

## SURGICAL NOTES

OF

CASES OF GUNSHOT INJURIES OCCURRING DURING THE ADVANCE OF  
THE ARMY OF THE CUMBERLAND IN THE SUMMER OF 1863.

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In compliance with orders to report for duty to the commanding officer of the department of the Cumberland, I proceeded to Murfreesborough and was assigned to duty as medical director, April 29th, 1863. This village was formerly a pleasant place of residence, with about twenty-five hundred inhabitants, most of whom were engaged in trade. The stores are situated on the four sides of a square, with the court-house, a handsome brick structure, in the centre. The streets, not wide, lead thence in several directions, and have on either side wooden cottages and occasional brick mansions of more pretensions surrounded with gardens; the surrounding country is gently undulating with fine woods. The whole locality is limestone, cropping out near the surface into vast ledges with little or no superincumbent soil.

The water, whether of Stone River, its tributaries, or from springs, is decidedly limestone, and produces irritation of the bowels for several days in persons newly arriving; there are a few good springs of pure water, but the inhabitants prefer rain water collected in cisterns.

The majority of the inhabitants, especially males, had left the place, being actively engaged in the ranks of the Confederate army.

This being the headquarters and the front of our forces, was the centre of our line, extending from Franklin on the right to nearly McMinnville on the left. Our forces encamped around the town, the buildings were principally occupied as headquarters of generals, the staff departments, and as hospitals.

There were in all thirteen hospitals, as follows:—

Field hospital, under charge of Surgeon J. Y. Finley, 2d Kentucky Cavalry, composed of hospital tents erected two together, end to end, in streets, with wooden houses as kitchens and dining-rooms, capable of accommodating sixteen hundred sick or wounded. A garden of forty acres was being planted in the grounds on the south side of the banks of Stone River. This hospital was between the field works and the river,

under protection of the guns of the former. The site was within a bend of the river, which thus surrounded it on three sides; the drainage excellent, conveniences for bathing and supply of spring water limited, but enough, with economy, for ordinary purposes of drinking and cooking. The latrines were pits from eight to ten feet deep in the streets, covered with wooden houses, which were filled with earth and lime from time to time, and when nearly full covered up and new ones dug. With all care, however, there was more or less odour at all times, and especially in wet weather; various disinfectants were constantly used. On May 1st, there were one thousand two hundred and thirteen sick and eighty-five wounded in the hospital.

Hospital Division No. 1 consisted of a large hotel on the square, with low ceilings and much cut up into small rooms and narrow halls, illy adapted for its purposes, as was evidenced by the great mortality among the sick and wounded, and by several cases of hospital gangrene, erysipelas, and adynamic conditions among the inmates. On the 22d, I commenced to break up the hospital by reducing the numbers, sending the majority to the field hospital or to Nashville, and on the 26th, there were no sick or wounded in the building. There had been, May 1st, one hundred and one sick and thirty-eight wounded in this hospital.

Hosp. Div. No. 2 consisted of a private residence of two stories, neatly kept, and contained for the most part cases of rubeola; there were, May 1st, fifty-one cases. The disease generally was of a mild character. Five deaths occurred up to June 9th, when the cases became so rare that the hospital was broken up.

Hosp. Div. No. 3 was decidedly the best hospital, consisting of six large floors or wards thirty by one hundred and fifty feet, with large windows reaching from floor to ceiling, and central apertures in the floors. The police and discipline were admirable. In this there were eighty sick and seventy-four wounded.

Hosp. Div. No. 4. This building, containing six small wards, was originally a private hospital; the police and discipline were defective; it was reserved for cases of erysipelas exclusively. There were fifty-seven cases, seven of whom were wounded. Cases did not do well; frequent relapses occurred; the disease was severe and fatal. Ten deaths occurred up to June 9th, when the hospital was removed to the field and the patients put in tents.

Hosp. Div. No. 5 consisted of four wards tolerably well ventilated, but deficient in police and discipline. In this there were one hundred sick and thirty wounded. It was discontinued June 5th, a portion of the inmates being sent to Nashville and the remainder to the field hospital.

Hosp. Div. No. 6 consisted of four well-ventilated wards, tolerably clean, containing one hundred and fifteen sick and one wounded.

Hosp. Div. No. 7 consisted of four wards of moderate size, clean and

well ventilated, but at the corner of the public square, and being exposed to noise and dust, containing fifty sick and twenty-one wounded.

Hosp. Div. No. 8 was the smallest and least adapted for its purposes ; it contained thirty-seven sick ; clean and well ventilated.

The smallpox hospital was about two miles from the city near a fine spring, isolated and composed of tents. It generally contained about fifteen patients ; the type of disease was mild, and there were few deaths. It contains now (July 30) eighteen cases.

The contrabrand hospital is designed for the sick blacks, and consists of a portion of a large building for females and children, and tents for males. There were usually about fifty inmates, their diseases being chiefly fevers and diarrhoea, with various forms of scrofulous affections ; the mortality was large.

The Soule Seminary, a fine large building, in the centre of a large open space at the verge of the town, and particularly well adapted for a hospital, contained about sixty Confederate wounded. The cases were of the gravest character, being those who could not be removed. After the battle of Stone River, this building was crowded with wounded, who, on the retreat of Bragg, were left under the care of their own medical officers. The mortality had been frightful, and hospital gangrene, pyæmia and erysipelas very rife. Every facility was afforded for their care and comfort, but filth and dirt of every description were allowed to accumulate inside and outside, under the beds, in the fireplaces, halls and kitchens. The persons of the patients were rarely or never washed, and the surgical dressings were carelessly applied. I broke up this den a few days after my arrival, and removed the patients to the Baptist Seminary, a fine building beyond the town, standing alone, well ventilated, and admirably adapted for a hospital. It was occupied by about the same number of Confederate wounded. The same remarks may be applied to the police and condition of patients here as in the last-named hospital. Some improvement in cleanliness and comfort was made, and several cases placed in tents outside. Some of the cases presented remarkable examples of the powers of nature under most forbidding circumstances in the process of cure. There were several men who had received comminuted fractures of the thigh by minie balls, and where union had taken place, but with great shortening and deformity. One man had lost the larger portion of the shaft of the tibia and fibula, who is now recovering with regeneration of the bone, though there is not firm union.

