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SURGICAL CASES.



**NEURALGIA OF STUMP AFTER AMPUTATION—SECONDARY
AMPUTATION—RETURN OF THE NEURALGIA.**

BY JAMES DUNCAN, M.D.,

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to the Royal Infirmary, Edinburgh.

J. R., æt. forty-five, an Irishman, was admitted into the Royal Infirmary, under my care, on August 30, 1843.

He had been employed on the Edinburgh and Glasgow Railway, and in August 1840 one of the carriages passed over the limb, tearing it off immediately above the ankle, and otherwise injuring it severely. The extremity had in consequence been amputated by Dr Hamilton of Falkirk a little below the knee-joint. The case had gone on remarkably well until about six weeks after the operation, when the stump became the seat of slight neuralgic pains. These continued to increase, notwithstanding a variety of medical treatment, and at last they became such a source of annoyance and distress to him, that he was obliged to abandon the situation on the railway, to which he had returned some time after the operation.

When admitted under my care, the pain was described by him as being exceedingly severe, more particularly during the night, and such as almost altogether to banish sleep. There was not the slightest reason to believe that the patient feigned; his employment was by no means an arduous one, he had a family depending upon him for support, and, above all, his appearance was that of a person worn out by continued suffering.

When admitted, the stump was carefully examined, under the belief that the pains might depend upon the divided ends of the nerves being either injuriously involved in the cicatrix, or applied over the ends of the bones. Nothing of this kind, however, could be discovered, no enlargements of the extremities of the nerves could be made out, and altogether the stump was as well formed and apparently as serviceable a one as could be met with. In addition, the pain was not confined to any particular spot, but affected the whole stump below the knee, very slight pressure on any point producing very acute pain.

As his general health appeared to be much disordered, it was thought possible that by improving this the painful affection might be relieved. A slight alterative course of the blue pill was accordingly exhibited, with the effect of somewhat improving his general condition, but without any the slightest amelioration of the local symptoms. This was followed up by the internal exhibition of tonics, and the other remedies occasionally found useful in such cases; amongst these may be named the Quinine, Carb. Ferri., Arsenic, &c., but all without effect.

Local remedies of different kinds were likewise tried. At first, as there appeared to be some slight fulness with increased heat of the parts below the knee-joint, leeches in considerable numbers were applied, and these were followed by a succession of blisters to the part. For a time the blisters appeared to act beneficially, the pain being relieved, although by no means removed, for a day or two after their application, as long as the discharge produced by them continued. Even this slight temporary relief, however, speedily ceased to follow their employment. The painting over the parts with a strong Tinct. of Iodine was next tried, and likewise with temporary relief, and that of longer duration than followed the use of the blisters. This application also soon failed to have any effect, and various anodyne remedies were next tried, but without their having the slightest influence.

On the whole, the severity of the symptoms continued to increase, and the tenderness became so excessive that even the drawing of a feather over the surface of the stump made the patient shrink. His appearance became more haggard, the expression of his face more anxious, his appetite became more and more impaired, he was worn out by want of sleep, and he became much emaciated.

From the time of his admission into the hospital, the patient had been incessantly urging me to remove the stump, a request which I was exceedingly unwilling to comply with, inasmuch as I did not believe the operation would be followed by any benefit at all proportioned to the risk incurred.

When, however, all the means I could think of had been tried, I was reluctantly compelled to think of having recourse to this step; and as the patient himself was more and more urgent, it was determined, after a consultation with my colleagues, to give him the chance afforded by amputation higher up. I explained to the patient the risk he incurred by the operation, and likewise the possibility if not the probability of the pain returning in the new stump. He was, however, determined on having the amputation performed, and stated his resolution, if we refused to comply with his wish, to leave the hospital, and find some surgeon who would.

Amputation above the knee was accordingly performed on November 16. The patient endured it manfully, and when carried to

bed, expressed himself as delighted with the relief afforded. The parts removed were carefully examined. The articulation was ankylosed, and free from any existing disease. The extremities of the nerves were thickly imbedded in soft parts, and the enlargements, almost invariably found after amputation, existed to even a less extent than is usually the case.

