MODULE D

1. COMPLIANCE CASE STUDIES

a. Adam Johnson is a 32 year old male who is hospitalized in the SICU following a gunshot wound to the abdomen. He on the Bennett 7200 ventilator, with the following settings
V_t: 850 ml
f: 12/min
FIO_2: .40
PEEP: 0
PIP: 40 cm H_2O
Plateau Pressure 35 cm H_2O

i. What is his Static Effective Compliance (SEC)?

$$C_{STATIC} = \frac{.850L}{35 - 0\ cm\ H_2O} = 0.024\ L/cm\ H_2O$$

ii. What is the normal SEC?
50 TO 170 mL/cm H_2O (ROUGHLY ABOUT 100 mL/cm H_2O

iii. What is his dynamic compliance?

$$C_{DYNAMIC} = \frac{.850L}{40 - 0\ cm\ H_2O} = 0.021 L/cm\ H_2O$$

iv. What is the normal dynamic compliance?
50 TO 80 mL/cm H_2O – ALTHOUGH THIS IS A VALUE THAT IS RARELY EVALUATED.

b. Twenty-four hours later, Mr. Johnson's ventilatory settings are as follows:
V_t: 900 ml
f: 12/min
FIO_2: .50
PEEP; 10 cm H_2O
PIP: 65 cm H_2O
Plateau Pressure: 55 cm H_2O

i. What is his SEC?

$$C_{STATIC} = \frac{.900L}{55 - 10\ cm\ H_2O} = 0.020\ L/cm\ H_2O$$

ii. What is his dynamic compliance?

$$C_{DYNAMIC} = \frac{.900L}{65 - 10\ cm\ H_2O} = 0.016\ L/cm\ H_2O$$

iii. What does this tell you about his lungs? **THEY ARE STIFF.**

c. Ellen Smith is a 72 year-old female who is in the Thoracic ICU following coronary artery bypass surgery. She has a history of asthma. Her ventilator settings are as follows:
V_t: 800 ml
f: 10/min
FIO_2: .40
PEEP: 0
PIP: 25 cm H_2O
Plateau Pressure: 20 cm H_2O

i. What is her SEC?

$$C_{STATIC} = \frac{.800L}{20 - 0\ cm\ H_2O} = 0.040\ L/cm\ H_2O$$

ii. What is her dynamic compliance

$$C_{DYNAMIC} = \frac{.800L}{25 - 0\ cm\ H_2O} = 0.032\ L/cm\ H_2O$$

Twelve hours later you notice Ms. Smith's high pressure alarm sounding frequently. Her ventilator settings are:
V_t: 800 ml
f: 10/min
FIO_2: .40
PEEP: 0
PIP: 40 cm H_2O
Plateau Pressure: 20 cm H_2O

iii. What is her SEC?

$$C_{STATIC} = \frac{.800L}{20 - 0\ cm\ H_2O} = 0.040\ L/cm\ H_2O$$

iv. What is her dyanmic compliance?

$$C_{DYNAMIC} = \frac{.800L}{40 - 0\ cm\ H_2O} = 0.020\ L/cm\ H_2O$$

v. What is the likely cause? What therapy is indicated?
ACUTE BRONCHOSPASM. TREAT WITH β_2-AGONIST AND STEROID THERAPY.

d. David Strong is a 21 year-old male who is in the MICU with a drug overdose. His ventilator settings are:
V_t: 800 ml
f: 10/min
FIO_2: .40
PEEP: 0
PIP: 40 cm H_2O
Plateau Pressure: 20 cm H_2O

i. What is his SEC?

$$C_{STATIC} = \frac{.800L}{20 - 0\ cm\ H_2O} = 0.040\ L/cm\ H_2O$$

ii. What does this tell us about his lungs?
NORMAL LUNGS – INTUBATED & MECHANICALLY VENTILATED PATIENTS WILL HAVE AN EXPECTED LUNG COMPLIANCE OF 40 TO 50 mL/cm H_2O IN MALES AND 35 TO 45 mL/cm H_2O IN FEMALES

Twenty-four hours later his CXR shows evidence of aspiration pneumonia. His ventilator settings are:

V_t: 1,200 ml
f: 12/min
FIO_2: .35
PEEP: 0
PIP: 50 cm H_2O
Plateau Pressure: 45 cm H_2O

iii. What is his SEC?

$$C_{STATIC} = \frac{1.200L}{45 - 0\ cm\ H_2O} = 0.027\ L/cm\ H_2O$$

iv. What does this tell us about his lungs?
THEY ARE STIFF.