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SCAB HEALING



SCAB HEALING

AND ITS

APPLICATION IN GENERAL SURGERY

BY

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PREFACE.

During the years I was a student at St. Bartholomew's Hospital, Mr. G. W. Callender conducted his experiments on the healing of wounds. I had opportunities of studying his experiments, which were important and highly interesting. His first object was to carry cleanliness to far greater perfection than had ever been done before, or has since, and I was witness to his elaborate precautions to prevent spreading of infection, and inoculating one patient with the secretions of another.

At the bed head of each patient was a test tube mounted in a brass clip, containing distilled water, and in this a camel hair brush to be used instead of sponge or tow in the dressing. In his search for a suitable dressing he made use of yellow pine sawdust, which he enclosed in linen bags and applied to compound fractures and other wounds, notably open cancerous ulcerations, after a method initiated by Surgeon Major Porter. This dressing Mr. Callender thought would greatly aid him in cleanliness, for it was so readily burned and was so cheap, fresh dressings might so easily be applied, when the former one was soiled. It proved, however, but a partial success because the linen bag was too fine meshed for the matter to find its way through, and too much remained on the surface. Nine years after I became surgeon to the Devon and Exeter Hospital and that enabled me to prosecute the ideas Mr. Callender's experiments had raised. The improved treatment of wounds introduced by Mr. (now Sir Joseph) Lister revolutionized the treatment

of surgical wounds, and brought more suitable appliances into the surgical market. These have been made use of to remove certain obstacles to Mr. Callender's method, initiated by Surgeon-Major Porter, and to bring the system to more modern date. After the method was perfected, it remained to test its efficiency in a number of cases. This during ten years I have done and the results have been tested against other methods; the cases here shown have not been unfairly selected, and many others might have been adduced showing results equally good.

It may be fairly contended that a method which gives such results, in such an inexpensive and simple manner that any country unqualified nurse could easily carry out in all its details, is deserving of attention.

J. DELPRATT HARRIS.

45 Southernhay, Exeter.

March, 1893.

ON
SCAB HEALING.

CHAPTER I.

DESCRIPTION OF SCAB HEALING.

HEALING by scab is a process essentially natural, but in its relation to human surgery, it is almost exclusively made use of in the case of small wounds only.

Hunter did not fail to take notice of this subject, and devoted considerable research to the process, but added that "it required no art," *Works*, iii., 262.

Many years later Paget investigated the process, and classified the principal means by which scabs are formed, under three heads.

He adds, "The healing of a wound by scabbing has always been thought a desirable process."

Again the same author writes:—"Many surgeons have felt, as Mr. Hunter did, that the scabbing process should be permitted much oftener than it is, in the case of both wounds and ulcers; but none have been able to lay down sufficient rules for the choice of the cases in which to permit it. Probably, the reason of this is, that at best, in the human subject, the healing by scabbing is an uncertain process." The object of this

work is to analyse why a process so simple that "it requires no art," so excellent in its results that all the best surgeons have been attracted by it, should yet remain comparatively unused except in the case of very small wounds, and be stigmatized by a leading surgeon and profound investigator as "an uncertain process."

Is it true that in all cases it requires no art? Would not a little more human art, a little thoughtfulness, and a little craft enable it to be used in large wounds, and thus extend its sphere of usefulness, and deprive it of its stigma of being an uncertain process? The process of scabbing is declared to be effected, *vide* Paget's *Surgical Pathology*, p. 167, by a substance which is effused on the surface of the wound, dries there, and forms a hard and nearly impermeable layer. The edges of this substance adhere over those of the wound, and so form a kind of airtight covering under which it heals *without suppuration*. This substance is found to be formed from dried blood, dried lymph and serum, or dried purulent fluid. Of these three, perhaps the commonest is blood, and it is by no means rare to see a blood scab form over a compound fracture, and the fracture proceed exactly like a simple one. A serum and lymph scab, however, is that which surgical cases will do best with, and in such cases where the surgeon has performed some operation, will be most readily formed.

In each case we see it is an exudation which has been allowed to become, and been kept, dry, and thus we are brought face to face with the advantages of keeping wounds dry, and it will be through dry dressings we shall obtain scab healing scientifically.

