

RESPIRATORY • EMERGENCY • TRAUMA

Tension Pneumothorax

A life-threatening respiratory and cardiovascular emergency. Air trapped in the pleural space collapses the lung and shifts the mediastinum — diagnose clinically, decompress immediately.

△ CLINICAL DIAGNOSIS • DO NOT WAIT FOR CHEST X-RAY • NEEDLE DECOMPRESS NOW △

SOURCE DISCLOSURE

This topic is *not* present in Diane's uploaded reference notes. Content has been compiled from external NCLEX-aligned sources: SAUNDERS COMPREHENSIVE REVIEW FOR THE NCLEX-RN EXAMINATION (2026)

, ATI ADULT MEDICAL-SURGICAL NURSING

, LIPPINCOTT MANUAL OF NURSING PRACTICE

, ATLS GUIDELINES (10TH ED., 2018+)

, and current AACN critical care standards.

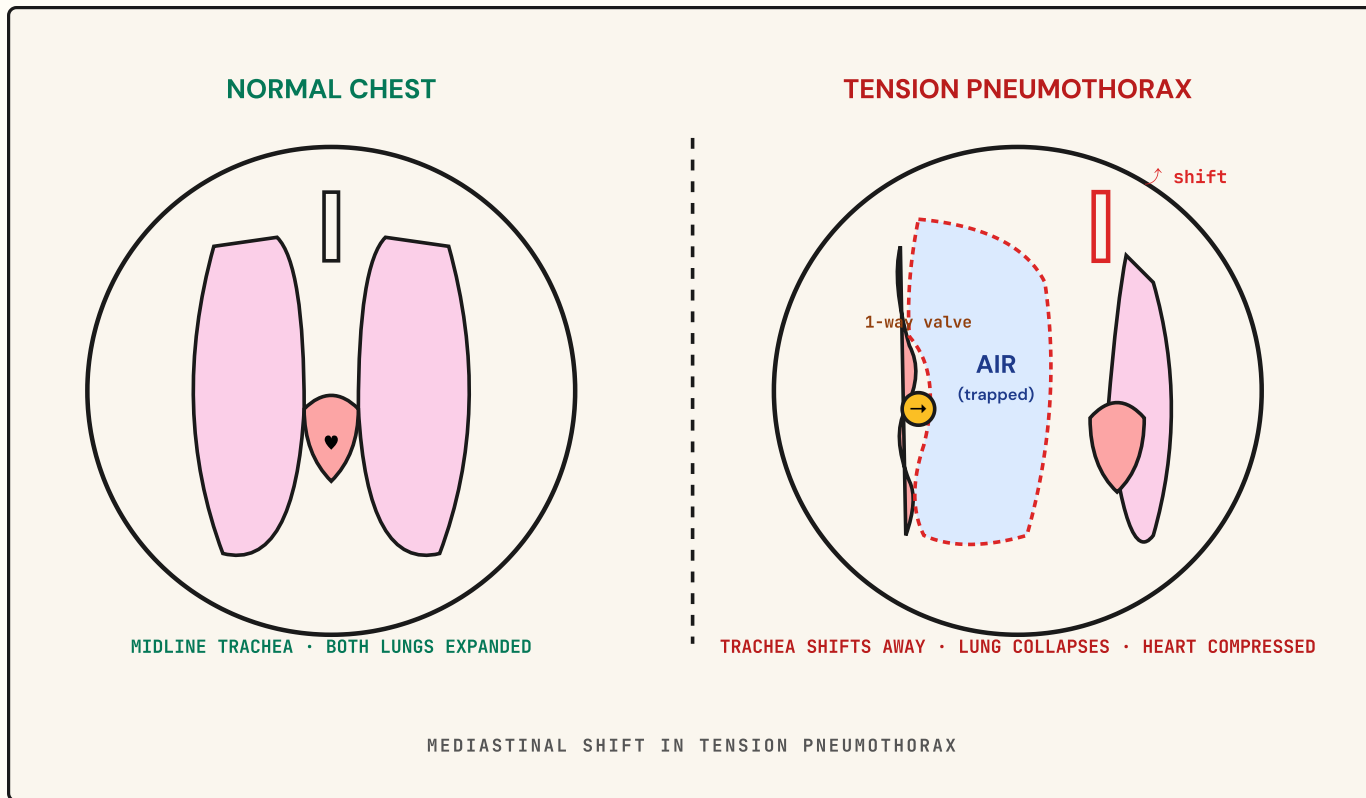
1 Definition & Overview

- ▶ Air enters the pleural space through a **one-way valve** mechanism — air goes *in* with each breath but *cannot escape*.
- ▶ Intrapleural pressure rises progressively, **collapsing the affected lung** and pushing the **mediastinum (heart, great vessels, trachea) toward the unaffected side**.
- ▶ Compression of the vena cava drops venous return → **obstructive shock** → cardiac arrest if untreated.
- ▶ **Tension pneumothorax is a clinical diagnosis** — recognize and treat *before* imaging confirmation.

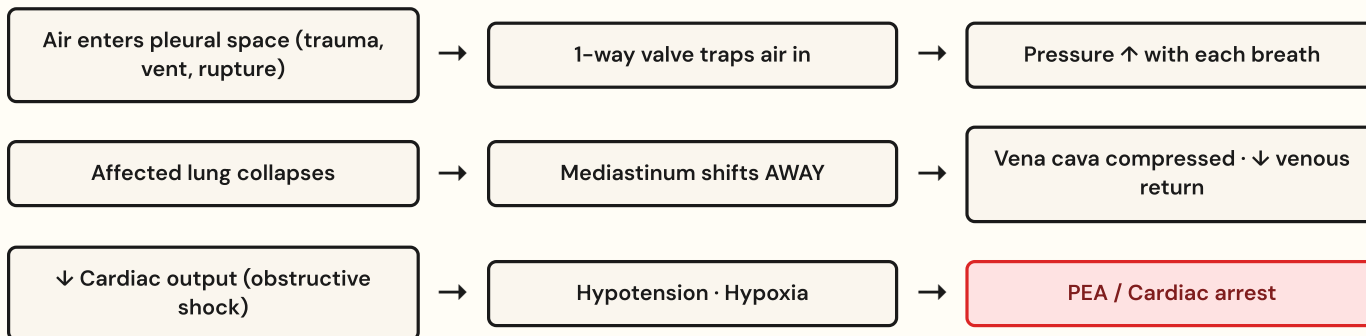
Why it matters: Unlike a simple pneumothorax (lung collapse without tension), the pressure in tension pneumothorax compresses both the affected lung *and* the heart — making this both a respiratory *and* a cardiovascular emergency.

