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Safety and Ethics: Acupuncture & Pneumothorax

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Acupuncture & Pneumothorax

I Introduction

Acupuncture, when performed by a licensed acupuncturist, is safe and effective. Creating a pneumothorax (collapsed lung) through performing acupuncture is an avoidable risk. This can be avoided with a thorough understanding of lung anatomy in relationship to acupuncture points. This course will give an overview of underlying anatomy and give safe needling techniques so that the licensed acupuncture professional need never risk causing a pneumothorax.

II Definition and Mechanism of Pneumothorax

Pneumothorax is defined as **the presence of air or gas within the pleural space,** the "potential" space between the chest wall and the lung. A compete explanation of the how this causes pneumothorax is presented below.

Between the lungs and the chest wall are two layers of pleural lining, the *visceral* pleura and the *parietal* pleura, normally without any space between them. These two layers slide smoothly across each other due to serous fluid within the pleural space.

The function of the pleural space is to constantly maintain lower pressure outside the lungs and within the chest cavity compared to external atmospheric pressure. The difference in these pressures keeps the lungs inflated at all times whether inhaling or exhaling.

Air from outside the pleural space is under higher pressure than the pressure *within* the pleural space. When pressure within the pleural space increases to match external atmospheric pressure, it **causes a partial or complete collapse of the lung**.

A pneumothorax can be spontaneous, caused by an underlying disease process or caused by trauma.

There are three ways air can fill this "potential" space:

- Air can enter the pleural space from **outside the body**, as from a broken rib or other external puncture, including from medical procedures. The potential space between the two layers becomes exposed to external atmospheric air, causing the pressure in the pleural space to equalize with the external atmospheric pressure. The lung collapses due to the loss of normal lower pressure within the pleural cavity compared to external atmospheric pressure.

- Air can enter the pleural space from **inside the lung**, as from a bleb *(explained below)* or other underlying weakness in the lung. Even though the air entering the pleural space in this case comes from the lung itself, it originates from and is always connected to the outside atmosphere. Obviously, this air has the same pressure as the external atmosphere and a collapse of the lung results.

- More rarely, gas can accumulate from a bacterial infection **inside the pleural space** within the pleural fluid. This trapped gas slowly increases pressure within the pleural cavity eventually becoming equal to external atmospheric pressure. The lung collapses.

It is essential to realize that ***the lung itself does not have to be punctured to cause a pneumothorax***. The collapse of the lung is caused by an increase of pressure within the potential space between the visceral and parietal pleura of the lung, most commonly as a result of external air entering the interpleural space.

If only a small amount of external air enters the pleural space, the body can gradually reabsorb it. However, if there is too large an amount of air trapped within this space for the body to reabsorb, surgical intervention will be necessary by aspirating the trapped air

with a syringe or placing a chest tube into the pleural space to remove the trapped air.

Primary spontaneous pneumothorax

Spontaneous pneumothorax happens without trauma or intervention and most commonly happens in young people, particularly young men who are tall and thin. Small air blisters known as *blebs* can form on the surface of the lungs and when one of these blebs spontaneously ruptures, air from the lungs leaks into the pleural space and becomes trapped. While it's unknown why blebs form in some people, they can be compared to a weak spot on a bicycle tire inner tube that ruptures.

Certain preconditions such as smoking, scuba diving, and high altitudes can make an otherwise healthy person more prone to pneumothorax.

Secondary spontaneous pneumothorax

A secondary form of pneumothorax can be caused by underlying lung disease. Underlying chest disease such as lung cancer, COPD, asthma, cystic fibrosis or tuberculosis can make one more prone to pneumothorax and patients with these conditions should be treated with additional caution when needling points in the vicinity of the lungs. A person who has experienced a collapsed lung should also be treated with additional caution as they are more prone to a repeat pneumothorax.

Traumatic Pneumothorax

A lung collapse can be precipitated by trauma such as a car accident, gunshot, knife wound, or air bag deployment. Broken ribs from trauma can cause pneumothorax by either piercing the chest wall and pleural space *or* by puncturing the lung itself.

Iatrogenic pneumothorax

Iatrogenic pneumothorax is caused by medical examination or procedures such as thoracentesis (biopsy), mechanical ventilation, and incorrect acupuncture technique.

Tension Pneumothorax

Tension pneumothorax is a medical emergency in which the collapsed lung causes severe difficulty in breathing, hypoxia and a severe drop in blood pressure.

Summary

A pneumothorax can occur *spontaneously* in an otherwise healthy person, most often someone young who is tall and thin. It can be the result of trauma such as a broken rib or may be caused by internal disease such as lung cancer or, more rarely, infection in the pleural space.

Most importantly from our perspective, it can be caused by a medical procedure that introduces air into the pleural space.

As we will see, pneumothorax as a result of acupuncture is rare, particularly in the United States as compared to other countries. It is even more rare when practitioners are adequately apprised of both the proximity of specific acupuncture points to the apices of the lungs and when proper needling techniques are used with these more vulnerable points.

III Symptoms and Diagnosis of Pneumothorax

CAUTION: If your patient reports any of the following symptoms during or shortly after acupuncture, do not attempt to diagnose pneumothorax on your own. Refer them to an immediate care center or emergency room for radiographic evaluation.

Symptoms of pneumothorax are generally rapid and unmistakable, presenting with sudden onset of sharp chest pain and shortness of breath that causes a dry unproductive cough and is made worse with coughing. Pain may also be felt in the upper back. With a more severe pneumothorax, the person will also feel fatigue, may experience a precipitous drop in blood pressure, and may even become blue from lack of oxygen. If any of these symptoms occur shortly after an acupuncture treatment, the patient must be immediately sent to the nearest emergency room.

Pneumothorax is diagnosed by Chest X-ray, CT Scan of the chest, or arterial blood gases. When listening with a stethoscope there will be reduction of absence of breath sounds over the affected area.