It was early noticed that in scab healing, whilst the surface was dry and covered with scab, the deeper portions of punctured

wounds were still secreting morbid exudations, which were retained, causing fever and pain, and it is clear that it is equally important to keep the deeper portions of the wound dry, and free from these morbid products. This, by means of artificial drains, and india-rubber or glass drainage tubes, has long since been done and it is no matter of difficulty now to keep the deepest part of a wound dry, and in strict apposition, and it is with these adjuncts that scientific scab healing is brought into the range of practical surgery, and its results bear comparison with some of the best cases obtained from what is known as antiseptic surgery. And as in a footnote in Paget's *Surgical Pathology*, he urges that antiseptic surgery may claim to be analogous to scab healing, the dressings being analogous to the scab, only more scientific—so those who practise scab healing in the manner to be related may justly claim their mode to be truly antiseptic, although this end is obtained in a different manner.

No one can be more firmly convinced of the usefulness of antiseptic dressings, or of the soundness of the arguments on which the system is based, than the writer. An extended experience in hospital and private practice has, however, shown that under the exigencies of private practice, in the country more especially, it is frequently impossible to follow out those measures essential to the treatment. Cases that should have been dressed to day are obliged to be shelved till to-morrow, and when opened are found to be septic, so that had the attendant nurse had some dressing supplied her, which she could have put on daily, the case would have been less septic, than with the antiseptic dressings allowed to remain a day or two too long. Again, although in England there is no intrinsic

difficulty in carrying out antiseptic surgery, or obtaining the materials and chemicals that are necessary, this cannot be said in many portions of the world, where surgery has to be carried on. In hot climates such as many parts of Africa and Asia, the volatile antiseptics are of little use, whilst in both portions of the world mentioned a supply sufficient in quantity cannot be obtained owing to expense in transport. This latter objection exists especially in the case of missionary stations where medical work is carried on.

It must be remembered that so far all dressings applied to wounds under the term antiseptic dressings have been impregnated with various chemical substances, the object of which has been, first to kill any microbic germs resting on the dressing itself, or the wound, or the patient's skin; secondly, to delay the growth of any pathogenic germs which may have found their way into the wound until the next cleansing, and fresh application of more antiseptic which will destroy most and again delay the growth of any that may still remain. In all, the action is essentially chemical.

In an ideally perfect dry dressing, however, the process is physical rather than chemical. The wound itself is drained of all moisture, the skin surrounding the wound is kept perfectly dry, and the moisture coming from the wound is conveyed away from its vicinity at once, and continuously. For it cannot be denied that heat and some substance capable of producing moisture is necessary to the propagation of pathogenic microbes.

Many years since, Rindfleisch, Riess and Koch, abroad, and Lister and Cheyne in England, remarked on the very strong power healthy tissues had for destroying these germs. The exact manner in which this destroying process was carried out

was not at first known; perhaps it is but imperfectly known now, but ten years ago Cheyne, in his work on *Antiseptic Surgery*, says:—"healthy living tissues are powerful destroyers of bacteria." This assertion is perfectly incontrovertible, and its effects are seen in every open wound when healing. Again, the same author writing on the subject of Ovariectomy states that "the peritoneum absorbs fluid so rapidly, that the bacteria, if admitted, have no fluid in which they can develop." The recent researches of Metchnikoff on the power of the leucocytes of enclosing and causing the death of microbes, and the experiments on the immunity producing power of blood serum, greatly help us to see how the healing of wounds is carried out, and the reason why under unfavourable surroundings, a wound may take as many weeks to heal, as under favourable circumstances it may take days. It is very clear, therefore, that those surgeons who endeavour to carry out the dry dressing or scab healing system, are following a strictly logical antiseptic treatment. In the one system the access and propagation of microbes is prevented by chemical means, in the other the fluid the microbes live in is conveyed away, and such microbes as exist in the wound are brought continuously in contact with the living tissues, and by them are speedily destroyed.

Dry and infrequent dressing is a term much made use of, but although such a dressing would be the highest desideratum, there can be no doubt that such a dressing does not exist. If the wound is to be kept dry the dressing must be changed as often as it becomes wet. If the dressing be very infrequent it remains no longer a dry dressing. If a wound be really dry, when the dressing is removed the wound will be found with a hard dry scab where the two surfaces of

skin approximate; the surrounding skin is absolutely dry and dusty, so that a dry brush, or cotton-wool puff will cleanse the skin without the use of water. Many surgeons think when they have covered the wound with dry lint, or Gamgee dressing, or absorbent wool, &c., they have treated the case with dry dressings. This, however, is far from being the case, and scab healing never takes place with these means. On taking off the dressing of lint from a stump for instance, the skin is quite wet with matter, and the dressing has formed a cup containing a quantity of matter, which the heat of the limb has kept at a temperature of about 90°. The fact being that the meshes of the lint quickly became clogged with the particles of pus, and the more fluid serum of the pus has for a time escaped, but the thicker and more inspissated portions have been caught and held in the meshes, and so formed a cup in which the stump has lain as though it had been a poultice.

