repair of the punctured wound. In any similar case, I believe that the adoption of my plan of conducting the urine away from the person would add materially to the comfort of the patient.

I have suggested to Mr. Coxeter of Grafton Street that, for this purpose, it would be well to prolong the cannula one-half or three-quarters of an inch beyond the shield; and upon this projecting part, clear of all possible interference with tapes or fastenings, the India-rubber tubing might readily be slipped after the cannula has been secured in the bladder.

It would seem very doubtful if this poor fellow will ever recover power over his bladder so as to dispense with his catheter. The stretching of the viscus from excessive distension must have been very great. He has taken, as yet with little absolute good, muriate of iron, strychnine, etc. Yet, with reference especially to the heading of my paper, I may be allowed to compare this man's present condition with the state in which he was three or four months ago. He has now, it is true, to pass a catheter three times a day; but this is a small evil, compared with his continual and painful attempts at micturition, disturbed nights, constant abdominal discomfort, and the chance of absolute retention daily hanging over him—to say nothing of the ultimate organic changes which would almost certainly have followed in the bladder and kidneys.

The operation of splitting urethral stricture is even yet *sub judice*; but as a simple and facile mode of ensuring a permanent benefit, at a minimum risk to the patient, I believe it deserving of more extended trial.

The instrument would, in my opinion, be made even more useful, if its stem were graduated in inches and half-inches. Valuable information as to the seat and length of the strictured part might thus be readily obtained by the operating surgeon.

REMARKS ON VENESECTION IN INFLAMMATION.

By WILLIAM MARSHALL, M.D., Mortlake.

IN the JOURNAL of February 4th, is a report of a most excellent clinical lecture by Dr. Markham, shewing the great and immediate beneficial effects of venesection in two cases of inflammatory diseases of the lungs. In my hands, in two or three similar cases, the same unmistakable and immediate benefit has resulted from it; and I am satisfied that this benefit is due in a great measure “to the freedom of action; the relief given by it to the play of the other (the uninfamed) parts of the lungs and the engorged heart; of the organs or parts, in fact, which have become secondarily engorged—i.e., impeded in action in consequence of the inflammation.”

But has bleeding no other action upon inflammation? Does it never “arrest, nor directly alter, the condition of the inflammatory process? I think it does; and would submit the following cases as evidence in favour of such an action.

CASE I. J. S., a strong, robust man, aged 59, a night watchman at a railway-station, was found, at 2 o'clock A.M., insensible, lying on the railway below a bridge, from which he had evidently fallen, and alighted on his head. His head and face were swollen and bruised to a great extent; so much so, that it was impossible to ascertain accurately whether the skull were fractured or not. He was semi-comatose. About 10 A.M., he became restless, throwing himself about and muttering. Ice was applied to the scalp, and active purgatives administered. Towards the afternoon, phrenitis had unmistakeably set in. He

was violently delirious; the pupils were contracted; the eyes were intolerant of light and the ears of sound; the skin was hot; and the pulse was rapid, full, and bounding. Leeches were applied to the scalp, and he was bled from the arm; to what extent I cannot say, as the violence of his struggles rendered it impossible to measure the quantity; blood, however, was allowed to flow until he showed symptoms of fainting. The change for the better was most marked and immediate. He became comparatively quiet; the intolerance of light and sound were greatly diminished; and the pulse, though still rapid, was soft. Towards evening, the delirium returned, and the pulse rose. I removed the bandages from the arm, and allowed eight ounces of blood to flow away, with the same happy result. Next day, he was greatly better; the heat of the skin and the intolerance of light and sound were gone; the pulse was but little affected; and there was scarcely any delirium. From this time, the patient gradually recovered; but was for months subject to hallucinations. As the swelling went down, an extensive fracture of the skull was found, extending from the outer angle of the right eye obliquely across the top of the head, ending about three inches behind the left ear. One edge of the fracture could be distinctly felt and even seen to be raised above the other; and his head had a curiously twisted appearance.