IV Treatment of Pneumothorax

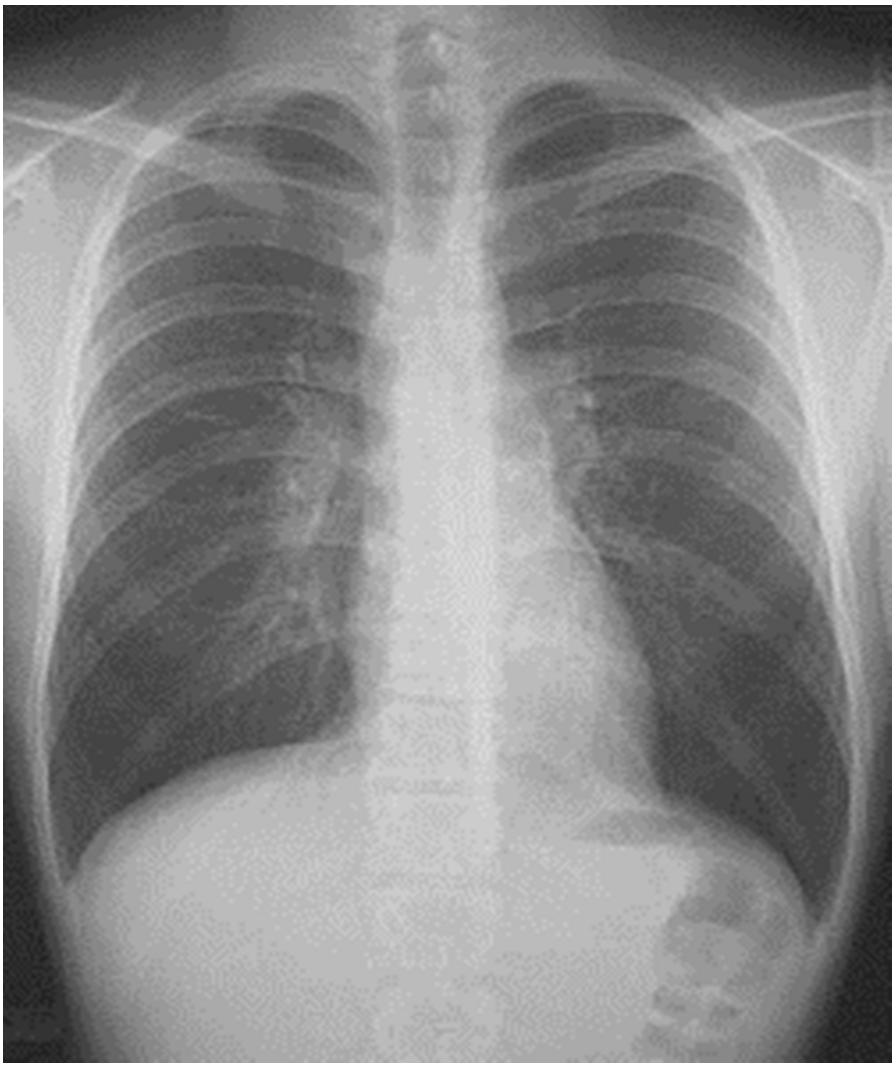
A mild or partial pneumothorax may resolve on its own without treatment as small amounts of air trapped in the pleural space can gradually be reabsorbed and the small amount of lung collapse can re-inflate on its own. The patient will be directed to rest and supplemental oxygen may be used. It is not within the scope of practice of an acupuncturist to determine the severity and treatment of a pneumothorax.

In more severe cases, the trapped air may be aspirated with a syringe or a chest tube may be inserted between the ribs and into the space between the chest wall and the lung to help remove the trapped air and allow the lung to re-expand. The chest tube may be

left in place for several days while the patient is hospitalized. In severe cases, chest surgery may be required.

V Lung Anatomy and X-Rays

First, let's look at a normal chest X-Ray:



Right *Left*

image reproduced with permission, David Darling http://www.daviddarling.info/encyclopedia/C/chest_X-ray.html

Normal Chest X-Ray taken from the back of an Adult Male

Orienting Yourself to the Image:

Personal Note from Colleen DeLaney, L.Ac., M.T.C.M.:

I worked as a Radiologic Technologist, primarily in hospital settings, from 1975 through 1990. During my radiology training I once X-rayed a 25 year old male Respiratory Therapist who experienced a spontaneous pneumothorax from a ruptured bleb as he was walking down the stairs towards the radiology department. He experienced sudden onset of sharp chest pain, non-productive cough and shortness of breath. This spontaneous pneumothorax was sufficiently severe to require placement of a chest tube for several days until the pneumothorax resolved. While generally not life-threatening, this is a serious and painful condition you do not want to cause in anyone, and it underscores the need for additional caution when treating a tall or thin young man who may be predisposed to a spontaneous pneumothorax.

A person is positioned for a normal chest x-ray by standing him upright, placing his chest against the x-ray cassette holder, rotating his shoulders forward so that the scapula do not overshadow the lung fields, and by instructing him to take as deep a breath as possible and hold it to fully inflate the lungs. Upon full inspiration the lungs will optimally be visualized down to the 10th rib. In the healthy image above, all **of the darkened area is inflated lung tissue**. The heart and diaphragm, being of denser material, show as lighter "shadows" on the film. Inside the darkened areas you can also observe lighter shadows that consist of the *hilum*, or region of each lung where the bronchi, blood vessels, and nerves enter and leave the lungs, along with slightly grayish areas depicting the densities of the lungs.

NOTE: The central point of this course is to visually bring to your attention to the reality that the dome or apex of the lungs extend above the clavicles.

EXERCISE

Look at the image and place your fingers on your clavicles (marked by the letter B). Feel the soft triangle of tissue above the clavicles that slopes upwards to the base of the neck. The apices or domes of the lungs (marked by the letter A), are right below the trapezius muscle (directly below GB 21). In a thin person without developed trapezius muscles, the apices of the lungs will be even closer to the surface of the body. Because the scapulae (marked by the letter F) are rotated forward so as not to obscure the lung field they are not in their normal anatomical position where they would afford protection to part of the upper lung region.