Gamgee dressing, although very convenient in many ways has the same objection in a somewhat slighter degree.

Fir-wood wool is a convenient material which, made up into pads with absorbent gauze, is quite as good as Gamgee tissue, they both have the same power of absorbing moisture, but owing to the fineness of their meshes, both become clogged if much suppuration exist. Their intrinsic value is, moreover, an item of expense in hospital or dispensary work. Of all materials of the gauze type probably Sal Alembroth is the most efficient. But all these preparations require special machinery to make, and one remote from a town could scarcely make them in any quantity.

Sawdusts obtained from the yellow or red pine or from cedar, or the eucalyptus tree, have been tried and found singularly effec-

tive, and there appears to be no comparison between the appearance of a wound treated with either, or all of these sawdusts, and one treated with any of the foregoing so-called dry dressings.

The sawdust most easily obtainable in England is from the yellow or red pine. It is a bye-product of not much value, and the only trouble connected with it is in obtaining it free from workshop dust. A sackful is valued at but a few pence. To prepare it for use it should first be sifted in an ordinary coarse sieve. The contents of the sieve consisting of the coarser portions are emptied into a mortar or coffee grinder, and ground and pulverized into dust. The sawdust thus prepared is a substance having peculiar qualities. It is about the same fineness as ordinary ground coffee (a coffee grinder set rather coarsely makes an excellent machine for preparing the sawdust) possessing a terebinthinous odour, and when taken in the warm hand, leaves a sticky or resinous substance adhering; it has the property of caking, and readily takes any form of uneven surface, and becoming warmed by the limb or surface of the body to which it is applied, it retains the shape in which it has caked, and thus forms a splint affording very efficient support to the injured part; indeed for the support of the flaps after an amputation, no other splint is necessary, unless some untoward occurrence such as sloughing takes place.

The sawdust thus prepared may consist of two parts pine and one of cedar, in which case the cedar diffuses an agreeable odour, or where gangrene is being treated eucalyptus chips may be added, whilst in ordinary operative cases the pure pine dust may be used. Bags of various sizes are made, usually more or less oblong in shape and three parts filled with the prepared dust. The bags must consist of some open meshed material, the best

seems to be the common absorbent gauze. Two layers are usually made use of, but a little sawdust always escapes on to the surface of the skin, and is of no detriment. The end of the bag is sewn, the sawdust moved about the bag so as to form an even layer about half or one inch thick according to the size of the bag which is then sewn in a few places through the sawdust, after the fashion of mattresses, to prevent the sawdust from shifting. When the proper size and shape is found several are to be made and kept in a tin box ready for use.

CHAPTER II.

MODE OF CONDUCTING A SAWDUST PAD DRESSING.

TAKE the case of a leg to be amputated for inveterate ulcer. To prepare the limb the hair is well shaven from the skin above and below the seat of operation. It is next advisable to wash the skin well with soap and hot water. Next stream the skin with any of the usual antiseptic solutions, preference being given to perchloride of mercury 1-2000. After operation particular pains should be taken to secure every bleeding point, and have as dry a wound as can possibly be secured.

Prepare a horse-hair drain, consisting of a sufficient number of hairs to form a drain the thickness of an ordinary penholder. No drain is so efficient as this in connection with sawdust pads. Any pressure applied to them never interferes with their action and, possessing as they do to an eminent degree the power of suction, they are far superior to india-rubber tubes.

It is most important that they should be not less than one inch beyond the wound on each side. The importance of this consists in the capillary attraction of the sawdust pad acting on the capillary attraction of the horse-hair drain for the distance of an inch on each side, being vastly greater than if a mere section of the drain be presented, or the end of an india-rubber tube. At the same time a longer portion than one inch is waste, for the serum clots on it and capillary action ceases. The horse-hair drain is tied with silk at each end to keep the hairs together.