Every thing went on favourably for a time after the operation. The stump healed with great rapidity, and for some ten weeks the patient remained perfectly free from pain; he was in high spirits, his appetite exceedingly good, and his appearance was that of a person in robust health. The patient himself chuckled at the idea of having known better than the doctors what treatment was necessary in his own case, and we were beginning to think that a permanent cure had in reality been effected. About the tenth or eleventh week, however, the patient began to complain of some slight pain in the stump, but was exceedingly unwilling to believe that it at all resembled that under which he had previously laboured; indeed, it was not until the lapse of ten days or more, when it at last became too severe any longer to flatter himself that it was not, that he would admit it. The same treatment as formerly was again tried, and with much the same result, the blisters perhaps affording more relief than before. In addition, blistering the spine was tried, but without the slightest effect. The tincture of Aconite was likewise given internally in doses of $\text{g}^{\text{tt}}\text{s. v.}$, three times daily, and certainly for a time with very marked benefit; but the effects produced by it on his general health, even in diminished doses, were so injurious, that we were obliged to discontinue it. We next tried its local application, and likewise with benefit to the local affection; but it still exerted the same prejudicial effect upon the general health, again obliging us to abandon its use. In consequence of the relief afforded by the discharge produced by the blisters, I was induced to try the effect of a seton, and one was accordingly passed through the anterior part of the stump. After this had produced pretty free suppuration, the pain began to abate, and the patient remained for about a fortnight much freer from it than he had been under any other form of treatment. This, however, likewise began to lose its influence; and finally, as it appeared altogether to have lost it, it was removed by the patient himself.

The patient is now in very much the same state, in so far as the neuralgia of the stump is concerned, as when he entered the hospital, but certainly not suffering so severely from the pain as immediately before the performance of the operation, although I have reason to fear that in time he may.

I should have mentioned that the pain at present does not involve the whole surface of the stump as formerly, it being confined in a great measure to its outer and posterior part, and

likewise, that it is produced by pressure over the whole extent of the sciatic nerve, the muscles at the same time being thrown into violent spasmodic action.

Cases of irritable stump are fortunately not of very common occurrence, and are perhaps not so frequently met with as formerly, a circumstance which has been attributed to the improvements which the operation of amputation has undergone in modern times. They are mentioned by Mr Liston as being more frequently met with after amputations of the forearm and arm than any other; this may be correct, but I have myself seen them more frequently perhaps in amputations below the knee. The pain in different cases varies in extent; it may involve the whole circumference of the stump, it may affect only a particular spot over the extremity of the nerve, or it may extend, as in the case I have related, along its whole course. The period after the operation at which the pain may occur varies much. Thus in the man Rice it commenced about six weeks afterwards; in a man upon whom Mr Mayo had operated, it began about eighteen months after the amputation; and in another, whose leg had been removed by Sir B. Brodie, it did not make its appearance until after the lapse of seven years.

In some cases the irritability of the stump may depend upon merely local causes, but in others again there would appear to be, as has been said, a constitutional and innate tendency giving rise to it. The extremity of every nerve after amputation swells into a bulb of greater or less size, which possesses considerable firmness, being sometimes almost cartilaginous in its structure. It was at one time thought that the mere existence of these bulbous swellings was sufficient to account for the occurrence of the pain; this, however, is far from being the case, as we not unfrequently find these tumours of very large size in stumps which had never been the seat of uneasy sensations; and on the other hand, they are sometimes comparatively small, in cases in which, as in the present case, great irritability had existed. Should these swellings, however, be involved in the cicatrix near the surface, or by its contraction, as suggested by Mr Laurence, be pressed against the sawn end of the bone, then irritability of the stump is extremely likely to follow. These conditions of the nerve, with perhaps, in some cases, a degree of chronic inflammation of its proper tissues, or its neurilemma, are, it is generally allowed I believe, the most frequent causes of those cases of irritability of the stump which are local in their origin, and are the only ones, I would say, which can be permanently relieved, either by a secondary amputation, or by excision of the extremity of the nerve, these being the operations recommended in such cases. The latter operation is of course to be preferred in those cases in which the symptoms are "clearly

attributable to an affection of one nerve only. That in certain cases the pain is dependent upon purely local causes, is fully established by the complete and permanent relief which has followed either the one or other of these operations, although, it must be allowed, in some of the recorded cases it would have been well had they been watched for a longer period than they appear to have been. There is no limit, we have seen, to the time after which the pain may occur after a primary amputation, and as little is there after the secondary operation. In the case I have recorded, for instance, the patient might have been dismissed the hospital, and regarded as cured, had I not, from a suspicion I entertained as to the ultimate result, detained the man much longer than was required by the existing state of matters; no return of the pain having taken place until after an interval of ten weeks.

