A REVIEW

OF

SOME OF THE MORE IMPORTANT SURGICAL PROBLEMS

OF

PRESIDENT GARFIELD'S CASE.

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SURGICAL PROBLEMS OF PRESIDENT GARFIELD'S CASE.

I AM permitted by Dr. D. Hayes Agnew to say that he entirely endorses the statements and opinions contained in this paper, which has been submitted to him for criticism.

Its motive is to be found in the fact that numerous articles which have from time to time appeared in both the medical and the lay press, seem to indicate that in the minds of many intelligent people, within and without the profession, there is still much misconception regarding several important points in the case of the late President Garfield.

When the circumstances of that case are recalled, the intense excitement which prevailed during its progress, and the extraordinary character of many of the published statements referring to it, it is hardly to be wondered at that a confused or altogether erroneous impression should have been left on the minds of many persons who have heard or read only partial or incorrect accounts of the questions involved.

While the assassin was still undergoing trial, and the question of his responsibility was undetermined, and while there was a possibility that the treatment of the case might become an element in either defence or prosecution, it seemed proper to refrain from further discussion of the subject. Now, however, there can be no objection to a brief review of

the points alluded to, and in attempting this I shall, as far as possible, confine myself to a statement of what appear to be undoubted facts, and shall not seek to particularize or otherwise notice opposing statements.

In bringing together the facts which I shall mention, I have especially consulted the official report, published in the *American Journal of the Medical Sciences* for October, 1881, and have carefully perused the excellent articles of Drs. Ashhurst, Hunt, Sims, Hodgen, Shrady, Weisse, Kumar, Schüssler, Figueira, and others, as well as the editorials and criticisms of the medical press of this and foreign countries.

The points which it seems worth while to consider, on account both of their general surgical interest, and of the misconception alluded to, and which may be taken up seriatim, are as follows:

1. Did the relative positions of the patient and assassin at the time of the shooting afford any indication of the course of the ball as revealed at the autopsy?

2. Was it probable that at any time the ball could have been detected or located by the use of probes, and, if so, should such an endeavor have been made?

3. Did the subjective symptoms indicate anything more serious than nerve injury or spinal concussion, or, in other words, did they furnish reliable material for diagnosis?

4. Was the subsequent treatment in any way whatever hurtful or defective, or could it have been modified with advantage, if the exact character of the injury had been known?

5. What was the immediate cause of death?

6. Was the wound necessarily a mortal one?

1. At the time the shooting took place, the President and Guiteau stood about six feet apart, the

latter a little to the right of his victim who was just in the act of turning to the left. The ball penetrated the skin three and a half inches to the right of the spine over the tenth intercostal space, comminuted the eleventh rib, fractured *the twelfth rib* at a point only an inch nearer the median line, and then passed through the connective tissue and the fat behind the upper edge of the right kidney, and perforated the psoas fascia and the psoas magnus muscle near its attachment to the first lumbar vertebra.

Thus its course could not by any possibility have been a straight line, the first deflection occurring when it impinged upon the eleventh rib. Otherwise to account for the fracture of the twelfth rib, it would be necessary, as I have determined experimentally, to suppose that the hand which held the pistol was at an elevation of at least five feet above the wound of entrance, a manifest absurdity. If the second shot, which was fired while the President was falling, had been the one which inflicted these injuries, the actual course of the bullet might then have been in the direct line of fire, but all accounts agree in stating that the second shot inflicted merely a slight flesh wound of the arm.

