

CHEST INJURY - OPEN PNEUMOTHORAX



Abraham Lincoln delivering his second inaugural address, 1865. (Photograph by Alexander Gardner).

“Fondly do we hope, fervently do we pray that this mighty scourge of war may speedily pass away. Yet if God wills that it continue until all the wealth piled up by the bondman’s 250 years of unrequited toil shall be sunk and until every drop of blood drawn with the lash shall be paid by another drawn with the sword, as was said 3,000 years ago, so still must be said, the judgments of the Lord are true and righteous altogether. With malice towards none, with charity for all, with firmness in the right as God gives us to see the right, let us strive on to finish the work we are in to bind up the nation’s wounds, to care

for him who shall have borne the battle and for his widow and his orphan, to do all which may achieve and cherish a just and lasting peace among ourselves and with all nations”.

Abraham Lincoln, Second inauguration speech, 4 March, 1865.

With Sherman’s victory at Atlanta, Lincoln’s chances of re-election were improving. And now came more bad news for the Confederacy. Phil Sheridan and 45,000 men were on the loose in the Shenandoah.

“The whole country from the Blue Ridge to the North Mountains has been made untenable for a Rebel army. I have destroyed over 2,000 barns filled with wheat, hay, and farming implements and over 70 mills. Tomorrow I will continue the destruction. When this is completed the Valley will have but little in it for man or beast”.
(General Phil Sheridan).

He was sent there to clear it out once and for all. His instructions were to strip it so clean that a crow flying across it would have to carry his own provender, and he came close to doing it.

(Shelby Foote, Civil War Historian)

No Union officer was fonder of fighting than Sheridan, none save Sherman, was so relentless. His orders were to follow Jubal Early to the death. Before dawn on October 18th, Jubal Early tried one last time to destroy Sheridan’s army by attacking at Cedar Creek, while Sheridan was asleep at Winchester 20 miles away. At first it seemed Early had succeeded. Union forces were driven from their camps. Sheridan mounted his great black horse, Rienzi, and galloped through his retreating men, urging them to turn back. They stopped and began to chant his name.

“God dam you !”, Sheridan shouted, “Don’t cheer me. Fight!”

The Union lines reformed and won back the field. Early fled, and the Shenandoah was closed forever to the Confederacy.

“General Sheridan, when this particular war began I thought a cavalryman should be at least 6 foot 4 inches high, but I have changed my mind, 5 foot 4 will do in pinch”.
(Abraham Lincoln).

At Petersburg, Grant fired a second 100 gun volley into the enemy works.

“Dear Nat, I think well of the President. He has a face like a hoosier Michelangelo. So awful ugly it becomes beautiful with its strange mouth, its deep-cut crisscross lines, and its doughnut complexion. I do not dwell on the supposed failures of his government. He has shown an almost supernatural tact in keeping the ship afloat at all. I more and more rely upon his idiomatic western genius”.
(Walt Whitman).

Harper’s Weekly: Abraham Lincoln and Andrew Johnson have been elected by enormous and universal majorities in almost all the states. This result is the proclamation of the

American people that they are not conquered. This is what they confirm by the re-election of Mr. Lincoln. In himself, he is unimportant, but as the representative of the feeling and purpose of the American people, he is the most important fact in the world”

“I give thanks to the Almighty for this evidence of the people’s resolution. This contest has demonstrated to the world that a people’s government can sustain a national election in the midst of a great Civil War”.

(Abraham Lincoln)

Sherman’s and Sheridan’s victories had changed the odds. Lincoln carried 55% of the popular vote. Only 3 states - Kentucky, Delaware, and New Jersey, went to George McClellan. Virtually all of the general’s old command, the Union Army of the Potomac, voted for Abraham Lincoln.

‘That grand old army performed many heroic acts, but never in its history did it do a more devoted service than vote for Abraham Lincoln”

(Union soldier)

“Not the fall of Richmond, nor Wilmington, nor Charleston, nor Savannah, nor Mobile, nor all combined can save the enemy from the constant and exhaustive drain of blood and treasure which must continue until he shall discover that no peace is attainable unless based on the recognition of our inalienable rights”

(President Jefferson Davis)

If it hadn’t begun before, the lost cause was born with his words. As Davis spoke at Richmond, his audience could hear Grant’s guns at Petersburg, just 20 miles away. More and more it was becoming a Confederacy of the mind.

It was a realization that defeat was foreordained. Miss Chesnut, for instance said, “It’s like in a Greek tragedy, where you know what the outcome is bound to be, and we’re living a Greek tragedy”. And things began to close in on them more and more. There was scarcely a family that hadn’t lost someone. There was disruption of society, the blockade was working. They couldn’t get very simple things, like needles to sew with - very simple things.

And the discouragement began to settle in more and more with the realization that they were not going to win that war. Their political leaders did everything they could, especially Jefferson Davis, to assure them that this was the second American Revolution, and if they would stand fast, the way their forefathers had, victory was unquestionably gonna come.

But the realization came more and more that it was not gonna come, especially if they were not gonna get foreign recognition, without which we wouldn’t have won the first Revolution. And all those things closed in on them.

(Shelby Foote, Civil War Historian)

David McCullough and Shelby Foote in Ken Burns’, “The Civil War”, 1990.