The cases which are to be included under the second head, those which are not dependent upon merely local causes, are fortunately comparatively rare; still, however, they are occasionally met with, and many of a very distressing character have been recorded. In these we have nothing in the formation of the stump to account for the occurrence of the pain; bulbous swellings, it is true, may exist on the ends of the nerves, but we have seen that the mere presence of these has nothing in itself to do with the existence of the pain; and in the cases which I would include under this head, there has been nothing in their condition to account for it, and, above all, the result of the treatment has shown that the symptoms did not depend upon merely local causes. In the case of Rice, the enlargements were smaller than usual, not implicated in the cicatrix, and not subjected to injurious pressure against the end of the bone. In the two following cases, as related by Mr Mayo, there was likewise no local cause to account for the occurrence of the pain. This first case, we may remark, affords us an instructive lesson as to the impropriety of having recourse to amputation in cases of neuralgia of a joint.

“H. A., ætat. twenty-two, the catamenia regular, having suffered during four years pain in the knee-joint, which, although sometimes greatly mitigated, never entirely left her, at length, when every remedy that could be thought of had been tried, and the pain had much increased, underwent amputation of the leg. The symptoms had been pain and increased sensibility, and nothing more; the joint, with the exception of slight œdema arising perhaps from the local remedies, had not swollen, nor had there been any mechanical impediment to motion. On examining the amputated knee, which had been previously injected, the capsular synovial membrane was found of a bright red. The synovial membrane covering a small part of the semilunar cartilages was likewise very vascular. At the upper part of the patella, the same appearance was seen; towards the lower part, the synovial membrane, for the extent of five lines by two, was not only red with injected vessels, but considerably thickened.

“These appearances admit of being interpreted in two ways. The in-

creased capillary vascularity of the joint may have been either the cause of the pain this patient suffered, or an effect of it. I am inclined to adopt the latter supposition. It is certain that influences upon the nerves are capable of producing, not pain alone, but even swelling about a joint : it is thus that, in hip disease, the knee often becomes affected with symptomatic swelling, in conjunction with pain and tenderness. The further progress of the present case seemed to show that the disease had been in the nerves, not in the organization of the joint. Soon after the stump had healed, it was accidentally struck. To this cause, probably without reason, the patient attributed a return of pain exactly similar to that which she experienced before the amputation of the leg. When the pain had gone on several months increasing in severity, the patient, anxious at any expense of immediate suffering to get well, submitted to another operation. The pain and tenderness were seated in the last three inches of the stump, not more upon one aspect than another, although most acute as it seemed in the part of the cicatrix covering the bone. The extremity of the stump was therefore amputated, a second portion of bone sawn off, an additional portion of the sciatic nerve taken off in the operation, and the bone and nerve buried in a full bed of relaxed muscle and integument. On examining the part removed, the sciatic and the saphenus nerves were found to terminate in large white cartilaginous bulbs, behind but not adhering to the cicatrix. It is distressing to have to relate, that, on the stump healing, the pain recurred. After some months, the pain continuing, the sciatic nerve was divided under the edge of the glutæus muscle. Again, that is, while the wound was green, her sufferings were mitigated ; on its healing, they have recurred. It is needless to say that every remedy, local and general, upon every plan, and the intermission of all remedies, were tried, before the repeated operations were resorted to."