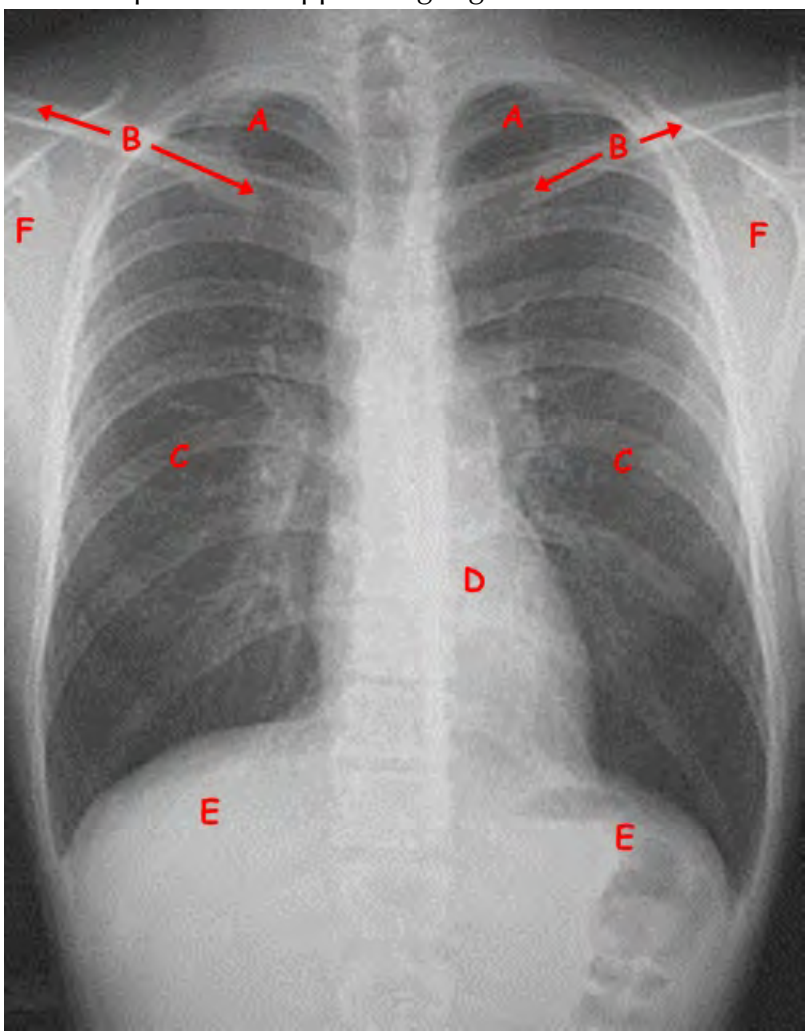


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Image reproduced with permission, David Darling http://www.daviddarling.info/encyclopedia/C/chest_X-ray.html,markings in red added by the authors

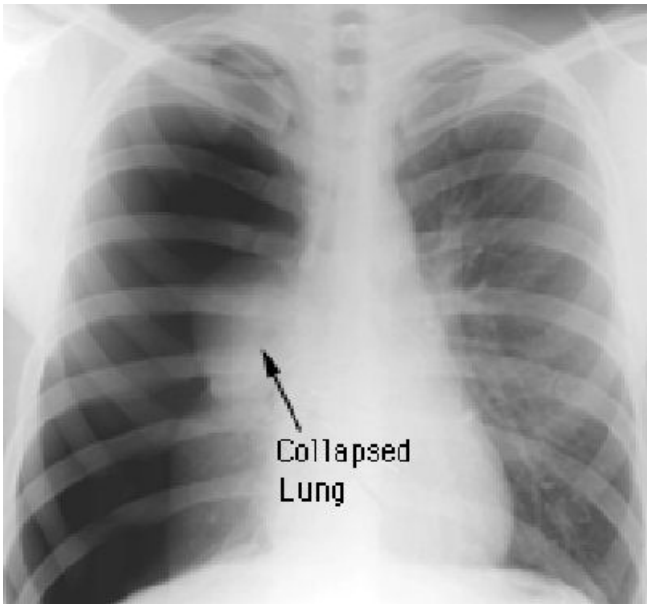
A: Apex of lungs B: Clavicles C: Lungs D: Heart E: Diaphragm

F: Scapula (rolled forward out of lung fields)

VI Appearance of a Pneumothorax:

A Pneumothorax can be small, only affecting a small degree of the lung, such as collapsing just one lobe of the lung in the area of the upper lung within the apex. Because the pleural space is self-enclosed on each side, and unless there is severe trauma to both sides of the chest wall, a pneumothorax will generally be limited to one lung. This type of limited pneumothorax may resolve with rest and close observation. However, as in the X-ray below, a pneumothorax can be severe. Enough air can enter the pleural cavity and become trapped there to cause collapse of the entire lung on one side, as depicted below:

Let's take a look at a right-sided pneumothorax:



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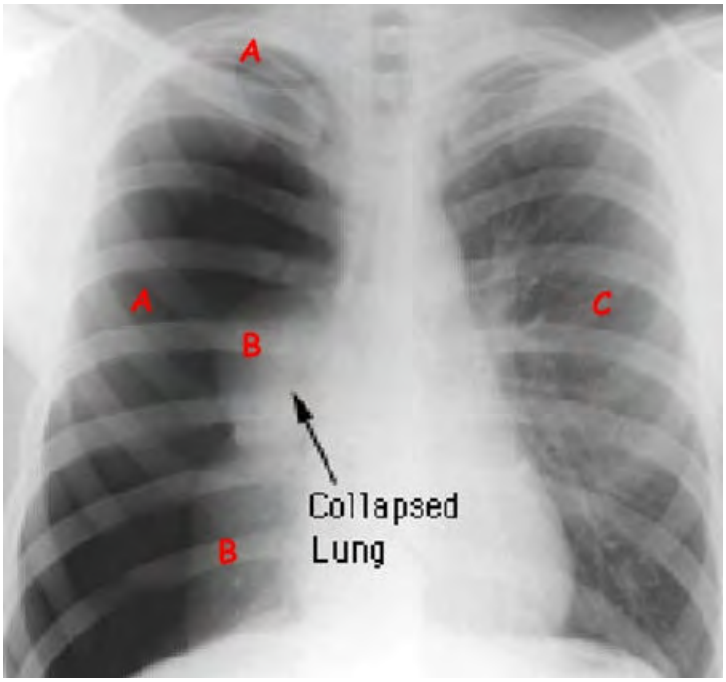
The right side of the chest shows a pneumothorax or collapsed lung, as indicated by the lack of pleural markings and vasculature seen on the left side. This “hyperlucency” or clear, dark area on the right is the hallmark of a collapsed lung.



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Additional red markings are those of the author.

A: Hyperlucent, air-filled pleural cavity: **Note this extends into the apex of the lung above the clavicle.**

B: Density showing collapsed lung tissue

C: Normal, inflated lung tissue with pleural markings

CT Scan of Collapsed Right Lung:

Right *Left*

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Again, notice the hyperlucency (darkness) of the air-filled right pleural space, compared to the lung tissue and vasculature that fills the left side. The white ball of density towards the center of the right side is the collapsed lung tissue.