To ensure the wound being dry and bloodless a flat sponge is introduced between the flaps and kept there until the last few stitches are being fastened. In making use of this form of dry dressing it is more than ever necessary to pay great attention to the mode of suturing. Each two portions of skin sutured must be approximated between the fingers, flat, and the suture carefully tightened until the two exact cut edges are brought together and no folding or inversion occurs. The stitches must be very close together and no protrusion between them must be allowed. Next a long shaped sawdust pad is laid on the under surface of the limb and the end of the pad turned up over the superior surface of the limb. Two narrower side pads are next placed one on either side and thus close in the wound. A thin sheet of cotton wool (not hygroscopic) is next placed over the pads, and the whole fastened securely with either a roller bandage or a three-cornered bandage. The object of the layer of cotton wool having a certain amount of oil in it, is to prevent germs coming directly to the discharge which will be found in the sawdust pad. Waterproof of any kind cannot be used in dry dressings, if healing by scab is desired.

The Second Dressing.

A wound thus dressed may require to be dressed the next day or perhaps not until the third day. As soon as the pads show the discharge coming through, the wound should be dressed. It must be remembered that a wound subjected to the action of carbolic acid always runs with serum much more than a wound washed with water or perchloride of mercury. In an ordinary

amputation the wound should be dressed on the third or fourth day to remove the horse-hair drain. When that is removed, the condition of the wound, the state of the dressings, the pulse and the temperature will be the guides.

On removing the cotton wool and pads, it will be found that the pads can be removed with great readiness. Care must be taken to avoid catching the sutures in the gauze. There is but little discharge lying on the skin, it is almost entirely absorbed by the pads; on the skin, however, will be seen some of the dry sawdust. A brush may be used to remove this, dry, or a puff of cotton wool. That which strikes the eye most, however, on inspecting the wound, is the condition of the cut surface. It presents the appearance of a thin cut line marked by a fine line of dried gummy material. The skin is not in the least red or inflamed and the wound has in great measure the appearance of having healed. If it is decided to retain the horse-hair drain, it should be loosened, and with some warm water and a piece of cotton wool as a sponge, be cleansed from the gummy crust. This enables the drain to act just as efficiently as before. The pads are reapplied in the same manner as before and a longer interval may be allowed before dressing again.

Under this method the most perfect healing by scab is obtained, leaving the slightest cicatrix that can be left, healing in the shortest period possible, with the least possible pain, and at the smallest possible cost. The pads when removed are at once put on the fire, where they burn very readily, being so full of resin, without perceptible odour.

As an average it may be assumed that in an ordinary amputation of thigh without excessive mutilation of soft parts, if no carbolic acid be used, it would be necessary to change the pad

on the following day, then on the third day following that, when the drain is removed, then twice a week.

In arms and forearms, and lower legs, it is not unfrequently found that these dressings may be left on much longer and yet the wound be absolutely dry. At the end of the second week the wound is usually reduced to two pits where the drain came out; these should be dressed with lint soaked in Peruvian balsam until the granulations are level with the skin, when some boric acid ointment, or better still an ointment of resorcin, gr. iv., ung. petrolei, ℥j., spread on lint should be applied, and the wounds quickly heal.

Although amputations have been taken to illustrate this system, it is equally available for all removals of tumours, and notably ovarian tumours, and also all breast removals, from which cases some of the most striking successes will be obtained. Cases of strangulated hernia do particularly well, the pad acting as a truss, to keep up the gut. One case will be found related further on where the patient could only be restrained from getting up before the second week with the greatest difficulty, the wound being healed and she feeling so strong and well. The sawdust system is also available and answers admirably in cases of ulcers, also strumous glands and phlegmonous erysipelas.

In the case of ulcers, or strumous glands which have ulcerated, it is best to cover them with a small piece of oilsilk and put the pad over it, the dryness, the pressure, and the support afforded, cause these to heal in a surprising manner. Those who believe in the value of iodoform can still use the drug by either dredging it on the pad or on the wound direct, before applying it. In cases of cellulitis, ending in masses of cellular tissue and skin

being thrown off as sloughs, the sloughs themselves, and also the pads, may be dredged over with powdered boric acid. This has greater antiseptic power than iodoform, without its depressing odour. Where an operation has been performed in an œdematous limb or part, the sawdust system is very effective, and it is interesting and even surprising to observe how, when one pad is overcharged with the serum, the adjacent pads take up the surplus by their capillary attraction. In such a case it is obviously absurd to think of infrequent dressing; the pads must be changed twice a day whilst the serum oozes in large quantities.

