REMARKS

ON

THE INSTRUMENTS DESIGNED FOR EXPLORING
GUN-SHOT WOUNDS,WITH A VIEW TO DETECT BULLETS OR OTHER FOREIGN
BODIES SUSPECTED TO BE LODGED IN THEM.

By T. LONGMORE, Esq., C.B.,

Professor of Military Surgery at the Army Medical School, Netley.

To obviate these difficulties and sources of fallacy, a surgeon of the French army, Dr. Lecomte, invented an instrument, to which he gave the name of "probe-nippers" (*stylet-pince*). His design was not merely to indicate the presence of a leaden bullet, by bringing away a stain or mark of its presence, but by bringing away a small portion of the lead itself. Such an instrument could not only be used for bringing away a scale of lead, but also a minute portion of paper, cloth, wood, or any other foreign body capable of being cut in a similar manner. If the supposed foreign body were a fragment of bone, it would equally bring away a particle of it. It was evident that, in addition to its other qualities, the *stylet-pince* would require to have its nippers smaller in size than the porcelain knob of Nélaton's probe, with a stem of sufficient length to be passed along narrow sinuses, and at the same time solid enough to bear a certain strain in use. I have ascertained by practical experience that the *stylet-pince* does possess the qualities aimed at by Dr. Lecomte.

The instrument consists of two portions. The first is a central steel rod of small diameter, fixed in an ivory handle at one extremity, and cleft at the other into two small branches, each of which terminates in a little cup-like blade or curette; the second is a slender cannula, which glides backward and forward, but only within a limited distance, along this rod. The central rod is fixed in the handle by means of a side-screw, which can be loosened at pleasure by the surgeon, so as to increase the length of the exposed part of the stem, or to enable it to be removed altogether to be cleaned. The two steel curettes have very fine and sharp edges. They separate from each other by the elasticity of the two little steel branches, of which they are the terminations; but they are easily brought together by a slight pressure, such as that exerted by causing the cannula to glide along the central stem up to them. When they are thus brought together, the two curettes so fit one to the other that, united, they form a small smooth steel knob or rounded extremity, about one-third of the usual size of the china knob of a Nélaton probe.

It will be apparent, from the description, that the gliding of the cannula determines the opening and closing of the curettes: when it is slipped back, the curettes open; when it is pushed forward, they are closed, and form a little hollow globe. There is no difficulty in the manipulation of the instrument. It is inserted with the curettes closed, and it may be used then precisely as the long silver probe in a surgeon's capital case of instruments. When about to be employed for determining the nature of the substance with which it is put into contact, the cannula is drawn towards the surgeon, at the same time that the extremity is retained with an equable and steady pressure against the substance. This movement has opened the curettes. The same even pressure is sustained while the cannula is pushed home, and this causes the curettes to be brought together again; their edges, as they close towards each other, nipping off a small particle of the substance over which they are moved. The instrument is then withdrawn, and, supposing it to have been brought into contact with an ordinary bullet, a small scale of lead will be brought away enclosed within the cavity of the rounded extremity formed by the two curettes. The glistening surface of the freshly cut shaving of lead will sufficiently indicate its nature. If any difficulty should occur in distinguishing the particle which has been brought away, it can be removed from the curettes, and observation under an ordinary magnifying lens will show what the substance is. The *stylet-pince* is thus a most useful explorer for deciding doubtful cases of lodgment of foreign bodies; it responds as an indicator with even more distinctness than the Nélaton probe in all cases in which that test would be of service, while it answers for a variety of other cases in which the Nélaton probe would give no indication at all.

Electricity was some years ago suggested as a means of detecting lodged bullets and other metallic substances in wounds; and some very ingenious apparatus depending on this agent have been lately contrived for the same purpose. One of the first to experiment upon an electric ap-

pliance of this kind was a French military surgeon, M. Fontan, assisted by M. Favre of Marseilles. A description of the somewhat complicated apparatus employed in these experiments is to be found in the *Gazette des Hôpitaux* of the 29th November, 1862.

