ON DRY GANGRENE.

By E. CRISP, Esq., Surgeon.

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THE disease upon which I am about to treat, appears to me to have been but imperfectly investigated by the surgeons of this country; and, although many have cursorily alluded to it, I know of no record of cases, with the exception of Pott's, which can be referred to, and these are altogether deficient in pathological information. My attention was first directed to this subject in consequence of a case which I brought before the society some years since (published in *THE LANCET*, Jan. 2, 1836). As a long period has elapsed (six years), and as the case is one of great interest, I may, perhaps, be excused for again giving the outlines; indeed, such a repetition is necessary, for the purpose of rendering the subsequent history intelligible.

Jan. 31, 1835. I was requested to visit a girl, ætat. 22, who, after three or four days of great constitutional disturbance, had acute pain along the course of the arteries of the extremities. On the fifth day no pulsation could be discovered at the wrists, or within an inch of each clavicle. On the thirteenth day the dorsal artery of the left foot was pulseless, and there was but feeble pulsation in the popliteal. On the eighteenth day it ceased about three inches below Poupart's ligament. On the twenty-second day no pulsation in any of the arteries of the extremities. The cessation of pulse always preceded by intense pain. Dry gangrene occurred in both feet; and I amputated the left leg, below the knee, on the 1st of October, nine months from the commencement of the attack. *The blood did not flow from the large arteries per saltum.* At this time pulsation ceased about two inches below Poupart's ligament, in the left femoral artery, and it could be felt in the right as far as the triceps. Pulsation was entirely absent in the right upper extremity, and very feeble in the left.

Sloughing to a small extent occurred on the tibial side of the wound, but on the twentieth day the appearance was healthy.

February, 1838. A portion of the stump, about the size of half-a-crown, had not healed; it remained in an indolent state for ten months, when it became perfectly cicatrised, and she was soon able to use a wooden leg.

I have frequently seen the patient since the last report, and this morning, assisted by a medical friend, Mr. Webber, I made a very careful examination of the principal arteries of the body, and also ascertained the following particulars:—

She states that her health has been quite as good as before the attack; she has not been so subject to hysteria, but has had more headach; and her sight is somewhat impaired, especially towards night. She has menstruated regularly; has had no palpitation of the heart; appetite good; bowels regular; has sometimes walked a distance of two miles. The stump is always cold, and she was obliged to envelope it in cotton during the winter; the skin frequently has a purple tinge. The right foot and leg also cold; the latter, as well as the stump, often affected with chilblains, and the foot becomes oedematous sometimes towards evening. The arms and hands are below the natural temperature; the right arm frequently numb, and she has less muscular power in it than in the left. The sense of touch perfect. If slightly bruised, the skin on the arms becomes black. Perspires on the trunk and face profusely in warm weather; says "the perspiration is less on the right arm than on the left." No pulsation can be felt below the clavicle on the right side, and on the left it is extremely feeble; and sometimes imperceptible, both in the brachial and radial arteries. Pulsation ceases in the right femoral artery, about two inches below Poupart's ligament; and in the left about an inch and a half. The beat of the carotids is much reduced in force, 80.

The sounds of the heart are natural; "bruit de rape" is heard in all the plugged arteries.

A few months after this report (May) I visited her, with Messrs. Pilcher and Liston, and we found the arteries in the state last described.

Jan. 15, 1841. I again carefully examined the arteries, and found them in the state before mentioned, 1838. Slight bellows-sound is heard above the right clavicle. She states, "that her health has been better of late; and during the present cold weather she has less difficulty in keeping up the temperature of the limb than formerly." She was often obliged to place the foot upon a tin vessel containing hot water.

It will be remembered that the case was fully discussed, and very different opinions were expressed, as to the nature of the affection. Many gentlemen thought that the non-pulsation was occasioned by functional disturbance of the arteries; whilst others, including myself, believed that arteritis was the cause. I apprehend that all will now agree as to the correctness of the latter opinion. The subsequent history of the symptoms, as well as the occurrence of cases of a somewhat similar nature, in my own practice, and in the practice of others, will, I think, almost warrant a positive inference. Time will not allow me to touch upon the many points of physiological interest connected with this case; I will, therefore, proceed to enumerate examples in sup-

port of the opinion which I have long entertained, viz., that dry gangrene is, in the great majority of instances, the effect of arteritis.