Now, let's talk about *how* a pneumothorax not only can occur but how it *actually affects people:*

VII Sample Case Studies of Pneumothorax from Acupuncture Treatment

Review of the Literature:

Fortunately, case studies of Acupuncture-Induced pneumothorax in the United States are rare. Acupuncture Today[1] noted that there are 8,000-9,000 cases of spontaneous pneumothorax reported annually in the United States.

In the same issue of the publication, a U.S. Acupuncture malpractice insurance based company reported a total of two cases in four years, one caused from a patient rolling over onto a needle placed in Lung 1.[1]

In *A Cumulative Review of the Range and Incidence of Significant Adverse Events Associated With Acupuncture* [2] in the United Kingdom it was found that In the hands of trained practitioners, the risk of serious adverse events with acupuncture is very low, estimated at 1:200,000, which is below that of many common medical treatments. The most common of the severe adverse effects are pneumothorax, injury to the central nervous system and infection. In the UK, the risk of pneumothorax after acupuncture has been estimated to occur twice in nearly a quarter of a million treatments. Less severe but more common side effects of acupuncture include dizziness, somnolence and redness around the needle site.

A prospective investigation in Germany of 97,733 patients constituting 760,000 treatment sessions reported that the two most frequently reported adverse events were needling pain (3.3 percent) and hematoma (3.2 percent). Potentially serious adverse events included two cases of pneumothorax.[3]

Complications are infrequently observed with acupuncture treatment; however, as with any form of needle use, adverse events can occur. These includes transmission of diseases, needle fragments left in the body, nerve damage, pneumothorax, pneumoperitoneum, organ puncture, cardiac tamponade and osteomyelitis. Local complications

include bleeding, contact dermatitis, infection, pain and paraesthesia.[3]

The authors conclude that despite these documented complications and the occasional case reports, major adverse incidents are quite rare and are usually associated with poorly trained or ***unlicensed*** acupuncturists.[3]

And yet, it does happen. Let's look at how:

Case Study # 1

According to The Southern Medical Journal, a review of the literature from 1985 through 2007 shows nine cases of acupuncture-induced pneumothorax in the United States.[4]

In the case cited above, a 27 year old non-smoking woman began experiencing sharp chest pain, non-productive cough and difficulty breathing minutes after an acupuncture treatment for a muscle spasm of the right levator scapula.

In this treatment, needles had been placed along the medial border of the scapula from T-2 to T-8. A subsequent chest X-ray revealed a 30% collapse of the right lung. Because the woman was a medical student who lived 5 minutes from the hospital and could be trusted to adequately monitor her own symptoms, she was sent home to see if the pneumothorax would resolve on its own.

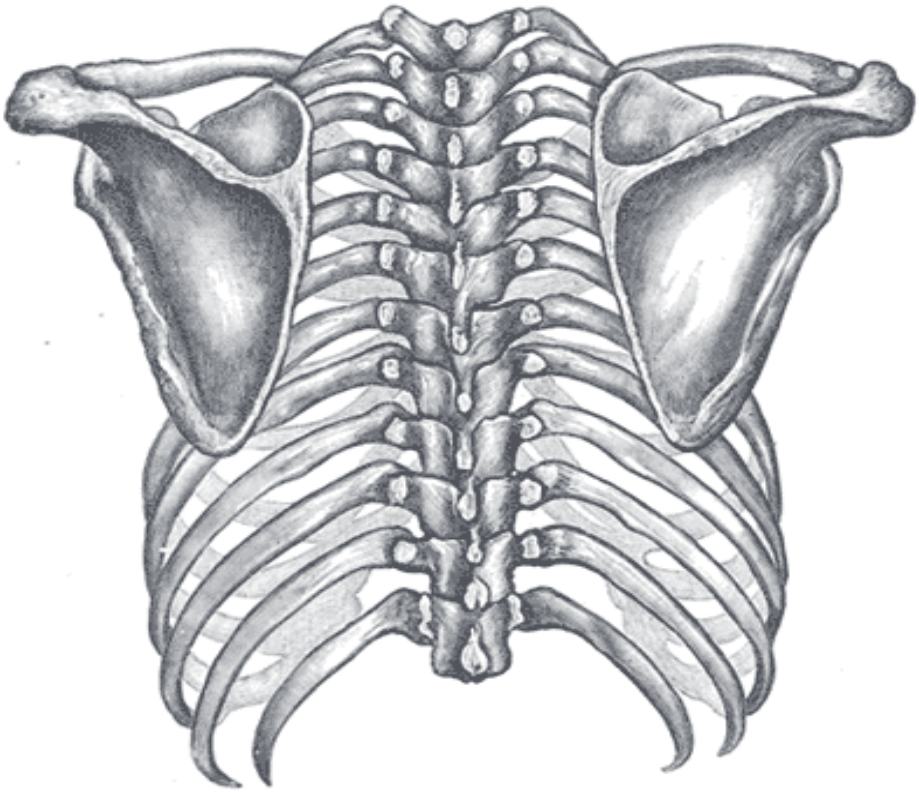
When her symptoms of chest pain, shortness of breath, and dry unproductive cough gradually worsened; she reported back to the emergency room after 36 hours. A chest tube attached to suction was inserted into the fourth intercostal space to remove the trapped air and to "pull" the lung back into a fully re-inflated state.

The chest tube was removed two days later and the patient had no further complications.

EXERCISE for Case Study # 1:

Locate the following points on the diagram below:

U.B. 41	S.I. 9
U.B. 42	S.I. 10
U.B. 43	S.I. 11
U.B. 44	S.I. 12
U.B. 45	S.I. 13



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Question:

1) Which points were used in Case Study # 1, above? Locate.

2) Which points could put the patient at risk for pneumothorax?

3) Which points present *no possibility* of creating a pneumothorax?

