OBSERVATIONS

ON

HÆMORRHAGE AND EXFOLIATION AFTER AMPUTATION.

By JOHN JESSE, Esq., F.R.S., &c. &c.

[Read before the Manchester Medical Society, Jan. 3, 1844.]

GENTLEMEN,—The operation of amputation is of so common occurrence, and one so universally performed by gentlemen not connected with public institutions, that I am induced to lay before the society some of my observations respecting it, less with the view of offering anything new, than the hope of eliciting information from the experience and talent of those by whom I am surrounded.

It was a remark of a distinguished friend of mine, that surgical opinions should be condensed as much as possible under distinct heads, and I am induced, on the present occasion, to comply with his view, for two reasons—first, it condenses what I have to offer to your notice, and I fear many will think brevity my only excellence; and, secondly, it affords more ample time for the expression of opinion and discussion.

Few operations are more common than amputation; the facility of performing it, and, as a whole, its general success, have reconciled the public opinion to its performance. It must never, however, be forgotten that it is horrible to bear, dreadful to behold; it mutilates the patient for life, and occasionally is followed by fatal consequences. To two conditions of the patient after amputation I shall confine my observations, and both these states are important—hæmorrhage and exfoliation. The former of these conditions may place life in immediate jeopardy at any period of the case; and the latter, by undermining the constitution, prove equally fatal after protracted suffering. We will commence with hæmorrhage, of which I shall notice nine varieties.

1. Hæmorrhage at the time of operation, after all the arteries are tied, and arising from mechanical obstruction to venous circulation, without disease.
2. Venous hæmorrhage from disease of the veins.
3. Hæmorrhage from diseased vessels at the time of operation.
4. Hæmorrhage from the same cause at any period after.
5. Oozing.
6. Hæmorrhage within twenty-four hours.
7. Hæmorrhage occurring at any period after four days.
8. From sloughing.
9. From peculiarities in the vessels.

I do not mean to say that under these heads all the varieties of hæmorrhage are included, and I wish it to be distinctly understood that no condition of the patient is mentioned which I have not myself witnessed.

I. Hæmorrhage at the time of operation, after the arteries are secured, may arise from undue pressure on the surrounding muscles by retraction of the fascia, above the extremity of the stump. The consequence of this is that the veins bleed, and in sufficient quantity to produce serious annoyance. In some cases where this took place the fascia was said to produce

the evil, but I must say the skin appeared in some cases to have its full share in producing the effect. I will just cite two cases where amputation was performed for the relief of accidental injury.

CASE I.—A fine young man, aged twenty-five years, had the thigh amputated rather above the lower third of the limb; after securing the vessels and slackening the tourniquet, venous blood poured freely from the stump; a sponge was held to it, which quickly filled, and, on removal, blood (venous) ran freely from the lower extremity of the stump, which was now observed to assume a peculiar appearance. The muscles protruded, and seemed as if grasped by a firm ligature an inch and a half above the end of the stump. An incision, three inches long, on the outer side, directly upwards towards the trochanter major, was made through the skin and fascia; the uncomfortable appearance of the muscles disappeared, and the hæmorrhage immediately ceased. He recovered rapidly, and without any other untoward occurrence.

CASE II.—A man, aged twenty-nine years, had his left forearm removed for a gun-shot injury; he was a fine athletic man (not averse to occasional boxing, and a poacher), and met with the accident whilst out shooting. The hand and wrist were severely injured; it was requisite to remove them, which was done about the middle of the forearm. In this case the fascia and skin, by retracting, produced hæmorrhage of venous blood; an incision through the skin and fascia, between two and three inches long, was made, an inch from the radius and parallel to it. The bleeding ceased and the man recovered. This species of hæmorrhage is sometimes produced by the roller being applied too tight, more especially in operations for accident; in these cases the stump usually swells much more than in operations for disease; on its removal the bleeding ceases. For the first few visits it is always prudent to examine the state of the bandage; if it feels tight, a director can be slipped under, and the scissors readily remove the pressure, which, if it cause no hæmorrhage, may create other and very serious injury.

II. It sometimes happens that a diseased state of the coats or valves of the veins gives rise to hæmorrhage; this is always a disagreeable state, as, if pressure fails, there is no alternative but the ligature. Veins very frequently heal, and the ligature comes away without inconvenience, but this is by no means always the case. In some instances the internal membrane inflames; this state spreads rapidly up the canal, and the patient dies.