The three following cases I attended in the poor-house, Walworth, during the illness of Mr. Lowne, the parochial surgeon:—

Mrs. Crown, ætat. 84, was admitted into the poor-house, Walworth, Jan. 29, 1840, with dry gangrene of the right great toe, extending as far as the second phalanx. The tips of the second and third toes were also black and gangrenous. She had, previous to the gangrenous appearance of the toes, suffered great pain. Ordered yeast poultices, and opium at bedtime. She died Feb. 19th. The gangrene did not extend from the time I first saw it, but she suffered intense pain, which was only relieved by large doses of opium.

I examined the anterior tibial, tarsal, and inner plantar arteries. The first, after its passage through the interosseous ligament, was hard and cylindrical; on cutting into it, a portion of lymph was found to occupy the caliber of the artery, to the extent of an inch, being firmly attached to the inner coat; this membrane, throughout its whole extent, was of an intense vermilion colour, containing, in various parts, bony and atheromatous deposit. About an inch before its termination it was quite impervious, from deposit of lymph, which had a cord-like feel, and must have existed for some time. The inner plantar artery was more healthy in appearance, but the lining membrane presented patches of intense redness.

The arteries were seen by Mr. Darvill, on the day after their removal, when the inner lining still exhibited the vermilion tint.

I was requested to see Susan Brown, poor-house, Walworth, Dec. 25, 1839. She for some days had been troubled with diarrhoea, attended with frequent pain in the abdomen; the motions profuse and watery; for about a month the bowels, at intervals, were in a relaxed state.

The treatment consisted in the administration of opiates and ipecacuanha, internally, with hot fomentations to the abdomen.

Jan. 25. She complained of excessive pain in the calves and fronts of both legs, extending into the hams, feet, and thighs; the pain, however, was much *more severe in the right*. There was no preternatural heat or swelling, but the pain was increased on pressure: it was so excruciating that she frequently screamed. This continued for a few days, when a black spot, of some extent, was observed on the outer side of the calf of the right leg; this increased till it was as large as the hand; it had a black, dry, shrivelled appearance. The foot and leg became cold, and the sensibility, on touch, was somewhat increased; the skin was of a livid mottled hue.

She died March 16. The pain, four weeks before her death, was much less acute; there was no *pulsation in the femoral artery*; the pulse at the wrist varied from 70 to 90; the temperature of the foot and leg, below the part first attacked, less than natural.

Autopsy Twenty-six Hours after Death.

Mr. Darvill present. The body rather emaciated; the right foot and two-thirds of the leg of a dark livid appearance; the foot and part of the leg quite black, but no sloughing has taken place. After examining the heart, about which there was nothing remarkable, we removed carefully the whole of the aorta, with the external iliac, femoral, popliteal, anterior and posterior tibial, and peroneal arteries, with the femoral vein, and the following appearances were observed:—

The caliber of the aorta rather larger than usual; its inner lining presented various patches, of a vermilion tint; the membrane darker than natural, with a few spots of atheromatous deposit; the femoral and popliteal arteries, with their veins, very large, having a cord-like feel; this arose from coagulated blood, of a light brickdust colour, very tough, and firm. The coagulum in the femoral artery commenced at the origin of the profunda; but here it was quite fibrinous, and firmly adherent to the artery; a portion projected into the canal, so as to form a sort of valve over the profunda, the opening of which was quite pervious. The anterior tibial artery contained a large quantity of fibrinous deposit; its inner lining very red; and at its lower third it was converted into a bony cylinder, about half an inch in length, between its inner and middle coats, not, however, rendering the canal impervious. The posterior tibial artery was filled with fibrinous coagulum, and its upper part, the middle third, contained a large quantity of ossific deposit; the peroneal artery was healthy.

In this case hot fomentations were used to the leg, followed by yeast poultices, with large doses of opium, internally, without which she obtained no sleep, in consequence of the severity of the pain.

Aug. 11, 1840, I visited at the poor-house, Walworth, J. B., ætat. 72, a brick-maker, of intemperate habits. He had been subject to rheumatism, and on Jan. 12th last he felt great pain in the calf and fore part of the right leg. He had been troubled with what he called a scorbutic eruption for some years; this eruption disappeared, and the inner part of the ankle became red; it soon put on a blackish appearance, and a large portion of the integument and muscle sloughed away, leaving a deep cavity. After this the pain ceased, and the wound remained stationary for some months, when it again became gangrenous; and he died August 12th.

