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Safety In Acupuncture Pneumothorax Prevention #2

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Pneumothorax

Do not needle deeply over the lungs. Puncturing of the lungs causes pneumothorax, a collapsed or partially collapsed lung wherein there is air or gas in the pleural space. Accidental needling through the lung is iatrogenic pneumothorax, caused by a medical examination or procedure. This may be due to a biopsy or improper acupuncture needling technique.

Onset of pneumothorax is marked by sudden sharp chest pain, shortness of breath and an unproductive cough. Low blood pressure accompanied by more severe symptoms may also occur such as upper back pain, exhaustion and the patient may turn blue due to low oxygen levels. Mild pneumothorax may resolve without medical intervention. However, the only correct protocol if there is a pneumothorax is to make sure the patient is brought to an emergency medical facility immediately. Pneumothorax is a medical emergency. Severe cases may require surgery. Positive diagnosis is confirmed by X-Ray, CT scan or evaluation of arterial blood gases.

There are many points in common acupuncture practice that must be needled carefully to avoid pneumothorax. These points include the following:

- LU1, LU2
- ST11, ST12, ST13 ,ST14, ST15, ST16, ST17, ST18
- UB11, UB12, UB13, UB14, UB15, UB41, UB42, UB43, UB44, UB45
- KI23, KI24, KI25, KI26, KI27
- GB21

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.

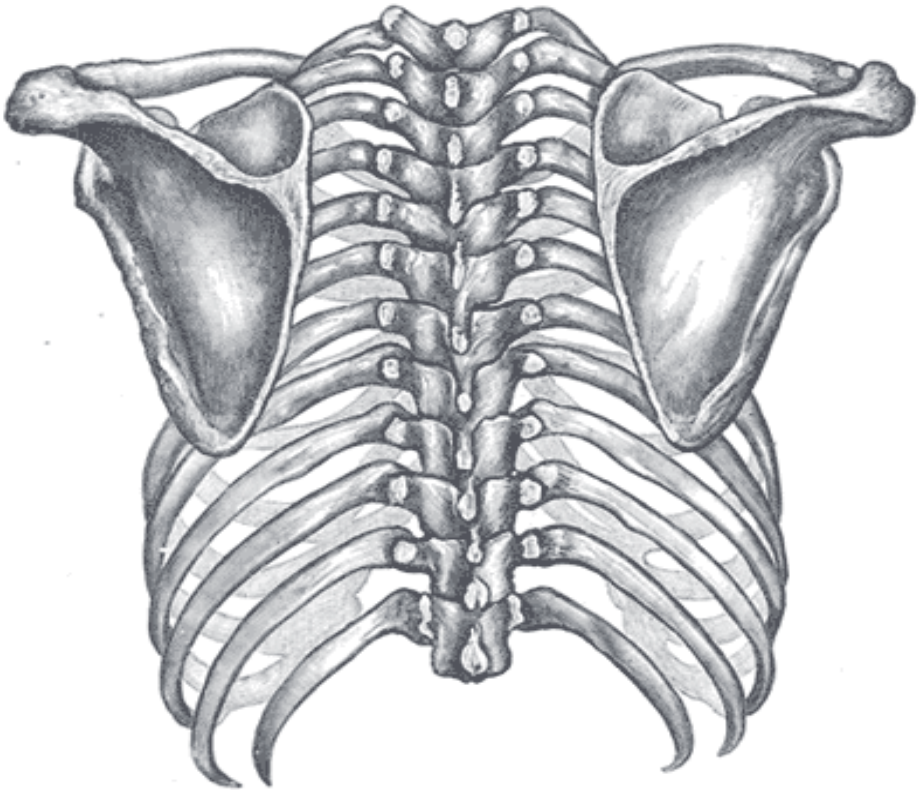
When her symptoms of chest pain, shortness of breath, and dry unproductive cough gradually worsened; she reported back to the emergency room after 36 hours. A chest tube attached to suction was inserted into the fourth intercostal space to remove the trapped air and to "pull" the lung back into a fully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

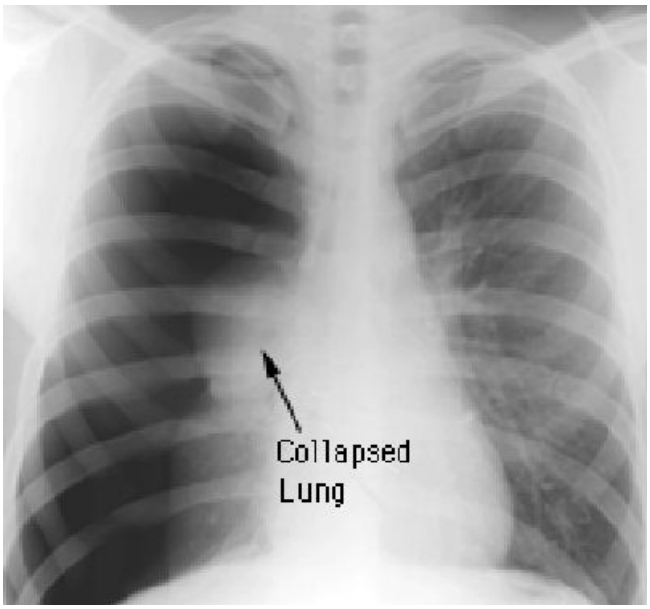
This case study from *Medical Acupuncture* describes a case of pneumothorax using Bladder 14.[5]

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.

