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REMARKS

ON THE

HEMOSTATIC TREATMENT

OF

CHOLERA,

HEMORRHAGE, EXHAUSTION, ETC.

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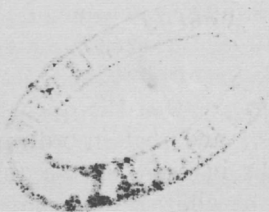
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WHEN the Spanish pilot smiled on the late Dr. Kelly, shivering under the influence of a cold fit of ague, and pointed out how easily it might be removed by the application of a garter to stop the blood of one or two of his limbs, he suggested a plan of treatment which has long appeared to me worthy of more attention than it has received. When in India I had, on one occasion, a regiment prostrated with fever unexpectedly placed under my charge; and, as I had but a small supply of quinine, and could not obtain more, I employed tourniquets to intercept the blood in the extremities, and with a degree of success that induced me to publish the result in *M'Clelland's Journal of Natural History, Calcutta*. I have not the journal by me; but the result was so favourable that I frequently employed it in the cure of intermittent fevers; and I afterwards extended the application of this powerful remedy to other diseases, and propose again to bring the subject under the notice of the profession.

The great discovery of Harvey determined the principle that we had, by means of the tourniquet, the complete command of the arterial circulation of a limb, and could, by means of a tight bandage, retard the return of a considerable quantity of blood from the extremity. Modern physiologists inform us that the quantity of blood in the whole body is about 28 lbs.; and that in ordinary health there is about two pounds weight in each of the four extremities. The numbers will, perhaps, be allowed to be nearly correct, although the absolute quantity will vary in different individuals, and in different parts and conditions of the body. For instance, a person during active exercise will have the distribution of the blood all over the body considerably different from an

individual in repose; and this difference will often be still greater in disease. The attack of an intermittent disease is accompanied with a congestion of blood in certain organs; and, as we have the complete control of at least a pound of blood in each limb—may we not act on this with great advantage in the cure of disease?

The circulation may be controlled in two ways—1st, by retarding the blood in veins, and, 2nd, by stopping the circulation in arteries.

*To retard blood in the veins of a limb as a therapeutical agent.*—In patients with the premonitory symptoms of apoplexy, in severe cases of dyspnea, in some organic diseases, and even in inflammation of particular organs, the temporary withdrawal of a certain quantity of blood from the general system, and its retention in the extremities may sometimes be used with great advantage. It is easily accomplished, by the application of a field tourniquet upon one or more extremities.

*Stopping the arterial circulation in a limb.*—It must not be supposed that a clamp or horse-shoe tourniquet, when compressing the chief artery of a limb, acts merely on the part, by stopping the circulation—it powerfully affects the whole system. If applied to the femoral artery, probably a pound, of the two pounds of blood intended for the limb, is prevented passing into it, and makes its way back to the heart, causing a more rapid and forcible circulation over the diminished circle.

Secondly. As many diseases are local, and are connected more or less with morbid congestions of blood, which generally produce the pain and the derangement of the functions of the affected organs, by so closing a portion of the circle you thus enlarge the volume of blood, and increase the force of the heart, which has a most powerful influence in removing local congestions in the internal organs.

It is not, however, in every case that the treatment can be employed with the same good effect. It is in the large class of functional diseases that the partial stoppage of the circulation is of so much permanent use; and even in some organic diseases it may be employed with advantage by withdrawing so much blood from the circulating system of the part. By thus placing a ligature so as to press upon the chief artery of one or two extremities, the general mass of blood circulates through a smaller circle, and in some diseases produces a powerful tonic or stimulating effect upon the general system.

In those sudden and appalling cases of uterine hemorrhage the effect



is very marked; and the fatal result is often arrested by this prompt and energetic interference. In such cases the patient is often left in a collapsed pulseless state, without the quantity of blood necessary for carrying on the vital functions, for which the strongest stimulants are used in vain; and in a large proportion of these cases, after a faint return of animation, the patient sinks into a state of collapse, and dies from exhaustion, without any further loss of blood. In such a case, the simple means of contracting the extent of the circulation, by closing one or more of the arterial trunks, will be of great advantage: Mr. Wardrop states that the effort of raising a patient, in such a case, and accidentally closing the humeral arteries, was found sufficient for nature to rally. This will be more effectually done by raising the limb, pressing the venous blood onwards, and applying a clamp-tourniquet to the humeral and femoral arteries, by which upwards of a pound of blood, sent to each limb, is stopped, and finds its way back to the heart. This diminished vascular circle, and increase of blood, stimulates the heart's action, and the greater volume of blood has a powerful influence in strengthening the weakened system.