Examined the leg with Mr. Lowne fourteen hours after death.—The right foot black, with slough upon the instep, and the whole inner side of the leg. The femoral artery contained various thin patches of bony deposit, and its caliber in some places was diminished. The popliteal was filled with coagulum, which at the lower part was dense, white, and firmly adherent to the artery. The anterior tibial was studded with numerous patches of ossific deposit, which in some places extended around the artery, and almost obliterated its canal. The lining membrane of the posterior tibial was in many places bony, and its lower portion nearly obliterated by a hard, white, fibrinous substance, which appeared organised: this was within an inch of the gangrenous part.

The pain in this case was very severe at first, but it subsided after a few weeks.

The treatment consisted in hot fomentations to the leg, and yeast poultices, with opium, at bedtime.

The arteries taken from the three last-mentioned patients are now in my possession, and may be seen by any member of the profession.

The late Mr. Bryant, of Kennington, was kind enough to furnish me with the following cases, which occurred under his care:—

In April, 1833, I attended Thomas Raugher, ætat. 78, when labouring under gangrene of the foot and leg. It commenced with slight discoloration of the foot, which gradually spread upwards, nearly as high as the middle of the leg, still showing a disposition to extend its boundaries; nothing like a line of separation between the dead and living parts being produced, although his powers were attempted to be sustained by nourishment, and the part excited to a healthy reparative action, by local stimuli; notwithstanding all, however, after the lapse of a fortnight, he became the subject of tetanus, and died.

On examining the limb, the femoral artery, throughout its extent, and the popliteal, to its division into the anterior and posterior tibial, were found plugged with adhesive matter, which in many parts was soft, and broken down, as if undergoing a suppurative action; the serous lining of the artery throughout its extent bearing all the characters of inflammation, if redness (quite a vermilion colour) can be considered to describe that state.

I know not whether others have seen tetanus supervene, or gangrene connected with such a state of vessel, but it has happened in three or four cases in my own practice to find such the termination of the case.

The second case is the one from which the preparation was taken which I exhibited at the London Medical Society.

It occurred to a man in the middle period of life, who became suddenly the subject of

gangrene of the foot and leg, not preceded by pain or inflammatory flush, but the part became discoloured, as in the other case, gradually extending, in spite of all that was done for him. The knee-joint became implicated, which produced so aggravated a state of constitutional irritation, as to destroy him.

The cause of mortification in this case was by no means obvious, although, from the manner in which it proceeded, I had but little doubt but obstruction existed to the supply of blood. On examination, this opinion was confirmed; the femoral artery was filled with adhesive matter, and the serous lining extremely red.

Mr. Linneear, of Aldermanbury, has favoured me with the following case, which he alluded to, some time since, at the London Medical Society.

J. J., sixty years of age, in descending a flight of stairs, struck the ends of two fingers against the story-post, which produced the sensation of numbness, but did not prevent him from going to his usual employment, that of foreman to a carrier. Three or four days after the receipt of the blow I saw him, and found the hand swelled, fingers livid, and very painful; no pulsation in either of the arteries of the forearm, but just above the bifurcation the pulsation was clearly felt in the brachial artery. On visiting him next day, I found the top joints of the fingers black and shrivelled: in a few days the thumb and the whole of the fingers, with the greater part of the hand, mortified. The usual remedies were used, but without avail; the man dying in about a month from the occurrence of the injury.

The body was examined by Mr. Stanley and assistants. The arteries of the arm were carefully examined, but no diseased appearance could be detected, with the exception of a few points of bony matter at the bifurcation of the brachial artery. *A small cord of fibrinous substance occupied the cavities of the ulnar and radial arteries*, but by no means obstructing the passage of the blood through them. The heart was apparently healthy; but a large pouch was formed in the aorta, at about the commencement of the arch. The liver was much diseased, being nearly all converted into a brain-like substance. A stricture was also found in the transverse arch of the colon, which would barely admit the top of the little finger.

I had been frequently in the habit of seeing this man, and feeling his pulse in the right arm (the arm affected), therefore the absence of pulsation must have been produced by the blow. The arm would have been amputated, had his general health been better. The post-mortem fully justified the course adopted.