The number of wounded confederates left at this post after the battle of Stone River was about fifteen hundred, of whom more than six hundred died. This hospital was broken up about June 1st, all but ten of the worst cases being sent north ; these ten, incapable of being removed, were sent to the field hospital, and have done well, except one, who having extensive hospital gangrene, sank, though not until the process was checked and the wound assumed a healthy appearance.

The prevailing diseases were fevers of various types, intermittent, remittent, typhoid, and that mixed form termed *typho-malarial*. Diarrhœa and dysentery were very prevalent and obstinate; jaundice was very common; a few cases of scorbutus, and of pneumonia; cases of syphilis were rare. A wise exclusion of intoxicating drinks made drunkenness almost unseen.

Abuses existed in the administration of several of these hospitals, and so little economy was practised that the hospital fund was in debt nearly two thousand dollars, while the sick and wounded had few or no extra articles of diet.

Maj. Perine, Medical Director of Department, had sent on for a supply of delicacies, which arrived about the middle of May, and by judicious returns for rations, the debt is paid, and there is now a large surplus of hospital fund in the hands of the commissary, while a bountiful supply of milk, eggs, butter, cheese, chickens, canned fruits and vegetables, fish, prunes and other dried fruits has been furnished, and our sick and wounded of this army can now be furnished as well and as liberally as those in the neighbourhood of Washington, and the price of the ration, about twenty cents, seems sufficiently large to yield a considerable saving.

Early in June, in anticipation of a forward movement by Gen. Rosecrans and an abandonment of the town, I was directed to break up all the hospitals in the town and remove the patients to Nashville or to the field hospital, which was accomplished on the 10th of the month.

The Soule Seminary, previously occupied as a confederate hospital, had been cleaned, whitewashed, and thoroughly ventilated. It was now fitted up anew ready to receive patients if required.

On the 21st of May, all the sick of regiments who were unfit for active service were directed to be sent to hospital, and some two thousand were admitted and distributed. No advance taking place, all remained quiet for a month, and on the 22d and 23d of May, the regiments were again purged of the invalids and malingerers, and the army moved forward in three columns.

Severe skirmishing occurred with the rear of the enemy, who were in retreat, and on the evening of the 24th the wounded began to come in, and continued to arrive day and night on the 25th, 26th and 27th. These cases were mostly of a severe character, and had been carried in ambulances over muddy, rough roads from fifteen to thirty miles; they had received their first dressings on the field.

Rain, which had set in on the day the army advanced, continued incessantly night and day, and the men were greatly exhausted previous to the fighting by marching and exposure to the wet weather.

On arrival they were very much exhausted; many had not slept for two nights, and had had little to eat. The majority of the wounds had been dressed with cloths dipped in cold water and an excess of roller bandage; quite a number had maggots in the wounds.

There were admitted into the field hospital during the month of June, one hundred and fifteen gunshot wounds, while there were forty-six remaining from the month of May, being the remnant of the wounded of Stone River, who were still too feeble to bear transportation, though their wounds were mostly healed. A new ward, consisting of double hospital tents, pitched on new ground, was established for the reception of the wounded, and every provision made for their comfort which could be afforded in a field hospital.

*Abstract of Gunshot Wounds received during the month of June, 1863.*

		Right side.	Left side.	
GUNSHOT WOUNDS.	Flesh wounds.	Of head . . .	1	4
		neck . . .		3
		trunk . . .	8	10
		upper extremities	11	6
		lower " . . .	14	21
	Cavities.	lungs . . .		1
		abdominal cavity		2
	Fracture of bones.	facial bones . . .	1	
		clavicle . . .		1
		humerus . . .	4	
		forearm . . .	3	3
		femur, upper 3d	1	3
		leg . . .		1
		ribs . . .	1	
		other bones . . .	3	5
Involving joints.	shoulder-joint . . .	1		
	wrist . . .	3		
	hip . . .		1	
	knee . . .		1	
	ankle . . .	2		
Total		53	62	

*Abstract of Gunshot Wounds received during the month of July, 1863.*

		Right side.	Left side.	
GUNSHOT WOUNDS.	Flesh wounds.	Of head . . .	1	
		trunk . . .	1	1
		upper extremities	2	2
		lower extremities	1	2
	Cavities.	lungs . . .		1
	Fracture of bones.	cranium . . .	1	
	Involving joints.	elbow . . .	1	
	Total		7	6

Making a total of one hundred and twenty-eight (128) cases, as the result of skirmishes attending the advance, and received into this hospital.

Hospital No. 1, or the Soule College, originally a flourishing female seminary and previously occupied as a Confederate hospital, had been thoroughly cleaned, whitewashed, and all offensive matters removed from the vicinity; partitions were removed and the rooms thrown into large wards. This was prepared for the reception of wounded after having been vacant six weeks, abundant time to remove all danger from its former impurities.

The wounded, on arrival at night, were placed into clean, dry beds, after being washed and dressed in clean clothing. Their hunger and thirst satisfied with warm food, and those requiring surgical dressings were properly attended to. The majority soon sank into deep sleep.