(Answers at the end of Case Study Section)

Case Study # 2

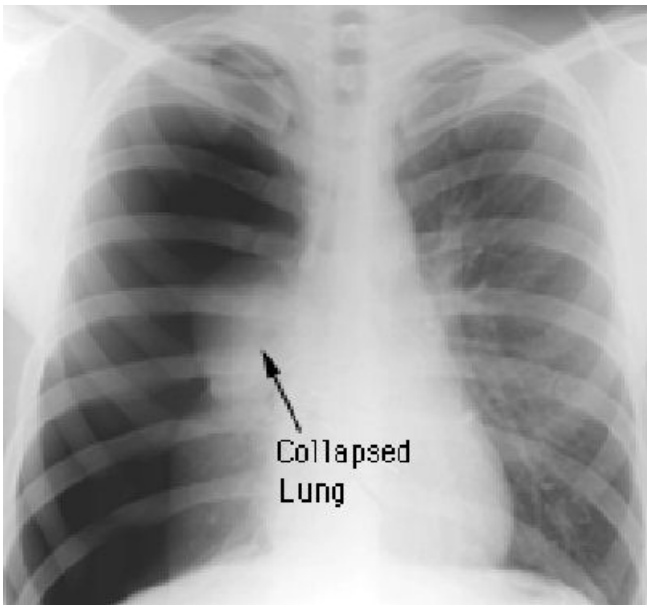
This case study from *Medical Acupuncture* describes a case of pneumothorax using Bladder 14.[5]

This case involved a 21 year old woman, a non-smoker with a history of mild asthma and use of a salbutamol inhaler and who was treated for whiplash.

The woman felt faint about 15 minutes after needle insertion and the needles were immediately removed after which she felt pain upon deep breathing. After a period of observation, during which she had no difficulty breathing, she was sent home. Her pain increased overnight accompanied by shortness of breath. When she reported back to the clinic 18 hours later, she was sent to the hospital where an x-ray revealed a moderate-sized pneumothorax. The woman's pneumothorax resolved on its own without use of a chest tube or surgery.

While it was unclear whether a fainting episode led to the patient moving and perhaps dislodging a needle, the practitioner admitted to the needle at Bladder 14 being inserted more deeply than necessary. The practitioner was given the warning “Needles placed in the region of the lateral line of the thoracic bladder meridian (BL 41 to BL 54) should be placed rather superficially, as the surface of the lung is about 15-20 mm beneath the skin."[5]

The woman's thin build and poorly developed musculature were cited as possible causes for the pneumothorax. It was also speculated that the patient's asthma or the use of the inhaler may have caused thinning of visceral pleura.



EXERCISE # 2

Locate Bladder 14 on the above chest x-ray. How would you now needle this point? Answer at end of Case Study Section.

Case Study # 3

This case from the *British Medical Acupuncture Society* [6] involves a 50 year woman who developed a pneumothorax after being needled along the rhomboid muscle at four points along the inner Bladder line.

The needle was inserted at an oblique angle to a depth of 15mm and only retained for 3 minutes as a form of trigger point therapy. Shortly after departing the woman reported feeling nauseous and unwell.

The patient was told to contact her physician if symptoms worsened. When she experienced breathlessness and a rapid heartbeat she went to the emergency room where a chest x-tray showed a moderate-sized pneumothorax that was resolved by placement of a chest tube. No further complications were reported.

EXERCISE # 3

Repeat Exercise for Case Study # 2. The same needling instructions apply.

Case Study # 4

While this case is not chronicled in a medical journal and therefore must be treated as anecdotal, it nonetheless presents a cautionary tale on two fronts. The patient ended up in surgery for her acupuncture-induced pneumothorax.

A Rare Risk With Acupuncture Case Study: [7]

In an apparent excessively deep needling of GB 21, the patient (a tall, thin woman) overheard the therapist saying during her treatment that "they had to get really deep." Within hours of the treatment she experienced pain all over and difficulty breathing.

After returning to the clinic the following day she was told by the therapist, "It sounds like pneumothorax, a little pin prick in the lung. Don't worry, it will heal itself."

Instead, she went to the hospital where [unspecified] surgery was performed to resolve the pneumothorax.

Three Important Lessons:

Do not needle GB 21 perpendicularly or deeply, especially in a tall thin person.

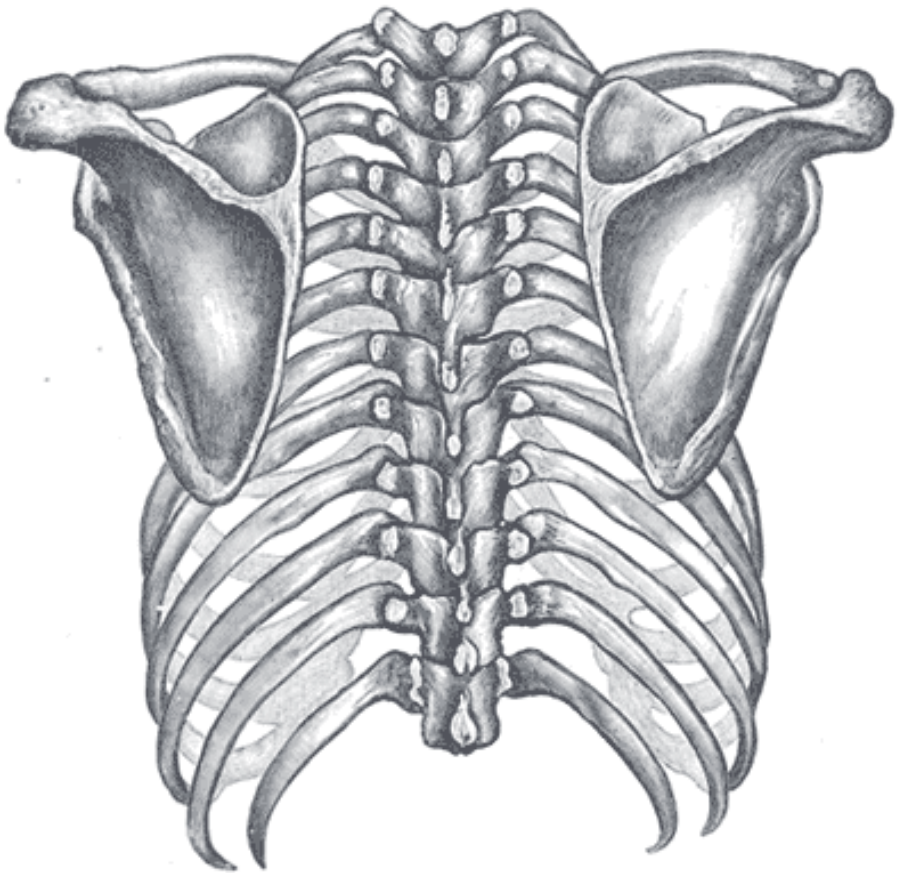
Do not "diagnose" a pneumothorax by yourself-- send the patient for immediate radiographic evaluation, and

Do not recommend treatment for a pneumothorax or make any assumptions about its harmless resolution.