The treatment of compound fractures, to obtain union under the scab treatment, varies with the particular case. In compound fracture of tibia, where merely a point protruded through the skin, having first cleaned it, it is simply necessary to stitch the wound with horsehair, and place a sawdust pad over the wound, allowing it to remain until the discharge shows through, which in many cases does not occur at all, and the wound heals at once. In more severe cases the wound may be left open, having the pad securely fixed over the wound by bandaging, changing it frequently. In comminuted fractures with more than one aperture, a horsehair drain may be introduced through one aperture and brought out at another, and kept there until all serum and oozing have ceased. In the case of the upper arm or thigh, it is useful to thread an india-rubber drainage tube with as much horsehair as it will conveniently take, and introduce it thus to the deepest part of the wound. The rubber tube keeps the hairs from adhering to spicules of bone, and thus prevents separate hairs being left behind when endeavouring to remove the drain. The wound is then closed by sutures up to

the tube, and a sawdust pad placed over all, and renewed when necessary.

When the surgeon who practises this system has gained confidence in its efficiency, he will be emboldened to try it in more daring cases, such as joint injuries. Perhaps in England and temperate climates, where the Listerian antiseptic appliances are so easily obtained and work so well, surgeons will scarcely desire to use any other; but on the field, in sieges, and at missionary stations, this system will be found most useful. To exemplify its use take the case of a loose cartilage in the knee joint.

The skin surrounding the seat of the wound being carefully shaved, the part is made absolutely clean by soap and water and disinfectant, as related in the case of an amputation. The operation is done in the usual manner. The cartilage being removed, the end to be aimed at is, first, primary union of the wound; second, the prevention of serous effusion into the joint. To secure the first, great care must be taken to approximate the edges of the wound by ample sutures, either of horsehair or fine wire. As small a pad must be placed on the wound as is considered safe, which may be three by two inches, and securely bandaged on with a narrow bandage. For the second object, the use of ice, or cold, is essential. Where ice is available, undoubtedly that is the best, applied in an india-rubber bag made for the purpose, or failing that, in a bladder. No rag or lint should be put between the bag and the skin however. In the event of ice being not available, irrigation must be used, but the pad must not be allowed to get wet; this is not difficult to prevent if a shaped piece of lint be laid on the joint embracing only one half of it.

The water should be in a porous vessel, or failing that, a tin, with rag fastened on it outside in such a manner that the strands of thread, which irrigate the joint, keep the rag on the tin wet also, and thus by evaporation cause the water to be as cool as such means will allow.

Under such treatment very gratifying results may be obtained, and a useful joint preserved. In those instances where ice is not to be obtained, it is useful to render the joint cool, prior to operating, and the irrigation should be practised some hours previously. Under such conditions the operation should be performed as rapidly as possible, the dressing completed, and the irrigation re-applied. It has also been found advisable, prior to entirely leaving off the irrigation, to allow the water to become warmer, thus gradually allowing the joint to return to its natural temperature.

Such treatment, especially with ice, is very powerful, it must be remembered; and healing may be entirely arrested for weeks, until the dangers feared are seemingly passed, when by the gradual warming of the part, as above described, the healing process may be regulated almost to a nicety.

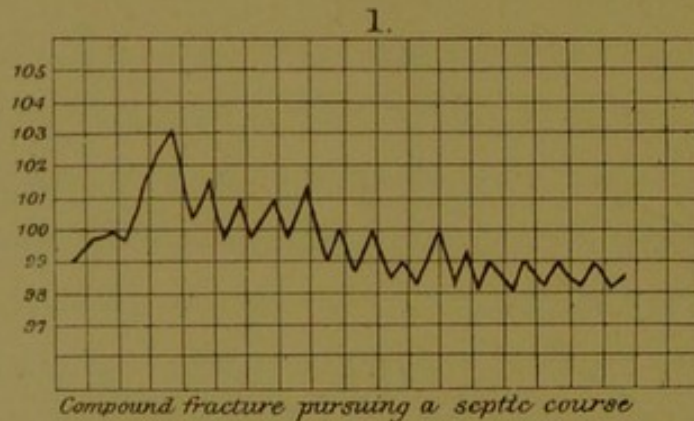
It must, however, be borne in mind, that when treating wounds of joints with this system, the keystone lies in obtaining primary union of the wound, and thus excluding all pathogenic microbes.

CHAPTER III.

SCAB HEALING CASES.

Let a few cases now be examined with a view to see what Listerian antiseptic precautions result in, and afterwards compare what results follow, the scab system here advocated.