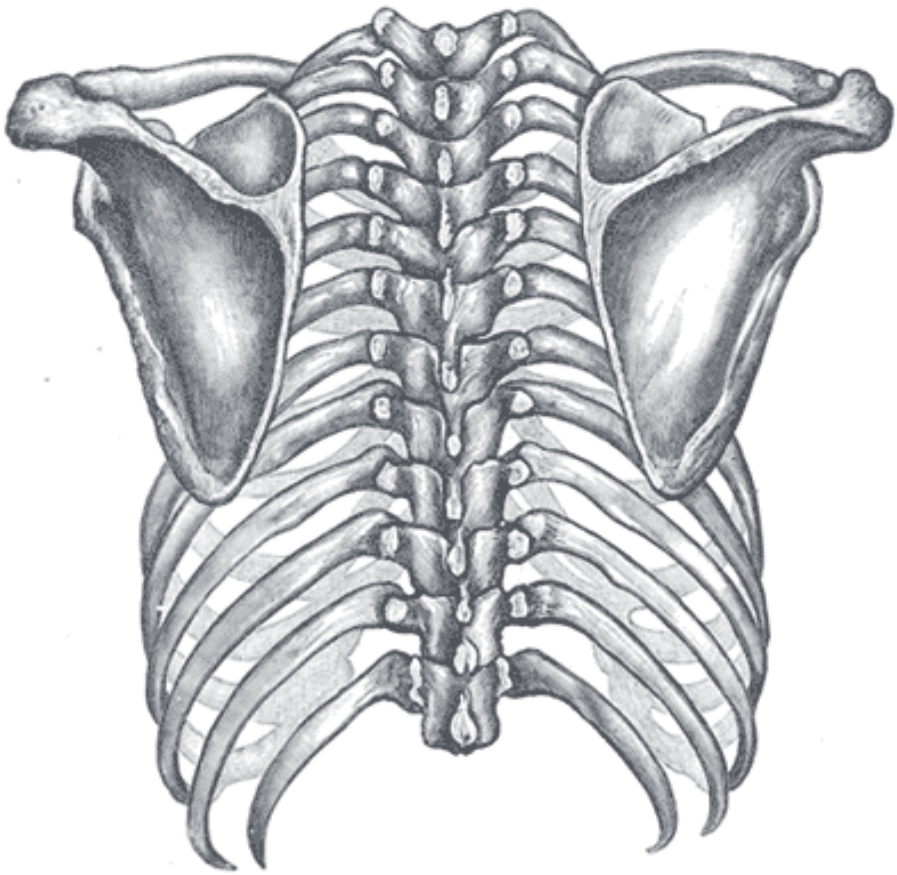
Do not "diagnose" a pneumothorax by yourself-- send the patient for immediate radiographic evaluation, and

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.

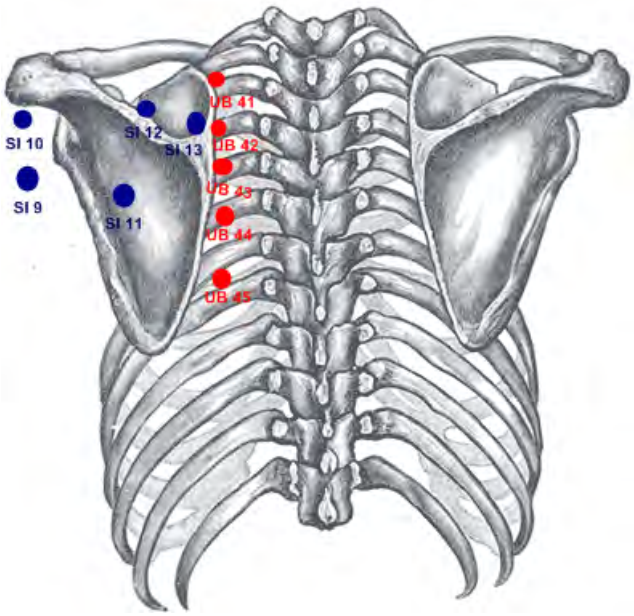
Needling too deeply or perpendicularly in points of the upper thoracic region. Points in this region should be needled *obliquely* and *towards the spine.*

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:

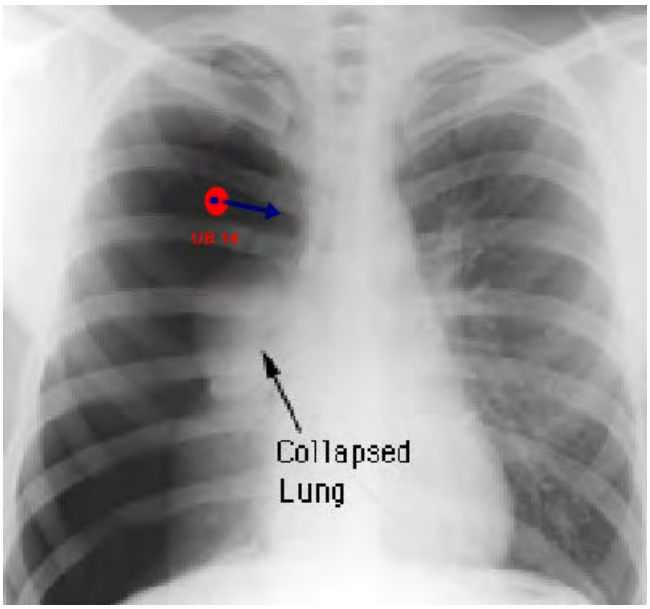


Bladder line points are marked in red. Small Intestine points are marked in blue.

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.

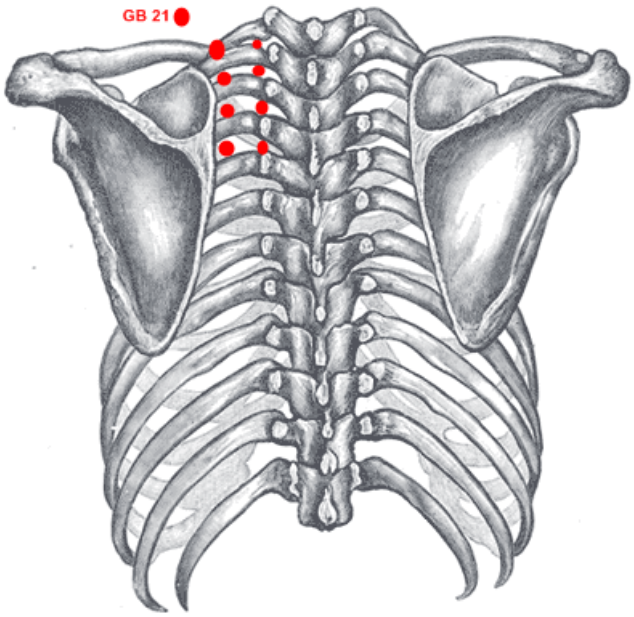
The blue dot in the center of UB14 (BL14) indicates a perpendicular needle insertion which provides a serious risk for pneumothorax.

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 non-productive 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:

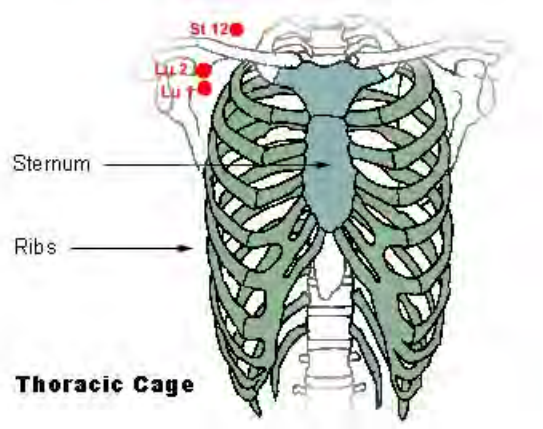
St 11: At the superior border of the sternal extremity of the clavicle, between the sternal head and clavicular head of the sternocleidomastoid muscle.

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.

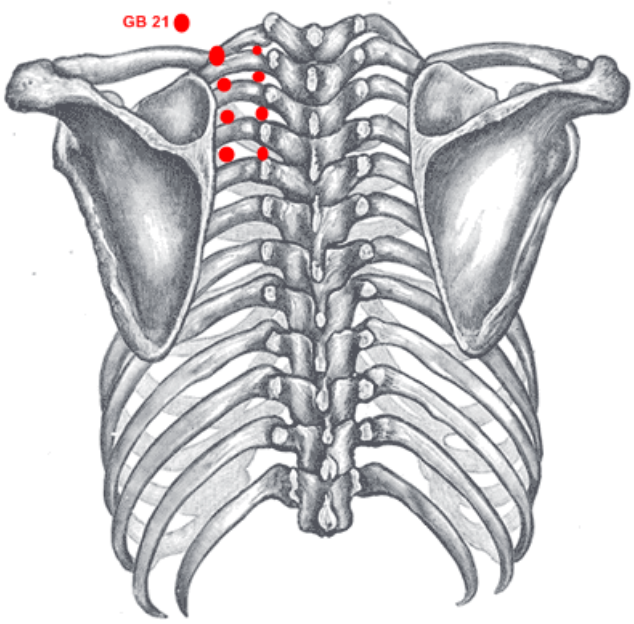
Kid 24: In the 3rd intercostal space, 2 cun lateral to the Ren channel.

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



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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.

Prevention of pneumothorax

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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