EXERCISE # 4

Locate GB 21 on the following illustration.

Name the symptoms a patient might report immediately during or after a treatment that would be cause for referral to an emergency facility.



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Case Study # 5

In yet another case of pneumothorax caused by needling points of the upper posterior chest wall,[3] a 54-year old New Zealand woman

felt immediate and acute shortness of breath during an acupuncture treatment.

On returning home she felt a "tightness" in the right posterior apical area along with increasing shortness of breath and pain and called an ambulance. A partial pneumothorax in the right upper lung was revealed on X-ray and the trapped air was aspirated with a syringe.

Unfortunately, the following day the pneumothorax recurred and this time a chest tube successfully removed the trapped air.

The authors recommend that, despite the low incidence of pneumothorax, *all* patients should be advised of the risk of pneumothorax when needling the thoracic area.

Question: Do you advise your patients in writing of the risk of pneumothorax, no matter how small that risk is?

SUMMARY

From these case studies we can see that even a minor pneumothorax causes a great deal of pain, distress, and expense to a patient. The list of factors that can lead to pneumothorax include:

A patient with thin build or poorly developed thoracic musculature.

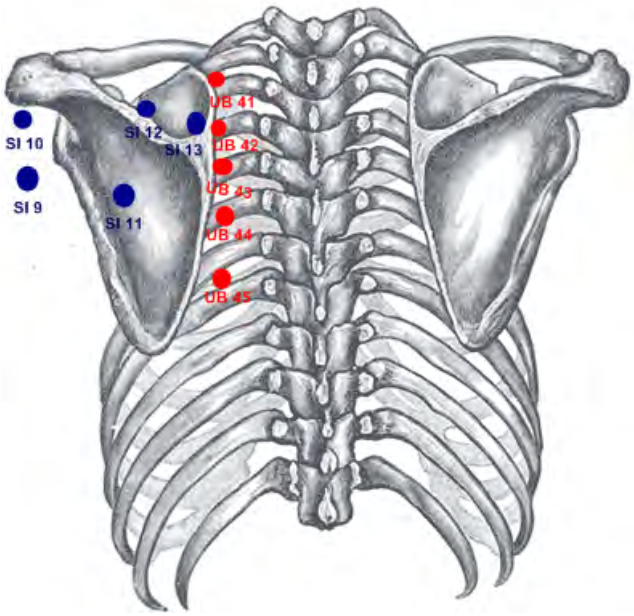
Needling too deeply or perpendicularly in points of the upper thoracic region. Points in this region should be needled *obliquely* and *towards the spine.*

Fainting or other movement by the patient.

Patient history of smoking, asthma, or use of steroid inhalers. A patient with underlying lung disease should also be treated with additional caution.

ANSWERS TO CASE STUDY EXERCISES

Case Study # 1:

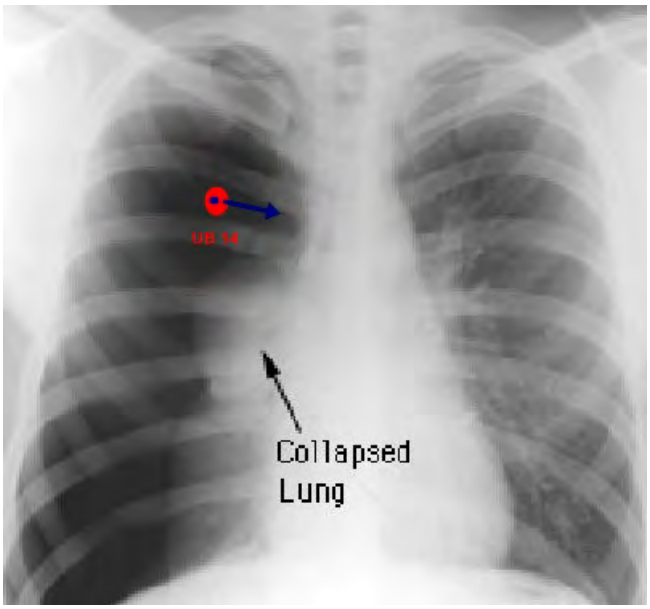


Bladder line points are marked in red. Small Intestine points are marked in blue.

Every one of the Bladder line points shown could potentially cause a pneumothorax if needled too deeply, being located directly over the lungs.

Not one of the Small Intestine points shown, properly located, can cause a pneumothorax, as they are all either outside of the chest wall or located directly on top of the scapula.

Case Study # 2



The red dot indicates the approximate location of U.B. 14.

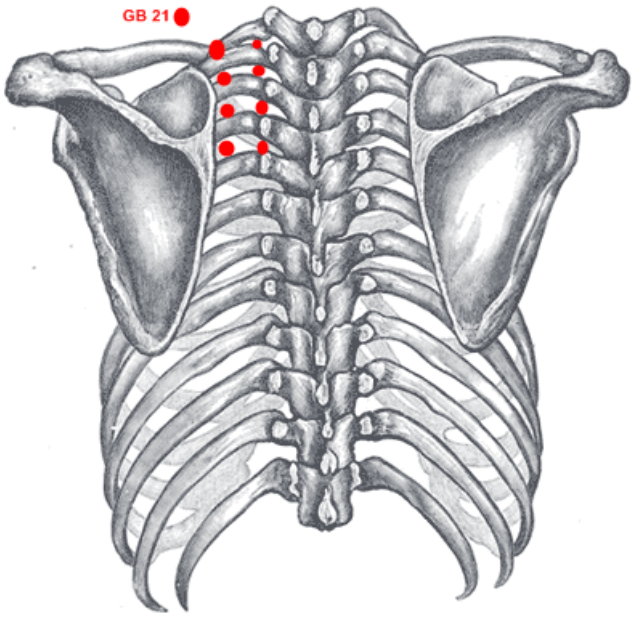
The blue dot in the center of U.B. 14 indicates a perpendicular needle insertion which provides a serious risk for pneumothorax.

The blue arrow indicates a needle insertion that is obliquely angled towards the spine, thereby greatly decreasing the risk of pneumothorax.

