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HYPERVENTILATION – A BREATH TOO FAR.

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- DIAGNOSIS
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- EVIDENCE and TREATMENT OPTIONS

HISTORY AND DEFINITIONS

In the past, variously described - irritable heart, DaCosta's syndrome, the soldiers heart.

1937 Kerr, Dalton and Gliebe first used the term "hyperventilation".

Respiratory disorder. Psychologically or physiologically based, involving breathing too deeply and/or too rapidly (hyperventilation).(Brashear 1983)

DEFINITIONS

Hyperventilation is defined as a state of alveolar ventilation in excess of metabolic demands leading to a decreased PaCO2 and respiratory alkalosis (Malmberg 2000)

Not all patients present with hypocapnia.

"Inappropriate breathing which is persistent enough to cause symptoms with no appropriate cause" (Rowley)

CAUSES

Many, varied, complex – interaction between organic, psychogenic and physiological factors

Organic disorders 5-11% – Asthma, ILD, heart failure, PE and pain. Physiologic (↑ progesterone)

Associated diagnoses.

Psychological factors 35-83%

Triggers – bereavement, emotional event, personality

Heightened emotional states – fear, anger, depression

Mental health issues – panic attacks, anxiety states, agoraphobia

SYMPTOMS

Multiple, variable and multi-system. Some common themes.

RESPIRATORY – breathlessness, sighing, yawning, dry cough, air hunger, unsatisfying deep breaths

CARDIAC – palpitations, chest pain, tachycardia, pseudo angina

NEUROLOGICAL – dizziness, paraesthesia (facial and distal), confusion, poor concentration, tetany (rare)

MORE SYMPTOMS……

GI – dysphagia, bloating, heart burn, reflux

MUSCULO SKELETAL – cramps, aches and pains, twitching, jaw clamping, postural abnormalities, adaptive shortening

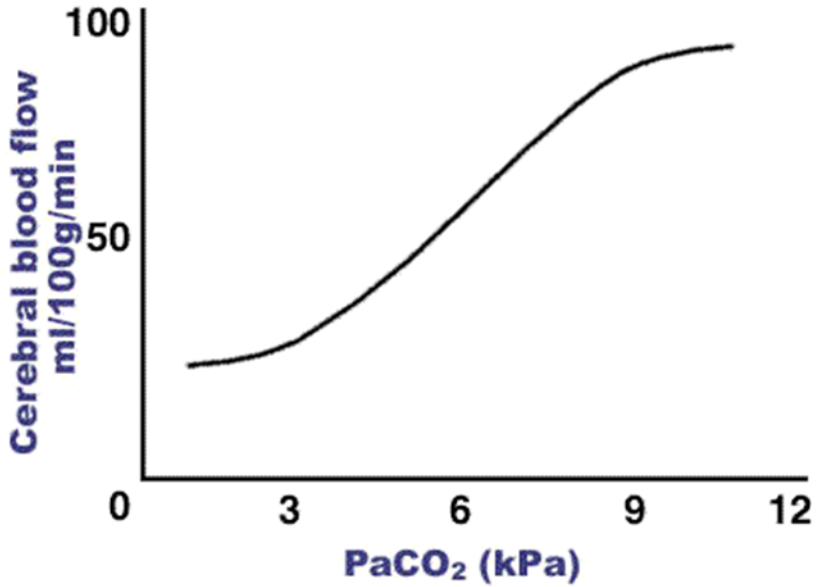
PSYCHOLOGICAL – anxiety, panic attacks, phobias, depression

VICIOUS CYCLE.....

PHYSIOLOGY OF HYPERVENTILATION

"We live in a narrow zone of homeostasis bordered on both sides by physiological disaster" *Christopher Gilbert*

Low/ fluctuating levels of Pa CO2 → ↓ CBF and ↑ lactic acid production



PHYSIOLOGY OF HYPERVENTILATION

Cerebral vasoconstriction, coronary vasoconstriction and subsequent tissue hypoxia

Bohr effect – reduced unloading of O2 to tissues

Predominance of SNS activity (Freeman and Nixon 1985, Lum 1989, Garsson 1987, Harvey 2002)- ↑catecholamine and adrenaline. (Folgering et al 1983)

THE IMPORTANCE OF NOSE BREATHING

"The nose is for breathing, the mouth is for eating"

Proverb

Filters/ warms/humidifies/protects

Regulates lung volume (controls CO_2 regulation)

Adds resistance

Sends afferent stimuli to Respiratory Centre – regular breathing pattern

DIAGNOSIS

No conclusive diagnostic tests

Nijmegen questionnaire

Rare = less than monthly. **Sometimes = more than monthly, less than weekly.**
Often = at least weekly, but not daily. **Very often = at least daily.**

Nijmegen questionnaire

	Never 0	Rare 1	Sometimes 2	Often 3	Very often 4
Chest pain					
Feeling tense					
Blurred vision					
Dizzy spells					
Feeling confused					
Faster or deeper breathing					
Short of breath					
Tight feelings in chest					
Bloated feeling in stomach					
Tingling fingers					
Unable to breathe deeply					
Stiff fingers or arms					
Tight feelings around mouth					
Cold hands or feet					
Palpitations					
Feelings of anxiety					

Total: /64*

* Patients mark how often they suffer from the symptoms listed. A score above 23/64 is diagnostic of hyperventilation syndrome.