There were received into this hospital one hundred and thirty cases of gunshot wounds received in action and in localities shown by the following table:—

		Right side.	Left side.	
GUNSHOT WOUNDS.	Flesh wounds.	Of head . . . . .	2	
		neck . . . . .	2	1
		trunk . . . . .	10	8
		external genitals . . . . .	3	
		upper extremities . . . . .	5	8
		lower extremities . . . . .	15	12
	Cavities.	lungs . . . . .	4	2
		other wounds of abdominal cavity . . . . .	3	2
	Fracture of bones.	cranium . . . . .	1	
		facial bones . . . . .	1	1
		clavicle . . . . .	1	
		scapula . . . . .		1
		humerus . . . . .	4	2
		forearm . . . . .		3
			lower third . . . . .	
		middle third . . . . .		2
		upper third . . . . .	3	2
		leg . . . . .	3	3
Involving joints.	elbow . . . . .	2	1	
	wrist . . . . .	1		
	hip . . . . .	1	2	
	knee . . . . .	6	3	
	ankle . . . . .	1	3	
	other joints . . . . .	3	1	
Total		71	59	

The weather at this post has been generally pleasant; temperature moderate; the early half of June was warm and dry, while since the 24th, up to August, large quantities of rain had fallen, said to have been unusual in former seasons. The army commenced its advance on the 23d June, from this post, and from that day rains fell continuously, night and day, or heavy showers on June 24th, 25th, 26th, 27th, 28th, 29th, 30th, and July 3d, 4th, 5th, 7th, 9th, 10th, 11th, 12th, 13th, 19th, 20th,

21st, 23d, 24th, 25th, 26th, 27th, 28th, 29th, 30th, being twenty-six days out of thirty-eight. During the last week in June, our army was toiling through mud, constantly exposed night and day to the rain, sleeping on the ground and being deprived of means of cooking, the temperature warm and enervating. Large numbers fell out and straggled back to the post. On arrival at the Field Hospital, the same state of universal moisture existed; bedding and clothing being in a constantly wet condition, so as to produce mould and rot, while at Hospital No. 1, they were received into dry beds and kept dry. To this cause alone may be ascribed the great difference in the record of cases. While all the wounded in the Hospital No. 1 presented a cheerful aspect, and continued to progress from day to day most favourably, without the usual unfortunate complications, the contrary prevailed at the Field Hospital; the men soon began to have a pale, anxious look; gangrene, pyæmia, erysipelas and diarrhœa set in; there was a languor in reparative processes; bones did not unite; bad sores frequently appeared, and, at the end of one month, I observed that only one wound had a perfectly healthy granulating surface, and this very case subsequently died of pyæmia.

The only assignable reason for this sad condition of things was the continued rainy weather, producing a moist atmosphere, and damp tents and bedding.

The appearance of hospital gangrene, its almost simultaneous occurrence in several cases in different tents, and those tents at the end of a row, pitched upon ground lower than the other tents of the row, seem to strengthen our views of its development from moisture.

The first case of gangrene admitted into this camp was in a Confederate soldier, who was removed from a hospital in town; the disease had ceased, and the wound was in a healthy condition, but his general health was much enfeebled, and he subsequently died of exhaustion. There is reason to believe that the disease was communicated to the first case by direct application through a sponge which was carelessly used by a nurse.

As these cases contain facts of interest, I will relate briefly their history.

CASE I. Charles Lake, private Co. C, 4th Ohio Cav. Wounded June 7th, on scout. Admitted into General Field Hospital, June 8, 1863. The ball passed through the middle and posterior third of the thigh. The wound did very well under cold water dressing until June 19th, when it presented a sluggish appearance. Labarraque's solution was applied and warm water dressing used. On the following morning it presented every appearance of being gangrenous; nitric acid was then applied and for the three following mornings without arresting it. Bromine was then resorted to, along with stimulating poultices. The gangrenous action was entirely arrested after the second application. The skin and cellular tissue were the only ones involved. The patient never presented a bad symptom, and was transferred to Nashville.

This case was in the tent with the confederate soldier, and the same sponge was used to wash his wound, which was slight, passing through the

skin and cellular tissue, and about two inches in length. As soon as the disease appeared, the patient was put in a tent by himself, a special nurse detailed, and all care taken against the spread of the disease.

The gangrenous action increased, and the tissues were involved to the extent of the size of a large hand before it could be checked. The immediate check in the disease by bromine, after repeated trials of nitric acid, was well marked.

The general health and appearance of the man were completely undisturbed. His appetite good, sleep natural, and functions well performed throughout the continuance of the disease. He took no medicine, and his food was nutritious.

CASE II. John Wiss, Corporal Co. A, 32d Indiana Inf., wounded June 24, 1863, at Liberty Gap. Admitted into General Field Hospital June 26th. The ball passed through the upper third of the forearm on the ulnar side, fracturing the ulna for about two inches of its extent. The shattered fragments were removed and cold water applied until July 5th, when gangrenous action commenced. General health up to this time was very good.

On July 5th, the patient had slight fever, no appetite, and had not rested well during the night. Warm water dressing was substituted for the cold, and Labarraque's solution freely applied for three days without any beneficial effects. On the 9th of July bromine (pure) was applied, and on the 12th healthy granulations began to show themselves. On the 16th gangrenous action was entirely arrested. The tissues involved were the skin and cellular. During the time gangrenous action was going on, the patient had stimulants, tonics, and good diet.

He is still in the hospital, and is regaining his health rapidly.

CASE III. A. J. Ryan, private Co. A, 49th Ohio. Wounded June 24th, 1863, at Liberty Gap. Admitted into General Field Hospital June 27th. The ball passed through the fleshy part of the middle third of the leg. The patient's general health was good, and simple cold water dressing was applied to the wound until July 14th, when gangrenous action commenced. The wound was thoroughly cleaned and bromine (pure) applied, warm water being used as a dressing. Healthy granulations began to show themselves on the 17th, and on the 19th gangrenous action was entirely arrested.

The patient's health was very little impaired; tonics, stimulants, and good diet were freely given to him. He was able to bear transportation, and was removed to Nashville July 27th.