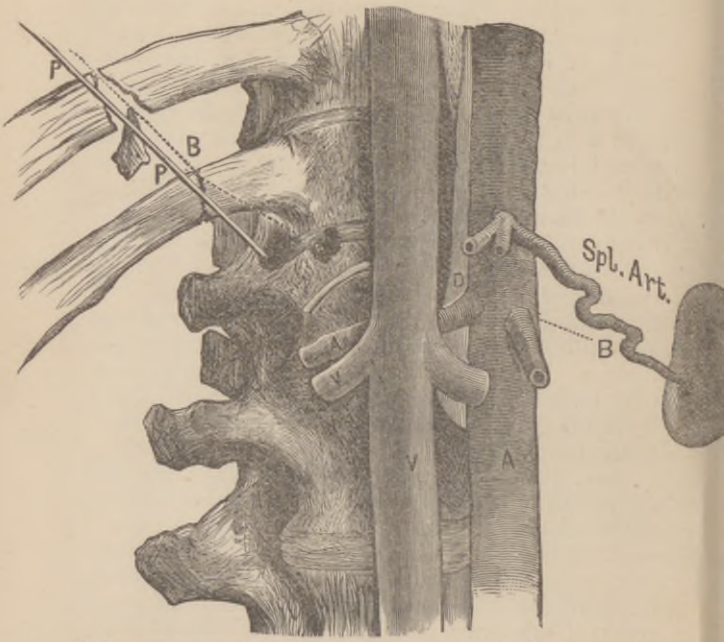
Now, although it is a well-recognized surgical precept that in the examination of gunshot wounds the relative position of the parties furnishes important information, it is yet equally well understood that such information loses most, or frequently all, of its value if the missile has impinged upon some resistant substance at the time of or soon after its entrance into the body.

A knowledge of the positions of Guiteau and the President might have been valuable in determining the course of the bullet from the skin to the eleventh rib, but as to its probable path beyond that bone, was of infinitely less importance. Indeed, if it had

been relied on as a means of diagnosis, it would have led to an entirely erroneous conclusion.

2. A glance at the accompanying diagram (Fig. 1), and a momentary review of the part, will be sufficient answer to the query as to the

FIG. 1.



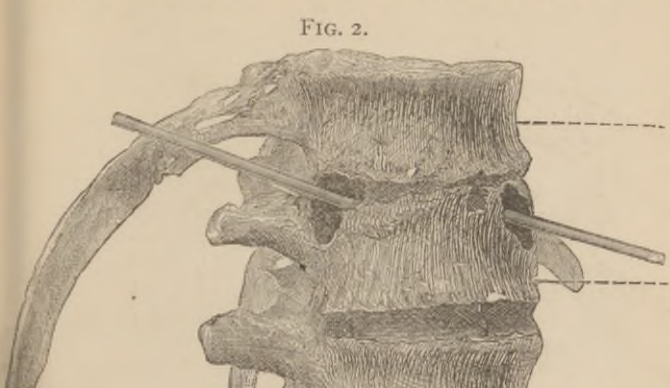
A diagram representing the surgical relations of the parts involved in the President's wound.

possible results of persistent probing at any time after the receipt of the injury.

B B represents the course of the ball from its point of contact with the upper edge of the eleventh rib

to its lodgement on the left of the spine. It must be remembered that over all that portion of the vertebral column represented in the cut, over the transverse processes, and over the vertebral extremities of the eleventh and twelfth ribs lie the psoas

FIG. 2.



Taken from a photograph of the twelfth rib, last dorsal and first and second lumbar vertebræ, in the President's case.

fascia and the psoas magnus muscle, the fibres of which, running longitudinally, were penetrated by the ball, and beyond all doubt speedily closed over its track. The succulence and elasticity of the intervertebral cartilage which it next penetrated, would in like manner have caused that tissue to close behind the ball, as it does after an awl or a trocar is inserted into it. A little external to the wound of entrance in the vertebra lies the intervertebral foramen between the last dorsal and first lumbar vertebræ, transmitting the last dorsal nerve, and

leading directly into the spinal canal. A, V, D, are the abdominal aorta, vena cava, and thoracic duct.

Fig. 2, taken from a photograph of the vertebra itself, and published in the official report of the autopsy, represents the course of a probe through its body, and it will be seen that here again the track was not a perfectly straight one. The line of the probe at the wound of entrance if continued does not even impinge upon the wound of exit at any point of its circumference.

