

From Tackle to Tension Pneumothorax

by

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Matt is a 22-year-old Caucasian male, a resident of Dallas, Texas, who came to the emergency department (ED) complaining of severe pain over his right chest area along with shortness of breath. He was injured during a college football game. He stated that he was tackled from the front and the side by multiple opponents. After the tackle, he was immediately short of breath and felt a sharp pain in the area of his right chest. Matt was transferred by ambulance to a local hospital, with paramedics administering oxygen at 12 L/min via a non-rebreather mask. He also received a nebulized albuterol treatment. Along with oxygen administration and breathing treatments, an 18-gauge IV catheter was placed in his left forearm. Upon arrival at the hospital, the following medical history was gathered from the nurse. While obtaining the medical history, the nurse took Matt's vital signs and began a physical assessment.

Medical History

- Childhood-onset atopic asthma.
 - Uses two metered-dose inhalers (Symbicort and Serevent), twice daily. Also uses an albuterol metered-dose inhaler when necessary.
- Previous diagnosis of moderate obstructive airway disease with marked bronchodilator response.
- His father died of an asthma exacerbation at age 50 a few years ago.
- All immunizations are up-to-date, albeit no tetanus shot.
- He has no smoking history, but does occasionally use marijuana brownies recreationally.
- Drinks alcohol a few times a month, usually during the weekend.
- He has no known drug allergies, but he avoids aspirin and aspirin-related medications.
- Other history was unremarkable.

Vital Signs

Table 1. Vital Signs

<i>Objective Data</i>	<i>Vital Signs</i>	<i>Normal Values</i>
Blood Pressure	90/50 mmHg	120/80 mmHg
Heart Rate	140 bpm	60–100 bpm
Respiratory Rate	36 breaths per minute	12–18 breaths per minute
SpO ₂	90%	> 95% on (21%) FiO ₂
Body Temperature	36.5 °C	36.1–37.2 °C
Body Mass Index	29.8 kg/m ²	18.5–24.9 kg/m ²
Height	6 ft	5 ft 8 in – 6 ft
Weight	220 lb	165 lb – 180 lb

Physical Assessment

Matt presents oriented to time, place, and location, but appears anxious and agitated. He also claims an 8/10 sharp right chest pain. Pupils are equal, round, and reactive to light and accommodation at 5 mm bilaterally. His skin is pale with cyanosis noted around the lips despite the supplemental oxygen. The right chest wall has scattered ecchymosis from his sternum to axillary region. Auscultation of the lungs sound diminished on the right with wheezing on the left side of his thorax. A murmur over his pulmonic valve is noted. Palpitation of the chest wall demonstrates subcutaneous emphysema on the right side of his neck and tympanic hyperresonance with percussion over the right chest wall. Pulses are present in all four extremities that are weak and rapid with a delayed capillary refill of three seconds. While performing a physical assessment, a lab technician obtains blood samples from arterial and venous sources to be sent to the lab.

Data

Table 2. Laboratory Data: Arterial and venous blood laboratory values.

	Matt's Lab Results	Normal Values
<i>ABG values (below):</i>		
ABG pH	7.30	7.35–7.45
PaCO ₂	50 mm Hg	35–45 mm Hg
PaO ₂	60 mm Hg	80–100 mmHg (21% FiO ₂)
FiO ₂	80% FiO ₂ with NRB at 12 L/min	21% FiO ₂ (Room Air)
<i>Venous Values (below):</i>		
Electrolytes: K ⁺ , Cl ⁻ , Na ⁺ , HCO ₃ ⁻	K ⁺ 4.0 mEq/L Cl ⁻ 100 mEq/L Na ⁺ 140 mEq/L HCO ₃ ⁻ 24 mEq/L	K ⁺ (3.5–5.0 mEq/L) Cl ⁻ (95–105 mEq/L) Na ⁺ (135–145 mEq/L) HCO ₃ ⁻ (22–26 mEq/L)
Complete blood count (CBC) (RBCs, WBCs with differential, platelets, hemoglobin, hematocrit)	Within normal limits (WNL)	Hemoglobin (12–16 gm/dL) Hematocrit (40–50%) Platelets (150–350,000 cells/mcL) WBC (5,000–10,000 cells/mcL)

Table 3. Diagnostic Data

12-Lead EKG	Sinus tachycardia with left axis deviation and right ventricular strain pattern.
Chest X-Ray	Large right pneumothorax with left tracheal deviation. Fifth and sixth right-sided rib fractures.

Diagnosis

The ED physician diagnosed Matt with tension pneumothorax with consequential hypotension and acute respiratory acidosis with partially compensated hypoxemia.

Care Plan

- Continue oxygen titration to maintain oxygen saturation greater than 95% with non-rebreather mask.
- Administer a procedural IV fentanyl 50 mcg bolus, continuous 0.9% NS at 125 mL/hr, and 1% lidocaine locally to prepare for chest tube insertion.
- Insert a 20 French chest tube at the right midaxillary line at the level of the 4th intercostal space and connect to suction at -20 cm H₂O.

