

Gunshot wounds of the larynx : with the report of a case in which the vocal bands were involved / by William H. Daly.

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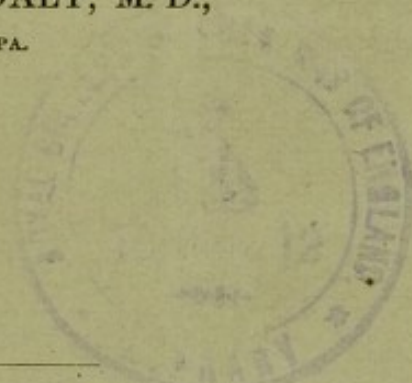
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GUNSHOT WOUNDS OF THE LARYNX,

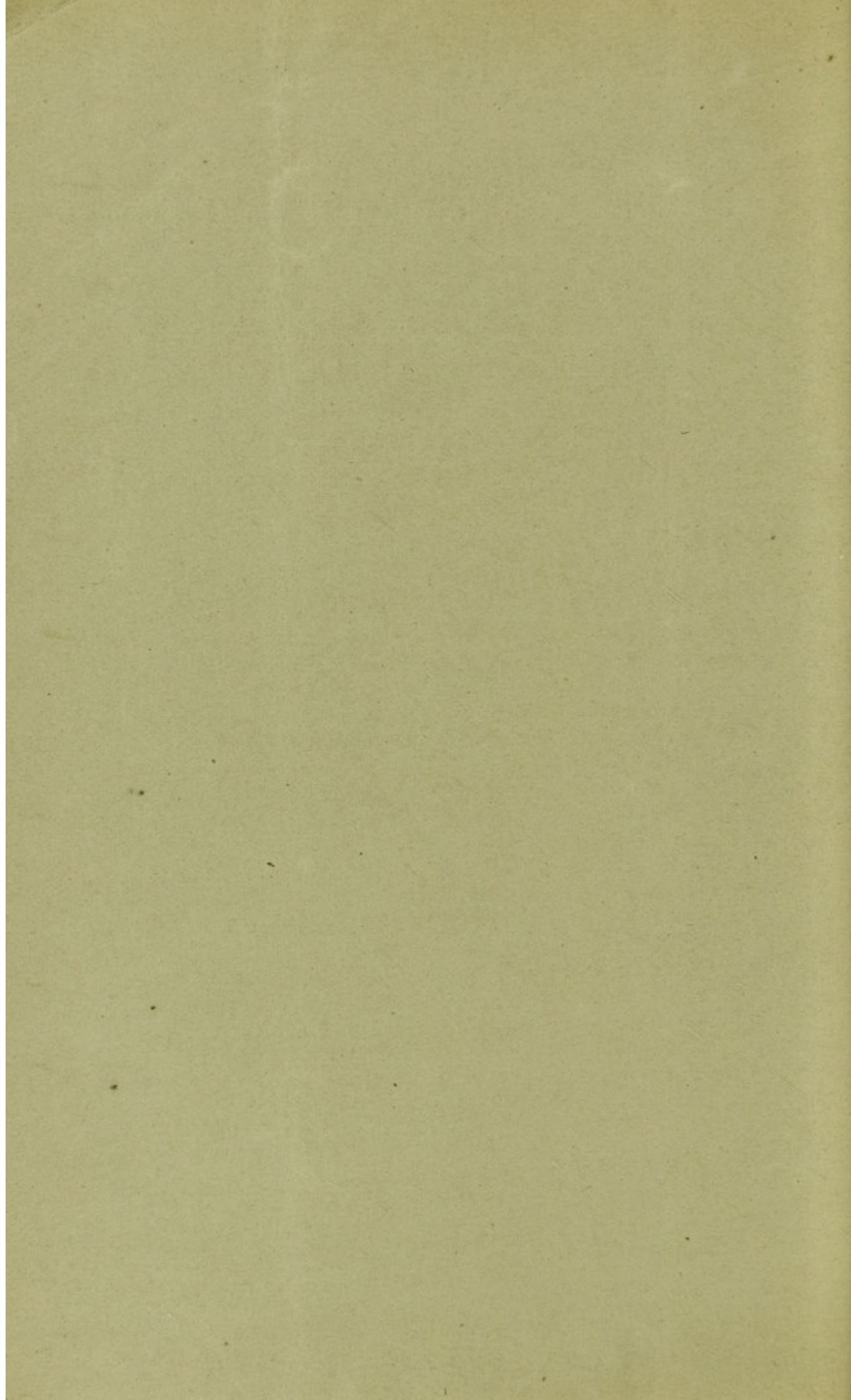
WITH THE REPORT OF A CASE IN WHICH THE VOCAL
BANDS WERE INVOLVED.

