Evaluation of the Dyspneic Patient

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B. Celli Disclaimer
No stocks or ownership in any company.
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Definition

• Dyspnea, shortness of breath (SOB), or air hunger, is the subjective symptom of breathlessness
• Uncomfortable sensation of breathing

Objectives

Physiology

Objectives

• Pathophysiology of dyspnea
• Why dyspnea
  - Functional
  - Activity induced
• Measuring dyspnea
• Exercise testing
• Treatment

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• Physiology of respiration
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How to measure dyspnea

- Functional dyspnea scale
  - Medical Research Council
  - Modified Medical Research Council
  - BDI-TDI
  - SGRQ, CAT
  - CRQ
- Exercise scale
  - Borg
  - VAS

Functional dyspnea scale

- Medical Research Council

0. I only get breathless with strenuous exercise.
1. I get short of breath when hurrying on level ground or walking up a slight hill.
2. On level ground, I walk slower than people of the same age because of breathlessness, or have to stop for breath when walking at my own pace.
3. I stop for breath after walking about 100 yards or after a few minutes on level ground.
4. I am too breathless to leave the house or I am breathless when dressing.
Mortality: Dyspnea

- Multicenter in Japan
- n = 222
- F/U for 5 years
- Outcome: Mortality

Nishimura Chest 2002;121:1434

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Exercise dyspnea

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Respiration

O₂ → Air → Ventilation → Circulation → Muscle → Mitochondria → CO₂

CPET
Physiology

Exercise Test: Cardiac

- Low exercise capacity (VO₂)
- Decreased heart rate reserve (HR/Pred HR)
- Large ventilatory reserve (VE/MVV)
- Early AT
- ECG or BP changes
- No ABG changes

Exercise Test: Respiratory

- Low exercise capacity (VO₂)
- Low breathing reserve (VE/MVV)
- Large heart reserve (HR/Pred HR)
- PaO₂ or O₂ sat may decrease
- PaCO₂ rises or fails to decrease
- AT not reached
- No ECG or BP change

Example: COPD

COPD: Patho-radiology

Hyperinflation

- Oxygen delivered = CO x O₂ content
- O₂ content = Hgb x 1.34 x % sat

- VT IRV
- ERV
- IC
- RV
- Normal
- Disease Progression
- Static Hyperinflation
- TLC
- RV
- FRC
- ERV
- Air Trapping at Rest
- Years - Decades
- Rest
Hyperinflation

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Pathophysiology

Dyspnea

Sedation

Pharmacotherapy

Central Drive

LVR

Oxygen

Rehab

Bronchodilator therapy, pulmonary rehabilitation and health status

Threshold for clinical significance

Change in CRQ total score

Placebo  Salmeterol  Ipratropium  Pulm Rehab


Repeated P.R. courses over 7 years
- Observational study
- N = 48. FEV₁ = 58%
- 5 courses, OP
- Outcomes:
  - FEV₁ (ml) -18 (22) <0.001
  - SGRQ (u) -9.6 (14) < 0.001
  - BODE (u) 0.71 (1.6) <0.001

Foglio et al Respir Med 2007;101:1961

Rehabilitation
Unbeatable
Evidence A
LVRS in COPD

Brantigan et al ARRD 1959

Patho-bio-physiology

Emphysema

R.Y. 58 years

FEV₁ = 38%
FRC = 192%
DLCO = 49%
MMRC = ¾
6MWD = 198 m
BODE = 7

Patho-bio-physiology

FEV₁ = 41
FRC = 172%
6MWD = + 78 m
MRC = -2
DLCO = 49%
BODE = 5

Conclusions

• Dyspnea is a frequent symptom in the clinic
• The cause can be the lungs, heart, vascular, anemia, muscle or idiopathic
• Dyspnea can be measured and should be measured functionally or during stimulus
• A CPET may help determine origin
• Treatment should be directed at the cause

References