The improvements which have taken place in the modern applications of electricity have paved the way for more simple and yet more sensitive bullet explorers. One of these is the invention of Mr. De Wilde, a civil engineer, and is very compactly arranged in a box of small dimensions. The electric action is excited in a suitable cell; the electricity there developed is increased in intensity by the intervention of a multiplying coil; an exploring probe is connected by insulated wires with the apparatus; and the indication, when the circuit is completed by contact of the two points of the probe with a leaden bullet or piece of iron, is given by the striking of a hammer against an alarm-bell. The bell sounds at each interruption and renewal of contact of the points with metal. The exploring probe consists of a long slender tube of smooth vulcanite, containing two insulated needles, the points of which can be withdrawn within the tube, or be made to protrude, at the pleasure of the operator. Altogether it is an effective appliance as an exploring instrument, owing to the strength of the electric current developed, and the marked manner in which the indications are given by the sound of the bell when a bullet or other metallic substance is met with. There is also attached to the instrument a bullet extractor, the two arms of which are insulated, and so arranged that, when they are connected, in the same way as the explorer, with the battery, they indicate the grasping of the foreign body similarly by the sound of the bell. Unless the metal be firmly grasped by both blades, without any other substance intervening, the indication will not of course be given.

Another instrument of a similar nature has been made by Messrs. Krohne and Sesemann of London. The indications of contact with a lodged bullet or other metal are in this instrument afforded by the movements of a galvanometer, and of a fine needle working upon a dial-plate, in the same manner as is seen in the ordinary single needle telegraph. I have experimented with both these instruments, and have found them equally effective in their indications. Attached to the latter instrument is not only a bullet-extractor as well as the explorer, but also a pair of acupuncture needles, for use in cases where metallic bodies are supposed to be lodged in soft tissues, away from any means of approach by a wound or sinus.

A rough but sufficiently effective electric instrument for facilitating the discovery of metallic substances lodged in gunshot-wounds has been made in the following way. The magnet of an ordinary pocket-compass, which has had some turns of wire covered with thread wound round it as an induction coil, is employed for the electric indicator while a piece of copper sheeting, bent round a small plate of zinc, but separated from it by flannel padding saturated with the usual diluted acid, forms the voltaic pile. The exploring instrument is formed by two insulated wires, bound together, but with the points left free. These parts being connected, when the circuit is completed by contact with metal, the indication is given by movement of the magnet of the compass.

Lastly, the endoscope has been suggested for use in exploring for foreign bodies in wounds. Dr. Fenger of Copenhagen, in 1869, made some experiments with the instrument on horses, and came to the conclusion that pieces of cloth in wounds, or bullets driven into bones, could be seen by its means. Dr. Fenger has stated that during the late war he was enabled in several instances, on examining wounds some weeks after they had been inflicted, to see their interiors distinctly by means of the endoscope, without causing pain, hæmorrhage, or any subsequent irritation, in consequence of the introduction of the instrument. I have no experience of such an application of the endoscope, and can hardly think that, with so many other effective appliances available, it is likely to be turned to much practical account in this direction.

It must be sufficiently obvious that several of the exploring instruments just described are not suited for use in the field. The circumstances of gunshot-wounds themselves, as they are ordinarily presented shortly after their infliction, do not render such instruments necessary; nor are some of them—as the electric explorers for example, which may be easily disarranged—suitable for use in the places where the wounds resulting from battle are usually treated during their earliest stages. But it has not been the purpose of these remarks to discuss either the nature or circumstances of the wounds in which instruments of this kind may be specially serviceable; their object has been only to describe the instruments available for exploring for foreign bodies in cases where the exploration is decided to be advisable. It is only right to remark, however, in conclusion, that even in such cases there must be a limit to search. This limit must depend on the circumstances of each particular case, and must be decided by the judgment and tact of the

* Concluded from page 716 of last number.