By WILLIAM H. DALY, M. D.,
PITTSBURGH, PA.



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GUNSHOT WOUNDS OF THE LARYNX,
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BANDS WERE INVOLVED.*

BY WILLIAM H. DALY, M. D.,
PITTSBURGH, PA.

THE literature of gunshot wounds of the larynx has not, so far as I am aware, been collated, excepting the cases compiled in the Medical and Surgical History † of the late War of the Rebellion.

These are peculiar as a class, from the fact that the missiles producing nearly all of them were of a large caliber. Of the thirty cases there tabulated as involving the neck and larynx, ten were fatal, and the termination of ten more was unknown; eight patients were discharged, and two returned to duty.

Not having sufficient time in which to collate all the cases that might be more or less accessible, I have thought it not out of place to append to this report such a bibliographical list as I could obtain, which may aid others alike interested in this study in doing a piece of work that ought to be of signal and lasting interest to the throat surgeon as well as the general practitioner.

This can only be done by a systematic and extensive inquiry from the general profession, gathering cases here and there from the experience of private practice, and formulating them.

Such a work would at once be not only valuable, but highly interesting; and it is eminently fitting that this should be engaged

* Read before the American Laryngological Association, May 12, 1884.

† "Medical and Surgical History of the War of the Rebellion," Part i, Surgical Volume, pp. 406, 407.

in, at no distant day, by the learned body of throat surgeons represented by our Association (this assemblage).

The compilation of the cases of gunshot wounds of the neck involving the larynx and other portions of the air-passages, as well as the upper alimentary tract, found in the "Medical and Surgical History of the War," is a piece of work quite in keeping with the high character of all the other carefully digested records of work done by the army surgeons of the late war; and it is a pleasure to note among the contributors to this department the name of our esteemed colleague, Dr. S. W. Langmaid.

But, for civil surgeons, there should be a collation of cases from private practice covering the entire United States.

The missiles producing wounds in other than army life are of smaller caliber, and it is rather difficult to make a comparative deduction from the army records that would be found useful to us as civil surgeons.

Of some of the consequences of wounds of the larynx, aphonia is, as a matter of course, the most common; also exfoliation of cartilage, persistent fistula, and permanent distortion of the vocal apparatus. Six of the ten cases detailed in the war record referred to were followed by chronic cough and complete loss of voice, and similar results are described as occurring among those so wounded on the Confederate side.

Of the general report of 4,895 cases of gunshot wound of the neck in the late war, there was a death-rate of fifteen per centum.

But it must be understood that the figures were taken from the casualty lists and regimental field reports as well as returns from base or general hospitals, and thus the excessive mortality is explained, and many cases are included of grave injuries that never came under treatment; and few indeed that probably came under the treatment that the more modern surgery of the throat would afford, since the advances in this department have been greater subsequent than previous to or during the war.

On reference to some of our text-books we find but meager information on the subject. "The danger of such lesions penetrating the larynx," says Gross, "will be particularly great if, as sometimes happens, the opening extends to the vocal cords, as œdema

of the glottis will then be almost sure to arise and occasion fatal suffocation.*

Cohen† speaks of the liability, in gunshot wounds, to serious contusion or laceration of the important nerves on the side affected, and ensuing paralysis or spasm of the muscles of the glottis, interfering with respiration.

The case which is here presented to you for your examination is that of a young man, aged eighteen, H. C. D., by occupation a student, who received, accidentally, a gunshot wound in the neck, from a .32 caliber pistol in the hands of a schoolmate, on the night of October 29, 1883, at a boarding-school in the State of Delaware.