In the collapsed stage of cholera, when, in many cases, the physician first sees his patient, the system is so much prostrated that the most powerful medicines have no effect, the application of the tourniquet affords the only chance of cure. This most powerful remedy immediately removes the painful cramps, and produces the same equalizing effect as blood-letting, without the debility caused by this evacuation. It likewise increases the volume of blood, which stimulates the heart to increased action, removes morbid congestions, and, changing the morbid distribution of blood from the secreting surface of the alimentary canal, sets up a new and salutary action in their place. It thus affords the most ready and most powerful means of rousing the system. By this means the purging and vomiting are stopped, the pulse becomes stronger, the heat and strength of the system are quickly restored, and time is allowed for medicines to act.

The tourniquet may be applied to two or to the four extremities, according to the effect intended to be produced. When the individual is weak, and the state of collapse great, more care is required in emptying, by friction, the blood in the veins of the extremity to be bandaged; and the effect will be more marked if the tourniquet be applied to four extremities. It may be kept on for hours, or even for a day or two. In one case I kept the tourniquets applied for

three days—as the exhaustion was very great—with the best effects; only relaxing one or more, as it appeared necessary. When reaction has taken place, by relaxing cautiously one or more of the tourniquets, so as to allow the blood to flow to the extremities, it afforded a ready means of relief. In a pretty extensive experience I have not seen any bad effects produced by the application of tourniquets. The effect, however, varies according to the stage and severity of the disease. When the patient is stronger, or when reaction has taken place, the pressure of the tourniquets is complained of—and much care is required to prevent the patient loosening them. If it be done too abruptly the blood spreads over the extremities, and the patient rapidly sinks, as occurred in the following cases:—

CASE I.—A young lady joined her parents in India; and, on a damp evening, walked along the moist bank of the river, which had been covered with water during the rains. She wore a light dress, and thin shoes, which she did not change at dinner, and went early to bed. During the night symptoms of cholera appeared, and I was sent for. The frequent and peculiar discharges, the state of the pulse, and the cramps, proved the severity of the attack. I immediately acted in the usual energetic manner, but without much effect; and in the morning I requested the assistance of an old and able physician. On learning the history, and the result of the treatment that had been employed, and as she appeared sinking, he considered there was no hope. I proposed the application of tourniquets, which he warmly recommended. They were applied to an arm and a thigh; and the result was soon most marked and gratifying. The cramps ceased, the cold and clammy skin became warm, the pulse resumed its action, and the pale sunken face became animated with a flush. I then slowly relaxed one of the tourniquets; and, having other urgent calls, I left the patient under the charge of my friend, with strict injunctions not to touch the tourniquets until my return, and pointed out the danger of such a proceeding. He understood, and carefully observed, my instructions; but, as the young lady dozed, he left the room, and did not return for some time, when he found all the unfavourable symptoms returned; and then it was he learned the young lady herself had persuaded her sister to unscrew the tourniquets; the blood that was animating the body flowed again to the extremities—the heart, weakened by the loss, ceased to act with the same energy—and all the fatal symptoms returned, and she died that night.

In those cases, when the disease is severe, the tourniquets should be kept on until reaction begins, when one extremity is to be set free at a time, and again, if necessary, *tightened*, to prevent the relapse—which is always most dangerous, as witnessed in the following case:—

CASE II.—Gunga Sing was brought, at noon, to the hospital, in the collapsed stage of cholera. There was great anxiety, no pulse at the wrist, and great thirst, with vomiting and purging. The tourniquets were applied, and continued all next day and night; only at times loosened, and they were removed for some hours the following morning. The body was then much warmer; but the eyes continued sunk and inanimate, and filled with mucus. The patient was anxious and restless, the pulse continued small and weak, and the temperature of the body was 100. He complained of the tourniquets; and at last removed them. 25th. Still anxious and restless, with 24 respirations in a minute. In other respects better. His appearance much improved; eyes more animated and clear; and he ate some arrow-root with appetite. He will not allow the tourniquets to be applied; they seem to irritate him. The circulation being then left free, the warmth of the body diminished, the pulse became imperceptible, and collapse and death followed. The usual remedies had no perceptible effect on this patient.