responsible surgeon. As a general rule, it may be stated that, whatever may be the reasons for concluding that a bullet or any other foreign body has lodged in or near a gun-shot wound, if, after search by the finger in cases where a digital examination is practicable; after external manipulation and observations made in varied postures of the part of the body concerned; after attention has been given to indications derived from the patient's sensations; effects of pressure upon, or injury to, nerves; and, lastly, after a moderate but careful exploration by one or other of the exploring instruments just described, if, after these steps have been taken, the site of the lodgment be still not ascertained, more especially if the patient be suffering pain, or is in an exhausted condition, the exploration should be at once discontinued. The continuance of the search will not merely add to the weariness and distress of the patient, but, if the several proceedings above-named have been properly carried into execution, it is not likely to be attended with a successful issue. The foreign body will probably have passed beyond or out of the field of exploration, or have become deeply impacted in bone, or entangled among tissues, where it could only be discovered by an unjustifiable amount of meddlesome and injurious disturbance of the structures implicated. We must rest in hope that, either during the process of suppuration, or under the influence of muscular actions, or by gradual approach toward the surface, the escape of the foreign body, whatever its nature, whether hard or soft, smooth or rough, organic or inorganic, may be eventually effected without such risks; or, if it be of a favourable kind and form, such as a leaden bullet is when its normal shape is retained, and if it be not in contact with a nerve, bone, or other important organ, that the wound may heal favourably, notwithstanding its presence, the foreign body becoming encysted, and remaining lodged without causing either pain or mischief for many years afterwards.

HYDRATE OF CHLORAL IN PUERPERAL CONVULSIONS.*

By J. G. SWAYNE, M.D.,

Physician-Accoucheur to the Bristol General Hospital.

CASE I.—On October 26th, 1870, Mr. Taylor requested me to see Mrs. H., living in Kingsdown, Bristol. She was a primipara, and from his account, had had albuminuria with oedematous extremities for about three weeks. For this he had purged her and given diuretics up to the time when symptoms of labour set in, accompanied with convulsions. I saw her first at 7.30 P.M. She had then had two convulsive attacks—the first at six, and the second at seven o'clock. Mr. Taylor had given her calomel and jalap, and applied a sinapism to the back of the neck. The breathing was slightly stertorous, but she was not wholly unconscious. Before the fits came on, she said that she saw "beautiful green things floating in the air." On examining, I found the os uteri dilated to the size of a crown-piece, and the head presenting. The membranes were unruptured, and there were scarcely any labour-pains. We bled her to fourteen ounces. Immediately after this, at eight o'clock, another fit came on. When it was over, we injected into the rectum thirty grains of chloral dissolved in three ounces of water. The pulse, which had previously been about 70, was now about 120. She was at first rather restless, but soon became more conscious, said her headache was better, and fell into a tranquil sleep. We then left her, with instructions that if any fresh symptom came on, Mr. Taylor was to be summoned immediately. Next day, I received a note from Mr. Taylor, in which he stated that she remained in the tranquil state in which we left her for nearly an hour, when labour-pains set in with regularity, and went on until 3 A.M., when he was sent for; and, on examining, found the head in the pelvic cavity, and a fairly good pain; but with the second pain after his arrival, she had a convulsion as severe as that we witnessed. He immediately applied the forceps and delivered her as quickly as possible, when he found, to his surprise, that there was a second infant. However, a foot presented, which he soon brought down, and promptly delivered the child. There was a considerable hæmorrhage at the removal of the placenta, but she was not very much exhausted, and he left her feeling comfortable. Mr. Taylor added that, "she is to-night cheerful, with a pulse of 100. So far, we may congratulate ourselves on the termination of a somewhat unpromising case. Your chloral had a most decidedly soothing effect, and I fancy its topical irritant quality may have had a reflex influence on the pelvic nerves." I may add that the patient went on favourably, and ultimately made a good recovery.

CASE II.—On March 26th, 1871, I saw, in consultation with Mr. Wine, Mrs. R., aged 25, living in Bread Street, St. Philip's, Bristol.