CASE IV. Wm. A. Statia, Sergeant Co. A, 7th Ill. Cav. Wounded June 24th, 1863, at Bradyville. Admitted into General Field Hospital June 27th. The ball passed through the upper third of the leg close to the inner side of the tibia. The wound did very well under cold water dressing, until July 8th, when the secretion was apparently arrested, and July 9th gangrenous action commenced. The case was treated similarly to the previous one, and gangrenous action was arrested July 12th. The periosteum of the tibia was somewhat destroyed, which no doubt will delay the healing of the wound. The patient was sent to Nashville July 27th.

CASE V. Wm. H. Beaver, Corporal Co. F, 7th Pa. Wounded June 27th, 1863, at Shelbyville. Admitted into General Field Hospital June 28th. The ball passed through the fleshy portion of the arm, close to the insertion

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of the deltoid, without injuring the bone, and then passed through the muscles overlaying the ribs, close to the outer border of the scapula. The wound from the first did not do well; the secretions were unhealthy, the arm became very much inflamed and swollen. On July the 4th, the wound was laid open along its whole extent, washed with Labarraque's solution, and warm water dressing applied. This treatment was continued until July 6th, when gangrenous action commenced. The wound increased in size very rapidly. A solution of the ferri persulph. was applied, and a stimulating poultice of Peruvian bark and linseed was used as a dressing. This treatment was continued until July 12th, without beneficial effect, the wound still increasing. Bromine was then applied, which partially arrested the gangrenous action. During this time warm water dressing was used. On July 20th, on removing the slough, there was considerable hemorrhage; the ferri persulph. in solution was freely applied, and the stimulating poultices resorted to again. This treatment was continued till the gangrenous action was arrested, which took place July 26th. The granulations are now very healthy, and the patient is fast recovering. During the whole time he was well supported by stimulants, tonics, good diet, &c. &c.

Tissues involved—skin, cellular tissue, and muscle.

CASE VI. Cyrus Mann, private Co. A, 49th Ohio. Wounded June 26th, 1863, at Shelbyville. Admitted into General Field Hospital June 28th. Ball entered middle third of thigh on internal side, and came out on the posterior; general health was good, and the wound did well under cold water dressing until July 15th, when gangrenous action commenced. Bromine was immediately applied, and the action was arrested July 19th. The patient suffered very little from constitutional disturbance, and when transferred to Nashville, July 27th, was doing very well.

Skin and cellular tissue only involved.

CASE VII. Edward Cutshaw, private Co. A, 17th Ohio. Wounded June 26th at Hoover's Gap. The ball passed through the fleshy part just above the elbow and then entered the hip, knocking off a portion of trochanter of the femur. The patient had a slight attack of intermittent fever, from which he recovered about the 8th of July. The wound did well until July 17th, when the secretion was somewhat arrested and the odor not so healthy. It was washed with Labarraque's solution, and warm dressing substituted for the cold.

On July 18th the wound had increased in size, and gangrene developed. Bromine (pure) was applied, and the gangrenous action was arrested July 19th. The patient was supported by tonics, stimulants, and good diet. He is now in the hospital and doing very well.

CASE VIII. James Christie, private Co. C, 6th Indiana. Wounded June 26th, 1863, at Hoover's Gap. Admitted into the General Field Hospital, June 27th. The ball passed through the left nates. The wound did well until July 8th, when gangrenous action commenced. Bromine was applied three times without arresting it. A solution of ferri persulph. was then used, and the gangrenous action was arrested July 13th. He has since been transferred to Nashville.

The appearance of gangrene at this hospital would seem to confirm the views entertained by many, and with which I fully accord, that gangrene

is an essentially local disease. McLeod, in his *Surgery of the Crimean War*, says: "It never became general or severe. It did not appear to pass from bed to bed, but arose sporadically over the hospitals." And such was the case in our hospital. There was in the majority of cases little or no general disturbance of the health; often no pain or uneasiness of the part, and not unfrequently but one opening affected. There seemed to be a breaking down and undermining of tissue, without any swelling or thickening of parts by inflammatory deposits; the secretions became suspended or altered; and a dry brownish crust overspread the parts, involving skin, cellular tissue, and muscle which was easily separable from the sound tissue. The disease did not appear among broken-down subjects, but rather the contrary; nor did it seem, unless very extensive, to produce much prostration.

The application of the escharotics soon checked the progress of the disease. Nitric acid, bromine, and persulphate of iron were all used with advantage, but bromine seemed to meet our wants in the largest number of cases. Its application, though very painful, should be thorough. Great care should be taken in its application, which should be to the sound tissue, after separating the slough carefully. One application will often be sufficient, but a second and third is not unfrequently required.

The persulphate of iron is a good and efficient remedy, and much less painful in its application. I have had good results from nitric acid elsewhere, but I should give the preference to bromine, although it has failed in some cases.

Generous diet, with stimulants according to degree of severity of disease, and opiates are necessary adjuncts in the treatment of this disease.

Though many of the cases were severe in character, we are to congratulate ourselves with unheard of success. There was not one fatal case.

Of the *wounds of head and face* there is nothing of special interest to be said. They are often of the most frightful character, horribly disfiguring the face, and yet doing well. Balls take all directions with seeming impunity, and lodge in the most out of the way places, and lie harmless for a long time. The two classes of cases most alarming are where they fracture the arch of the skull, or take a course near an arterial branch.

In the first they are almost universally fatal, and as far as my experience goes in this and former campaigns, it makes little difference whether you trepan, remove depressed bone, or let them alone. Even the seemingly trivial cases, after a longer or shorter interval, die, with few exceptions.

