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ON SECONDARY HEMORRHAGE.

Observations on some of the Causes of Secondary Hemorrhage. By N. R. SMITH, M.D. Prof. of Surgery in the University of Maryland.

THERE occurs to the surgeon no more unpleasant, or reproachful necessity, than that of exposing a wound recently dressed, for the purpose of securing bleeding arteries. There are causes often giving rise to this necessity, which I am persuaded, by my own experience, have not been sufficiently dwelt upon by practical writers. A few pages in this place, therefore, may not be unprofitably occupied with their exposition.

It is an admitted principle in pathology, that irritation in any part, created by whatever cause, produces an afflux of blood to that part. Consequently anything which in the management of a wound is allowed to inflict irritation upon the injured part, and increase the excitement of the wounded vessels, may become a source of hemorrhage. If I mistake not, such causes of irritation may often be found in the modes of treatment commonly regarded as applicable to such injuries. I allude particularly to the following :

1. Sutures.

Happily sutures are far less generally employed in surgery than formerly. Their frequent employment is condemned by modern surgeons because of the inflammation which they excite, the ulceration which their presence occasions, and the marks which they leave in the skin. I am not aware that they have often been avoided because of their occasionally producing hemorrhage, but this in my opinion should be an important reason why they should be far less generally used than even they now are.

I had occasion, three years since, to extirpate a tumor from the back of a patient in the Baltimore Infirmary. The skin was pretty extensively involved in the disease, and consequently I was under the necessity of removing a broad elliptical incision, hoping, however, to be able so to close the receding lips of the wound, as in a great degree to cover the exposed surface with integuments. The integuments of the back being rigid, and the sub-cutaneous cellular tissue of that region less yielding than in others, I found it impossible to effect as close an approximation as I desired with adhesive plasters, and I resolved to employ the interrupted sutures. These I applied as usual, and made as much traction with them as I deemed prudent. Adhesive plasters were also employed to sustain the sutures. Two or three hours after the wound was dressed, I was called in haste to my patient, and was informed that he was bleeding freely from the wound. On reaching him, I learned that soon after the dressing had been completed, he had begun to complain

of severe pain from the action of the sutures, and upon this the bleeding had soon followed. I immediately removed the dressings and found blood to be still copiously issuing from the wound. Much coagulated blood had accumulated in the wound, and by distending its walls had increased the painful tension of the sutures. To my surprise I found that one of the sutures had, on one side, cut entirely through the skin which it included. I immediately cut out the other stitch, and the lips of the wound quickly receding, I turned out a large coagulum from its cavity. Although the blood was flowing freely at the time this was done, yet the instant it was accomplished, and the parts were thus relieved of all irritation from the ligatures, and from the presence of the coagulum, it wholly ceased. I was unable to discover any considerable vessel from which blood had flowed; and although I applied ligatures to some points from which blood appeared to be slightly oozing, I was by no means certain that I had sufficiently guarded against the recurrence of hemorrhage. I then applied adhesive plasters, not endeavoring to draw the margins of the wound into contact, believing that I might soon be again under the necessity of searching for bleeding vessels.

The patient, however, complained of no more pain, and there occurred no more bleeding. There might, it is true, in this case, have been an accidental coincidence between the relief of irritation which the part was suffering, and the sudden cessation of hemorrhage; but it is at least probable that these events stood in the relation to each other of cause and effect. This case having drawn my attention to the subject, I have since ascertained that secondary hemorrhage far more frequently occurs from wounds, when sutures are employed to close them. After amputating the female breast on account of scirrhus, and when it has been necessary to sacrifice some portion of integument, I have sometimes found it necessary to open the wound for the purpose of securing bleeding vessels, and I find on recurring to my note book, that this, when it has happened, has almost always occurred in those cases in which I had deemed it necessary to employ sutures.

Since I have more generally avoided the use of sutures, in the treatment of wounds, I am persuaded that secondary hemorrhage has far less frequently occurred in my practice than before. A little reflection, indeed, must convince us that they must necessarily have the effect of inducing an afflux of blood to the part; for even where no previous injury had been inflicted, such an irritant would not fail soon to produce a sense of throbbing, and an inflammatory blush. In the vicinity of a wound such an effect must more certainly occur.

2. Adhesive Plasters.

In naming adhesive plasters as a cause of hemorrhage from wounds once dressed, let it not be understood that I design to condemn the general and proper use of these means of closing wounds. It is indeed impossible to effect with them the mischief which is often occasioned by the injudicious use of sutures; and yet even adhesive strips are not always innoxious in regard to hemorrhage. The adhesive plaster is sometimes prepared of stimulating ingredients, which applied in any manner to the skin will necessarily excite its vessels. When much force is used

with adhesive strips, to unite the lips of a wound, the patient will almost always soon begin to complain of painful traction of the skin, and of a smarting sensation where the adhesive plaster takes hold of it. True, they will generally soon drag along the skin, and thus become relaxed, but often not till they have created much irritation in the wound. I am confident that I have known hemorrhage often to result from irritation thus induced in a recently dressed wound, and I have seen that hemorrhage instantly cease on the removal of the strips for the purpose of securing vessels.

