AN ACCOUNT OF A CASE
OF
ARTERIO-VENOUS ANEURISM
OF THE
TEMPORAL VESSELS,
WHICH WAS TREATED BY LIGATURE OF BOTH THE
ARTERY AND THE VEIN.

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EXACTLY a century has elapsed since Dr. William Hunter first recognised and described those aneurisms, in which a direct communication exists between the artery and a vein. The propriety of abstaining from surgical interference, which he laid down as the ordinary rule of practice in such cases, has since been amply tested; and many a patient has in consequence been spared the suffering and the danger attending the performance of an unnecessary operation. When the communication between the vessels is direct, there is, indeed, no reason for expecting danger to threaten either life or limb; the vein may be greatly distended and tortuous, but, unlike an aneurism, it does not burst; for the arterial blood, finding in the vein an open channel, better fitted for its conveyance than for its coagulation,

may and does continue for years to make its way harmlessly back to the heart. The longest period during which such a condition of the vascular system of a part has existed in any case is, so far as I can ascertain, in the instance I am about to relate to the Society, in which the arterio-venous communication had been made thirty-six years before the patient came under my care.

Under what circumstances a disorder, usually long innocuous, shall become so changed as to imperil life, and demand prompt surgical treatment, has been but partly ascertained. Most frequently, perhaps, the disastrous change has been produced by inefficient treatment, as when a ligature has been placed on but one (the upper) orifice of the artery. Other causes of danger are spontaneously engendered in the affected parts, and arise slowly from alterations of nutrition. Thus sometimes, as life advances, the coats of the varicose vein become so expanded and thin as to be no longer capable of resisting the ceaseless pulse of the arterial current; sometimes degeneration and softening occur in coagula, which may have formed, and the cavity of the vein is opened by suppuration. One or both of these last changes appear to have been the cause of the dangerous hæmorrhage which took place in the following case.

Thomas A—, a labourer, æt. 60, in ordinary general health, but pale, very feeble and depressed in consequence of hæmorrhage, was brought from Northamptonshire, on the 30th September, 1857, by Mr. Jones, surgeon, of Brackley.

The patient's left temporal artery had been opened thirty-six years before, by a surgeon in Australia, for pain in the head. The bleeding returned two or three times after the operation, and was ultimately stopped by constant pressure; but a small swelling, which had formed in the site of the wound, never again subsided. It always pulsated synchronously with the heart, and the patient often observed that he could stop the beating of the tumour by pressing with

his finger behind the left ramus of the jaw. For the two or three succeeding years, an enlargement, as of vessels, took place, reaching the size of the little finger, and a peculiar sound was noticed in the swelling, which was audible by the bystander and by the patient. In the course of years the swelling attained the size of the man's fist; but, although the vessels of the temple had assumed a most formidable appearance, the tumour never occasioned him any material suffering until last July. An abscess then formed in the diseased part; the skin covering a large part of it became thin, and at length gave way at a small spot. Hæmorrhage did not take place until three weeks after the first discharge of matter, but when it did occur, a quantity of blood was rapidly lost, which there is reason for estimating at four pints. Mr. Jones removed an immense quantity of coagula, and applied pressure, under which the hæmorrhage ceased. A fortnight afterwards the bleeding returned, and extremely exhausted him, but it was again arrested; and as soon as he could bear the journey, he was removed to town, and admitted under my care into the Middlesex Hospital.

I found the left half of the scalp much swollen, partly by œdema, but above and behind the ear by a large abscess. On removing the bandages, an ulcer was seen in the temple, equal in size to a crown-piece, and formed of flabby granulations. A stream of pus issued at a small opening near its posterior border: towards the front a clot of blood adhered, and showed the spot at which the blood had escaped. Above, below, and in front of the ulcer, as well as beneath the clot of adherent blood at its base, tortuous blood-vessels, as large as the brachial artery, could be felt beating with a bounding, soft pulsation. When pressure was made in the parotid space, they ceased to beat, and their soft walls could be but indistinctly felt among the loose and flaccid tissues in which they lay. No purring tremor was felt in the veins of the scalp; if any such movement existed, it was effectually concealed by the general œdema of that part. In the neck, however, two enormously dilated veins descended in the

course of the external jugular, and in them an arterial pulsation, which was most marked in the higher parts of the neck, and also a continuous vibratile thrill, were distinctly visible. Neither arteries nor veins were enlarged in the frontal, posterior auricular, or occipital regions.