Mr. Longmore, Prof. of Military Surgery at the Army Medical School, Netley, says: "Of seventy-six cases treated, where depression only, without penetration or perforation existed, fifty-five proved fatal, twelve were invalided, and nine only were returned to duty. Of eighty-six other cases where perforation or penetration of the cranium existed, *all died.*"

I can call to mind a soldier of the 6th U. S. Infantry, who was wounded, and a large piece of the parietal bone removed, who recovered. Also an

officer (Col. S.) who was wounded at the battle of Stone River, and who recovered after a gunshot wound of the head, with a loss by necrosis of a small portion of the right parietal bone. The wound was not entirely closed six months after, and he was unable to expose himself in the sun or to fatiguing duty.

Of the cases received, only the following one seemed to call for the use of the trephine.

Athal Achme, Co. I, 33d Indiana, was struck, June 26th, with a ball near the inferior and external angle of the left parietal bone, depressing about an inch square of the external plate, and a much larger extent of the internal.

The substance of the brain and meninges was torn. He had a wandering, unsteady gait, but was conscious though dull. The crown of the trephine was applied and all the loose fragments removed, several of which penetrated the substance of the brain.

He recovered well from the operation; slept, ate, and expressed himself as feeling comfortable; and all his symptoms promised well until about two hours before his death, July 3d, when he became comatose.

I regret to have to confess that all my operations for trephining have been unsuccessful thus far in this war; but Stromeyer tells us that during the three years he attended the hospitals of Vienna, London, and Paris, he had not met with a single successful case; and even in civil life, where the injuries are chiefly produced by blows or falls, and the patients have every attention of the highest surgical art, only one-fourth of the cases recover.

During the Crimean campaign, the trephine was applied successfully only four times, and not for gunshot wounds, by the English surgeons; and Dr. Scriver says that trephining was for the most part fatal in its results in the French Army.

Dr. Stromeyer declares that he has abandoned the practice.

*Secondary Hemorrhage: Ligation of Common Carotid Artery.*—Wm. Bryant, private Co. B, 17th Indiana Volunteers, June 25th, received a gunshot wound; the ball entered the left malleolar bone, and, passing through, fractured the palatine, superior and inferior maxillæ on the right side. He did well until July 5th, when secondary hemorrhage set in, which was checked by plugging and application of the persulphate of iron.

July 8. Profuse hemorrhage again occurred, and the common carotid artery was tied by Asst. Sur. McCullough, 77th Penn. Vols. No recurrence took place, and he progressed well, starting on furlough August 18th. Several loose pieces of bone were removed from time to time, and a slight attack of erysipelas occurred about July 27th.

*Shell Wound of Face and Arm.*—Sergt. A. Miller, Co. A, 2d Ohio Volunteers, was struck with a fragment of shell, tearing away a large portion of the soft tissues of the face, especially on the right side, destroying the eye, and fracturing the zygoma and inferior maxilla. He presented a horrid appearance. The soft parts of the right arm from the shoulder to

the elbow were terribly lacerated. Notwithstanding this amount of injury, he steadily improved and finally recovered. After healing it was found necessary to repair the loss of the right angle of the mouth by a plastic operation, so as to enable him to drink without the fluid escaping.

There was one *gunshot wound of the shoulder-joint.*

Sergt. James Fisher, Co. K, 17th Indiana Volunteers. A minié ball struck the shoulder on the outer and anterior side, passed through the head of the bone and behind the scapula, at Liberty Gap, June 25th. He was brought to Hospital No. 1, next day, in a very prostrate condition; but rallied during the next night, after being put in a warm comfortable bed, with good diet and anodyne. I found, on examination under chloroform, a comminuted condition of the head and neck of the bone, and resected. (See specimens in Museum.) There was little blood lost, and he seemed to do well, but sank after twenty-four hours, and died.

There were ten *comminuted fractures in shaft of the humerus*, of which two died; on both of whom resection had been performed; in one case by the surgeon of his regiment (2d Indiana Cavalry), and in the other by myself. Both cases promised admirably for a month, but finally feeling the influence of the poisonous atmosphere of the surgical ward of the Field Hospital, died of exhaustion. In another case of resection, George Dougherty, Co. C, 77th Pennsylvania Volunteers, I took away full three inches of the middle third of the left humerus. He entirely recovered, but his convalescence was retarded by a hemorrhage, which occurred a week after the operation, and reduced his general health very much.

The other cases (seven) recovered without any operative interference, as is usual in this character of injury. No cases give more satisfaction than those in which the surgeon can save an arm; and unless the parts are very much torn by shell or round shot, or the vessels and nerves injured, he may count upon a successful result.

The introduction of the plan for saving arms in cases of wounds of the elbow joint by exsection of a part or the whole, according to the extent of the injury, has in many cases saved arms which but a few years since I have seen fall before the surgeon's catlin; and I regret to say, I believe at this day I can see many a poor fellow with his stump whose arm could have been saved.

It has been urged that we are called upon to amputate in many such cases on the field, and the chances are better, especially where the wounded are obliged to be removed rapidly to the rear; but however good such reasons may be in gunshot fractures of the lower extremities, it cannot be applied to the upper.

Of four cases recorded, three were reported as recovering, without any other operation than removal of loose spiculæ.

In the other, private Daniel Long, Co. D, 77th Indiana Volunteers, I removed about two and a half inches of the ulna, including the olecranon.

The patient promised admirably for a month, but finally succumbed to the pyæmic poison at the Field Hospital.

All the wounds of the forearm and hand recovered without amputation, although many were of a severe character, and more than one through the wrist joint involving the carpal bones. In one case, three inches of the radius was removed, and the wound became gangrenous; but the patient finally recovered, with some use of his fingers; but so great was the destruction of muscular substance by gangrene, that his arm will not be of much value.

*Wounds involving the lungs* present to our attention cases of the most grave character, and, when we consider the importance of this vital organ, it is remarkable how many recover, with due care.