The ball struck the neck a little anterior to and below the angle of the jaw on the right side, the pistol being held about five feet from the parts, the bullet taking a transversely downward course through the two walls of the larynx, and finally lodging upon the subclavian artery at the opposite side from the point of entrance.

The symptoms arising immediately after the injury were: stinging or burning at the point of entrance of the ball, a sense of fullness in the throat, and a desire to clear it, the latter act being followed by the expectoration of fresh blood; hoarseness at first, which constantly increased until, within a few hours, there was complete aphonia.

This, in brief, was the history of the case up to the time I was called, November 5, 1883, seven days after the reception of the wound, to see him at his school, where he was attended by Dr. Chandler, of Brandywine, and Dr. Draper, of Wilmington, as consultant. With the former I made an examination of the patient. Externally, over the region of the neck, throat, and upper part of the chest, there was swelling with discoloration from extravasated blood; there was also emphysematous crepitation in the cellular tissue of the neck and chest.

There was a look of anxious alarm about the face; respiration nearly normal, but labored about the region of the larynx. Placing the patient carefully in a sitting position, a laryngoscopic examination was attempted, which revealed œdema of the glottis, with evidences of traumatic discoloration of such a character as to utterly destroy all the anatomical landmarks of the parts; a superficial examination was made for the ball, and a point found on the opposite side, six inches from the point of entrance immediately behind the left clavicle, that was exceedingly tender to the touch. While the ball could not be felt here by mere palpation, I strongly suspected that it was in this immediate locality, and,

* "System of Surgery," Gross, vol. ii, p. 383.

† Cohen, "Diseases of the Throat and Nasal Passages," p. 603.

fearing further delay in its removal might result in secondary hæmorrhage, urged an attempt to discover its whereabouts by careful dissection.

This was acceded to by the attending physician and the father of the boy. The patient was prevailed upon to undergo the ordeal without an anæsthetic, fearing its use might bring on emesis and precipitate hæmorrhage, which it was desirable to avoid. A careful dissection at the point shown by this cicatrix was carried down deeply behind the clavicle, through tissues much swollen and ecchymosed, and predisposed to bleed.

This was done by drawing down the skin and superficial fascia and making the first incision upon the clavicle, then with the handle of the scalpel and a grooved director tearing my way down, carefully exploring as I went.

I was finally rewarded by being able to feel what I supposed to be the missile slipping away into its track at every effort to touch it; but, after further careful dissection, the ball was discovered and laid bare, immediately upon the subclavian artery, where its elevation with each pulsation of the blood-vessel was noted.

The ball was removed, and the wound made for the purpose healed kindly; twenty-one days later the boy had progressed so favorably as to make it desirable to take him to his home near Pittsburgh, stopping *en route* in Philadelphia, November 26, 1883, to enable us to obtain an examination and counsel in the case from our friend Dr. Cohen.

This was done at Dr. Cohen's office, as thoroughly as the case would admit of, the traumatic changes in the larynx being of such a character as to make it impossible to discover the anatomical relations in any degree whatever.

There was complete aphonia, and the caliber of the glottis was probably less than one fourth of its normal size. Dr. Cohen was not of the opinion that the ball had penetrated the laryngeal walls, and further thought that the fixation of the left arytenoid in the position of farthest separation from its fellow was due to inflammatory changes which had taken place after the reception of the wound, and not to lesions caused immediately by the destructive force of the ball.

This was an opinion which he qualified by remarking our palpable inability at this time to make a satisfactory, or, in fact, any examination whatever of the interior of the larynx; stating, very properly, that nothing short of a daily study and observation of the case would lead to a comprehension of the lesion, and that the probable destructive changes which had been wrought rendered a favorable prognosis for recovery of vocal powers almost impossible.