The situation needs no further elucidation. If we suppose that the probe (represented by *p*, *p*, Fig. 1) could have followed the track of the ball through the large muscular mass of the psoas, though this is highly improbable, it is evident how dangerous, how altogether inexcusable, any further exploration would have been in that region. Directly in front of the end of the instrument would have been a foramen leading straight into the spinal cord itself, as yet not seriously injured. A little in advance, anteriorly, lay the vena cava and the thoracic duct, with their delicate and easily ruptured walls, and a slight distance beyond was the aorta; just below were the cords of the lumbar plexus, which, also, might easily have been damaged. When it is remembered that beyond all this the track lay through the body of a vertebra, and that the ball emerged from the spine anterior and external to the left psoas muscle, it can hardly be believed that any thoughtful person would insist either on the possibility of having discovered the ball itself under these circumstances, or, if for the sake of argument that were admitted, on the propriety of having made the search. The depth of the wound prevented digital exploration from revealing anything of value. Of course, when the consultants were called in, and the wound was found filled with a firm clot, the dangerous symptoms subsiding, and professional attendants at hand to give

an account of the previous explorations made with probes and fingers, it would have been contrary to all received surgical principles, and opposed to all customary practice, for them in any way to have explored or disturbed the wounded part.

3. The possibility of having made the diagnosis from the nervous symptoms of the patient, and without reference to physical exploration, has been repeatedly asserted, but it seems to me without a proper consideration of the peculiarities of those symptoms. They consisted in their totality, in hyperæsthesia of the right side of the scrotum, and tingling pains in the feet and ankles, at first altogether on the right side, and always much more marked on that side than on the left. They were temporary, diminishing rapidly in severity, and disappearing altogether in a short time, were identical with those which every one has experienced after contusion of a nerve—as in striking the "crazy-bone"—and were unassociated with any motor or sensory paralysis.

It cannot be reasonably contended that these symptoms are *characteristic* of fracture of a vertebra, or of grave and irreparable damage to the cord, or, indeed, of anything except *some* form of nerve injury of a fleeting character. They pointed directly to a moderate degree of concussion, to laceration of a nerve trunk, or to some other reflex source.

"Occasionally,[1] when the trunks of nerves are directly injured (not divided, but violently pushed aside), the wound will be accompanied with intense pain, but none will be experienced locally; the pain which is felt will be referred far away from the track of the projectile to some distant part, to which the nerves are distributed. . . . Less rare cases are those in which

[1] Gunshot Injuries, their History, Nature, and Treatment, by Surgeon-General T. Longmore, London, 1877, p. 145.

pain is not only felt in the wounded limb, but reflex pain is also felt in the opposite uninjured limb," etc.

"Nerve injuries may also cause pain which, owing to inexplicable reflex transfers in the centres, may be felt in remote tissues outside of the region which is tributary to the wounded nerve."[1]

"In Case IV., Hutchinson's Series, p. 313, the median and ulnar nerves being injured, there was pain in the unhurt hand. Pirogoff, p. 384, has a similar instance from injury to the right brachial plexus.

"In two cases, wounds of one leg seemed to the patient to be truly in the other."[2]

So far as I know, all the diagnoses of spinal injury which were claimed to have been made in different parts of the country, first appeared after the publication of the autopsy, and this is rather to the credit of their authors than otherwise, as certainly no one having merely those symptoms submitted to him in a similar case to-day, would be justified in asserting the existence of a fractured vertebra or a grave injury of the cord.

Prof. Kumar, of Vienna, after a lengthy criticism of the case in the light of the clinical history and the autopsy, wrote:[3]

"Evidences of paralysis in the region of the lower extremities were never noticeable; the only symptoms of disturbance of nerve function were those already mentioned,—hyperæsthesia of the skin of the feet and ankles, and of the right half of the scrotum,—which at the end of the first week had entirely disappeared. From all these symptoms no conclusion as to the course of the ball could be drawn."

Lidell says:[4]

"The general symptoms of gunshot fracture of the spine are not essentially different from those which are

[1] Injuries of Nerves, by S. Weir Mitchell, M.D., Philadelphia, 1872, p. 193.

[2] Ibid., p. 146.

[3] Präsident Garfield's Verwundung, von Primararzt Dr. Kumar, Wiener medizinische Blätter, November 10, 1881.

[4] American Journal of the Medical Sciences, vol. xlviii. p. 311.

present in other forms of that injury, and they are referable mainly to paralysis, either partial or complete (but commonly the latter), of all the muscular apparatus supplied with spinal nerves given off at or below the seat of fracture."