These cases illustrate the danger of leaving off the tourniquets, or slackening them too soon. It requires much care and attention to do this properly. The rule being to relieve any symptom of congestion by relaxing the ligature for a time, according to the state of the patient.

The following are cases in which tourniquets were used, and in which medicines, in all probability, would have been given in vain:—

CASE III.—Shakh Hoosen admitted into hospital, under the care of Dr. Eastall, with the usual symptoms of cholera. The pulse was imperceptible at the wrist—body covered with cold perspiration—no secretion of urine—and the evacuations from the bowels were passed involuntarily. Four grains of calomel, and four of quinine, with a grain of opium, were given, and washed down with brandy and spiced warm water. As the unfavourable symptoms continued,

four tourniquets were applied to the four arterial trunks of the extremities, and at the same time a draught of the *drogue amere*, laudanum, and peppermint water was administered. In the evening he was found without pain, the action of the heart stronger, and the body warmer. He complained of the tourniquets, and loosened them himself during the night. In the morning they were again tightened. All the bad symptoms had disappeared, he was warm, his voice was stronger, and he felt better. The improvement continued during the day, and two of the tourniquets were removed at night. He continued to improve, and he soon left hospital quite well.

The following cases were reported by one of my intelligent assistants:—

CASE IV.—Hurrooman, aged 25, was brought to the city hospital, in consequence of several liquid evacuations, which had reduced him very much. He had no pulse at the wrist, and complained of severe cramps in the muscles of the legs. A cholera pill, composed of black pepper, assafetida, and opium, was given, suspended in mucilage, with salt; and an infusion of ginger for drink; with hot bricks to his feet, and turpentine and oil rubbed over his body. The application of the tourniquets immediately stopped the cramps, and soon improved the pulse. He continued restless, with occasional severe pain in the abdomen, which went off. The heat of the body was improved, the cramps did not return, and he left the hospital quite well three days after admission.

CASE V.—Noor Mahammud was brought to the hospital labouring under a severe attack of cholera. He had incessant purging and vomiting, with no pulse at the wrist, and the skin cold. The tourniquets were immediately applied to a leg and an arm, a sinapism to the abdomen, and the cholera medicines administered. The purging and vomiting ceased, the heat of the body improved, and he slept comfortably. Next day he felt well, and continued to get stronger: on the fourth day he was discharged cured.

CASE VI.—Ducas Sing, aged 30, was admitted, yesterday afternoon, into the city hospital, in the collapsed stage of cholera. He had vomited, and his evacuations were liquid; his body was cold;



pulse small, weak, and rapid—probably from the exertion of being brought to the hospital—for it soon became imperceptible, and his eyes were sunken and lifeless. Narcotics, and the usual stimulants were employed without effect, and he continued to complain of thirst. Two tourniquets were applied—one to an arm and the other to the opposite leg—which had soon the effect of improving the pulse, and the warmth of the body. He loosened the tourniquets several times, as they felt uneasy; and he fancied his uneasiness might proceed from the tight bandage, and removed them altogether during the night. In the morning he felt quite cold, eyes sunken, and pulse imperceptible at the wrist. The temperature of the air was then  $86^{\circ}$ , and that of the axilla  $96^{\circ}$ , when the tourniquets were applied; and in a short time the pulse became full, soft, and 112 in a minute, and the temperature of the surface somewhat increased—being in the axilla  $97^{\circ}$ . He feels better, and is inclined to eat.

30th.—After the exhibition of a pill containing 10 grains of calomel and one of opium, he had three pale motions, secretion of urine free, and of a good colour. Sleeps well, pulse full, skin still cold. Next day, in consequence of a determination to the head, three leeches were applied to the temples with advantage, and the patient felt well, and wished to go home, but was induced to remain two days longer in hospital.