2

Pathophysiology



The Cascade:



Common Causes:

TRAUMATIC

- Blunt chest trauma (MVA)
- Penetrating wound (stab/GSW)
- Rib fractures puncturing pleura

IATROGENIC

- Mechanical ventilation (barotrauma — high PEEP/PIP)
- Central line insertion (subclavian)
- Thoracentesis / lung biopsy
- CPR (chest compressions)

SPONTANEOUS

- Ruptured bleb (tall, thin young males)
- COPD / emphysema bullae
- Severe asthma exacerbation
- Cystic fibrosis, TB

3

Signs & Symptoms

EARLY — RECOGNIZE

Compensating

- Sudden, sharp **pleuritic chest pain** (affected side)
- Dyspnea, tachypnea (RR > 24)
- Tachycardia (HR > 100)
- Anxiety, restlessness, agitation
- ↓ breath sounds on affected side
- **Hyperresonance** to percussion (affected side)
- ↓ chest wall movement on affected side
- Cough (may be dry)

LATE — DECOMPENSATING

Red Flag Findings 🚨

- **Tracheal deviation AWAY** from affected side
- **JVD** (jugular venous distention)
- **Hypotension** (obstructive shock)
- Cyanosis (lips, fingertips)
- **Absent** breath sounds on affected side
- Subcutaneous emphysema (*crepitus* — "Rice Krispies")
- SpO₂ < 90%, severe hypoxia
- ↓ LOC, confusion
- PEA, cardiac arrest

🚨 **HARD STOP** — Three findings = call for immediate decompression: Tracheal deviation + Absent breath sounds + Hypotension. Do not wait for imaging.