Hamilton[1] wrote in 1865:

"In a few cases a ball has been known to pass through the side of the body of one of the vertebræ leaving a round hole or a lateral furrow, without coming in contact with the spinal marrow or the bloodvessels. It is not probable that we shall be able to diagnosticate such a case clearly during the life of a patient, and if we were able to do so, we do not see what benefit could be derived from any surgical operation."

Legouest[2] says:

"It is always very difficult, if not impossible, to be assured that the bodies of the vertebræ are injured when there are no symptoms of a lesion of the spinal marrow. The surgeon in most of these cases is constrained to leave them to the efforts of nature, watching for the appearance of those accidents which may accompany the presence of foreign bodies, and which are aggravated in such cases by the importance of the organs in the neighborhood of the wound."

Agnew[3] says of fractures of the vertebræ:

"Except in fractures of the spinous processes, where the damaged part is entirely accessible to the touch, we cannot affirm the existence of such an injury with any degree of certainty. The presence of certain symptoms following a sufficient cause, furnishes ground for supposing the existence of a fracture, and yet these may all be present without any injury of the kind. The prominent symptom is paralysis."

Authorities to this effect might be multiplied indefinitely, but the question hardly admits of dispute.

If, then, a study of the positions of the wounded

[1] Military Surgery, p. 338, quoted by Dr. Hunt.
[2] Treatise on Military Surgery.
[3] The Principles and Practice of Surgery, Philadelphia, 1878, vol. i. p. 825.

man and his assailant was without diagnostic value; if probing to any extent was strongly contraindicated, and could not possibly have resulted in anything but harm; and if the subjective symptoms were not distinctive, or were positively misleading, it is evident that the materials for definitely determining the character of the injury were altogether wanting. Much has been written in regard to "mistaken diagnosis," even by gentlemen who intended to defend the management of the case; but it has always seemed to me that this did not fairly state the situation. An "absence of diagnosis" on account of a total lack of necessary evidence, would have more nearly expressed it, and every surgeon of experience knows how frequently and how unavoidably this occurs. As I have already stated elsewhere, at a time when speculation was rife as to the exact seat of the bullet, and when we heard daily of certain imaginary movements which it made, Dr. Agnew, who, doubtless, in this as in other matters represented accurately the opinion of the surgical staff, assured me that he did not know the position of the ball, and knew of no safe means of determining it. And Dr. Hunt has shown, by a letter written to him by the same gentleman on the 23d of August, 1881, that the hopelessness of the case was fully appreciated by most of the surgical attendants.

4. Recognizing, then, that, in the absence of a positive diagnosis, it was proper in this as in all other cases under the same circumstances to treat symptoms as they arose, it may be well to inquire into the character and effects of that treatment in this case.

The vomiting immediately after the accident and the temporary retention of urine, were usual symptoms of shock, and received all necessary attention. The nervous symptoms subsided, as has been said,

in a short time, without requiring any special treatment. The rigors which occurred about the 22d of July were due, in the first instance, to the formation of a small abscess under the erector spinæ muscles, possibly caused by the irritation of a small fragment of the broken rib, buried in the contiguous muscle. Evacuation of the abscess, and removal of the bony spicula, resulted in prompt disappearance of the chills and in subsidence of the temperature. It seems probable that about this time the blood received its first septic impression; but this is not to be wondered at when we recall the fact that suppuration occurring in this region is rarely circumscribed, the pus, owing to the scanty amount of connective tissue, and to the presence of loose masses of fat, finding its way freely through the surrounding parts, and thus affording the best possible condition for decomposition and for the absorption of poisonous matters. The laceration of the cancellated structure of the first lumbar vertebra doubtless contributed largely to the production of the septicæmic condition, which was in no wise due to lack of proper or sufficient drainage. More favorable circumstances for its production than existed in the comminuted and softened cancellous tissue, with its open venous sinuses, bathed in ichorous pus, could hardly be imagined.[1]