Eight cases are reported as received at this post, of which two died. All these cases were transported in ambulances, and presented alarming symptoms on admission; blood still expectorated, breathing short and hurried, anxious expression of countenance, and acute pneumonia setting in. It would be useless to give the individual history of each case and its course towards recovery. The principal means were digitalis and veratrum viride, extreme quiet, light diet, and avoidance of all excitement to mind or body.

In the case of adjutant Thomas, of the Confederate service, the ball passed in one inch below the middle of the clavicle and passed out posteriorly, fracturing the superior angle of the scapula; a loud bellows murmur was developed over the region of the heart and aortic arch, a few days after admission into hospital, which was explained by the fact that the ball had passed near this vessel or the left subclavian (he being wounded through apex of left lung). His condition was critical for a month; but he finally recovered, and was paroled to visit his friends in Nashville.

Private Charles H. Palmer, C. S. A., was admitted June 27th; a ball had entered the left side of the chest between the fourth and fifth ribs, one and a half inches to the left of the nipple, and made its exit two inches below the inferior angle of the scapula. He had bloody expectoration and pleuro-pneumonia. On July 27th a large accumulation of pus in the left pleural cavity was evacuated through an opening into the bronchi, and he suddenly threw up a quart or more of pus, which continued in small quantities until he was well enough to send to Nashville about Sept. 1st.

Private Barton Cook, Co. F, 89th Ills. Vols., was brought in, having received a gunshot wound of the lungs, the ball had entered on the left side, outside of the nipple, and, passing through, made its exit on the back on the right side of the tenth dorsal vertebra, and must have passed between the heart and thoracic aorta. On admission he had constant harassing cough and bloody expectoration, great dyspnœa, frequent full pulse, and flushed face. He passed through a dangerous succession of symptoms, with free suppuration, but in September he is recorded as "improving, discharge almost ceased, and walking about the room," and on the 19th as having walked down stairs and ready to go on furlough.

Other cases presented no important points of interest.

Four cases of *wounds of the hip-joint* are reported, of which two were

transferred to General Hospital at Nashville. Some doubt exists in my mind as to the accuracy of diagnosis in these cases, and I am inclined to regard them rather as fractures near the head of the bone. I have no history of the cases, and cannot recollect the particulars, though I should no doubt have done so had cases of so grave a nature been received, as it was my custom to visit every surgical case of interest in all the hospitals two or three times each week.

The third and fatal case was that of Captain Martin, 79th Ill. Vols. A minié ball entered the left hip opposite the great trochanter, passed inwardly through the head of the femur, and was reported to be there retained. He was brought to the hospital after a journey of thirty miles in an ambulance, and on arrival was very much exhausted. On the second day after, having rallied considerably in strength and spirits, he desired that an operation should be performed if considered necessary. He was rendered insensible by ether and an exploration made, by which it was discovered that the ball had passed through the neck of the bone, and the finger could follow its track, but no ball was felt—although the fissure could be detected which rendered the fracture complete, yet there was very little comminution and no displacement. It was deemed most proper to leave things as they were.

The patient recovered well from the anæsthetic influence, and presented no unfavorable symptoms until the third day after the operation, when he rapidly passed away.

It was discovered, after the operation, that the ball had passed through the thigh and made its exit near the anus in the cleft of the nates. (See specimen in Army Museum.)

The fourth case, and fatal, was Private W. C. Lesneur, of Confederate Army, who was admitted June 27th with gunshot wound on right side; the ball had entered opposite the great trochanter of the femur, passing inwards and backwards through the trochanter major and lodging. The finger could be passed into the inner side of the bone, but could not follow the track farther. As this patient was much exhausted by a long and fatiguing journey, no operation was deemed advisable.

He lingered along for a few weeks, although supplied with food and stimulants, and sunk rapidly, being at no time in a condition to warrant surgical interference.

On examination, eight hours after death, the ball was found to have entered the trochanter major, passing through it and the capsular ligament of the joint, carrying away a portion of the head of the femur, the round ligament, and posterior portions of the acetabulum, and to have lodged beneath the *psöas magnus* and *iliacus internus* muscle near the spine, where a large abscess was found filled with dark unhealthy pus. The ligamentous and cancellous structures in the vicinity of the joint were almost entirely absorbed, and the soft parts infiltrated with sero-purulent matter.

In such a case no operation, even if attempted, would have offered any chance of saving life, and would have without doubt hastened the fatal result.

The experience of the English and French surgeons in the Crimean war has led them to declare that the attempt to save gunshot wounds of the

thigh was so complete a failure, that MacLeod in his Notes winds up his history of this class of injuries by the following precept:—

“That under circumstances of war similar to those which occurred in the East, we ought to try to save compound comminuted fractures of the thigh, when situated in the upper third; but that immediate amputation should be had recourse to in the case of a like accident occurring in the middle or lower third.”

Now these circumstances were, as mentioned by him:—

“During the greater part of the siege the means of treating these accidents, whether as regards food, bedding, clothes, or shelter, did not exist in camp; and to transfer them to the rear only made the fatal result the more certain, from the pyæmic poisoning which was sure to be set up by the transport. Thus, then, it came to be, that up to the period when things were improved in the camp hospitals and in the transport service, recovery from a compound fracture of the thigh was impossible, or nearly so, and that the best hope lay in an early amputation.”

Not only the above causes operated, but the “scurvy-poison held command in their systems; most of the patients had either suffered from dysentery or were on the verge of falling into that disease; in fact their condition of health did not bear sickness or gunshot injury.” Now just the opposite state of things existed in our army. The men had been at rest in camps about Murfreesborough for five months, warmly clothed, abundantly fed, with a wholesome allowance of potatoes and onions, and they were the pick of the entire force, at least seven thousand of the feeble, sick, and worthless being left behind in hospital or invalid camp, or having straggled to the rear after two or three days’ march. Now any rules or principles derived from the experience of the Crimean war were not applicable in our treatment of injuries.