The Nijmegin Questionnaire

Developed at the University of Njimegin

Questions relate to symptoms - rated on a 5 point scale

Three dimensions

Max score of 64

Score of > 23 suggests chronic HVS

Used as an objective marker

High sensitivity and specificity (Van Dixhoorn & Duivenvoorden, 1985)

OTHER DIAGNOSTIC TESTS

- Breath hold tests – semi-objective, useful outcome measure for treatment
- ABG, ETCO2
- Hyperventilation Provocation Test (HVPT) – measures Pa CO2 after 3 mins voluntary hyperventilation and recovery rate .

PHYSIOTHERAPY ASSESSMENT

Subjective assessment – open ended Qs, full history of symptoms. Proforma

Trigger/trace

How often/for how long

Lifestyle – diet, exercise, occupation, sleep, personality, psycho social history

What does hyperventilation look like?

http://gifsoup.com/view/2508261/lebron-hyperventilation.html

OBSERVATIONS

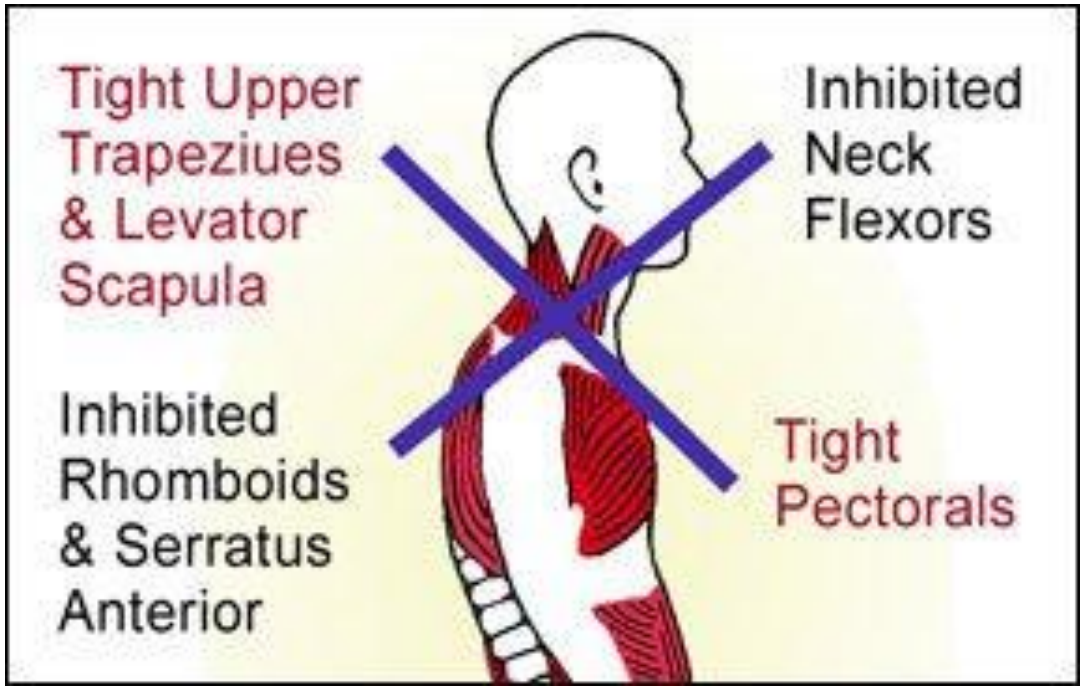
BREATHING PATTERN – speed, depth, co-ordination, diaphragmatic vs accessory muscle use, chest wall movement, I:E ratio, breath holding, breath stacking

Sighing, yawning, coughing, throat clearing, sniffing, dry cough

Co-ordination of talking and breathing – pre-sentence gasps.

Posture and gait

MSK ASSESSMENT



BREATHING RETRAINING - a glance at the evidence

What is the evidence that it works….. Some RCTS

Thomas et al (2009)

-Randomised controlled trial comparing breathing retraining vs nurse led asthma education.

-At one month – similar AQLQ score improvements between both groups but significant improvement in BT group at 6/12(symptoms, activs, emotions domains)

-Study suggests that BT may have a role to play in mild-moderate sub-optimally controlled asthmatics but must occur alongside pt education and pharmacotherapy.

Slader et al (2006)

-Double blind RCT

-studied the effects of breathing retraining vs upper limb exercises in the treatment of asthma.

-Instruction by video and 2xdaily practice

-Improvements noticed in BOTH groups with decreased use of reliever medication

COCHRANE REVIEW 2013 – breathing exercises for asthma

- 13 studies, 906 adults with mild-mod asthma. Overall improvements in QOL, symptoms and numbers of exacerbations reported
- No adverse effects reported
- Overall quality of evidence was poor
- Therefore, no conclusive evidence to support or refute their use

Also…Cochrane review of Breathing exercises for db/HVS in adults 2013

TREATMENT

Education and explanation

Breathing retraining

Postural re-education

Chest wall, shoulder girdle and spinal mobility

Rescue strategies – acute episodes, persistent cough

Relaxation (Stress management, hypnotherapy)

Behavioural therapy CBT/NLP/Mindfulness

Lifestyle management – dietary advice, increased activity levels, exercise

Yoga / Buteyko??!!

BREATHING RETRAINING – HOW I DO IT volunteer please….

Relaxed position – head and neck support

4 important components

1) Nose breathing
2) ↓ accessory muscle activity
3) Activate diaphragm
4) Lengthen expiratory phase

Progress by increasing frequency, reducing support (sitting, standing, walking, treadmill)

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