CASE VII.—Sadec Misterie, aged 30, was admitted into the hospital on the 23rd of October, in the collapsed stage of cholera. Has passed rice-water stools, and has had frequent vomiting; pulse imperceptible. Tourniquets were applied to the two arms and legs, and only loosened occasionally, as required. The pulse soon improved, and next day was 84, small and weak; trunk warm, and temperature  $98^{\circ}$ . 25th. Body cool; pulse still small, weak, and  $88^{\circ}$ ; still purged. The tourniquets had been removed for two hours before I visited the hospital. On their being again applied the pulse soon became more full and regular, and the warmth of the body increased to  $99^{\circ}$ . The usual cholera medicines were exhibited.

26th. Improved in every respect. The tourniquets to be continued. 27th. Nearly well; sleeps well; and the temperature of the body is natural; secretes urine; dejections of a good colour. 30th. The tourniquets to be left off by degrees. He left the hospital quite well on the 3rd of November.

CASE VIII.—A gentleman of the civil service, who had been

many years in India, had latterly become indolent, had left off early rising, and had got very stout. He had been "out of sorts" for a week, but not sufficiently so to require assistance. On Sunday he partook of some ham, and ate two hard-boiled eggs. He felt the food had not agreed with him; but went to church in the evening; and at night slept under a punkah, with the bed-room window open, an unusual occurrence. There was a strong, cold, and easterly wind blowing over a garden which had been raised from the river, but was not entirely filled up; and, as the water of the river retired, it left this garden a marsh covered with rank vegetation—a very hot-bed of malaria, particularly when the cold, damp, easterly wind passed over it, and upon a person asleep. At 3 a.m. he awoke, and had a large rice-water stool, from which he felt faint. He had several more of the same nature in the course of the morning and forenoon, without any bile or feculent smell. He became sick, and the cramps were frequent and very severe, in both legs during the day. Frictions of hot turpentine and oil had little effect, but the cramps were immediately removed by the application of the tourniquets. They were slackened; and when the cramps returned, a turn or two removed them. "A little more," he said, "that will do; the pain is gone." This was not repeated once, but frequently; for the pressure was repeated as often as required, and always dissipated the agonizing cramps, the most distressing symptom of this most painful disease. In this patient the pulse kept very weak, but still sensible at the wrist; and I did not require to stop the circulation so much to produce reaction as to stop the painful cramps. Repeated large mustard poultices were applied to the abdomen, and scruple doses of calomel and large doses of laudanum, produced little or no effect. The weakness increased towards evening, when the ends of the fingers became cold and blue. A quart of salt water, with a drachm and a half of laudanum, was thrown up the rectum, and appeared to be of use. Half an hour afterwards it was returned little changed. He felt more comfortable; had snatches of sleep towards morning; and, as his bowels had not been affected for 16 hours, 10 grains of the extract of colocynth and five of calomel, were given, and brought away a liquid bilious stool; followed by the secretion of urine. On the 14th of July he complained of pain in his head, which was removed by the application of a few leeches. He continued from this time to improve, though slowly, in consequence of a weakened constitution and the unhealthiness of the season.

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*Cholera, Hemorrhage, Exhaustion,*

The following conclusions may be deduced as to the use of a tourniquet in the collapsed stage of cholera, in exhaustion.

1st. By its obstructing the circulation it immediately relieves the distressing cramps of the extremities in cholera.

2nd. By increasing the quantity of the circulating blood in the trunk, and thereby stimulating the heart's action, it relieves the congestions, stops the secretions from the bowels, increases the animal heat, and powerfully tends to restore health.

3rd. By improving the vigour of the system, medicines act more powerfully, and in a more salutary manner in removing the morbid actions.

4th. When the reaction has taken place by loosening the tourniquets with care, the determination of blood to the internal parts is diminished by its diffusion over the extremities, upon which the tourniquet had been placed. They are immediately to be re-tightened when there is any coldness or weakness experienced or any tendency to relapse. This must be most carefully watched for, and prevented.

5th. By increasing the volume of blood in the contracted circulation, the force of the heart is increased, local congestions are removed, and the whole system is strengthened.