CASE III.—A man, upwards of fifty years of age, had his left thigh removed for a diseased tibia; the vein bled and was tied; he died in six days. The femoral vein was of a dark-red purple color, and this state extended upwards to within an inch of the vena cava. The stump was healthy, and the viscera of the abdomen and thorax healthy. His previous health was moderately good.

The symptoms were a very feeble and rapid pulse; a dry, brown tongue; the skin cooler than natural; he appeared to sink from exhaustion; he lost very little blood during the operation, none after; and no evacuation took place to account for the debility.

CASE IV.—A boy, fifteen years of age, had his

thigh removed for diseased knee, and the vein was tied. At the end of three days he had a dull pain in the groin; there was a slight red purple blush, acutely painful when touched; a feeble, rapid pulse; tongue coated and brown; the skin dry, and little, if at all, above the natural temperature. He had been in previous good general health, had no cough or disorder of the digestive organs. The disease of the knee was attributed to a strain. A lotion of spirits of wine and rose water was applied to the thigh; he took a mixture, of which liq. ammon. acet. was the essential ingredient; sago, arrow-root, and rice. At the end of a week his skin was moist, the tongue began to clean, and from this period nothing unfavorable took place. At the end of three weeks all the ligatures came away, and the stump was firmly healed at the end of a month. May we not suppose that the inflammation did not extend beyond Poupert's ligament, and that this was a fortunate escape? Whatever view we take of this morbid condition of a vein, we have ever a fearful antagonist; taking all the cases I have witnessed, there appears an analogy to erysipelas when accompanied with typhoid symptoms. It is a rule with me never to tie a vein unless driven to the necessity, and ever to regard the case with anxious feelings. I admit having tied veins; I have several times seen the femoral and brachial veins tied, and known the internal jugular tied successfully, but the proportion of cases where doubtful symptoms have arisen leaves the practice as a question of necessity.

III. Hæmorrhage may occur at the time of operation from the circumstance of the vessels being, from disease, incapable of sustaining the action of the ligature; and this alarming condition is best seen in the artery where calcareous deposit has rendered part, or the entire calibre of the vessel, brittle. I refer you to preparations on the table, and will just state a case.

CASE V.—A man, forty-nine years of age, had a diseased ankle; amputation was performed at that point which allows the stump to be bent, and the patient to walk on the knee. The posterior tibial artery was laid hold of, the end came away; a second attempt was made, and the ligature cut the end off. The anterior tibial artery was now examined—found healthy and tied, as also the fibular. A very attentive examination of the posterior tibial artery was now made, and, as far as it could be examined, it was found to be diseased; a needle was carried round it, with a portion of muscle, care being taken to avoid the nerve, and the ligature was cautiously tightened; a thick, firm slice of sponge, well compressed, was placed on this part of the stump, and the edges drawn firmly together; a large opiate was given; an attentive watch kept, with cold applications to the limb. No secondary bleeding took place, and the man recovered. The stump was long in healing, ten weeks elapsing before it finally closed. At the end of four weeks the sponge was reduced, a small bit being cut away with the scissors every dressing, and at the end of six weeks very little remained; difficulty was at this period experienced in getting the remainder of the sponge away, the granulation seemed inclined to take possession of it. The stump was a good one, and perfectly well at the expiration of ten weeks. Were secondary hæmorrhage to occur in

such a case, it would be advisable, at all events, to examine the state of the femoral artery, and if it appeared and felt undiseased, to tie it; this would give time for the formation of a plug, and probably prevent further anxiety.