Our ambulances were easy and abundant, and the hospitals amply supplied with everything essential.

Under such circumstances we were prepared to exert ourselves for the preservation of limbs, and our success has been such as to warrant our efforts.

Thirteen cases of fractured gunshot wounds of the femur were received, of which five died. Of the five who died, three were amputated at the upper and middle third; one had resection performed of the middle third, and one died without surgical interference.

Two cases of resection were recovering.

Three cases where spiculæ were removed were recovering.

One case where there was no interference was recovering.

One case was discharged, and one sent on furlough.

In the six cases marked as recovering, two had been wounded at Stone River, December 31st, 1862, and were able to be up but not put any weight on the limb; the other four were wounded in the latter part of June, and on September 15th their wounds were nearly closed and every indication of bony callus having been deposited around the fractured ends.

I shall have another opportunity of presenting a very large number of cases in a future communication.

No class of surgical cases occur after a battle so important both to the surgeon and the soldier as wounds of the knee-joint.

A wounded man is brought into our hospital soon after he has received a ball through the knee-joint, fracturing bones, or coursing so near the joint as to involve the synovial capsule without any fracture. The man is in fine condition of health, and does not suffer any, and thinks his wound is not of much severity.

Shall we follow the experience and lessons cited in books, and immediately amputate above the seat of injury. One year ago I would have considered myself justified in doing so. At a meeting of the Army Medical Society, held in Washington, not a year since, the universal voice of the members present was to the effect that no case of recovery had occurred in their practice. Esmarch says:—

“In all gunshot wounds of the four greater joints of the extremities, in which the bone is at the same time injured, the question is only whether the limb shall be removed, or its preservation attempted by the performance of resection.” Again, “All gunshot injuries of the knee-joint, in which the epiphysis of the femur or tibia has been affected, demand immediate amputation of the thigh. It is a rule of deplorable necessity already given by the best authorities, and which our experience fully confirms.”

Guthrie states:—

“Every gunshot wound of the knee-joint when one or both epiphyses are struck, requires immediate amputation. He has not seen a single case recover without removal of the limb.”

McLeod, in his *Surgery of the Crimean War*, says:—

“The knee, when penetrated by gunshot, presents an injury of the gravest description. Taking much interest in cases of this description, I visited every one I could hear of in camp, and can aver that I have never met with one instance of recovery in which the joint was distinctly opened, and the bones forming it much injured by a ball, unless the limb was removed.”

With such precepts and experience I was slow to come to a conviction that very many cases which I had seen go on to an unhappy conclusion, might have been saved.

It seemed to me that the patients had not so much died from the injury itself as from timid surgery. A wounded joint within forty-eight hours begins to swell, and becomes tense, shiny, and painful, and soon fluctuation is felt within the capsule and exteriorly. This may be delayed for several days by cold applications. Matters go on from bad to worse; there is discharge from one or both wounds, but which does not relieve the distension. The general system finally succumbs, and after death we find the joint cavity and all the tissues above and below the knee with burrowing abscesses. It is a rule of surgery to give free exit to pus wherever it is detected, and more especially when beneath fibrous and unresisting tissues. Now, if we apply this good precept to the knee-joint as soon as we find distinct fluctuation, shall we not save the increase and spread of the pyo-



genesis? Shall we fear to freely open the knee-joint? Are we not told that shell wounds tearing open the joint are less dangerous than gunshot or punctured wounds?

Are not amputations and resections at the joints abundantly successful?

By such reasoning I had determined as soon as opportunity presented, to risk a trial to save a limb, and this occurred.

CASE I. Sergt. Haynie, Q. M. Sergeant 10th Ohio Cavalry, while on a foraging expedition, June 6th, a few miles from Murfreesborough, Tenn., received a gunshot wound of the left knee-joint; the ball struck the centre of the patella, and passed through, comminuting it; it then passed outward and backward, involving the articular surface of outer trochanter of femur, tearing the capsular and lateral ligaments.

He was brought to the Field Hospital immediately, and soon after seen by several surgeons. I recommended that the track of the wound should be laid open and a free incision made into the joint, the limb firmly fixed in a good position, and cold irrigation applied.

This was done effectually as soon as swelling and redness appeared, and the fragments of patella removed at various intervals. No pus was allowed to accumulate or burrow. Cold or warm water dressings were used, as most comfortable to the sensations of the patient. Everything progressed most favourably, and when I left the post,<sup>1</sup> Sept. 14th, the wound was nearly closed, and the patient had some motion of the joint.

CASE II. Adjutant Y. Caswell, Georgia Sharpshooters, C. S. A., was brought to the hospital, June 26th; a ball had struck the outer condyle of the femur, glancing downwards, opening the capsular ligament of the knee-joint, and made its exit in the leg, opposite the middle of the fibula.

The utmost rest of the joint and ice water applications seemed to strangle all excessive action; the wound suppurated kindly, and he was so far recovered as to allow his being sent to Nashville, July 27th.

CASE III. Capt. Pettigrew, 20th Tenn. Confederate army, was admitted the same date, with gunshot wound of the right knee-joint; the ball had entered above the external condyle, fracturing it and passing out posteriorly. For some days no inflammatory symptoms of severity occurred under complete rest and cold applications, and so comfortable was he, that he got out of bed and attempted to walk. This brought on active inflammation of the joint, with abscesses in and around it, and he suffered terrible pain. Extensive openings were made so as to thoroughly drain off all collections of pus, and he passed through the usual course of such cases, until Sept. 6th, when he began to improve, the discharge being diminished and more healthy, the swelling subsiding, his appetite and sleep good, and mind cheerful.

On Sept. 16th, the record declares him greatly improved and beyond all danger.<sup>2</sup>

Nov. 25th. Prospects of complete recovery with ankylosis.