Direction matters: Trachea deviates **AWAY** from the affected side (pressure pushes it). On the affected side, expect ↓/absent breath sounds **AND** hyperresonance (air, not fluid).

4 Priority Nursing Interventions

A

AIRWAY

- ▶ Assess patency — is the airway open?
- ▶ Anticipate intubation if LOC ↓
- ▶ Position upright if hemodynamically stable

B

BREATHING

- ▶ **High-flow O₂** via non-rebreather (100%)
- ▶ Prepare for **NEEDLE DECOMPRESSION** (emergent)
- ▶ Assist with **chest tube** insertion (definitive)
- ▶ Continuous SpO₂, ABG
- ▶ If on vent: notify provider — reduce PEEP

C

CIRCULATION

- ▶ Continuous cardiac monitor (watch for PEA)
- ▶ 2 large-bore IVs (16–18 ga)
- ▶ IV fluids for hypotension
- ▶ VS q5–15 min until stable
- ▶ Notify Rapid Response / HCP STAT

Needle Decompression — Emergency Procedure

ELEMENT	DETAIL
Site (Classic)	2nd intercostal space, midclavicular line on the affected side, just over the top of the 3rd rib (avoids the neurovascular bundle)
Site (Updated ATLS 2018+)	4th–5th intercostal space, anterior axillary line in adults (better chest wall depth penetration; lower failure rate)
Needle	14- to 16-gauge over-the-needle catheter, ≥ 8 cm length
Confirmation	Audible rush of air , improvement in hemodynamics & SpO ₂
After	Chest tube is definitive — needle decompression is only a temporizing bridge to chest tube insertion (typically 4th–5th ICS, midaxillary line)

Chest Tube Drainage System — Key Nursing Care

SITUATION	NURSING ACTION
Tube falls out	Cover with sterile petroleum (Vaseline) gauze , taped on 3 sides only (creates one-way valve — air escapes, none re-enters). Call HCP STAT.
Tube disconnects from drainage	Place the end in a bottle of sterile water (water seal) . Do NOT clamp. Notify HCP.

SITUATION	NURSING ACTION
Tidaling (water-seal chamber moves with breath)	EXPECTED — confirms patency. Lost tidaling = tube blocked OR lung re-expanded.
Continuous bubbling in water-seal chamber	ABNORMAL = air leak. Locate by briefly clamping closer to patient stepwise.
Bubbling in suction-control chamber	NORMAL (gentle, continuous) — confirms working suction.
Drainage > 100 mL/hr (or > 200 mL/hr per most current guidelines)	Notify HCP — possible hemorrhage.
Drainage system position	Always below chest level (prevents backflow). Never raise above the patient.
Clamping	Do NOT clamp a chest tube on a patient — risks creating tension pneumothorax. Only clamp briefly to change drainage unit or per HCP order.