Although there had been no hæmorrhage for a fortnight, yet as the man suffered severe pain from the pressure which was employed, as he was under great apprehension of a recurrence of the bleeding, and as there was good reason to think a third gush of blood might place him beyond help, I had no hesitation as to the propriety of preventing such hæmorrhage by ligature. The usual and proper operation on wounded arteries, viz., that of tying the artery immediately above and below the aperture in it, did not appear applicable in this case, as it was most unlikely that vessels which had been so long diseased, and had become so thin, would bear a ligature. Two considerations diverted me from tying the common carotid artery; one of which was the importance of the internal carotid stream to the nutrition of the brain; the other, that as none but the temporal artery was involved in the disease, it would suffice to secure that vessel, or the external carotid, at the highest point at which a healthy condition of its coats and the practicability of tying it coincided. That point appeared, on examination, to be in the parotid gland, a little below the external meatus of the ear.

A vertical incision behind the ramus of the jaw needed to be carried to a considerable depth before the vessel which had been felt beating was reached. It lay a little deeper than the edge of the ramus. I carried a ligature round it, and, before tying the knot, felt the pulsating vessel in the loop. When my finger was pressed into the loop, the vessels in the temple ceased to beat; but after I had tied the knot, they continued to pulsate as freely as before. Having repeated the operation with the same result, I examined the vessel again, and found it beating only on the distal side of the ligatures. This singular circumstance removed all doubt of the vessel having been

satisfactorily tied; it also disclosed the fact that the tied yet pulsating vessel must be the vein on the cardiac side of its communication with the temporal artery. The latter vessel, which led to the aneurism, was then felt for elsewhere, and was found in front of the wound, near the posterior edge of the masseter muscle. It was undoubtedly the temporal artery, tortuous and consequently much displaced; and it was situated where it might readily have been compressed, when the finger was introduced into the wound. I passed a ligature round it; and upon my tying the knot, the pulsation in the temple, and in the vessel previously tied, immediately ceased. Upon examining the jugular veins, I found them diminished in size, and entirely without their former pulsation and thrill.

The patient complained of pain in the evening, but after taking an opiate he passed a good night. His jaw was tied up with a bandage; he was fed freely with beef tea or minced meat, and took a little wine; and he went on very favorably. The discharge from the abscess rapidly diminished; the ligatures came away on the tenth and thirteenth days; the ulcers assumed a healthy appearance, and contracted to the size of a shilling; the œdema of the scalp disappeared; and the temple, no longer swollen with pulsating vessels, looked shrivelled, and shrank beneath the level of the ulcer. He did not, however, gain strength rapidly, and on the 15th October he had a slight attack of erysipelas, which commenced at the wound, and spread across the face. Nevertheless, though still feeble, he was able to leave the hospital on the 19th. No pulsation then existed in any of the diseased temporal vessels.

In November the man was at work as an agriculturist, and perfectly well.

The condition of the circulation in cases of circumscribed varicose aneurism is peculiar, and modifies the treatment admissible in them. Two parallel tubes, having their currents unequal in force and opposite in direction, communicate with one another. The arterial blood flows into the

vein with varying freedom in different cases, a freedom perhaps dependent on the size and directness of the opening by which the two vessels communicate. From the opening outward the force of the current in the artery is diminished, whilst in the vein the stream is reversed below the wound, and augmented and accelerated above it. The state of the circulation in the distal parts of the vein is well shown in Larrey's case of a sword-wound at the root of the neck, by which the subclavian artery and vein were opened into one another. When venesection was performed on the external jugular of the same side, the blood which issued was of scarlet colour. Upon this circumstance probably depends the character of the nutrition sometimes observed in the parts beyond the disease. Far from being wasted, as might be expected from the weakness of the circulation in the distal arteries, and from the proneness of the limb to gangrene upon the application of a single ligature on the higher part of the artery, a part affected with varicose aneurism is rather over-nourished. Broca mentions that the hair is unusually abundant on limbs whose trunk-vessels communicate, and that in some instances the limbs themselves grow to an unnatural length.