V. After the removal of a limb, oozing, to a greater or less degree, may be expected. It would be difficult to conceive a case where no discharge of this kind took place, although it must be admitted in some instances the quantity is minute. In amputation from disease the condition of the muscular and other tissues is favorable to very small discharges of blood; but in primary operations done on healthy subjects for accidents the reverse takes place, and in the plenitude of strength and health we must not be surprised if this discharge continues for hours; if not profuse, it is of no serious consequence. In secondary amputation, or that for disease, it is occasionally so slight as scarcely to stain the bandage, but this seldom applies to the primary operation. When the quantity of blood lost by oozing is only a few ounces, it is of no consequence, provided the pulse does not rise rapidly, which seldom occurs, except in those rare cases where the constitution is obnoxious to loss of blood. If the previous condition of the patient is such as to render a small loss of blood a serious affair especial care should be taken, prior to dressing the stump, to obviate the possibility of material hæmorrhage. This is best accomplished by getting up the arterial action, by giving warm wine, brandy, and other stimulants, a warm sponge being held to the stump, and renewed from time to time till the pulsation of the secured vessels on the stump be clearly seen. The dressing may then proceed, and the occurrence of secondary hæmorrhage will be rare. When the previous debility is great, long delay is inadmissible, and the patient had better be laid on his bed, and the dressing delayed for an hour or more till the arterial action gets fairly up; if any small muscular branch has been overlooked, it can easily be tied. Profuse oozing may be caused by over-stimulation. A man had his right arm removed about the middle; that same morning after the operation he got drunk, sat up in bed, and smoked his pipe; when I saw him at two, p.m., he had lost five or six ounces of blood; the stump was covered with more lint, and a second bandage over all; an opiate was given; he needed nothing more, and recovered well.

VI. At any period bleeding may take place; it is most common within the first twenty-four hours, and if in quantity, it renders the opening of the stump a matter of absolute necessity. This is always a disagreeable affair; a few hours having elapsed, the divided muscles become exquisitely sensitive, and the agony of opening and sponging the stump proportionably great. The chance of union by the first intention is diminished in exact proportion as the tendency to suppuration and granulation is excited by this occurrence. When I have been compelled to open a stump, I use the tourniquet only where there has been much loss; compression of the vessel by an assistant is the better plan, if you can rely upon him. Get the dressings off as quickly as possible, and as the stump opens, look out for a clot; gently draw it away and have the self-acting spring forceps ready to seize the vessel. It rarely happens there are more than

one, unless a ligature has come off from imperfect tying, or a vessel given way from disease.

VII. Permit me now to call your attention to a most important part of the subject, hæmorrhage at any period after five days; for in these cases consummate pathological and accurate anatomical knowledge are essential to the safety of the patient. The usual time for the separation of the vessels is from ten to twenty days, and at any intermediate period hæmorrhage may come on or at a much earlier period from ulceration of the vessel. When this is the case, it is desirable to ascertain if a ligature is loose; if so it should be drawn away, and the knot examined; if it be found too tight, the inference is that it was properly applied; and if the operator has placed a knot at the inferior end of the ligature, so as to distinguish the vessel, the information will be valuable (especially in the case of the profunda femoris).

Immediate and vigorous steps must be taken; there are a variety of means—ice, opiates, lint, charpie, sponge, pressure, and securing the trunk whence the vessel arises. All the circumstances of the case must be taken into consideration; however valuable cold may be, its use has a limit, and if there be any tendency to pulmonary disease, it is scarcely admissible. The application of lint, sponge, &c., must be combined with pressure; and how far the new union will bear it is a grave question. The chance, also, of protrusion of bone is another very serious objection.

If two or three ligatures come away at the time of hæmorrhage, and it be not very profuse, a coarse calico bandage (for they are the most elastic) should be rolled from the extremity of the stump to nine or more inches, if convenient, above it, making, during its application, as much pressure as is prudent. This will serve a twofold purpose; by its uniformly exerted pressure, it will compress all the vessels to a certain extent, and afford a firm hold to straps of adhesive plaster, after a sponge or other compress has been placed opposite the part of the stump whence the bleeding has proceeded. Should the bleeding have been profuse, the conclusion is that a large vessel is the source, if not the main artery; and on this point my mind is made up, viz., to secure the trunk higher up, and above the source of collateral hæmorrhage, for anastomosis is scarcely to be thought of. It may be urged that a second operation is very undesirable; no one will deny this, but I am quite sure the evil is a trifle, compared to what may follow without it. To prevent being misunderstood, in hæmorrhage from the leg the femoral artery is to be secured at the same spot as for aneurysm; if from the thigh, the inguinal; if the forearm, the brachial, &c.