She had had two children previously with easy labours. About five days before the present labour, she was frightened very much (because one of her children was nearly run over), and felt no foetal movements afterwards. Mr. Wine saw her first at 3 A.M. on March 25th. The os was then slightly dilated, and the pains feeble. She then had a convulsion for the first time, and afterwards dozed off into a snoring sleep. Mr. Wine went home for three grains of calomel, which he gave her. He came again at 10 A.M., and found that she had had six fits since he last saw her. On examining the bed, he found that she had given birth to a dead child, which was quite rigid. About 11 P.M. on March 25th, she had a very bad epileptiform convulsion. After that (about twelve o'clock) she had some fits of a more hysterical character, accompanied with screaming. When I saw her at 1 P.M. on March 26th, she was lying in an almost insensible state. The pupils were scarcely affected by light; but the breathing was not stertorous. Pulse 86. We drew off about twelve ounces of dark coffee-coloured urine. This was highly albuminous, and became almost solid when heated. We gave her thirty grains of chloral by injection. At 10 P.M. I saw her again, when Mr. Wine told me that she had another fit about half an hour after the chloral was administered, and then another very long one about half an hour after that, and then none for two hours until 6 P.M., after which she had seven rather violent ones. Although her pulse was rather weak, we bled her at 10.30 P.M. to twelve ounces. She had a fit about twenty minutes before the bleeding, and another about an hour afterwards. There was then a complete cessation of them for three hours until a quarter to 3 A.M. on March 27th. From that time up to 8 A.M., the fits returned, and she had as many as twelve. I saw her at 11.30 A.M. on March 27th. She had then been quiet, and had slept for more than three hours without any fits. The pulse was 136. The urine now showed no trace of albumen. The pupils were slightly affected by light, and she was able to take a little milk and brandy, though scarcely sensible. We ordered her thirty grains of chloral, to be repeated if necessary in six hours. She took the first dose at 2 P.M., and (by a mistake of the woman in attendance) the second dose at 4 P.M., and thus one drachm of chloral was administered in two hours. I saw her at 10.30 P.M. There had been no return of the fits, but she was lying in a very prostrate condition, with a pulse of 144, and respirations 36 in the minute. I was summoned early in the morning of the next day (March 28th), because Mr. Wine, from certain symptoms, apprehended an attack of abdominal inflammation. The abdomen was tympanitic and somewhat tender to the touch. There had been no more fits, but she was lying in a very prostrate condition, and was scarcely sensible. Pulse 125; pupils slightly affected by light. As she had not yet had much stimulus, we ordered her a dessert spoonful of brandy every two hours. She was able to take strong beef-tea and milk very well. On March 29th, she was much better, able to answer questions, and becoming conscious. Pulse 108; appetite good. I did not see her after this, but Mr. Wine reported to me that she made a good recovery, with the exception of considerable headache, which lasted about a week.

REMARKS.—I have brought forward these two cases of convulsions rather with the view to record my own experience, as far as it goes, with respect to the use of a comparatively new medicinal agent in this formidable disease, than because they furnish any very conclusive proof of the value of the remedy. I have the highest opinion of the efficacy of bleeding in puerperal convulsions, and have shown from time to time that it has a greater power than any other remedy in removing the albuminuria which is probably at the root of this affection. I did not, therefore, in either of the two cases just mentioned, feel justified in relying solely on hydrate of chloral and omitting to bleed; and, on this account, the cases are not so conclusive as to the value of chloral as one could wish. In the first case, however, the chloral, when given after bleeding, seemed to have a very tranquillising effect, and the result, perhaps of both, was that there were no more fits for about eight hours, when they came on again with the more severe expulsive pains of the second stage, and were at once relieved by delivery. The great distension of the uterus from the presence of twins had probably some share in causing the convulsions. In the second case, the convulsions appeared to be chiefly due to the very unnatural condition of the urine; for they were not relieved, but rather became worse after delivery. Chloral was then given to the amount of thirty grains, and there was a cessation of the fits for about two hours. The woman was bled after the fits returned, and they then ceased again for three hours, though not immediately after the bleeding. After that the fits returned, nearly one in every hour, and then appeared to cease spontaneously as soon as the urine was free from albumen. Soon afterwards, she took, partly by mistake, a double dose of chloral (about one drachm in two hours), and there was no return of convulsions; but this powerful dose of chloral appeared to add very much to the previous prostration.

* Read before the Bath and Bristol Branch, October 1871.