<sup>1</sup> Nov. 25th. I have since learned that he went on furlough, the wound having entirely closed.

<sup>2</sup> Nov. 30th. Has just returned from furlough with a good joint and considerable motion.

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 CASE IV. Private Edward Phipps, Co. I, 6th Indiana, received a wound in the right knee-joint, July 5th; the ball entered on the outer side, passing through between the patella and articulations of the femur and tibia, and passing out on the inner and lower side. No fracture could be felt. He had considerable swelling and inflammation of the joint, but no abscesses, and Sept. 13th was furloughed with ankylosis of joint, and able to move about on crutches.

CASE V. Private Adam Loutenschlager, Co. A, 77th Penn. Volunteers, admitted June 27th, gunshot wound; the ball entered in front near the attachment of the biceps, above the patella, and penetrated the joint. The ball was extracted at the hole of entrance. Ice water dressings were applied to joint with absolute rest; active inflammation set in, attended with purulent deposit in the joint and burrowing up the thigh. Free incisions were made, but later than I could have wished, evacuating unhealthy pus. Bandages were applied above and below the knee, and the most nutritious diet with stimulants freely given. Two months of suffering, with great prostration, enormous discharges of pus, and extreme emaciation, were rewarded by a fair prospect of the limb being saved, and Sept. 15th, the patient is recorded as "improving and the discharges from the knee almost ceased." It was thought by the surgeon in charge of the hospital that "he would recover with an ankylosed joint, and the limb nearly straight."

Ten cases of wounds of the knee-joint were admitted (all except Sergt. Haynie) into Hospital No. 1, from the several skirmishes of the advancing army.

Of these three died without operation; one died after amputation; one died of secondary hemorrhage from a branch of the popliteal artery; three were nearly recovered when I left the post, Sept. 15th, and two remained with fair chances of ultimate recovery. Thus we have one-half the cases which will in all probability be saved with useful limbs and various amounts of motion in the joints.

These cases were treated under the most favourable circumstances; the physical condition of the men was most excellent, and soon after the reception of the injury, they were taken to well appointed hospitals, surrounded with comfort, and with every luxury of diet at command, and skilful surgical attendance.

From the unsatisfactory histories furnished me, I am unable to give the details of all the cases; but having been in the habit of seeing them from day to day, I know that three recovered and two promised well; then I was ordered to the front, in anticipation of a battle at Chattanooga. I hope to be able to give more accurate and enlarged notes of the vast number of such cases resulting from the desperate conflict on the Chickamauga.

In conversation with surgeons, several successful cases have been related, and Surg. Goldsmith, U. S. A., at Louisville, related, as a curious fact, that more men have been discharged the service at that post who had received gunshot wounds of the knee-joints with recovery, than where amputations of the thigh had been performed for various injuries.

Injuries of the ankle and foot, involving more or less destruction of the bones, are among the most formidable presented to us after a battle, and from the small amount of apparent destruction, we are induced to give a trial for the conservation of the limb, nor can we at all judge what is going to be the course of the injury, not unfrequently the most formidable go on to a happy termination, while less severe cases result in destruction of all the bones, ligaments, and coverings.

I have been greatly delighted at the result of several of our cases, where I was in great doubt whether they could be saved, and have turned away unresolved what to do. I have more than once been the only opposing voice to amputation, and have rarely if ever had reason to regret my decision.

Six cases of ankle-joint injury and others of the foot were treated and with admirable results; in no case was amputation necessary.

I subjoin the history of two cases:—

Private Henry Hartman, Co. I, 34th Illinois Volunteers, admitted with compound comminuted gunshot wound of left ankle-joint and foot, the ball entering two inches above the internal malleolus and passing out at the inner point of the heel, through the joint and fracturing the malleolar process.

Ice-water dressings, with elevation of foot, free incisions to prevent burrowing of matter, were the means resorted to; violent inflammation followed with great pain for some time, which yielded to the appropriate treatment, and his improvement was rapid, considering the extent and gravity of the wound.

He was walking about on crutches with his foot slung, early in September, and went home on furlough. He will in time have good use of his foot and ankle.

Private A. P. Witson, Co. K, 58th Indiana Volunteers, was admitted June 27th, with compound fracture of the left foot, ball entering at lower end of second metatarsal bone, passing diagonally to the inner, back and lower point of the heel, where it made its exit, fracturing the second and third metatarsal bones, lacerating the tendons and ligaments of the foot extensively in its passage.

The same general course of treatment was adopted, with removal of fractured pieces from time to time.

He did well, and in September was going about on crutches with best prospects of a complete healing of parts and ultimate use of his foot.

Fractures, by minié balls and shells, of the bones of the leg, except in cases of great destruction, are very favourable. Resections and removal of large pieces result in renewal of the parts, and every surgeon is familiar with the success of conservatism in this part.

There were performed on the field and sent into hospital—

Amputations of the arm . . . .	1;	of which died	0;	remaining	1
“ “ shoulder . . . .	1;	“ “	1;	“	0
“ “ leg . . . .	2;	“ “	1;	“	1
“ “ mid. 3d thigh . . . .	2;	“ “	1;	“	1

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There were performed after admission into the hospital—

Amputations of left leg . . . . .	1
“ “ low. 3d thigh . . . . .	1
“ “ mid. 3d “ . . . . .	1
“ “ knee-joint . . . . .	1
“ “ trephining . . . . .	1
Ligature of femoral artery . . . . .	1

All of which were fatal.

One case of ligature of the carotid (external) was successful.

All these were secondary operations performed from two to six weeks after injury, and all but the cases of ligation of arteries and trephining were in the field hospital, where depressing causes alluded to above existed, and which explains the great mortality.

MURFREESBOROUGH, TENN., Nov. 25, 1863.