CASE VII.—A boy, fourteen years of age, had his left thigh amputated for disease of the knee of five years' duration. All went well to the twelfth day, and as the stump had nearly healed, and only one ligature remained at this period, it was pulled at (the profunda), and the application was followed by a gush of blood; a bit of lint placed on the spot stopped the further progress, and straps of plaster retained all in due position. Three days afterwards it was dressed, and very cautiously; the spot where the ligature remained had ulcerated, and the moment the lint came off it was followed by a stream of arterial blood, which trickled quickly down. The operator enlarged the

wound in the direction of the stream, and endeavoured, with the tenaculum, to seize the end of the vessel, but in vain; the patient became very faint, and the bleeding ceased. It was hoped the tenaculum had reached the bleeding vessel, and a ligature, which was applied, would remedy the evil. In a few hours he rallied; again the bleeding was renewed, the tourniquet was applied, lint was crammed into the wound, and the stump dressed. After a few hours he again bled, and the same scene of misery was renewed, and twenty days after the operation, and eight from the first hæmorrhage, he died.

CASE VIII.—A man of middle age had his leg (left) removed for a machinery accident. In this case the stump went on indifferently well. I saw him at the end of three weeks; he had sustained five or six hæmorrhages; pressure with sponge had been made with partial success. The tibia was threatening to protrude; the upper point was covered with a very thin portion of skin of an inflamed color, and the general aspect of the stump was not favorable to further compression. I urged the necessity of applying a ligature to the femoral artery; it was done, and he bled no more. His recovery was perfect but slow.

CASE IX.—A lad, aged sixteen, had his right arm removed close to the joint, for an injury of the arm. On the tenth day he had a sudden and fearful hæmorrhage. He was seen half an hour after; he was pulseless, but breathing, and the expression one of great anxiety. Nothing was disturbed; as he lay an incision was made, and the subclavian tied where it passes over the rib. He rallied, lived; the last ligature came away in twenty-three days; the stump was a fair one. What has been said on this division applies equally to the sloughing stump. When this state occurs after the operation for crushed or lacerated limbs, the ligature higher up has a fair chance, for the injury is local. In the anxiety to lessen as much as possible mutilation, more of the injured limb is often spared than is desirable; but the death of injured parts implies no particular injury of the constitution; hence these cases usually do well. Where sloughing is the result of constitutional disorder, the patient's chance is less favorable. In these melancholy cases, piece after piece of cellular tissue and muscle comes away, leaving a sloughy surface, and hæmorrhage often closes the scene. Even where the constitution is able to support the securing of the trunk of the vessel, and to brave the discharge, still you have, at the close of an anxious case, an ill-formed stump, and a constitution assuredly no better for the struggle. Partial, or even entire, mortification of the stump is by no means always followed by hæmorrhage.

CASE X.—A man, aged sixty-nine, had his left thigh removed for diseased tibia. All did well till the fifth day; he then exhibited signs of constitutional irritation; his pulse became rapid and feeble, the tongue dry. The next day sloughing of the stump began, and rapidly extended; at the end of three days more two-thirds of the stump were involved, and on the twelfth day he died. The last two days he was unconscious. There was no hæmorrhage.

CASE XI.—There is a preparation on the table illustrating a case where both feet came away from mortification, one at the ankle, the other below the knee, yet bleeding had no share in destroying the

unfortunate sufferer. He was only thirty-five years of age; nine years before he had a bad fever of the continued kind, from which he never entirely recovered, and the circulation in the lower limbs was ever after feeble. No particular pain or illness preceded the final disaster; the limbs were unusually cold. He went to bed, and in a few hours the changed appearance excited alarm. He lived near six weeks; both feet came off, one above the ankle, the other below the knee. Stupor came on a day or two before the closing of existence.

CASE XII.—A man, aged sixty, had his right thigh removed for disease of the knee; he was subject to epilepsy. Sloughing came on, and he died on the thirteenth day; there was no hæmorrhage. I removed the artery. You will observe the beautiful effort nature made in this case to preserve the patient.

There is yet one more form of hæmorrhage always troublesome, and sometimes dangerous, and this may arise either from the number or peculiarities of the vessels. If the main artery of a limb be tied, and in the course of a few days it be necessary to amputate, the smaller vessels, especially the inosculating, are then enlarged and active, and bleed profusely. The stump shows a very unusual number of vessels.

