

siderable than it was yesterday, if I did not bring into use a proceeding which enables us to have complete control over the hemorrhage. The patient, who has just been laid on the operating-table, has almost total necrosis of both tibiae, the result of acute osteo-myelitis, which followed a severe cold more than twenty years ago. You see that on the anterior surface of the leg there are numerous fistulous openings, which give exit to much pus, and through which the probe everywhere reaches rough movable bone. On examining the legs, you feel that the bones are enormously thickened; and, from the long duration of the morbid process, we may safely assume that the thickened bone which encloses the dead bone (the sequestrum) must also be remarkably hard. The position of the sinuses, which, as you see, are distributed nearly from the upper to the lower epiphyses, leads to the inference that large portions of both diaphyses have died; and from the different depths at which the probe introduced into the fistulous openings reaches the dead bone, it may be concluded that the necrosis has advanced more deeply in some parts than in others. I leave a probe sticking in each of the fistulous openings, and make intermitting pressure on the sequestrum with the upper probe. You see how both probes move together, and hence you may draw the conclusion that the whole sequestrum is movable and forms one connected piece. To remove it, the thickened bone which encloses it must be laid open in its whole extent; and, to ensure the perfect healing of the large wound, I consider it best to convert the openings in the bone into one large trough, by removing the entire anterior wall, thus leaving nowhere any cloacæ which may delay the healing process.

Those of you who have previously seen such operations, will remember with how great loss of blood they were attended, and how difficult and protracted their performance was rendered by the hemorrhage. Our patient is in tolerably good condition, and not exactly anæmic; but I believe that at an earlier time I should have decided not to operate on both legs at once, because I should have feared to place the patient's life in too great danger from loss of blood. With the help of the proceeding which I will now show you, I have no hesitation in operating on both necroses simultaneously, thereby sparing the patient the repetition of the operation and of long confinement to bed. My assistant, Dr. Peterson, will operate on the right leg, at the same time and in the same manner as I shall on the left. While the patient is being chloroformed, we wrap the leg in waterproof varnished tissue-paper, so that the pus from the sinuses may not soil the bandages; then, with these elastic bandages, made of India-rubber webbing, we envelop each leg from the tips of the toes to above the knee, and, by equal compression, force the blood out of the vessels of the limb. Immediately above the knee, where the bandage ends, we apply this piece of India-rubber tubing four or five times round the thigh, drawing it very tight, and fastening the hooks which you see at one end to the brass rings at the other. The India-rubber tubing compresses all the soft parts, including the arteries, so completely that

not a drop of blood can pass into the part which has been tied off. It has this advantage over all tourniquets, that you can apply it to any part of the limb, and need not give yourself any trouble about the position of the principal artery. Even in the most muscular and fattest individuals, you can perfectly control the flow of blood in this simple way.

We now remove the India-rubber bandage which was first applied, and the varnished paper lying under it; and you see that both legs, below the compressing tube, perfectly resemble the legs of a corpse, presenting in their pale colour an almost dismal contrast with the rosy hue of the remaining parts of the surface. You will see, too, that the operation will be in all respects like one on a dead body.

We now divide the soft parts over the whole anterior surface of the tibia down to the bone. A few drops of blood exude from the bone, and are wiped away with the sponge. After this, no more blood comes. The periosteum, divided along its whole length, is now pushed back on both sides by means of raspatories, so as to expose the whole anterior surface of the thickened and uneven bones, which are seen to be beset with numerous openings.

We now take large chisels with wooden handles, such as joiners use, apply the edge to the border of the uppermost cloaca, and, with the help of wooden mallets, cut away the anterior bony wall in large splinters.

The bone is very hard, as I expected it would be. The work is not easy, and requires some practice, which is soonest acquired in a joiner's workshop. I must beg you, gentlemen, to take care of your eyes; for the sharp and pointed splinters fly about in all directions with great force. This wall of bone might be removed in other ways, by the saw or by Heine's osteotome; but these are so very much more troublesome and tedious, that I give the preference to the chisel.

The large sequestrum now gradually comes more and more into view. You can easily distinguish it by its whitish colour from the reddish living bone. Of course, the difference in colour is more marked if you operate without shutting off the blood; then the blood streams as from a sponge; or sometimes spurts with force from all the pores which you see on the cut surface, filling the wound after each stroke to such an extent that you can recognise nothing, and cannot again apply the chisel until your assistant has energetically mopped out the cavity with sponges held in forceps. But now I want no assistant; my assistant, Dr. Peterson, is, like me, chiselling at his bone in the sweat of his brow—and now the hardest work is done. Both sequestra lie exposed in their whole extent; we seize them with strong forceps, and draw them out with some exertion, for they still send some irregular processes into cloacæ.

You see that the large trough-like cloacæ, in which the sequestra lay, are partly lined with pale-red granulations. We remove these by means of a sponge, which we press and rub forcibly over the irregular osseous surface, and with small sharp scoops, with which we penetrate into

the depressions and cavities. We remove these granulations because, in my opinion, they are of no value in the formation of new bone: besides, they have been partly injured in the operation, and must afterwards die. You will be able to see at a later stage, that the whole surface of bone very rapidly produces luxuriant granulations, which soon become transformed into osseous tissue and repair the great loss of substance.

The operation is now ended. We wash the wounds with carbolic water, to destroy any septic organisms that may be remaining in them; lay in them some pieces of gauze soaked in solution of chloride of iron, so that they may line the walls; and fill both the large cavities above the level of the external integument with German tinder. Each of the plugs is well pressed in by means of a gauze bandage soaked in carbolic oil; over this comes a layer of varnished tissue-paper, which encloses the whole leg: an airtight case; and the whole is secured by an ordinary bandage.

Now for the first time we slowly remove the compressing India-rubber tube. You see how the pale skin of the foot reddens, at first in spots, then all over, becoming, indeed, of a darker red than the rest of the skin of the body. Observe the dressing of the wounds under the transparent paper; you see that no blood whatever penetrates through the gauze bandages. The patient has thus lost altogether not more than a teaspoonful of blood. And now observe the still calmly sleeping patient; he has the same red cheeks as before the operation, his pulse is full and strong, and his convalescence will without doubt be more rapid and secure than if we had performed the operation for necrosis in the usual way.

[The dressings remained until the fourth day. On their removal, the enormous cavities showed everywhere the commencement of granulations. These were first dressed with oil, and after some days with ointment of sulphate of zinc. Healing went on so rapidly, without any disturbing circumstances, that the patient was discharged from the hospital at his own desire on the twenty-first day.]

If you now compare the operation of to-day with that of yesterday, nothing more will be required to make clear to you the great advantages of this plan, both to the patient and to the operator. You have seen that both of us have been able to perform without assistance a difficult operation; and you will have no doubt that the proceeding must be of very great value to the practising surgeon, who is often destitute of efficient assistance.

You can bring this plan into use in almost all operations on the extremities, with more or less complete success. In the extirpation of tumours, in the ligation of trunks of vessels, in operations in scrofulous sores and carious bones, in the resection of smaller bones and joints, you may proceed in the same way as I have just shown you; you must not loosen the tubing which encircles the limb, until the dressing of the wound is completed.

(To be continued.)