Case Study # 3

As in the above exercise: In the case of needling the inner Bladder line, the risk of pneumothorax would be reduced if needling were performed in a medial oblique direction, towards the spine.

Case Study # 4



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Approximate location of GB 21 along with inner and outer bladder points of the upper posterior thorax.

The following symptoms should be treated as signs of potential pneumothorax, especially if they are reported during or immediately after an acupuncture treatment involving points of the upper thoracic region:

Sudden severe chest pain or upper thoracic pain

Pain that worsens over time

Chest pain worse with or causing nonproductive cough

Sudden unexplained shortness of breath or difficulty breathing.

IX Points to Use With Caution

Pneumothorax due to acupuncture is rare. The pain, expense and potential complications of resultant medical intervention makes it imperative that all necessary precautions must be taken to prevent this adverse effect. Review of both the literature and the anatomy of the lungs and rib cage demonstrates that certain points must always be used with great caution. **Anterior and posterior acupuncture points in the upper chest from the apex of the lungs to the level of the fourth thoracic vertebra are the most vulnerable.**

Anterior Surface Points:

Points on the anterior surface of the body that can result in pneumothorax include the following:

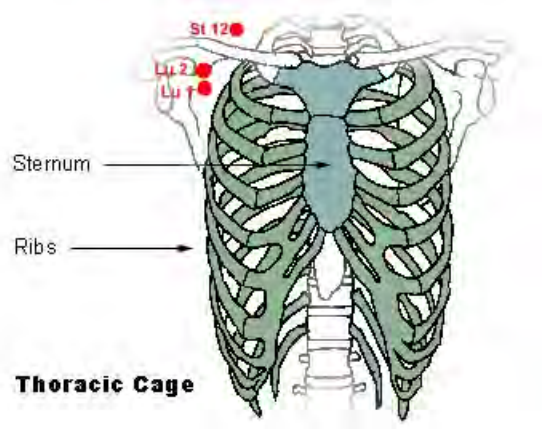
St 11: At the superior border of the sternal extremity of the clavicle, between the sternal head and clavicular head of the sternocleidomastoid muscle.

St 12: In the midpoint of the supraclavicular fossa; directly over apex.

Lu 1: Below the acromial extremity of the clavicle, 1 cun below Lu2, 6 cun lateral to the Ren channel.

Lu 2: In the depression below the acromial extremity of the clavicle, 6 cun lateral to the Ren channel.

When properly needled, these lung points are not directly over the rib cage. However, since one documented case of pneumothorax has been shown as a result of a patient rolling over onto Lung 1, these should be used with caution. Point location must be precise to avoid needling directly over the rib cage and the patient must be cautioned against movement.



Exercise: Continue to locate the following points on the above illustration, noting the closeness to the lungs in each point, particularly in a thin individual.

Stomach Meridian Points:

St 13: At the lower border of the middle of the clavicle, on the mammillary line.

St 14: In the 1st intercostal space, on the mammillary line.

St 15: In the 2nd intercostal space, on the mammillary line

St 16: In the 3rd intercostal space, on the mammillary line.

St 17: In the center of the nipple (not needled or moxa, for location purposes)

St 18: In the intercostal space, one rib below the nipple.

Kidney Meridian Points:

Kid 27: In the depression on the lower border of the clavicle, 2 cun lateral to the Ren channel.

Kid 26: In the 1st intercostal space, 2 cun lateral to the Ren channel.

Kid 25: In the 2nd intercostal space, 2 cun lateral to the Ren channel.

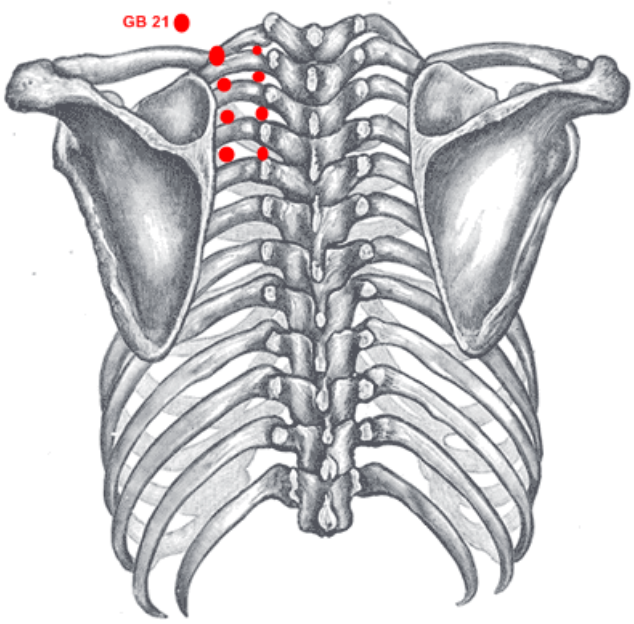
Kid 24: In the 3rd intercostal space, 2 cun lateral to the Ren channel.

Kid 23: In the 4th intercostal space, 2 cun lateral to the Ren channel.

NOTE: While none of the case studies above showed a pneumothorax due to needling of upper Kidney meridian points, these points must still be approached with caution due to their location.

Conception Vessel points located over the sternum are safe for needling.

Points on the Posterior Chest Wall



reproduction from Gray's anatomy, public domain

Looking at acupuncture points from the posterior chest wall. The inner Bladder lines are all located midway between the spinous process and the medial border of the scapula.

UB 11: 1.5 cun lateral to the lower border of the spinous process of the 1st thoracic vertebra, about 2 fingerbreadths from the Du channel.

UB 12: 1.5 cun lateral to the lower border of the spinous process of the 2nd thoracic vertebra.

UB 13: 1.5 cun lateral to the lower border of the spinous process of the 3rd thoracic vertebra

UB 14: 1.5 cun lateral to the lower border of the spinous process of the 4th thoracic vertebra

UB 15: 1.5 cun lateral to the lower border of the spinous process of the 5th thoracic vertebra.

The upper outer bladder line points are located near the medial border of the scapula.

The spaces between the 1st, 2nd, 3rd, and 4th ribs are the closest to the apices of the lungs.

UB 41: 3 cun lateral to the lower border of the spinous process of the 2nd thoracic vertebra, about 4 finger-breadths lateral to the midline of the vertebral column.

UB 42: 3 cun lateral to the lower border of the spinous process of the 3rd thoracic vertebra.