But first, for purposes of comparison, is produced a true septic case, related by Mr. Watson Cheyne, where fermentation took place and the case ran a septic course, the highest temperature reached being 103° . The thermogram graphically tells

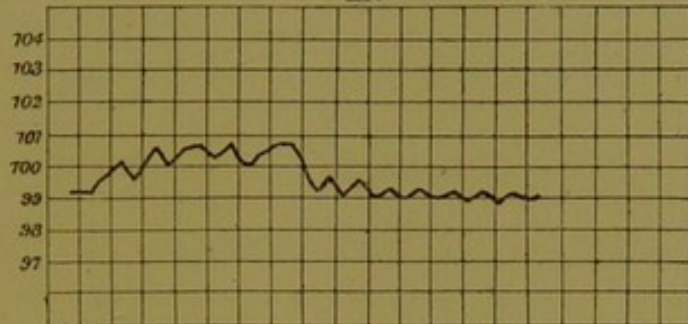


its own tale, of fever during the first week, gradually subsiding during the second, when the granulations protected the soft parts from absorption of putrid material, with a favourable termination from healing by granulation.

Thermogram No. II. (p. 23) is that of a case of compound fracture of tibia. It occurred in Sir Joseph Lister's own wards, and is referred to by him as a satisfactory case, and showed the organization of blood clot extremely well; showing that antiseptic treatment was thoroughly successful. The highest tem-

perature reached was under 101° F., and normal temperature was reached and maintained about the eleventh day.

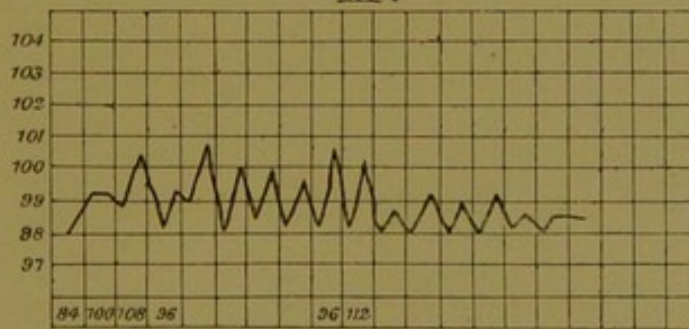
II.



*Compound fracture of Tibia. A septic course
Beautifully exemplifying organization of Blood clot.*

This case of compound comminuted fracture of both bones of leg maintained a strictly antiseptic course. It occurred under Lister's care, and is referred to as a typical case running a satisfactory course. Its highest temperature is 100.8° F., and normal tem-

III.

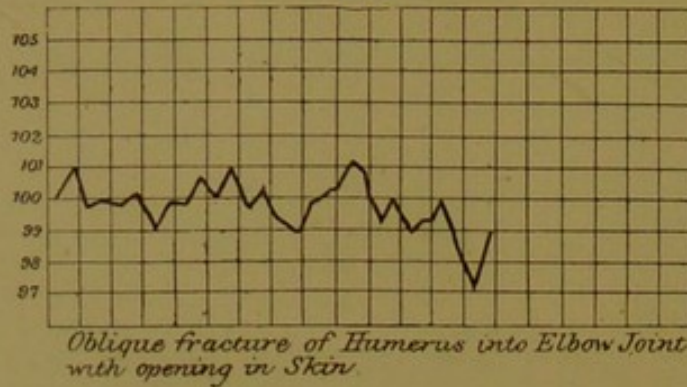


*Compound comminuted fracture of both bones
of Leg Treated by Lister himself*

perature was reached and maintained about the fourteenth day.

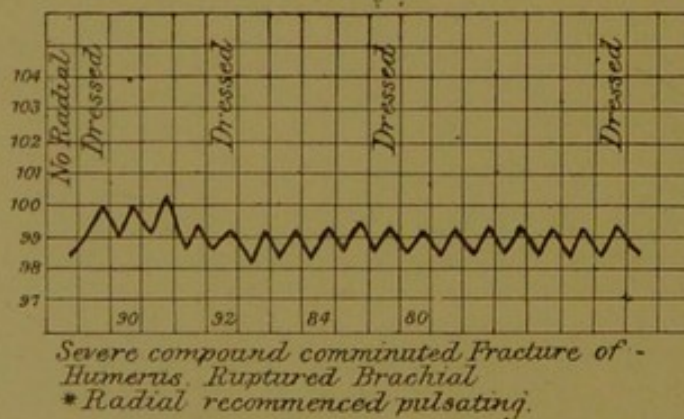
Thermogram No. IV. (p. 24) shows the temperature in a case of oblique fracture of the humerus into elbow joint with an opening in skin. A most troublesome condition, which might end fatally, but under antiseptic treatment ran a favourable course, result-

IV.