In this opinion I fully concurred. However, three weeks after this

consultation, when the tumefaction of the internal parts had subsided sufficiently to bring more of the interior of the larynx into view, I discovered a ragged lesion of the right vocal band near its middle portion, which nearly severed it, and which distinctly marked the entrance of the missile into the larynx, and, at the opposite side, a spot which, upon careful study and observation, plainly showed the point of exit of the ball from the larynx to be just at the lower portion of the ventricle of Morgagni, or immediately above the true vocal band, splitting the band, as it were, at its upper border. The first spot is now marked by a serrated cicatrix in the true vocal cord, and the opposite side is marked by more extensive post-lesional inflammatory changes, still apparent in the image of the larynx.

At this time I thought it expedient to resort to the use of the mild interrupted current, both intra-and extra-laryngeal. After two weeks of daily applications, lasting from three to five minutes, we were rejoiced to get a raucous vocal sound under the stimulus of the battery current.

This, however, was a very uncertain sound, and it was some weeks before there was any sonorous vocalization, excepting under the immediate use of the battery.

About January 1, 1884, there was an intra-laryngeal appearance rudely represented in Fig. 1, with an occasional sonorous note under great effort.

There was ankylosis of the left arytenoid, and no adduction of the left vocal band, excepting a short portion of its anterior end, under the powerful stimulus of the battery current. This ankylosis has gradually yielded to attempted powerful use of the voice, the patient being instructed, after all traumatic inflammation had been subdued, to suddenly attempt to shout several times in the day. This gradually loosened the left aryte-

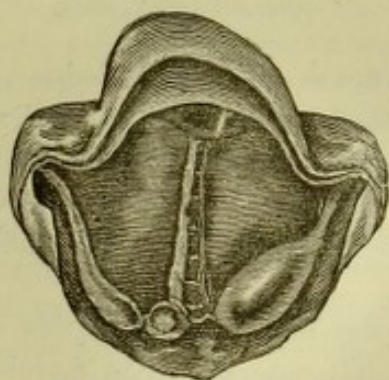


FIG. 1.—January 1, 1884.

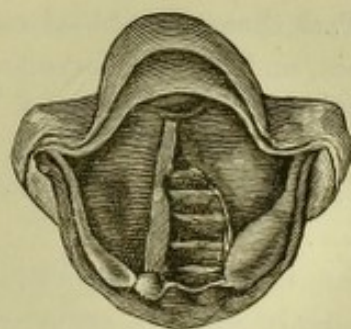


FIG. 2.—February 1, 1884.

noid, and it was amusing as well as gratifying to see the first futile attempts at motion in this cartilage, and to notice its slow and almost

daily increased motion until, as you will now see, it comes over to nearly its proper place in the vocal effort. The treatment persisted in was essentially a system of vocal gymnastics, with the daily application of the interrupted current, from five to fifteen minutes, only abstaining from its use when there was any evidence of congestion or pain in the larynx.

The vocal powers of this patient have been recovered so far beyond the most sanguine expectations of his physician and family that it presents a tempting field for reasoning as to the structures involved other than the immediate vocal cords themselves. It is true the injuries immediately inflicted upon these bands were not of themselves sufficient to maintain the prolonged adductor paralysis. The course of the ball, fully betrayed by the wounds in the larynx, proves not a matter of any certainty as to the course it pursued in the tissues of the neck on each side of this structure.

The nerves supplying the vocal apparatus are deeply placed in proximity to important blood-vessels.

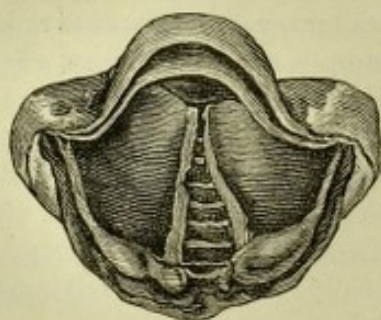


FIG. 3.—March 1, 1884.

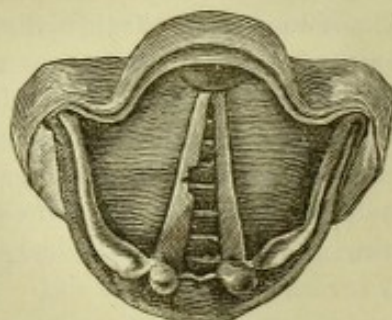


FIG. 4.—April 21, 1884.