I am indebted to Mr. Adams, of Broadstreet, formerly dresser to Mr. Green, St. Thomas's Hospital, for the following case

(which I have considerably abbreviated). It is interesting, as showing the similarity of gangrene produced by ligature, and the same disease when the result of arteritis from violence.

William Connor, ætat. 45, a strong, healthy countryman, was operated upon by Mr. Green, Sept. 5, 1834, for popliteal aneurism. On opening the sheath of the femoral vessels, a small artery was divided, which bled very freely, and it became necessary to enlarge the opening in the sheath to secure it. Mr. G. thought it prudent to employ two ligatures, and divide between them. Soon after the operation, the temperature of the leg and foot was much reduced.

On the 6th the foot presented a livid appearance, with loss of sensation; frequent pain in the leg, of a pricking and darting character.

7. The foot shrivelled; there are several purple spots on the surface; the veins turgid, and when emptied are slow in refilling; two broad blue stripes extending up the leg.

8. Slight sensation about two inches above the malleolus, increasing towards the tumour; the skin over which is so sensible, that the slightest touch produces excruciating pain.

10. The foot and leg present the appearance of a limb which had been in the dissecting-room for some time.

15. The leg almost black on the outer side, with numerous vesications; complains of a great deal of pain at one time, and at another is quite easy.

16. Sensation extends only to about the middle of the leg.

18. The mortification having spread during the night, and there being much swelling, heat, and redness above the knee, amputation of the upper part of the thigh was performed; *no satisfactory examination was made of the leg*; has gone on well.

Dec. 2. Stump quite healed; health good.

The treatment in this case consisted of nourishing diet, porter, opium, and ammonia, with poultices to the leg.

Mr. Bottomley, of Croydon, has furnished me with the following:—

Mary Mathews, aged 39, was confined February 8, 1838. Her general health during pregnancy was good, till within two months of her confinement, when she became subject to cough and great general debility, the probable result of cold, and the want of proper nutriment, she being only able to procure animal food once a-week, and then only a small quantity of bacon.

Her labour was expeditious: the child being diminutive, died twenty days after its birth. The mother continued to do well for ten days, when she became the subject of pleuritis, for which she was bled, leeches, and blistered, and recovered from the attack very speedily; but a few days after she

complained of a severe pain in the heel, taking a course towards the great toe. External appearance healthy; warmth of surface natural. Presuming it to be a severe neuralgic affection, the veratrine ointment was pretty plentifully applied; internally large doses of the acetate of morphia; fomentations, and a variety of external means, were used without benefit. After several weeks of suffering, a livid spot appeared on the inferior part of one of the toes; the temperature of the foot at the same time became gradually reduced, accompanied with diminished sensibility. The pain increased, and sensibility diminished; the livid spots increased in numbers, and became larger, till all the toes were perfectly black, and this went on till the foot and ankle became involved in the mortification. A line of demarcation was well defined about two inches above the ankle-joint. During this process she was well supplied with wine, beer, meat, &c.

Her health suffered so much, that the removal of the limb was deferred for some time; and it was not till the 2nd of May that her health was so far restored as to allow of the operation being performed.

Although the line was well defined (only two inches above the ankle-joint), the calf of the leg being tumefied and rather painful, and also as the cause of disease was constitutional, it was deemed advisable to amputate the limb above the knee. After its removal, upon seeing the vessels, *both femoral artery and vein were found completely plugged with semi-cartilaginous, transparent, elastic substance*. By way of security, a ligature was put upon the femoral artery, the stump dressed with but faint hopes of success. Upon the removal of the first application, adhesive inflammation had taken place at the angles: the integument and parts around the femur sloughed, denuding the end of the bone. After a few weeks a healthy action was set up, and it now became necessary to remove a still further portion of the femur, by taking away some of the unhealthy soft parts, and passing a long double-edged bistoury round the bone, retracting the integuments so as to saw off about an inch and a half. The integuments were again brought over the end of the bone, and the stump healed almost immediately. The patient quite recovered, and at this moment is in perfect health.

In addition to the foregoing, I might mention several related by Dupuytren,* Tossé,† Londe, Andral, and other French pathologists. A very interesting communication upon this subject is contained in the third volume of the "Medico-Chirurgical Transactions of Edinburgh," by Mr. J. W. Turner. Thirteen cases are related of absence of

* Leçons Orales, &c.