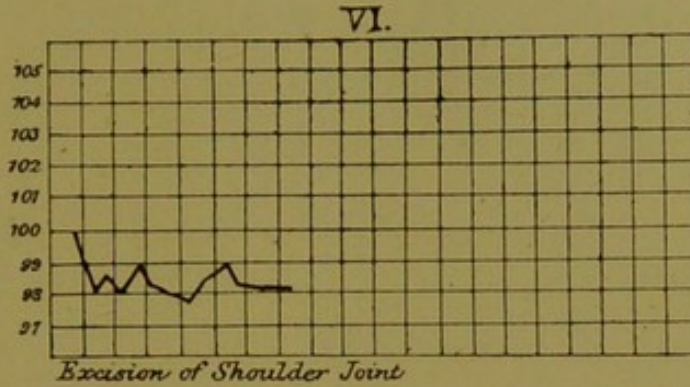
ing in movable joint. Highest temperature 101° F. Normal reached in thirteen days.

These are but a few cases extracted from the work on *Anti-septic Surgery* by Watson Cheyne, but the treatment is so well known, and so thoroughly appreciated by all surgeons, it is needless to insert more, and indeed, these cases are merely shown to enable reference being made when comparing the cases treated under the scab system.

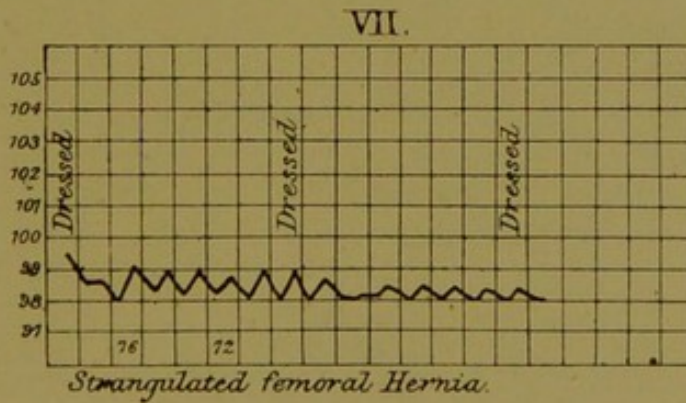


This thermogram shows a most severe compound comminuted fracture of the humerus on the left side, in which the brachial artery was torn. The wound was treated in the manner described in this work, and the highest temperature was 100.2° F., and normal temperature was reached and maintained on the fifth day. Comparison may be made between this and number three.

This shows the course of a case of excision of the shoulder joint in a child. Those who know the deep wound which attends

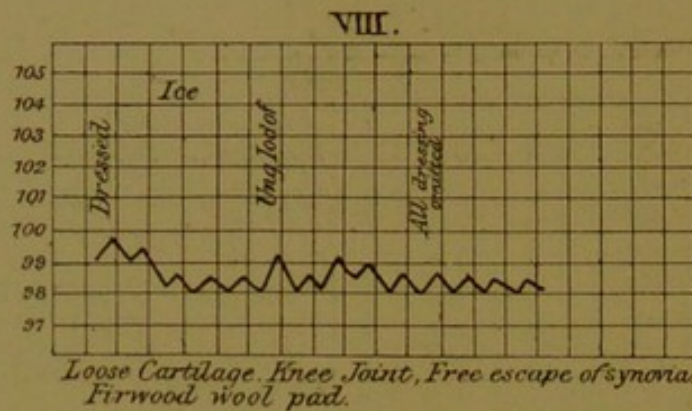


this operation, and the difficulty which occurs in draining it will appreciate the value of the treatment. Normal temperature was reached and maintained immediately after the shock of the operation was over, namely on the second day.