CASE II. A. M., a strong healthy woman, aged 24, was struck violently with a hoe over the junction of the left parietal and frontal bones; the result was a compound depressed fracture. The depressed bone was raised. The membranes seemed uninjured. Everything apparently went on well for forty-eight hours. Symptoms of phrenitis then showed themselves, and rapidly increased in intensity. The skin became hot, the pulse full and bounding; delirium was constant and violent; intolerance of light and sound were most marked. Leeches were applied to the head, and twenty-five ounces of blood abstracted, within even more marked benefit than in the previous case; for within an hour the bad symptoms diminished, and rapidly disappeared. The patient recovered.

Here, then, are two cases in which “I think a man must be sceptical indeed, beyond all bounds of reason and common sense (if we may invoke that sense here), who refuses to connect effect with causation, the consequence with the antecedent, the cure of the disease with the venesection.” And to go on quoting from Dr. Markham's lecture, “What other remedy do we know of under the sun which is capable of producing off-hand, then and there, such great results in such formidable disease.” And yet phrenitis is not an inflammatory disease, “in the course of, or out of which, arise impediments to the play of the heart and lungs.” I think we must admit, that the bleeding had an immediate, and probably a direct, effect on the inflammation in these two cases. What, then, is probably this direct effect?

Dr. Markham writes: “If venesection be of service in internal, it should equally be of service in external inflammations—i.e., in those inflammations whose progress we can see with our eyes. But in what records of ‘bleeding’ times will you find any satisfactory proof that it ever was of service in such inflammations?” I would, however, direct attention to what we can see of the beneficial effects of local bleeding in external inflammations.

Now, to an eye affected with strumous ophthalmia, apply two leeches, and watch the effect. As the blood is withdrawn, it will be seen that the redness diminishes—becomes paler. Repeat the leeching at subsequent periods, and the same result always follows: the redness—this visible sign of inflammation

—immediately diminishes,* and does not retrace when the bleeding has ceased. What has caused this paleness? It is not simply that the leeching has partially emptied the engorged vessels, and thus relieved tension (which in this case, I think, is analogous to impeded action of the lungs when inflamed); because the very small quantity of blood that two leeches have abstracted can have produced little or no effect on the strength of the general circulation; and blood would be immediately forced, on the cessation of the bleeding, into the vessels, and the inflammation return as previously. But it does not. The paleness always remains for hours—sometimes is permanent. Evidently, some other and a more direct effect on the inflammation than the mere abstraction of the superabundant blood, thus affording relief to tension—to impeded circulation—has taken place. What is it?

Into a forearm, affected with severe inflammation of the cellular tissue and skin, before pus has been formed, make free incisions. Tension is at once relieved. But observe the change in the redness as the blood flows from the wounds. Immediately around the incisions a white margin appears; then pale spots here and there through the bright red; these rapidly enlarge, coalesce, and transform the brilliant into a pale dingy red. What had been severely inflamed one minute before is so no longer. Introduce lint into the wounds, so as to stop the bleeding effectually: the bright redness does not return, as it would do if the engorged vessels had been simply relieved of their superabundant blood. Manifestly, some other effect on the inflammation has taken place. What is it?

The explanation of the cause of the paleness given by Mr. Lister is, I believe, the correct one. The blood-vessels in the immediate vicinity of the incisions contract, as it were in defence of the loss of blood; this contraction by nervous influence spreads rapidly to the smaller arteries around; and the supply of blood to the inflamed parts becomes almost as effectually cut off as if pressure had been applied to the main artery of the limb. The parts now have the benefit of *rest*, and, before the contraction of the arteries yields, have so far recovered that they do not in many cases again inflame. But does general blood-letting act in the same manner in internal inflammations—viz., by affording *rest* in some degree to the inflamed parts? I think it does. When a man with an inflamed brain is bled till he is faint, the first effects must be to relieve the brain in some degree of its superabundant blood, and thus diminish tension; and the second, to induce general pallor, then syncope; *i. e.*, to cause contraction of the arteries of the body in general, including those supplying blood to the brain, and thus diminish the quantity of blood sent to the inflamed parts, and afford them *rest*. When a patient suffering from rheumatic ophthalmia is bled freely, we can absolutely see that the inflamed parts participate in the general contraction of the arteries of the body—in the general pallor. And if this be the case with the eye, surely it must be so with the brain, lungs, heart, or any other inflamed organ.