The passage into the right iliac fossa, caused by the gravitation of the pus in this direction, and ending in a point of inflammatory induration, gave rise to the report that the ball might possibly have taken this direction. The autopsy showed that this was not the case, but it also developed the fact that the wound proper was thoroughly drained through this

[1] "A long, interrupted, and sinuous shot-wound with several fractured bones in its course and terminating in the neighborhood of the abdominal cavity, necessarily presents every facility for unhealthy suppuration, the formation of secondary abscesses, the retention of pus, and all their accompanying inseparable and unavoidable evil consequences."—Kumar, op. cit.

channel, and that the second operation (performed on August 8th), which, by an opening below the twelfth rib and directly through the quadratus lumborum muscle, effectually drained the space between that muscle and the peritoneum, and indeed the whole iliac and lumbar regions, also aided in carrying away the products of suppuration from the neighborhood of the wounded vertebra. Indeed the abscess thus evacuated had doubtless been conducted directly to this point from the wounded vertebra by the psoas fascia.

The grounds which seemed to exist for believing this sinus to be the track of the ball, especially in the absence of any evidence that it had gone in a different direction have been well expressed as follows:[1] The anatomical possibility that a ball deflected downwards from the eleventh rib might take the same course as did the sinus to the iliac fossa; the rapidity with which this sinus formed; the readiness with which the drainage tubes passed; the fact that the incision of the second operation tapped the sinus below the twelfth rib; the fact that the wound of entrance of the ball healed so promptly after the incisions below; the existence early in the case of a point of tenderness in the right iliac fossa; and the subsequent recognizable induration there which gradually diminished.

I desire to reiterate, however, that, although this view was thus strongly favored by these facts, it was not held unreservedly by the surgical staff, and by some of them was, at the most, regarded merely as a possibility.

The drainage of the long narrow passage into the iliac fossa by a counter-opening at its lower extremity, which, it has been asserted, was an indication not met by the surgeons, would have necessitated an abdominal section, displacement of the viscera,

[1] Dr. F. D. Weisse, Medical Record, Oct. 8, 1881.

and division of the posterior layer of the peritoneum, and would have resulted in absolutely no benefit, as in the recumbent position the pus would have continued to gravitate toward the opening in the lumbar region, as it did throughout the entire case. It must be remembered, also, that the only instruments which would penetrate this track were small and flexible; that when introduced, their lower extremities could not be felt through the abdominal walls, and that therefore an extensive and dangerous operation might have been performed without revealing the situation of the sinus or effecting a communication with it.

The fact that drainage was thorough and complete, and that no portion of the unfavorable symptoms was due to neglect in this respect, was fully established by the absence of purulent collections either along the track of the ball or in the passage caused by the burrowing of the pus. There was no time previous to the first operation at which the accumulated pus did not pass out of the original wound, but its exit was favored by gravitation after the two operations which brought the external openings on a lower level, and enabled them not only to drain completely the iliac and lumbar regions, but also to carry away any discharge that may have come from the fractured vertebra.

Antiseptic treatment was employed throughout as carefully as possible, although the case was in its very nature especially unlikely to be materially benefited by it.

Drainage tubes were used until it became evident that they were unnecessary.

Prof. Max Schüller, of Berlin, after a careful review of all these points, wrote:[1]

"Even if a suspicion of the wound of the spine had arisen, the problem of treatment, which the attending

[1] Deutsche medizinische Wochenschrift, No. 47, p. 634.

surgeons were endeavoring with the greatest skill to solve, would have undergone no alteration."

5. The subsequent complications through which the President was being so skilfully, and we may say successfully, carried are familiar to every one. The gastritis, a result of chronic dyspepsia; the parotid inflammation, a not uncommon accompaniment of exhausting fevers; the bronchitis and broncho-pneumonia, due partly to his long-continued supine position, and partly to the unavoidable septicæmia, were being carefully watched and treated, when death occurred from rupture of the splenic artery.

There can be no doubt that the coats of this vessel were either injured at the time of the shooting, or were involved in a slowly developing inflammation and ulceration, extending from the contiguous track of the ball. The rigors which preceded death were doubtless due to the successive hæmorrhages which were indicated by the lamination of the blood-clot found in the peritoneal cavity.