5 Pharmacology

DRUG / CLASS	PURPOSE / MECHANISM	NURSING CONSIDERATIONS
Oxygen (Respiratory support)	↑ PaO ₂ ; speeds reabsorption of pleural air	High-flow non-rebreather initially. Titrate to SpO ₂ ≥ 94% (88–92% in COPD).
Morphine / Fentanyl (Opioid analgesics)	Pain control; ↓ respiratory effort (good for splinting from pain)	Watch for respiratory depression, hypotension. Have naloxone (Narcan) available. Monitor RR & LOC.
Lidocaine 1% (Local anesthetic)	Numbs site before chest tube insertion	Confirm allergy. Check max dose (4.5 mg/kg).
Midazolam / Propofol (Sedation)	Procedural sedation; sedation for mechanical ventilation	Continuous cardiopulmonary monitoring. Propofol: monitor triglycerides; "milky" infusion — never co-infuse with other meds.
Antibiotics (Per traumatic/open cause)	Prophylaxis for traumatic/open pneumothorax (typically 1st-gen cephalosporin)	Check allergies, give on schedule, monitor for reaction.
Tetanus toxoid / Td	If traumatic cause & last dose > 5 yr	Verify immunization status.
IV crystalloids (0.9% NS or LR)	BP support for obstructive shock — but definitive fix is decompression	Monitor for fluid overload, especially in elderly/CHF.

Pharm priority: No drug treats tension pneumothorax — the cure is **decompression**. Oxygen + analgesia + IV access are supportive only.

6

NCLEX Test Traps

✗ COMMON WRONG ANSWER

"Get a STAT chest X-ray to confirm before treating."

✓ CORRECT PRIORITY

Tension pneumothorax is a **clinical diagnosis**.
Decompress first; image later. Waiting kills.

✗ TRAP

"Trachea deviates *toward* the affected side."

✓ RIGHT

Trachea deviates **AWAY from affected side** in tension pneumothorax. (It only deviates toward in atelectasis / lobar collapse.)

✗ TRAP

"Clamp the chest tube before transport."

✓ RIGHT

Never clamp a chest tube — risks creating tension.
Keep drainage below chest, keep moving.

✗ TRAP

"Tube fell out — cover with sterile gauze and tape all 4 sides."

✓ RIGHT

Petroleum gauze, taped on 3 sides only. The open side acts as a flutter/one-way valve so air escapes without re-entering.

✗ TRAP

"Continuous bubbling in the water-seal chamber is normal."

✓ RIGHT

Continuous bubbling in the **water-seal** chamber = **air leak**. Continuous bubbling in the **suction-control** chamber is what's normal.

✗ TRAP

"Lost tidaling means the system is broken."

✓ RIGHT

Lost tidaling can mean **lung re-expanded** (good!) OR tube is **kinked/clogged**. Assess the patient first.

✗ TRAP

"Hyperresonance + dullness — same side."

✓ RIGHT

Tension pneumothorax = **hyperresonance** (air).
Hemothorax / pleural effusion = **dullness** (fluid). Don't confuse them.

✗ TRAP

"Patient on mechanical ventilation became hypotensive — give a fluid bolus and reassess in 30 min."

✓ RIGHT

In a ventilated patient, sudden hypotension + ↓ SpO₂ + ↑ peak airway pressures = **suspect tension pneumothorax**. Notify provider STAT — fluids won't fix obstructive shock.

7 Patient & Family Education

Activity restrictions: Avoid heavy lifting, straining, and strenuous activity for ~6 weeks after recovery.

Scuba diving: Permanent restriction after spontaneous pneumothorax — pressure changes can cause re-rupture.

Warning signs to report: Sudden chest pain, shortness of breath, fever, chest tube site redness/drainage, or worsening cough.

Wound/site care: Keep chest tube site clean & dry after removal; watch for signs of infection.

Air travel: Avoid flying for at least 2–3 weeks after lung re-expansion (cabin pressure changes can trigger recurrence).

Smoking cessation: Smoking increases recurrence risk significantly. Refer to cessation programs.

Deep breathing & incentive spirometry: Practice 10× per hour while awake — promotes full lung re-expansion.

Follow-up imaging: Repeat chest X-ray as ordered to confirm lung remains expanded.