† Mélanges de Chirurgie Pratique.

pulse in the extremities from plugged arteries; some arose from violence, and several occurred spontaneously: the first bears much resemblance to Mary Champion. It occurred in a gentleman, 40 years of age. On the eighteenth day, after violent pain, pulsation ceased in the leg, and the twenty-second day in the arm; the former became gangrenous. The patient died, and on examination the arteries of the arm and leg were found to be impervious, being plugged by fibrinous coagula.

Mr. Solly, in the "Medico-Chirurgical Transactions" for 1839 and 1840, has recorded an extraordinary case of dry gangrene occurring in a child only three years old. The little patient lost the arms and legs, by spontaneous amputation, after eight months' suffering; the child, although apparently going on favourably for a few months, died. The four cavities of the heart, the primitive trunks, and the arch of the aorta, were filled with coagulated blood of a dark colour. Mr. Solly states, that "he is at a loss to account for the cause of the gangrene, there being little or no alteration in the arteries."

Mr. Bury, who first examined the child, says, "both femoral arteries were remarkably shrunk, being obviously much less in caliber than their veins, very pale, and were not patulous on division with the knife."

Mr. Liston, in a clinical lecture (LANCET, 1835), mentions a case of dry gangrene of the arm, with non-pulsation of the axillary artery.

John Hunter, in his work on the Blood (p. 27), relates a case of gangrene of the foot and leg which terminated fatally. The iliac and crural arteries were found filled with "strong coagulated blood."

In Dr. G. Burrows' Croonian Lectures (published in the "Medical Gazette"), two cases of gangrene of the foot occurring in St. Bartholomew's Hospital are related. In one, the femoral and iliac arteries were diminished in their caliber, and contained white fibrinous coagula. In the other case, coagula were found in the femoral and popliteal arteries, the former vessel was contracted, and its internal coat wrinkled.

Mr. Clarke, of Devizes, in the 19th volume of the same publication, has related a case of dry gangrene of the foot and leg, which he supposed to originate from disease of the heart; but the plugged state of the arteries, as well as the previous pain along their course, with absence of pulsation, I think clearly point out the existence of arteritis.

I could have abstracted many similar cases from the works of various authors, but the above are sufficient; and I will now go on to consider the causes, symptoms, and treatment of the disease. That these deposits of fibrine in the arteries are in many cases the result of inflammation, I think there is abundant evidence. When the de-

posit is situated (as in nearly all the cases I have related) high above the gangrenous parts, as well as in the contiguous vessels, the artery contracted and its inner coat corrugated, I believe the existence of inflammation is clearly proved. It may, I think, be laid down as an established fact, that blood will not coagulate in a healthy artery.

John Hunter, in speaking of the case before alluded to, says—"We may thence infer that the tendency to mortification in the vessels produced this disposition in the blood, if the coagulation should have been supposed to have arisen from the blood being stopped in the large vessels at the mortified part. Let us reflect that this cannot account for it; the same thing ought then to happen in amputation, or in any case where the larger vessels are tied up." He adds, afterwards, that "rest does not of itself at least assist the coagulation of the blood."

That bony deposit alone is sufficient to produce the disease, the innumerable cases of ossified arteries in old people fully disprove. How common an occurrence is it to find the arteries of the extremities converted into bony cylinders, and how comparatively rare is the disease in question. I am inclined, however, to believe, that the ossific deposit may often act as the exciting cause of inflammation, in consequence of the inner membrane of the artery (which in these cases is extremely brittle) becoming partially detached, perhaps from a slight blow, or from increased muscular action. The great toe (where the disease so often commences) being particularly exposed to both these causes. This opinion is further strengthened by several cases of arteritis and gangrene, which have followed the rupture of the serous coat of the vessel from external injury.

Morgagni* says, that "persons subject to gout and rheumatism are most liable to be affected with the disease;" and this opinion has been confirmed by Pott and other writers. In addition to the above, many of the predisposing and exciting causes of inflammation in general may be enumerated. The old are much more subject to the disease than the young, but the cases among the latter are far from unfrequent.

Dr. Carswell† says, "It is stated by some pathologists that this form of mortification sometimes occurs in young persons, and is much more frequently met with in males than in females. The former statement we believe to be an error originating in an imperfect knowledge of this disease; for as we have ourselves never seen it in young persons, and as this statement has not been supported by other than mere negative facts, and these, too, very incomplete, we must

* De Sedibus et Causis Morborum.