That these great blood-vessels were not seriously wounded is quite certain, and that the laryngeal nerves were not immediately seriously wounded or severed seems almost positive, because the boy spoke after receiving the wound, and the injuries to the nerves were of the nature of contusions, or changes due to traumatic inflammation.

An intra-laryngeal inspection in this case, April 22, 1884 (see Fig. 4), reveals the arytenoid of the left side almost as mobile as its fellow. The epiglottis, which was from the first drawn toward the arytenoid of the left side by reason of contracture of the ary-epiglottic and subjacent tissues, is now symmetrical and almost normal. Upon the right vocal cord, about one half the distance from

the anterior end, can be seen what resembles a serration in the free edge of the band.

This serration marks the point of entrance of the missile into the larynx. The left vocal cord is seen to be less mobile, and the free band-like structure is split laterally in its longitudinal axis, so that its measurement, looking from above downward, is four times its normal thickness, especially at that portion next the cartilage.

The ventricle of Morgagni is on this side obliterated by the traumatic distortion, and, indeed, the ventricle is scarcely discernible on the opposite side.

I shall leave any reasoning I might engage in as to the question of concomitant or subsequent lesions in this injury for the discussion by those of my fellows who may feel competent or willing to engage in it. Suffice it for me to say, the boy has regained powers of vocalization, if not equal to what they would have been without the injury (and which I do not assert), yet which are excellent, and ample for nearly all the needs of life other than those of the orator or elocutionist—since in his conversational voice there is little fault that can now be discovered by other than the expert—with a prospect of further intra-laryngeal improvement in the yet somewhat distorted tissues, that gives a reasonable hope of a perfect restoration of all the natural vocal powers of the individual patient.

Dr. Fauvel contributes the following curious case ("Revue mens. de laryngol.," October, 1881):

The patient, ten years before, had received a gunshot wound under the left eye, and medical opinion was divided as to whether the bullet had remained in the head or not. For three months pus and small pieces of bone were discharged through the mouth.

The man had since suffered, at frequent intervals, from acute pain in the head and jaws, and his general health was impaired.

Seven months ago he first felt pain in the throat and in the jaw near the temporo-maxillary articulation and left ear, with pricking sensations, which he compared to a needle plunged in the ear.

Later on the same pricking sensations and pain were felt in the left side of the larynx. There were expectoration of blood, cough, hoarseness, trouble in swallowing, and, finally, aphonia.

Liquids could scarcely pass.

At this crisis laryngoscopic examination was made, and a dark, irregular, lobulated, fungating-looking mass was discovered, filling up the

left half of the glottis and concealing the greater part of the left vocal cord.

The other parts of the throat were normal. The tumor most resembled a melanotic growth; but, in consideration of the rarity of such growths in this situation, it was thought rather that the patient was suffering from the ulcerative stage of laryngeal phthisis. But afterward, as the tumor increased in size and seemed very firm and resisting to the touch, it was diagnosed as osteoma, and its extraction decided on.

Attempts that were made to remove it were not at first successful. The patient passed the night in coughing and vomiting, and, during a fit more violent than the rest, expelled a hard, heavy body, which proved to be a bullet. From this date the patient recovered his voice, and all pain and trouble in swallowing disappeared. Nothing could be seen of the tumor except the slight scar where the bullet had passed through.

On rhinoscopic examination, some small perforations in the upper part of the naso-pharynx were discovered.

Dr. Fauvel, after remarking upon the difficulty attaching to the diagnosis of this case, says that it is equally difficult to explain the manner in which the ball passed downward into the larynx.

He suggests that, having entered apparently below the malar bone, the bullet penetrated obliquely between the ascending ramus of the inferior maxillary and the superior maxillary bone, and became lodged in the basilar process of the occipital bone, in front of the vertebral column and behind the pharyngeal aponeurosis.

The ball, instead of becoming encysted, was probably set free by the surrounding bone becoming necrosed, which would account for the discharge of the pus and spiculæ of bone, and the perforations in the naso-pharynx, afterward seen by the rhinoscope.

Yielding to the force of gravity, it then slowly descended in front and to the left of the vertebral column, being concealed from view, first, by the veil of the palate, and afterward by the posterior pillars of the fauces.