No advantage results in regard to the union of a wound from the employment either of sutures or the adhesive strips, with such a degree of force as to be distressing to the patient. Not only are they sometimes productive of hemorrhage, but when thus applied they generally fail to accomplish the very object for which they are used, for the stitches will generally prematurely cut through the skin, and the strips will soon so slip upon the skin as to be no longer of any avail.

3. *A Coagulum lodged in the Wound.*

To some, it may seem absurd, that while we know that the coagulum is the principal immediate means by which nature temporarily arrests arterial hemorrhage, this agent should sometimes be the principal cause of its continuance. That such, however, is sometimes the fact, I am assured by my own observation. A coagulum of small volume does indeed arrest hemorrhage, and probably contributes to union by the first intention. But one which painfully gorges a wound, produces a directly opposite effect. When a wound has been so closely dressed that blood cannot issue from its cavity—when, perhaps, also, it has been closed before the usual oozing of blood from small vessels has ceased, an accumulating coagulum soon begins to distend its walls, and to increase the tension of stitches (if they be employed) and adhesive strips. Perhaps, also, the parts wounded are of such a structure, that some sensitive tissue is put upon the stretch, and much irritation thus produced. It cannot be a matter of surprise that under such circumstances a coagulum should be the very cause of hemorrhage which it usually suppresses. I have sometimes found a wound thus bleeding, and have proceeded to expose the bleeding vessels for the application of the ligature. I have found the parts distended, and hard, from the presence of the coagulum, and the patient suffering greatly from the irritation caused by it, a throbbing sensation being usually present. As soon as the coagulum has been turned out from the bottom of the wound, I have seen all this suffering instantly cease, and simultaneously the blood which issued from many small vessels has ceased to flow, and I have been unable to ascertain the points from which it issued; though frequently, it is true, the effect will not so promptly cease after the removal of the cause.

4. *Compresses employed to arrest or prevent Hemorrhage.*

Under some circumstances, compresses, judiciously applied, are undoubtedly effectual in arresting hemorrhage even from wounded arteries of considerable magnitude; but there are many instances in which a compress is not only ineffectual, but absolutely pernicious in regard to hemorrhage, being itself indeed the principal cause of its continuance.

Some months since, I was called to a case of secondary hemorrhage from a wound inflicted upon the palm of the hand. It was the deep palmar arterial arch which had suffered injury, and two weeks had now elapsed since the accident. Hemorrhage had occurred about a week after the first closure of the wound, and had recurred every day, or oftener, till the time that I saw the patient. An intelligent physician, who attended the case, had made several ineffectual attempts to secure the bleeding vessel, which, being deeply buried in a narrow wound of firm parts, was approached with great difficulty. After each attempt he was compelled to resort to the compress. This was applied exterior to the wound, and was confined by a roller in the ordinary mode. The bleeding, however, still occasionally recurred, and it apparently became necessary to bind the compress still more firmly. On its first application the patient complained of irritation caused by its pressure, and this became much aggravated by the increased tightness of the bandage whenever the hemorrhage returned. But the periods of bleeding became more frequent, and the flow more rapid. When I entered the room, a little mental excitement being probably produced by my entrance, the blood gushed from beneath the dressings, and flowed with more rapidity than I had supposed possible from so small a vessel. I immediately stripped the dressings from the hand, and found the stream of blood issuing from beneath a firm compress which was very tightly bound to the hand. On removing the compress I found that its pressure had been so severe as to occasion a high degree of inflammation, and even to a small extent sloughing. A great degree of feverish excitement existed in the whole hand, and there was preternatural pulsation in the arteries of the fore-arm. It was manifest, indeed, that there was a very unusual afflux of blood to the wounded hand, and this was no doubt, in a great degree, caused by the action of the compress which seemed necessary to check the immediate flow of blood. I secured the vessel with some difficulty, and then covered the wound with simple dressings. The patient immediately ceased to complain of any irritation in the hand; the inflammatory excitement in the member ceased; there occurred no more hemorrhage, and the wound soon healed.

I have witnessed a very similar result from the application of a small, hard compress to a branch of the temporal artery. It at first commanded the hemorrhage; but the patient soon began to complain of severe pain from its pressure; the collateral branches began to throb with great force; the compress was lifted by the impulse given to the artery where it was wounded, and hemorrhage took place. The dressings were removed for the purpose of securing the vessel; but on thus taking away the source of irritation, the bleeding spontaneously ceased. We waited some time for hemorrhage to recur, in order to distinguish the bleeding vessel; none however recurred; the wound was then dressed lightly, and no more bleeding took place.