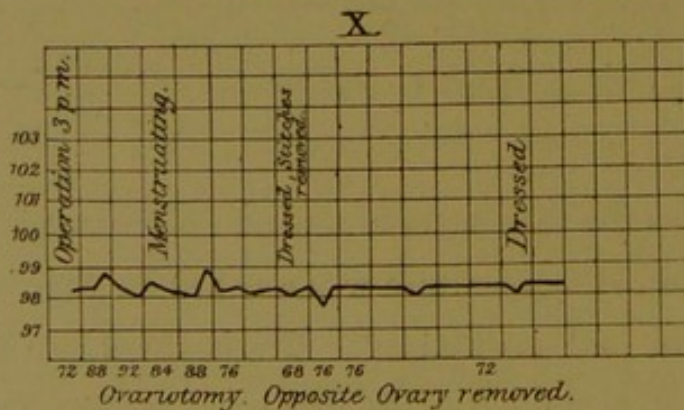
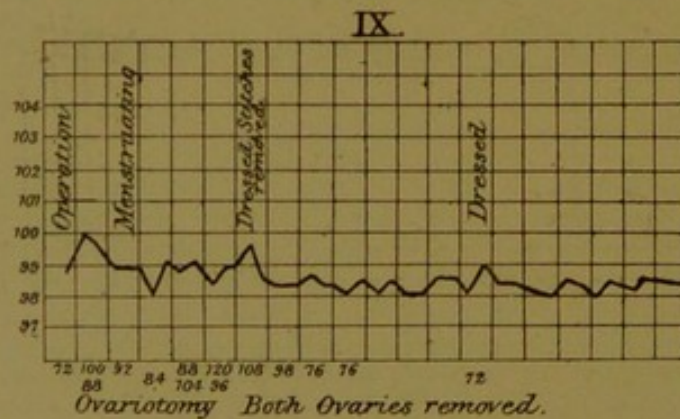


This shows the thermogram of a case of strangulated femoral hernia. Normal temperature was reached on the day following the operation and maintained. These cases are perhaps the best suited of all to this mode of treatment, the pads forming an excellent support to the parts. Several other similar thermograms might be adduced, but this may serve as a type for all

In the case here shown, a loose cartilage was removed from a knee-joint under the treatment described with all precautions,



and the wound treated by sawdust pads. Normal temperature was reached and maintained on the third day. No adhesions occurred in the joint, and the case ran a perfectly aseptic course.



Finding these cases do so exceedingly well, the same treatment was adopted as a dressing to ovarian cases, and these

thermograms show how well such cases will do under this treatment. In the first case normal temperature was reached and maintained on the third day. In the second the temperature never rose above normal at all, and as far as shown by the temperature the patient might not have undergone any operation at all. In each case both ovaries were removed, being found diseased.

Many other cases might be recorded similar to these, running aseptic courses by the means described. To economise space it may be sufficient to epitomise them in stating the cases of :—

	Highest temperature.	Became Normal in.
Resection of the knee	100·4°	
Double amputation of both forearms	101·4°	7 days.
Adenoma of breast	99°	
Femoral hernia	99·2°	2 „
Femoral hernia	Normal	
Ovariectomy	101°	4 „
Ovariectomy	100·4°	7 „
Scirrhus breast	100·4°	7 „
Amputation of forearm	99°	1 „

These are taken as showing the lowest temperatures, and in addition many compound fractures, ulcers of the leg, amputations of thigh, and various small operations on the fingers and toes, fatty tumours, osteotomies, &c., might be cited.

In conclusion it is necessary to observe that to obtain these results, and carry out the system of scab healing successfully, great time, attention, and skill are required. That like the Listerian antiseptic system, it requires great attention to details,

and constant practice ; that as the surgeon perfects himself in the skilful application of the pads, the drainage of the wound, and the proper support of flaps, so his cases will improve, and that long after he has succeeded in obtaining healing by scab in cases of amputation of legs and thighs and arms, he will yet fail in cases of fatty tumours, where the flaps are large and pendulous ; but still with patience he will succeed in draining these cases also, and procuring primary adhesion of the whole area of the flaps. This may, however, require the removal of elliptical portions of the skin, and thus removing the pendulous pockets for fluids to collect in. When the surgeon has thus perfected himself in the system it will come as a revelation to him, and he will be struck with the cleanliness, simplicity, and ease, and inexpensive character of the system, and it will strike him as remarkable at first to see the thin gummed edges of skin firmly adherent to each other, held by a thin line of scab, which retains the flaps firmly together, and only falls off when the wound is firmly healed. The tenacity of the scab in its power of binding the surfaces of skin together is surprising, and is shown by accidental circumstances such as the hitching of a pad to a stitch when at times the weight of a heavy pad may rest momentarily on a flap, apparently tearing it open, but the adhesiveness of the scab overcomes all accidents of this kind.

There is one absolutely essential point, and that is the scab must be kept dry. Wet alters its character entirely, even ointment will soften it and render it valueless, and no dressing seems to give such a perfect scab as the dressing here advocated, namely, pine sawdust pads.

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