CASE XIII.—There is a portion of the brachial artery on the table. The vessel had been punctured in bleeding; diffused aneurysm followed; the sac was opened, and the vessel secured. At the end of a week it was requisite to amputate. The patient was but a youth, eighteen years of age. Ten ligatures were applied; cold and moderate pressure checked a profuse oozing, which was going on when the dressings were applied. He lost no more blood after he was put to bed; he died three days after of irritative fever.

CASE XIV.—A lad, fourteen years of age, had the third finger of his left hand removed about the middle of the third phalanx; it was done with the scalpel and nippers. The vessels bled most profusely; before a tenaculum could be got he lost about eight ounces of blood. The two arteries were tied; they appeared as large as radial arteries. The finger had been crushed by machinery, and he was losing blood when he came. I have never seen a lad nearer destroyed by hæmorrhage; he was ten days before he recovered from the effects. The finger healed slowly.

CASE XV.—I have seen one instance where the medullary artery of the tibia bled very profusely; this small vessel projected blood twelve to fourteen inches from the stump, and with a perseverance which indicated some trouble. The end of the vessel could not be seized either with the tenaculum or forceps; a small plug of lint, dipped in muriated tincture of iron, was pushed into the aperture, whence the blood gushed. No bad consequences followed; it healed rapidly; the stump was all that could be desired. The patient was about forty years of age, and lost the limb for diseased ankle.

Necrosis.—Few circumstances are more vexatious to a surgeon than necrosis following amputation. So surely as it is known to exist, as certainly the friends complain, and the operator comes in for an ample share of reproach. Now, it is our duty to repress these bad feelings, which have so unhappily crept into society; and public opinion, however erroneous, in our profession can only be combated one way, viz.,

by an open and manly explanation of the pathology of the case. We all know neither adroitness in operating nor skill in prescribing can prevent this termination in some cases. It has often been supposed to be caused by insufficient covering of muscular fibre, or from too great pressure made in dressing, the action of the saw, or proximity of pus. Necrosis does, however, occur without any of these causes, and I have known it to produce fatal consequences without being suspected.

There are five varieties:—

1. Scales, either partly or entirely surrounding the end of the bone, separating and leaving a granula surface, usually easily cicatrising.

2. Solid spiculæ, involving part of the end of the bone.

3. Involving the whole end, and part of the shaft.

4. The whole shaft.

5. The concealed variety.

I purpose to illustrate my meaning by preparations and cases, and will trespass on your patience as short a period as possible, having selected as few cases as is consistent with perspicuity.

When there is no protrusion, the first intimation of necrosis is a dark discharge on the dressing, opposite to the spot where the bone lies; and after all ligatures have come away, this point does not heal, and on introducing a probe it grates on the bone, which is felt bare. Occasionally this discharge occurs, the bone slowly granulates, and the parts heal; but this is not generally the case. In many instances the bone, or a portion of it, becomes external either by passing through the wound or making its way by ulceration through the skin. The most favorable cases of necrosis are those where a small part of the end of the bone only is exposed, for we may then hope a scale only will exfoliate, and in this state of the disease it is better to do as little as possible, merely keeping the part clean and covered with lint spread with cerate of wax and oil. There is a great difference between a separating and separated bone. While the portion about to detach is firm, it is prudent to be cautious how we disturb it; but when loose, it cannot be too soon removed. Any attempt to shake or prematurely disturb the piece is only to interfere with the operations of nature and to convert a chronic into an acute case at the risk of extending the sequestrum, and without the slightest chance of accelerating the cure. When a scale comes away, the surface beneath is usually granular, and heals in a moderate time. Of this variety there are two specimens, and, under the same glass, one of the solid exfoliations coming away three months after the operation, and healing perfectly ten days after. These are minor varieties of a very serious disease, when it proceeds to any extent up the shaft of the bone, for then the constitution is hard pushed, and a long and doubtful struggle for life is the result; and that these cases do not always end as we could hope, the specimens before us testify (the preparations). The length of time required for the separation of a large portion of the shaft is so various, that an approximate time can scarcely be fixed, and much will depend on previous habit and constitution. The plan of treatment is very simple and uniform. There are two leading indications—first, to keep down, as much as

possible, local and constitutional irritation ; secondly, to support the strength. With regard to the stump, I usually dress it with white wax, softened with olive oil, leaving the bone, if it protrudes, uncovered, and wrap round it dry soft lint, with a view to absorb moisture. When the bone protrudes much, and is troublesome, and provided the patient can bear it, to be held by a large pair of nippers ; the end can then be sawn off. It reduces the mass, and makes the patient more comfortable. I consider this plan to be right, on the principle that the bone must have been separated before it protruded to any considerable extent ; and our inability to draw the whole away is, in my opinion, no argument against reducing the mass, nor in those cases where there is protrusion from retraction of the muscles, &c., when the patient can bear the bone to be firmly held without suffering.