By May of 1864, it seemed like the darkest hour for the Union. Despite the great victories at Gettysburg and Vicksburg, the previous year, the war still dragged on with little end in sight. In the west Sherman was stalled outside of Atlanta, fighting titanic battles with the Texan Confederate commander, John Bell Hood while in the east the Union's last best hope, Ulysses S. Grant, had just been thoroughly routed by Robert E. Lee at the Battle of the Wilderness. The elections loomed for 1864. The Democratic nominee for President was no less than General George B. McClellan, the commander whom Lincoln had dismissed following his refusal to follow-up the Union "victory" at Sharpsburg - Antietam, the previous year. But what was even worse McClellan stood on a platform for a negotiated peace with the South, and an end to the war, and if McClellan won, the Confederacy would surely be finally recognized by the great European powers. It seemed like Lincoln's great cause of a unified United States was soon to be at an end. "I'm going to be beaten", Lincoln wrote that summer, "and unless some great change takes place, badly beaten".

Not only one, but two great changes would come. On September 2nd, just two months before the election, came an electrifying telegram from William Tecumseh Sherman, "Atlanta is ours and fairly won!"

"September 3, 1864. Glorious news this morning", wrote George Templeton Strong "Atlanta taken at last! It is, coming at this political crisis, the greatest event of the war!"

"Atlanta is gone", recorded Mary Chesnut in her diary, "That agony is over. There is no hope, but we will try to have no fear".

Ulysses S. Grant was ecstatic, "Dear General Sherman", he wrote to his friend, "I feel you have accomplished the most gigantic undertaking given to any general in this war and with a skill and ability that will be acknowledged in history as unsurpassed, if not unequalled".

If this news wasn't sufficient, General Phil Sheridan, in October then telegraphed his news of the final defeat of Confederate forces under General Jubal Early, in the Shenandoah Valley. This time there was no Stonewall Jackson to defend it. Now the Confederacy would starve.

On November 8, 1864 Lincoln won a resounding and miraculous victory over McClellan. Only three states - Kentucky, Delaware, and New Jersey, went to George McClellan. Virtually all of the general's old command, the Union Army of the Potomac, voted for Abraham Lincoln. The two great, and extraordinarily timely, victories of Sherman and Sheridan had dramatically changed the odds.

For those who suffer the injury of an open pneumothorax, the future looks bleak indeed unless some great change can improve the odds for survival. As Sherman and Sheridan provided two for their President, so we may provide two for patient with open pneumothorax in the form of the occlusive dressing secured on three sides and the placement of an intercostal catheter remote from this site. By so doing, the chances of final victory in the form of definitive surgical repair, will be greatly enhanced.

CHEST INJURY - OPEN PNEUMOTHORAX

Introduction

An **open (or “sucking”) pneumothorax** is a particular type of pneumothorax that occurs when there is a chest wall defect, such that there is an open wound that directly communicates with the exterior.

Treatment consists of 3 steps:

1. Emergent First aid treatment:
 - Closing the wound with an occlusive dressing, taped in 3 sides.
2. Placement of an intercostal catheter at a site remote from the wound.
3. Definitive surgical repair.

Pathology

In larger open wounds, equilibration between intrathoracic pressure and atmospheric pressure is immediate, and results in collapse of the lung.

During inspiration, a negative intra-pleural pressure is generated.

Once the size of the chest wall defect is greater than *two thirds* times the size of the cross section of the trachea, air preferentially enters the pleural cavity through the chest wall defect, rather than through the trachea because the chest wall defect is much shorter than the trachea, and hence provides less resistance to air flow.

This results in severe impairment of oxygenation and ventilation, and a progressive accumulation of air within the pleural space.

Additionally the pneumothorax may become tension if a one-way valve type flap develops that allows air inward, but not outward.

Clinical Assessment

Diagnosis is made clinically during the primary survey when an open wound in the chest wall is identified. Larger defects will be obvious but smaller ones less so.

Clinical features include:

1. Air appears to be “sucked” noisily into the chest cavity on inspiration.
2. There may be visible bubbling of blood around the chest wall wound on expiration.

3. Other signs may develop indicating a tension pneumothorax:
 - Reduced breath sounds.
 - Hyper-resonant percussion note.
 - Elevated JVP
 - Hypotension

Investigation

Bloods tests:

These will be done according to clinical need as in any case of major trauma.

The following may be done:

1. FBE
2. U&Es/ glucose
3. Blood group and cross-match as clinically indicated

Plain radiography:

Plain radiography will not be the initial priority, as the diagnosis will be obvious clinically.

It should be done once the patient has been stabilized.

CT scan:

Again this may be considered once the patient has been stabilized, if further chest pathology need to be excluded, providing the patient is stable and does not required urgent surgery.

Management

1. ABC
 - As in any multi-trauma, attention should be paid to any immediate ABC issues.
Oxygenation:
 - Give high flow oxygen by face mask initially in all cases

- Immediate intubation and ventilation may be necessary in severe cases.

Subsequent management is then done in 3 stages:

2. **Close the open wound:**



Tape the occlusive dressing on 3 sides only.

- The open wound should be closed with an occlusive dressing, (e.g. plastic wrap or petroleum gauze) **large enough to completely overlap the wound edges.**
- This should then be **taped securely on 3 sides, with the fourth side left free.**

This, in theory, acts as a flutter-valve to allow air to escape from the pleural cavity during expiration, but not to enter it during inspiration, thus preventing the development of a tension pneumothorax.

If the taping is closed on all 4 sides, this can cause air to accumulate within the pleural cavity resulting in a tension pneumothorax if there is no chest tube in place.

- Note that a completely occlusive dressing may be difficult to apply to very large wounds and its effect in reality can be variable.

3. **Intercostal catheter:**

- After closure of the chest wall defect, a separate intercostal catheter **remote from the chest wound** should be placed as soon as possible, to prevent the possible development of a tension pneumothorax.

6. **Surgery:**

- Once the patient has been stabilized definitive surgical closure of larger chest wall defect will often be necessary.



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Harper's Weekly, April 1865

References

1. ATLS 10th ed 2017.

Dr. J. Hayes

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