The treatment which is admissible in these cases, is governed by the peculiar state of the circulation. So far as I have ascertained, the modes of successful treatment which have been adopted are excision of the whole diseased vessels, compression, and the ligature. By excision the disease was in one instance removed from the scalp. The swelling was of course small, and the cure complete. Compression is found to produce its effects upon the vein. In one instance that vessel became obliterated below the point of its communication with the artery; in another instance the entire vein was closed. By means of the ligature, the artery has been tied above the unnatural aperture in it. It has also been tied both above and below that point, the ligatures having sometimes been placed close to the orifice in the artery, sometimes at a distance from it. In one instance the vein

also was included in one of the ligatures. In the case related in this paper, the artery and vein were both tied on the cardiac side of their communication with one another.

The results of these various combinations of treatment are also varied. A brief survey of them will serve to show what surgical value may attach to the case I have detailed.

When the artery is tied above and below the opening, the disease is cured; unless, indeed, an anastomosing branch join the artery between the ligatures, in which case arterial blood still continues to pass into the vein, and the operation is unsuccessful.

The entire obliteration of the vein at the seat of the opening suffices equally with the closure of the whole artery for the cure of the disease. M. Nélaton undertook the treatment of a case of arterio-venous aneurism at the bend of the elbow by direct compression upon the wounded vessels, aided by pressure upon the artery in the higher part of the arm. After several months of treatment he succeeded in curing the disease, and at a post-mortem examination of the patient, two years afterwards, the vein was found obliterated at the site of the aneurism, the artery was healed and pervious.¹

There are but two classes of case in which one orifice only of either vessel has been closed. They are that in which the artery has been tied by a single ligature above the aperture, and that in which, by compression, the vein has been obliterated below it. Both modes of treatment are unsuccessful. In the former case the collateral circulation fails to nourish the limb; not because it is deficient either in amount or in force, but because, so long as the artery and vein communicate, the blood continues to find a more ready retrograde passage through the opening into the vein, than into distant and narrow capillaries. The ligature weakens the impulse of the arterial current,

¹ 'Gazette des Hôpitaux,' Sept. 22, 1855, and Sept. 12, 1857.

the very force which, up to the time of the operation, had secured the conveyance of the blood to the remoter parts of the limb. A frequent issue of the treatment, consequently, is gangrene of the limb; and, if that should be escaped, the disease is in no way improved. In one case, indeed, after the single ligature above the disease had been thrice unsuccessfully employed, a cure was effected by direct compression;¹ whilst in another case the arterial current regained so much freedom and force through collateral channels, as to produce an aneurism in the lower part of the limb.

Two cases which have been reported in the Society's 'Transactions,' stand in interesting contrast to one another. Mr. Perry² employed pressure over a part of the femoral artery, at which that vessel opened into the femoral vein. The lower orifice of the latter vessel became obliterated, and the thrill in the veins of the limb diminished. No cure of the disease, however, followed this partial closure of the vein, and an aneurism which had previously existed in the posterior tibial artery, suddenly enlarged, and required the ligature of the femoral artery. Mr. Cock,³ on the other hand, relates a case in which, eleven years after the ligature of the femoral artery on account of a wound of the popliteal artery and vein, the consequence of the persistence of a communication between the trunk vessels in the ham was seen in the formation of an aneurismal dilatation of the posterior tibial vein, which led to suppuration and arterial hæmorrhage, and required amputation of the limb. Both cases illustrate the insufficiency of any treatment which obliterates one orifice only of either vessel.

The only remaining mode of successful treatment, but a mode which could hardly be recommended for varicose aneurisms of the limbs, is that of obliterating both the arterial and venous trunks on the cardiac side of the

¹ *Lallemand, 'Gaz. Méd. de Paris,' 1837, p. 347.*

² *'Med.-Chir. Trans.,' vol. xx, p. 31.*

³ *'Med.-Chir. Trans.,' vol. xxxiv, p. 327.*

unnatural communication between them. That communication does, indeed, still exist, yet, since the direct access of blood to it by the artery, and the return by the vein, are prevented by the ligature of those vessels, the success of the procedure may reasonably be expected to be permanent. The unnatural aperture, being beyond both ligatures, is reduced in importance to that of a passage between subordinate and branch vessels, and will probably be entirely obliterated.