When it reached the base of the tongue it changed its direction, and, passing forward and downward, became lodged in the left ary epiglottidean fold.

Dr. Langmaid writes, April 25, 1884, concerning the soldier Young, whose case is reported in the "Medical and Surgical History of the War," that the patient still wears a trachea tube, and has scarcely any inconvenience from it. He says: "I have examined

his throat from time to time; the vocal cords are concealed by a valvular tumor, the base of which presumably occupies the situation of the original wounds, and is, I suppose, the result of an inward prolongation of granulations."

I say valvular tumor, for its action is like that of a pump-valve. Inspiration through the mouth is impossible, but expiration (the external opening of the fenestrated tube being closed by the finger) raises the tumor, and the voice-sounds are easily produced.

Any operative interference with the tumor intra- or extra-laryngeal is firmly refused.

Dr. Samuel Johnston, of Baltimore, sends me a clipping from one of the Baltimore daily papers, of April 21, 1884, which mentions a case of a terrible wound of the neck and throat received by Count von Boreke at Aldie; this officer was once on the staff of Stuart's cavalry in Virginia.

The necessary particulars for our purpose in this case being wanting, I merely mention it as a matter of record for future use if needed.

From Dr. Thomas F. Rumbold I get the following:

"A. M. Groves received a gunshot wound through the larynx December 15, 1879. The missile (a duck-shot, probably No. 4) entered the left side, about one inch posterior to the pomum Adami, passing horizontally and laterally through the larynx, wounding both vocal cords."

The doctor saw the case about seventeen days after the wound was received; the parts were healed, but the marks of the missile were yet perceptible.

The vocal effort, which became aphonic at once after the wound, was, at the doctor's first examination, described as "squeaky." The case was only seen once, and was not made the subject of treatment.

There can be little doubt, however, that the interrupted current would have been beneficial.

Dr. R. B. Tauber, of Cincinnati, kindly sends me the following notes:

"J. S., aged forty-six, was shot in the neck while on a steamboat during the late war; the ball could not be discovered. He complained of dysphagia, was aphonic, and had slight shortness of breath. For twelve years the bullet lodged in his larynx; at the end of that time he consulted

me, and, on making a laryngoscopic examination, I found the space of the left sinus pyriformis entirely covered over. I introduced the laryngeal sound, and found the bullet in this cavity lodged very tightly. I removed it, and found it to be a conical .25 caliber, and half an inch long."

The patient measurably regained his voice afterward, and was otherwise relieved of his distressing symptoms.

The voice, however, was described as being imperfect, or, in the language of the doctor, a "monotonous voice."

This case has a striking likeness in its character to the one so graphically detailed by Fauvel, and is worthy of being recorded in its company, deserving a decidedly more extended record:

The second case, given me so courteously by Dr. Tauber, is that of H. L., aged thirty, married, who had syphilis eight years before he was shot in the neck. The bullet entered the right side, under the angle of the inferior maxilla, passed through the epiglottis, injured both arytenoids, and made its exit opposite on the left side, about the sterno-cleido-mastoid muscle. The patient had great dysphagia and dyspnœa; voice not above a whisper; food regurgitated; breath very offensive. Laryngoscopically, the entire larynx was deep-red and congested. Three fourths of the epiglottis were gone, and only a small red stump left. Both arytenoids are at the present time enormously hypertrophied; the stump of the epiglottis has healed. The vocal cords are thickened and reddened, though the patient has regained his voice, and is an expert at swallowing food, which seldom enters the larynx.

My friend Dr. D. N. Rankin kindly reports the case of John Horner, aged twenty-three, soldier in the late war, who was under his care while serving as assistant surgeon in the army:

This man received a gunshot wound, involving the upper part of the larynx, while on picket-duty. The ball entered at the malar process of the right side of the face and passed downward and backward, wounding the nasal passages, tongue, œsophagus, and larynx, making its exit at a point about two and a half inches below the angle of the left inferior maxillary bone. The patient was nourished by means of the stomach-tube, and finally recovered, with good powers of deglutition and vocalization.

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