* If Dr. Marshall will refer to the BRITISH MEDICAL JOURNAL of April 2nd, 9th, 16th, 23rd, 30th, and May 7th, 1864, he will find that Dr. Markham has, in his Lectures delivered before the Royal College of Physicians, referred to the excellent effects of the local abstraction of blood from inflamed parts, and has explained it in part by reference to its local action over the vaso-motor nerves. Dr. Markham has there shown, or endeavoured to show, that venesection and the local abstraction of blood are remedies totally different in their effects as regards inflammation; that to bleed a man for inflammation of the conjunctiva, for example, and to draw blood immediately from the conjunctiva by leeches, are to perform two distinct and essentially different operations—to use two distinct and essentially different remedies. EDITOR.

The facts, then, concerning blood-letting are: that it does in many cases produce a most marked, immediate, beneficial effect upon some inflammations; that it relieves tension—impeded circulation—impeded action—by causing diminution of the quantity of the circulating fluid, by enfeebling the heart's action; that, when used locally, it causes an immediate paling of the redness, which does not return when the bleeding is stopped. When used generally, it causes universal pallor and syncope. The inference naturally is, in the first, that it has caused contraction of the arteries supplying blood to the inflamed parts; and in the second, that it has caused contraction generally of the arteries of the body.

The theory of its action I deduce from the above facts and inferences is, that by diminishing tension, and cutting off in a great measure the supply of blood, it gives the inflamed parts *physiological rest*—that most powerful of all remedial agents.

ON THE PHYSICS OF DISEASE, AND THE PHYSICAL PATHOLOGY OF THE BLOOD.

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CHAPTER III.

*Conditions which Modify Oxidation of Blood (continued).
Further Researches on Ozone.*

At the close of my last chapter, I adverted to the effect of ozone, or active oxygen, on carnivorous as distinct from herbivorous animals. The remarks there made, I will ask the reader kindly to bear in mind as the subject progresses.

In the year 1852, I constructed an apparatus by which freshly made oxygen could be passed in current over animals confined in chambers properly constructed so as to allow them freedom of motion, and at the same time prevent them from receiving any air save that which was specially supplied to them. By sending oxygen through the chamber in free quantities, perfect ventilation was sustained, and no accumulation of carbonic acid could take place. The oxygen, as it was used, was in the active state; but the quantity of ozone present was small. Arrangements were made by which the animals subjected to the oxygen could be supplied both with liquid and with solid food.

A cat was first placed in the oxygen chamber; no attempt was made to save the gas; and the current of gas was sustained so steadily, that at any time a partly extinguished taper could be re-lighted at the escape-tube. For an hour and a half the animal breathed the gas, the temperature being 65° Fahr., without signs of derangement. Then the breathing became quickened and harsh; and thirst was a prominent symptom. After breathing the oxygen seven hours, there was slight convulsive movement; the animal was, therefore, set at liberty in the open air, but it continued to sink, and died at the end of three hours. On examination, the lungs were found to be intensely red in colour, but no organ had undergone structural change. The cause of death was separation of fibrine in the right side of the heart; the right auricle was choked with a firm fibrinous mass, which was of a pure white colour, and adhered closely to the muscular wall.

In another experiment, results of a like kind were produced in a guinea-pig. In a pigeon exposed for nine hours to the gas, symptoms resembling those of croup were induced; the animal breathing with a