The top of the sequestrum may be larger than its inferior portion, and it then makes its way slowly down. There is a preparation on the table taken from a boy, whose thigh was removed ; the bone protruded, and I pursued this plan ; his recovery was slow but perfect. The dates of the removal of the portions are on the paper within the glass bell ; these portions were removed with a metacarpal saw, the blade was a very fine one and the teeth good. In one of the preparations you will observe a tendency to separate at the apophyses of the bone ; had the patient lived this would have been a terrible affair. There is another preparation on the table of very great interest, and although not exactly derived from amputation, bears directly on our present subject, and the vast importance of the case will, I trust, form an apology for introducing it. The preparation is the upper portion of the shaft of the humerus of a boy twelve years of age ; he had fever with acute abscess of the shoulder, which burst, and a large quantity of matter was discharged. In three weeks the shaft separated from its apophyses, and the question as to amputation was argued. There was an opening an inch below the acromion leading directly to the bone ; I made an incision from this opening directly downwards ; the end of the shaft was then pushed through the wound just as if it were a compound fracture, and the end sawn off ; no exfoliation followed. I dressed it as a simple wound with spread lint, and in a week with a tailed bandage ; afterwards with a common roller ; the arm hung in a sling ; no splints or apparatus was applied. He got well, could use the arm without pain, and easily raise it to right angles with the body.

Concealed Necrosis.—The last preparation I beg to call your attention to, is one where a man, aged fifty, recovered after amputation for a diseased knee ; the stump healed, and he was quite well in five weeks. He did not, however, recover his health ; his appetite was precarious, he slept poorly, and continued to emaciate ; the belly became tympanitic, and in four months he died. On inspection the viscera of the abdomen and thorax were found healthy, and the union of the stump was excellent ; the femur was necrosed. I was allowed only to remove a small peice, which I now have the honor of showing the society.

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DEATH OF SIR FRANCIS BURDETT.

The death of this kind-hearted old man tempts us to make one or two observations on the inconsistencies displayed by those who desert the rational and well-educated physician and place implicit confidence in the delusions of quackery.

We learn that, during the last autumn, Sir Francis placed himself under the care of an hydropathist, who keeps an establishment in the neighbourhood of London, and who assured him that if he adopted the so-called water-cure he would be relieved of all future apprehensions of the gout. Notwithstanding the failure of this prediction—for Sir Francis had an attack of the old complaint in December—he persevered in the cold water treatment, and it is said was so absorbed in it that he actually rode out on horseback wrapped in wet towels. Under this foolish discipline he became reduced to a state of considerable debility, when, in the middle of January, the death of Lady Burdett, his faithful companion for half a century, gave the finishing blow to his vital powers. He never held up his head afterwards. His heart became feeble in its action, and incapable of relieving itself from the blood poured into it ; the lungs consequently became engorged ; this naturally produced hæmorrhage ; the vital powers never rallied, and delirium and death soon followed in inevitable sequence.

On the occurrence of the above alarming chest symptoms, his family, naturally and reasonably alarmed, insisted on the discontinuance of the water system, and urged the necessity of regular medical aid. But even now two invaluable days were wasted ; for Sir Francis insisted on seeing a homœopath, whose silly inanities usurped the place of active invigorative treatment. After this the efforts of medicine were fruitless.

Estimable as this fine old English gentleman was in all the relations of private life, he was an instance that neither a vigorous understanding nor a refined education are proof against delusion of all kinds. And it requires but little trouble to prove by his example how contrary to common sense is the practice of those who are addicted to quackery. Their belief is a blind credulity, led by an excited fancy. It is supported neither by fact nor argument, and, therefore, cannot be shaken by them, however palpable. If any argument whatever tells against quackery, it is this.

The persons who indulge in it seldom or never confine their belief to one particular sect or panacea