Were certain precautions attended to in the application of the compress, I am ready to admit that this degree of irritation would rarely result. The mischief usually arises from the unnecessary pressure of the compress on sensitive parts surrounding the bleeding vessels. When the form of the compress is well adapted, and is made to bear directly

on the vessel itself, a very slight degree of pressure is sufficient to command an artery of small calibre. But if the compress be ill-adapted, and diffuse its pressure widely around the bleeding point, great force must be employed to accomplish the object, and some sensitive part is sure to suffer. When a compress is resorted to, the wound (unless the soft parts are thin and cover a bone) should be expanded, the bleeding point exposed, and a small piece of sponge pressed directly upon it, within the lips of the wound. Another, somewhat larger, is to be superimposed, and then another, until we have formed the graduated compress, which is then to be confined with the gentle pressure of the bandage.

Whoever for a moment calls to mind certain principles in hydrostatics, will readily conceive under what great disadvantage pressure is made for the purpose of commanding hemorrhage, if it be applied to the exterior of a wound, with the intent of commanding the flow of blood by pressure diffused over the whole exterior of the cavity which receives the fluid. The blood issuing from an artery into such a cavity, presses upon its walls on every side with precisely the same force as that with which it issues from the orifice of the artery. Consequently there is required as much more force to stop the hemorrhage by pressure over the whole region of the wound, as the extent of the surface of the wound is greater than a section of the artery. We very well know, that when we open a wound and apply the finger directly to a bleeding artery, we command it with very gentle pressure. But when we close a wound in voluminous soft parts, and then attempt to command the bleeding by the pressure of the whole hand, we find it impossible.

Compresses, however, used to suppress arterial hemorrhage, must always be productive of some degree of irritation, and should, therefore, never be employed when the ligature can be applied, or torsion of the artery practised.

5. *Foreign Substances in the Wound.*

The lodgment of foreign substances in a wound is a well-known source of irritation, and consequently may be productive of hemorrhage. They should, therefore, be carefully sought for and removed, provided the means employed for this object do not create more irritation than would the presence of the foreign body.

6. *Bleeding of Cutaneous Arteries.*

In several instances in which I have been under the necessity of opening wounds once dressed, on account of hemorrhage, I have found that the bleeding had occurred from some minute artery just beneath the skin, and closely adherent to it. This circumstance I account for in the following manner. The artery being situated in the dense tissue adherent to the internal surface of the skin, instead of being involved in a loose sheath, as are usually the deeper vessels, cannot retract and conceal its orifice in a manner favorable to the formation of a coagulum in its sheath. The mouth of the vessel remains exposed close to the lips of the wound, and the coagulum within the wound, closing the deeper vessels, will have no effect upon this. Those arteries of the skin are also more influenced by sutures, adhesive plasters, &c. which directly exercise their irritation

upon the surface. Hence the importance of carefully searching for and securing such cutaneous vessels.

7. Pressure of Soft Parts upon a Sharp Margin of an Amputated Bone.

When, in performing amputation, the surgeon has unfortunately not preserved soft parts; and especially skin of sufficient extent to cover completely the face of the stump, in his solicitude to close the parts as accurately as possible, the integuments, and even the muscles, are sometimes drawn with much force over the sharp margin of the amputated bone. Great irritation must necessarily be the consequence; and we know that sloughing often results from it. This therefore must be occasionally a source of troublesome hemorrhage, as I am confident I have witnessed in several instances.

From what has been advanced, is to be inferred the general precept, that in the treatment of all wounds in which many small vessels may have been divided, everything should be avoided in the treatment which renders the condition of the part uncomfortable to the sensations of the patient, especially all irritating traction and unnecessary pressure.

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SHOT PASSED FROM THE BLADDER.

Case in which Shot were discharged from the Urinary Bladder. By WILLIAM WATSON, M.D. of Bedford, Pennsylvania—communicated in a letter to Professor N. R. SMITH, M.D.

THE following interesting case has been communicated to me by my intelligent friend, Dr. William Watson, of Bedford. I would venture to suggest that, as these shot (which are now in my possession) have evidently the battered appearance of those which have been discharged from a fowling piece, they probably were swallowed by the patient in the flesh of game which she may have eaten;—that in passing the alimentary canal, they became lodged in some cell or follicle, in some portion, probably, of the sigmoid flexure of the colon;—that adhesion being established between this portion of the intestine, and the peritoneal covering of the bladder, the shot were conveyed by ulceration into the bladder, without entering the general cavity of the abdomen. The symptoms of local and constitutional disorder appear to me to confirm this supposition. Your readers are aware that analogous cases are on record.

Yours, &c.

N. R. SMITH.

“I will relate in a very few words a case which occurred in a visiter to the Bedford Springs, in the last summer, of so extraordinary a character that I fear it will be considered incredible.

“Mrs. M. a lady who had been married but a few days, with her husband, came to the springs probably for amusement and change of scene. She had had a slight bilious attack before she left her home, but had recovered and was quite well when she came to the springs. Two or three days subsequent to her arrival, she had a recurrence of bilious symptoms assuming the form of remittent fever. The attack was mild in character, and readily yielded to the common means of prescription;