UB 43: 3 cun lateral to the lower border of the spinous process of the 4th thoracic vertebra

NOTE: Small Intestine points located over the scapula and Du channel points located directly over the thoracic vertebrae are safe for needling, as are the Jia Ji points.

How to Needle GB 21

By now it is apparent that GB 21 should be treated with exceptional caution for the following reasons:

Holmes Keikobad, MBBS, DPH (Ret.), Dipl. Ac., LAc notes the following peculiarities and precautions in needling GB 21:[1]

It is the highest point on the trapezius in the sagittal plane.

II. It sits astride on the very apex of the lung, which rises in a dome, bilaterally.

III. If an insertion is done using a perpendicular trajectory, an injury is likely.

IV. Any usage must factor in the rise of lung tissue at inspiration.

V. If the point is needled in any position but prone, the risk increases greatly.

VI. If the patient coughs or sneezes, the danger becomes manifold.

VII. In tall men and in smokers between the ages of 20-40, the risk of spontaneous pneumothorax is significant.

VIII. Constant supervision is necessary during treatment if this point is used.

IX. The risk of accident increases if the risk was not explained to the patient.

X. In a bony, thin man or woman the hazard increases greatly.

XI. In a person with concomitant scoliosis, lordosis and kyphosis, risk increases.

IMPROPER NEEDLING OF GB 21 ILLUSTRATED:

Note that a 2" needle is used for visual purposes only to emphasize needle angle. A short needle is appropriate and not the 2″ needle.

By now it should be readily apparent that any needling of GB 21 should be done with great caution because GB 21 sits astride the dome or apex of the lungs. In the above image, GB 21 is needled in a perpendicular fashion. Given the thin body frame of the subject, this leads us unacceptably close to the apex of the lungs. This danger becomes more pronounced with any movement, including coughing or sneezing.

1) The patient should in all cases be prone, in a comfortable face rest and instructed as to the need for absolute stillness. Needle the point at the end of expiration.

2) If you needle GB 21 perpendicularly, use **very shallow insertion**. Essentials of Chinese Acupuncture[8] recommends needling perpendicularly up to .5 inch. However we would find this depth to be an unacceptable risk for a patient of this size. **Any perpendicular needling of this point risks injury.**

3) **Safer Approach**: Needle GB 21 **at a posterior and oblique angle** to approximately .5 inch in depth.

4) **Safest of All**: Pinch up the skin while inserting the needle in a posterior and oblique angle so that the needle is sliding horizontally with no chance of slipping past the ribs. The patient is prone, relaxed, and cautioned against moving. The skin is pinched up between the fingers of one hand while the needle is inserted at a posterior angle, horizontal to the ribs and chest wall. The needle is inserted upon expiration when the lungs are still.

These steps can be generalized to working with any points on the chest wall to remove the risk of injury.

For Maximum Safety:

1) ALWAYS stress to the patient the need to remain still and relaxed. While this may seem so obvious as to not require stating, this practitioner has over 21 years in practice, had three patients get up off the table with needles in place and walk around despite being cautioned to remain still. One young woman got up off the table to answer her cell phone. *(I was profoundly grateful that in each case only points on the extremities had been used, and added a conspicuous sign in the treatment room to turn off all cell phones before treatment).*

2) ALWAYS be aware of underlying anatomy and the minimal distance between the vulnerable apices of the lungs and the body's surface.

3) NEVER puncture a point located over the lungs in perpendicular fashion.

4) ALWAYS use an angled, oblique insertion for points over the chest wall.

5) Pinching up the skin or muscle when needling over a vulnerable point, so that the needles slides in **horizontal to the ribs** ensures proper angle of needle placement.

6) Use caution when strongly stimulating points on the upper back or chest, whether by hand or with electrostimulation.

These same needling precautions should be used with any points located over the upper chest wall, whether the points are anterior or posterior.

SUMMARY:

Pneumothorax as a result of acupuncture is rare in the United States and even more rare among licensed acupuncturists.

A thorough knowledge of lung anatomy with an acute awareness of points located near the vulnerable apices of the lungs is essential to preventing an accident.

Young, thin, bony patients with a history of smoking or asthma are at higher risk for spontaneous pneumothorax.

Techniques for prevention of pneumothroax

Patient Education: Patients must be apprised of the risks of moving during a treatment.

Avoid the two most dangerous points: GB 21 and St 12.

Needling Technique: Points around the chest wall should always be needled in a shallow, oblique fashion. Best of all is pinching up the skin and sliding the needle so that it remains horizontal to the plane of the ribs to avoid slipping between the ribs.

Patient Observation: Patients who seem unable to remain still or who suffer coughing spells need to be closely supervised.

Knowledge of Pneumothorax symptoms: Any patient who develops sudden sharp chest pain, cough, shortness of breath, or drop in blood pressure during or immediately after a treatment involving vulnerable points should be immediately referred for radiographic evaluation. **Do not presume to diagnose a pneumothorax yourself.**

Endnotes

1) Keikobad. Acupuncture Today. June, 2004, Vol. 05, Issue 06

2) White A. A cumulative review of the range and incidence of significant adverse events associated with acupuncture. .Acupunct Med 2004;22(3):122-33.

3) Brian Kennedy, Lutz Beckert, A case of acupuncture-induced pneumothorax. NZMJ 13 August 2010, Vol 123 No 1320; ISSN 1175 8716

4) Ryan J. Chauffe, BS; Ann L. Duskin, BS, BA. Pneumothorax Secondary to Acupuncture Therapy South Med J. 2006;99(11):1297-1299. © 2006 Lippincott Williams & Wilkins

5) Thye K. Leow, MB (MD). Pneumothorax Using Bladder 14. Medical Acupuncture. 2001; Volume 16 #2.

6) Jatinder K Juss, Catherine A Speed, Jayne Warrington, Ravi Mahadeva. Acupuncture Induced Pneumothorax- A Case Report. Acupuncture in Medicine Journal of the British Medical Acupuncture Society (2008) Volume: 26, Issue:3, Pages 193-196 PubMed: 18818566

7) Harris, Dorla Anne. A Rare Risk with Acupuncture. March 2008. Natural Medicine @ Suite 101. http://www.suite101.com/content/accupuncture-a48558

8) Essentials of Chinese Acupuncture, Foreign Languages Press, Beijing, 1980, pp237-38

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