The theory that the rupture of the artery was caused by "malnutrition of the coats, the result of pyæmia," is hardly worthy of mention, no such case due to systemic influences, and not affected by local conditions, having ever been recorded. It is only equalled in absurdity by the alternate theory emanating from the same source, that the blood in the peritoneal cavity was "pushed out" of the vessels by the injecting fluid, the author of these remarkable hypotheses having evidently been ignorant of the fact, to which his attention has since been called by Dr. Wm. Hunt, that after death the arteries do not contain any material quantity of blood.

The edges of the ulceration in the splenic artery were adherent to the posterior layer of the peritoneum, which fact is in itself a sufficient answer to all theories of post-mortem rupture.

During the life of the President there was one

symptom which probably pointed to the first yielding of the coats of this vessel. A few days before going to Elberon, he suddenly developed a "sinking sensation" and a peculiar pain at the end of the sternum, which, after a few minutes, disappeared. The latter very closely resembled, both in character and situation, the pain which immediately preceded his death, and was doubtless due to a similar but slighter hemorrhage.

No metastatic abscesses were found at the post-mortem; the only accumulations of pus which were discovered being in a cavity on the under surface of the liver, which may have been a result of contusion by the broken rib at the time of the injury, and, at any rate, did not communicate with the wound, and another, one-third of an inch in diameter, just beneath the capsule of the left kidney. With the exception of the pulmonary changes, all the viscera were free from acute pathological alterations.

This brief review of the history of the case will serve as an answer to the fourth and fifth questions. The treatment was cautious, but thorough, and no indication was overlooked or disregarded. Wherever collections of pus took place, they were properly opened by free incisions made at the most dependent portions. These incisions drained not only the course of the abscess, but communicated freely with that portion of the spine which had been penetrated, and, therefore, with the track of the ball, and the completeness of the drainage was shown by the absence of pus accumulations either in the locality traversed by the ball or in the iliac or lumbar regions. The treatment also as regards the other complications, the parotitis, bronchitis, dyspepsia, etc., was in the most marked degree careful and judicious, and, indeed, may be said to have prolonged the life of the patient for many weeks.

As to the immediate cause of death, it was, as has

been stated, the rupture of an aneurism of the splenic artery. The ball itself had become encysted, and had given rise to no damage whatever, after the moment of its lodgement, but the injury to the cancellated tissue of the lumbar vertebra was sufficient to explain all the septicæmic symptoms, and in time would doubtless of itself have proved fatal.

6. In attempting to reply to the sixth and last question, as to whether or not the wound was necessarily a mortal one, much time and labor has been spent in a review of all the authorities bearing upon the subject. It may be said at once that in the whole range of surgical literature, civil and military, no similar case, followed by recovery, has ever been recorded, and this statement is made with the full knowledge that it has been asserted that such recoveries are not infrequent. In some instances these erroneous assertions may have been due to neglect properly to classify the cases, which are often very imperfectly reported. Of course, it is well known that fractures of the vertebral processes are not especially fatal injuries, and that a large proportion of them recover. Many of these are recorded under the general head of fractures of vertebræ, but evidently have no bearing upon the case in question.

In a few instances it is difficult to see how the error could have been other than a deliberate attempt to misrepresent the facts. For example, in one article[1] upon the surgical treatment of President Garfield, the assertion is made that

"Lidell, one of the most experienced of our military surgeons during the late civil war, states that of ten cases of gunshot fractures *of the bodies* of the vertebræ without injury of the cord, four recovered."

What Lidell[2] *does* say, is that

"In the British army, during the Crimean War, there occurred ten cases of gunshot wounds with *fracture*

[1] North American Review, December, 1881, p. 579.
[2] American Journal of the Medical Sciences, vol. xlviii. p. 317.

of vertebræ, but without lesion of the spinal cord, of which six died and four recovered so far as to be invalided; there also occurred twenty-two cases of gunshot wounds with fractures of the vertebræ and lesion of the spinal cord, all of which died."