† Dr. Carswell, "Cyclopædia of Practical Medicine."

continue to regard it as a disease peculiar to persons advanced in life, and occasioned by morbid states of the arterial system, which occur only in such persons, at least to such an extent as to produce local death."

The cases which I referred to, however, completely invalidate this assertion. I can scarcely suppose that functional disturbance of the ganglionic nerves can have any effect in producing the disease, those afflicted with brainular and nervous lesions not being more liable to the malady. The ossific condition of the vessels throughout the system before mentioned, also tends to show how little the function of the arteries is directly affected by nervous influence.

The symptoms of this affection vary somewhat according to the age of the patient; the disease in the young and middle-aged being generally of an acute character, and more diffused; there is also at the commencement great constitutional disturbance, with heat of skin, quick pulse, and disposition to fainting; acute pain along the course of the affected vessels, increased on pressure; this succeeded by absence of pulsation some distance above the gangrenous parts. *The throbbing of the arteries mentioned by some writers I have not met with.*

In the old the disease is more circumscribed, slower in its progress, and attended with less constitutional disturbance. "The gangrene, in the great majority of cases," says Pott,* "is frequently preceded by great uneasiness, and those subject to flying pains in the feet are more liable to it." *In all the patients which I have seen, the gangrene has been preceded by acute pains, which greatly subsided towards the termination of the disease.* There are some cases recorded, however, where pain has been absent.

If I am correct in my views respecting the proximate cause of the disease, the curative measures must in the first stage be directed to the subduing of the inflammatory action. This, in the young and plethoric, can best be effected by the use of the lancet, or the application of leeches along the course of the arteries; hot fomentations will, I believe, also be found serviceable. Opium I think the most important of the internal remedies. In the second stage, the use of a nourishing diet, with tonics, may be had recourse to. With respect to depletion in the aged (where the disease is of a more subacute character), my experience does not enable me to offer an opinion. Dupuytren,† however, says, "that after abandoning the stimulating treatment, and pursuing the antiphlogistic, he was enabled to relieve and cure three-fourths of his patients." Pott gave bark a fair trial, and came to the conclusion that it was entirely useless. He thought highly of opium, and preferred soothing applications to stimulant.

The propriety of amputation (I speak only of the young) must be left to the discretion of the surgeon. The three cases which I have recorded show that it may succeed under very disadvantageous circumstances. In my own patient many prognosticated an unfavourable result, and wished to dissuade me from the attempt.

I must now bring this imperfect sketch to a conclusion; my object has been to show, 1st, that dry gangrene is not a disease confined to old people; 2nd, that it is generally the result of arteritis of an acute or chronic character, producing coagulation of the blood, deposits of fibrine, and consequent obstruction to the circulation; and, lastly, that the stimulating treatment, so frequently pursued in the first stage of the disease, is highly injurious.

Since the above was written, a communication upon this subject, by Professor Syme, has appeared in the first number of the "Edinburgh Monthly Journal of Medical Science." I am pleased to find that his views respecting the treatment of this disease are similar to my own. He mentions the case of a woman who laboured under dry gangrene of the foot: for the first week she was treated in the usual manner; all stimulants were then withdrawn, and a strictly farinaceous diet enjoined, with water for drink, and a simple poultice to the foot. The sores healed kindly, and presented on each side of the foot a no less seemly cicatrix, than if a skilful amputation had been performed. The starving plan was then abandoned; and the poor old woman, after subsisting on bread and water for upwards of four months, was allowed the usual diet of the hospital.

Mr. S. says, "I have uniformly observed that, whether the patient was stimulated by an additional allowance of food and wine, or was permitted merely to continue his ordinary diet, the sloughing action prevailed in opposition to every sort of soothing application that could be tried locally; but when the starving plan was adopted, and the patient restricted to vegetable articles of support, the redness has quickly disappeared, the pain has gradually decreased, and the sloughs, ceasing to extend, have been detached from a subjacent healing surface of granulation, which before long formed a sound cicatrix. The only means employed on such occasions, in addition to the vegetable regimen, have been linseed poultices; and the muriate of morphia given freely, either solid or in solution, so long as the nocturnal pains continued. It may be added, that no inconvenience has ever been sustained, to my knowledge, either from adopting the spare system, or resuming the ordinary one, even when the age of the patient was beyond eighty years."

* On Dry Gangrene. † Leçons Orales.