable result in those cases in which I saw him use it. His *modus operandi* consists in introducing within the contracted orifice of the prepuce his "Érigne," sheathed. On pushing it fairly in, he unsheathes it, and, drawing it towards him, he effectually draws with it the whole circle of the prepuce entangled in its hooks; he then fixes on the chain of the *écraseur* in the usual manner, having previously isolated the portion to be removed by a ligature. The after-treatment consists in simply dusting the parts frequently with flour, and applying, in the process of healing, a solution of nitrate of silver to the wounded surface daily.

*Operations on the Scrotum and Testicle.*—M. Chassaignac claims a very high character for the *écraseur* in the operation for the radical cure of varicocele. I should imagine, however, that most surgeons would dread the effect of so extensive a wound as he inflicts in those cases. I witnessed two operations of the kind, and certainly felt no slight alarm for the patient's safety when I saw the huge gap left in the scrotum on the removal of the instrument, carrying with it, in each case, a slice of over an inch in length, by half an inch in width, of the varicose vessels, with the surrounding tissues and integument. In both cases, however, fortunately for the patients, M. Chassaignac's prediction as to the benignity of the wound proved correct: they healed rapidly by granulation, and the radical cure of the disease seemed certainly complete. The operation consists in first carefully isolating the varicose mass from the cord and spermatic vessels, which latter he keeps with his left hand securely out of the reach of his operative manœuvres; then passing three spear-pointed pins, as in M. Vidal's operation, he encircles the mass included within the three by a ligature, over which he passes the chain of the *écraseur*, and removes the whole in the usual manner. He directs the pins to be passed through at somewhat less than a

finger's-breadth from one another, taking care that the lowest of them will pass through on a plane above the vaginal sac.

He always endeavours, by bringing the lips of the wound together, and retaining them by interrupted sutures, to procure adhesion by the first intention; and states that he succeeded in accomplishing this in a case the particulars of which he laid before the Academy of Medicine<sup>a</sup>. Generally, however, owing to the contused nature of the wound, this attempt will not succeed.

He tells us in his Memoir that he has repeatedly removed the entire testicle with perfect success. As I had not an opportunity of seeing him use it in a case of the kind, I can but refer to the interesting examples reported by him.

*Operations on the Tongue.*—I regret that my opportunities of witnessing its effects, in the removal of the whole or part of the tongue, were not sufficient to qualify me to form a judgment on the disputed question, as to whether it affords the surgeon in these cases a complete safeguard against hemorrhage. I saw but one case of partial amputation of this organ effected by the *écraseur*, and must confess that in it the results were not such as to make me enthusiastic in its favour, the most that could be said for it being, that the application of a ligature was not needed; the hemorrhage, however, was very obstinate, and was only checked, after some hours, by repeated applications of ice.

The case was not, however, one from which it would be fair to condemn the instrument, inasmuch as M. Chassaignac admitted he had effected the section in a very much shorter time than was usual with him. He added, that in the previous operations he had performed on this organ, he allowed a couple of hours to elapse (on this occasion he only allowed a few minutes) between each motion of tightening the chain, so that the section was only completed the day following that upon which the constriction had been commenced; and he stated that in these cases there was no hemorrhage worth naming. If we are to give credit to the remark with which, on reference to my notes, I find he concluded his comments on this case, to the effect that in no one of the numerous partial and complete amputations of the tongue which he had performed with the *écraseur*, had he occasion to apply a single ligature to a bleeding vessel, we are forced to the conclusion that the advantages possessed by it over the ordinary ligature, in effecting the sec-

<sup>a</sup> Bulletin de l'Académie de Médecine, tom. xx. p. 561.

tion in one day instead of seven or eight, renders it the most efficient instrument as yet devised for these cases.

I cannot, perhaps, better conclude my remarks on this "novelty" of M. Chassaignac's than by quoting, from the Appendix to his Memoir, a *resumé* of its results in eighty-four cases operated on by him.

1st. The inflammation which follows operations by the *écraseur* is much less than that observed after operations by the bistoury.

2nd. Suppuration is diminished to an enormous degree; so much so that, after the operation for fistula, or the removal of hemorrhoids, there is no need for dressing after the first two or three days. A little flour dredged on the wound will be enough.

3rd. The slight traumatic inflammation and little suppuration explain the rapid cicatrization which follows the *écraseur*.

4th. One of its most remarkable properties is that of being unattended with purulent infiltrations in the neighbouring parts, which so frequently follow operations with the knife.

5th. The pain attending and following it is much less than that following the bistoury.

6th. All hemorrhage, whether primary or secondary, is prevented in a certain manner.

7th. Not a single instance of nervous delirium, or of tetanus, has followed its employment.

8th. If it does not wholly prevent purulent absorption, it certainly diminishes the chances of this accident exceedingly, since, out of the eighty-four cases observed, on one occasion only was there any evidence of it having occurred, and this was in the midst of exceptional circumstances, which deprived the operation of its most essential qualities.

9th. Complete absence of the occasional accidents of ordinary wounds, such as erysipelas, hospital gangrene, inflammation of absorbents, abscesses, &c.