On the very same page Dr. Lidell, who is truly described as one of the most experienced of our military surgeons, says:

"Leaving out of the calculation such fractures as involve the spinous process alone, the writer has never seen a case of gunshot fracture of a vertebra get well, and he might add that he has never seen life prolonged for a month after the infliction of that injury."

In the same criticism of the treatment of the President it is asserted that

"Surgeon-General Longmore, of the British army, says: 'Balls have been known to pass through the bodies of vertebræ and apparent cure follow.'"

The *full* quotation is, "Balls have been known to pass through the bodies of vertebræ, and apparent cure follow; but, as such patients in military practice are usually invalided out of the service as soon as they are fit to leave hospital, no opportunity is afforded of observing the consequences which ulteriorly ensue."[1]

A writer, whose only motive was to establish a surgical fact, would hardly have omitted the latter half of the sentence.

A quotation from Jobert de Lamballe, is translated by the same person, as follows:

"Although the ball may have traversed the body of the vertebra in its anterior part, and although it may have caused paralysis, we should still trust to the infinite resources of nature."

And this is followed by an account of a fracture in the lumbar region, resulting in incomplete cure. This portion of the article in question also needs a trifling correction.

[1] A Treatise on Gunshot Wounds. By T. Longmore, Esq., Philadelphia, 1862, pp. 76, 77.

What Jobert says is—

"Lorsque la balle aura traversé le corps de la vertébre par sa partie anterieure, et qu'elle aura déterminé une paralysie, il faudra encore espérer des resources infinites de la nature,"[1] etc.

That is, "*When* the ball shall have traversed the body of the vertebra, it will be necessary to trust to nature," which is a very different idea from the one ingeniously conveyed in the other translation by the unauthorized use of the word "although." The case which follows is not even stated by Jobert to be a *gunshot fracture* at all, much less a perforating one. As it has been thought worth while to quote this author, it may be remarked that on the same page he says very definitely that in cases of gunshot fractures of the vertebræ, and particularly where the ball is lodged in the body of the vertebra:

"Attempts at extraction are dangerous and often useless," and that "only when paralysis exists will it be necessary or prudent even to make incisions, or to search in the simplest manner for the foreign body or for spiculæ of bone."

The case of Dr. Hamilton, reported to the New York Pathological Society on September 25, 1867, was simply one in which three years previously a ball had entered on the left side a little above the crest of the ilium and about four inches from the spine, and had passed across deeply and nearly horizontally to the right side, where it lodged. This was followed by paralysis and the escape of some fragments of bone, and the man finally recovered. The opinion that "the ball had struck the body of the vertebra" was certainly without any demonstrative evidence, and it is not even stated that the pieces of bone could be identified as portions of a vertebra. Even if this had been the case, however,

[1] Plaies d'Armes a feu, par A-J. de Jobert, Paris, 1833, p. 123.

it is far from proving that the ball had *perforated* the vertebra. In his remarks to the Society on presenting this case, Dr. Hamilton said:

"In the Surgeon-General's Report, No. 6, one hundred and eighty-seven examples of gunshot fracture of the vertebræ are reported, of which one hundred and eighty died, and of seven which recovered not one was a fracture of *the body* of a vertebra."[1]

A few additional authorities out of many may be mentioned corroborative of the assertion as to the fatality of such wounds.

Demme[2] says:

"Extensive injuries or lodgement of balls in vertebræ or in the cord give rise either to death or incurable paralysis."

He makes no exceptions.

Macleod[3] says:

"All the fractures of the vertebræ were promptly fatal, except two among the officers and two among the men, all of which were either fractures of the transverse processes in the neck, or of the spinous process only. Even where the spinal cord, apparently, was not primarily injured, inflammation of it or its membranes was sometimes set up and quickly proved fatal. The functions of the spinal cord were occasionally destroyed temporarily, or even permanently, where no discoverable lesion existed."

Gross[4] says:

"Gunshot wounds of the vertebræ, with lesion of the spinal cord, are nearly always, if not invariably, fatal. Of twenty-two cases of this kind in the English army, in the Crimea, not one recovered. Even when the bones alone are affected the danger is generally very

[1] Medical Record, 1867, vol. ii. p. 401. The italics here are Dr. Hamilton's.