" A man, about thirty-five years of age, was admitted into the Middlesex Hospital in the course of the last autumn, whose leg I had amputated below the knee, for compound fracture, about two years before. It was, to the best of my recollection, half a year before the readmission of this patient that the stump began to be painful. The pain was described as a constant and severe gnawing pain : it was principally felt at the end of the fibula, from whence it extended to the knee and ham. The cicatrix covering the end of the fibula was exquisitely sensible, and the muscles of the stump were in a state of perpetual quivering : the cicatrix appeared to grin, from the successive traction of different packets of the muscles. Supposing the symptoms to depend upon an enlargement of the end of the superficial peroneal nerve, I cut down to the fibula, and removed about the half of a square inch of integument and cicatrix covering it, with half an inch of the fibula, and some thickness of the flesh attached to it, including the superficial fibular nerve. The end of this nerve was found to terminate in a small bulb behind the cicatrix.

" The severe pain which the patient had suffered for months was instantaneously removed by this operation. While the wound was healing, however, some pain and tenderness reappeared in the direction of the fibular nerve : but on applying leeches, and administering calomel every night for a week, these symptoms went away, and the patient left the hospital almost free from pain in the stump ; but a little of the quivering remained, with slight tenderness of the original cicatrix opposite to the situation of the tibial nerve."

In the first of these cases, it is perfectly evident that the symptoms did not depend upon merely local causes; but if any room for doubt remained after the primary amputation, this was completely removed by the issue of the secondary one, and the precautions taken in the latter. The second case, it appears to me, was likewise one of the same description, the whole history leaving no doubt upon the matter.

The period after which, in cases of this kind, the irritability may supervene, appears to vary much, as I have said, both after the primary and secondary operations. Most generally, however, after the secondary amputation, it commences either when the healing process is nearly completed, or at least within a short time afterwards, the patient in the interval, generally speaking, remaining free from uneasiness. In the present state of our knowledge, it would be useless to speculate upon the causes of this irritability. By some the cases are regarded as very analogous to those of spinal irritation, and certainly, in one case related by Mayo, he mentions that he thought he detected some tenderness at one part of the spine; however, treatment applied to this part appeared to exert no influence whatever over the disease. In Rice nothing of this kind could be discovered. In most cases the symptoms appear to be intimately connected with some derangement of the general state of the health, but whether as a cause or effect it is often difficult to say.

The treatment in the first class of cases is obvious, and has already been alluded to: it consists, as I have said, either in performing a secondary amputation, or in excising the bulbous extremities of the nerves. The success of the treatment in these cases has been well established. The same cannot be said of any treatment whatever in the latter class of cases, as all the remedies which have been employed in different cases, although in the first instance several of them have appeared to afford considerable relief, have after a short time become equally powerless. The greater number of the remedies generally employed in these cases were tried in this one, but all without permanent benefit following their use.

As to the propriety of secondary amputation in these cases, there can be no difference of opinion, when the surgeon is convinced that the symptoms depend upon constitutional causes; and in this case I would never have had recourse to this step, had the possibility of their depending upon local causes been altogether beyond doubt. After all the remedies employed had completely failed, I did, after considerable hesitation, decide upon giving the patient the chance afforded by amputation; but now that the nature of the case has been, as I believe, completely decided by the issue, nothing would induce me a second time to have recourse to it, although the patient himself now strongly urges it, and is more than willing to run the risk of a

third amputation. In almost every case, relief for a longer or shorter period has been afforded by the operation; but then we have seen that it is but of short duration, and not at all proportioned to the risk run. Mr Mayo, however, I find from the report of the case already referred to as operated upon by him, is not very strongly opposed even to a third or fourth operation, and the following are his reasons:—

“I suppose it to be possible that, in this case, the seat of irritation may be confined to the trunks of the nerves in the limb, and that their origins may not be engaged. If it were so, amputation at the hip-joint might cure this patient. But I am loth to recommend this formidable operation, as it might prove as useless as those which have been already sustained. My reason for conjecturing the seat of the irritation may possibly not extend beyond what remains of the limb, is the following case.

“I had about three months ago under my care, as an out-patient of the Middlesex Hospital, a woman whose arm Mr Bransby Cooper had amputated at the shoulder-joint for neuralgia, which had followed an amputation above the wrist, and had returned after a second amputation above the elbow. She told me that she was perfectly cured, by the third operation, of the pain she had undergone so much to get rid of.”