8

Memory Boosters & Mnemonics



"TENSION" — Red-Flag Findings

T

Tracheal deviation AWAY from affected side

E

Engorged jugular veins (JVD)

N

No breath sounds on affected side

S

Shock (hypotension, obstructive)

I

Increased HR & RR (tachycardia, tachypnea)

O

Oxygen saturation drops · cyanosis

N

"NOW" — needle decompress immediately



"PNEUMO" — Quick Recognition

P

Pain — sudden, sharp, pleuritic, affected side

N

No breath sounds on affected side

E

Elevated HR & RR

U

Uneven chest rise (affected side lags)

M

Mediastinal shift (trachea deviates AWAY)

O

Oxygen + decompression — STAT

Quick Pattern Recognition

"Push AWAY" rule

Tension **PUSHES** the trachea **AWAY** from the affected side. Atelectasis **PULLS** the trachea **TOWARD** the collapsed side.

Sound rule

AIR = hyperresonant (drum). **FLUID** = dull (thud).
Pneumothorax → hyperresonance.
Hemothorax/effusion → dullness.

Tape rule (dislodged chest tube)

3 sides taped = one-way valve, air escapes, none re-enters. **4 sides sealed** = re-traps air → tension worsens.

Chamber rule

Continuous bubbling in **water seal** = **BAD** (air leak).
Continuous bubbling in **suction control** = **GOOD** (working).

9 NCJMM Clinical Judgment Scenario

Scenario: A 22-year-old male is admitted to the trauma bay after a motorcycle collision. He is alert but anxious, complaining of severe right-sided chest pain. RR 32, HR 128, BP 92/58, SpO₂ 87% on room air. You note diminished breath sounds on the right and the trachea appears slightly deviated to the left.

STEP 1 • RECOGNIZE CUES

What stands out?

Trauma mechanism + unilateral diminished breath sounds + tracheal deviation away + hypotension + hypoxia + tachypnea + tachycardia. Subjective cue: severe pleuritic chest pain & anxiety. **Classic tension pneumothorax cluster.**

STEP 2 • ANALYZE CUES

What do they mean together?

The cues cluster around a single problem: air is trapped in the right pleural space under pressure. The mediastinal shift (trachea to the left) and hypotension indicate that the heart and great vessels are already being compressed — this is decompensating obstructive shock, not a simple pneumothorax.

STEP 3 • PRIORITIZE HYPOTHESES

Most likely / most dangerous

#1 Tension pneumothorax (most likely, immediately life-threatening). Differential to keep in mind: hemothorax (would expect *dullness*, not deviation), cardiac tamponade (Beck's triad: hypotension + JVD + muffled heart sounds — without lung findings), flail chest, massive PE. **Treat the worst-case clinically** — don't wait for imaging.

STEP 4 • GENERATE SOLUTIONS

Plan of action

Call rapid response/trauma surgeon STAT. **Apply 100% O₂ via non-rebreather.** Establish two large-bore IVs. Place on continuous cardiac & SpO₂ monitor. Prepare equipment for **needle decompression** (14-ga, ≥ 8 cm catheter; 2nd ICS midclavicular OR 4th–5th ICS anterior axillary) and a **chest tube tray** for definitive management. Notify radiology for portable CXR *after* decompression.

STEP 5 • TAKE ACTION

Implement

Apply O₂ and establish IV access immediately. Assist the provider with needle decompression on the right side — listen for the rush of air, watch for rapid improvement in SpO₂ and BP. Hand off to surgical team for chest tube placement; secure chest tube to drainage system below chest level. Reassess vital signs every 5 minutes during the acute phase.

STEP 6 • EVALUATE OUTCOMES

Did it work?

Effective response: SpO₂ rises to $\geq 94\%$, BP normalizes, HR drops, breath sounds return on right, trachea returns to midline, tidaling appears in the water-seal chamber. **Ineffective:** persistent hypotension, ongoing tracheal deviation, or absent tidaling/continuous bubbling — reassess for chest tube malposition, persistent air leak, or hemothorax. Continue serial CXRs and monitor for re-expansion pulmonary edema.

Diane's NGN NCLEX 2026 Visual Study Library

Topic: Tension Pneumothorax • Respiratory / Emergency / Trauma Cluster