[2] Military Surgery, edition of 1868.

[3] Medical and Surgical History of the British Army during the Crimean War, pp. 336, 337.

[4] Treatise on Surgery, vol. ii. p. 82.

imminent, most of the patients thus affected dying in a short time."

Pirogoff[1] quotes three cases of embedding of the bullet in the vertebral bodies; all died.

Hennen[2] has never seen a case in which the performance of any operation could have been of service. The picking away of splinters of bone or other sources of irritation was all that he ventured to do. He trusted the rest to proper regimen and dressings.

In the "Medical and Surgical History of the War of the Rebellion,"[3] it is stated from the immense experience of that contest, that

"cases of gunshot injury of the vertebræ were commonly fatal; yet a few examples were recorded in which the transverse or spinous processes only were injured, in which more or less complete recovery ensued, and fewer still in which the patients survived for a protracted interval, after fractures of the bodies of the vertebræ."

No instance of complete recovery after the latter injury was met with, and in those here alluded to, the actual seat of the fracture was in every case doubtful. No *perforating* wound with recovery is mentioned at all.

Space will not permit a more extended consideration of this subject, but I may add that, in addition to the authorities already quoted, the excellent writings of Alcock, Ballinger, Bell, Bird, Chevalier, Clowes, Cole, Demme, Guthrie, Hall, Hutchinson, Longmore, Ranby, Thompson, and Williamson have been consulted, and with a similar result.

No undoubted instance of recovery after a compound comminuted or perforating gunshot fracture of the body of a vertebra has ever been recorded.

The explanation of this fact is apparent to every one who carefully considers the nature of such an

[1] Military Surgery, pp. 514, 515.
[2] Op. cit.
[3] Part 1, vol. ii. p. 430.

injury, the grave and manifold dangers which encompass it, and the almost infinitesimal chance which the patient has, if he escape one or two of them, of avoiding them all.

In support of the foregoing statements, both as to the necessary fatality of the wound and as to the absolute correctness of the treatment in the President's case, it would be easy to adduce almost unlimited confirmatory evidence. The leading medical journals of the world have strongly and unequivocally upheld these views, and, indeed, it may be said that they have been maintained by every writer who has discussed the subject and who is entitled, by special study or experience, to speak with authority.

I shall confine myself now, however, to quoting the testimony of three eminent members of the profession in this country:

"Looking at the whole case, from beginning to end, I do not see that the treatment could have been altered in any way to the advantage of the illustrious patient; nothing was done that should have been omitted, and nothing was left undone that could possibly have been of benefit."[1]

"The President's surgeons did all that men could do; all that the present state of science would permit; and all that could have been done even if they had at first ascertained the course and direction of the ball. Our whole medical literature does not contain a single well-authenticated case of recovery from such a wound." "He had not the least chance of recovery under any circumstances or any treatment."[2]

"In reviewing the history of the case of President Garfield I can find no reason for adverse criticism of any part of the management."[3]

In conclusion it may be asserted that, after careful consideration and thorough search through the rec-

[1] Dr. John Ashhurst, Jr., in North American Review, December, 1881, p. 594.
[2] Dr. J. Marion Sims, Ibid., p. 600.
[3] Dr. John T. Hodgen, Ibid., p. 610.

ords of this and similar cases, and after the opportunity of deliberate comparison thus afforded, the following facts appear to be incontrovertible:

1. It was never possible at any time or by any method to ascertain definitely and safely the precise character and extent of the President's wound.

2. Any attempt in this direction further than was made by the attending surgeons would in all probability have resulted fatally at once, and their steadfast resistance to extraordinary influence in favor of operative interference entitles them to great credit.

3. The treatment, which was directed to meeting the indications as they arose, was in every respect that which it would have been necessary to adopt had it been possible fully to determine the exact nature of his injuries.

4. Life was prolonged for an unusually protracted period by the careful and skilful attention which the distinguished patient received.

5. Death resulted from the secondary effects of the wound upon structures far beyond the reach of surgical interference.

6. No undoubted instance of recovery from such a wound is to be found recorded in surgical literature.

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