Accommodation and its anomalies

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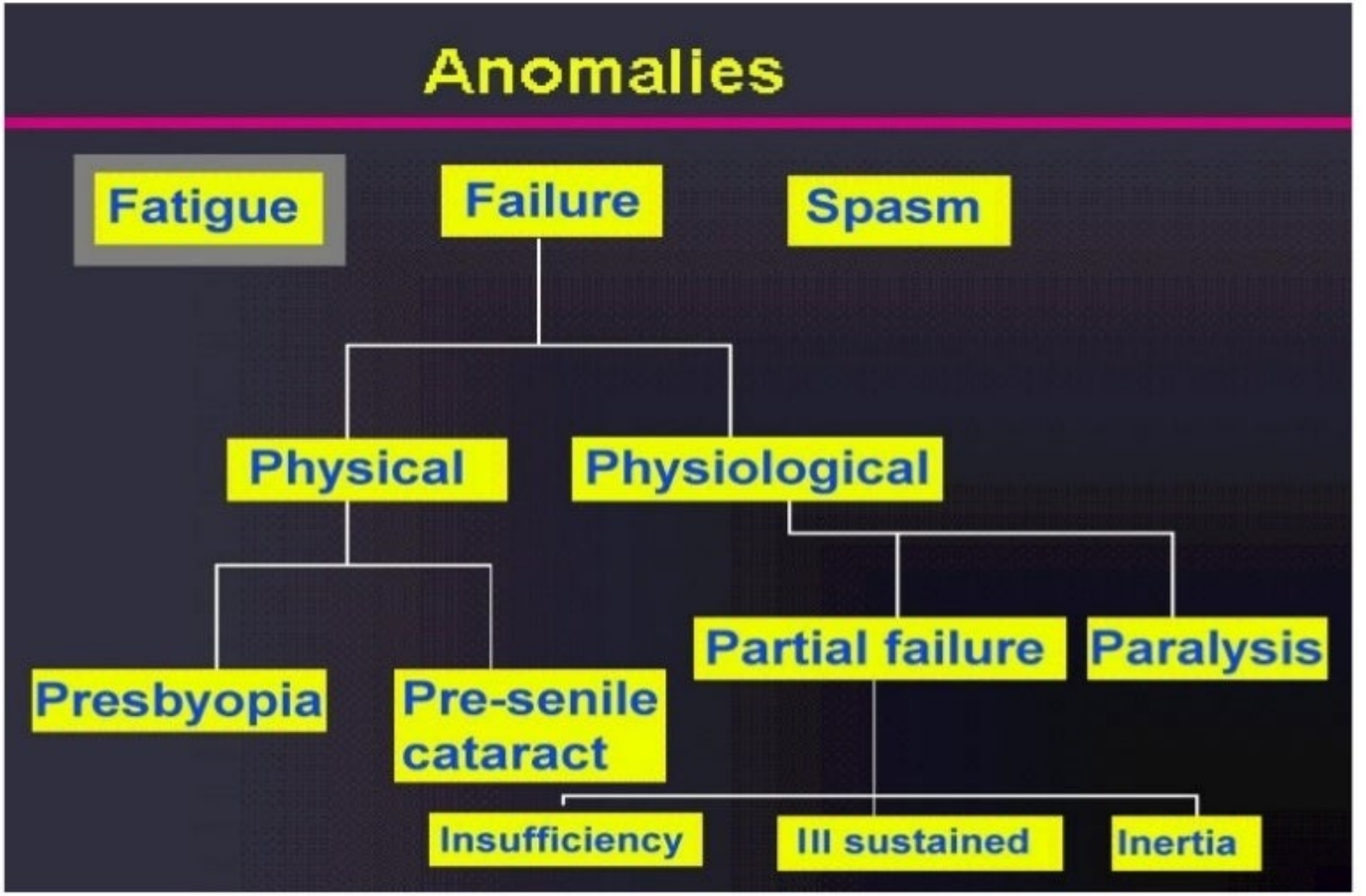
Accommodation

The facility enabling the change in dioptric power of the crystalline lens thereby altering the focus of the eye.

Assessment of accommodation

1. Dynamic retinoscopy
2. Subjective measurement of accommodation amplitudes with e.g., RAF rule
3. Facility of accommodation with "lens flippers"


Anomalies
Fatigue
Failure
Spasm
Physical
Physiological
Presbyopia
Pre-senile cataract
Partial failure
Paralysis
Insufficiency
Ill sustained
Inertia

Accommodative fatigue

Apart from overuse, factors that influence onset of fatigue include

1.refractive status

2.relationship with convergence

- **<u>Symptoms</u>**

  Asthenopia

Treatment

- Correct significant ametropia
- Correct significant OMB anomaly
- High astigmatism ? - check near cylinder axes
- Discuss "*Visual Hygiene*"
- Advise on lighting and length of time accommodation
- Consider "orthoscopic" spectacles

Failure of accommodation-Presbyopia

- ✓"Old sight"
- ✓Not a "disease" - explain to patients
- ✓Distance vision ?

- <u>Age of onset</u>

  Depends on individuals, ace, occupation, and habits

Symptoms of presbyopia

- "I have to hold my book further away"
- "my arms are not long enough"
- "newspaper print is not what it used to be"

Patients complain of reading difficulty in poor light, tired eyes after reading and BLURRED VISION for reading

Management

Prescribe correction so that near point of focus is brought within normal working distance

Determination of reading addition

- **Objective - dynamic retinoscopy**
- **Subjective –**
  - **complete distance refraction**
  - **measure amplitudes of accommodation**
  - **use amplitudes as a STARTING point to calculate an approximate reading addition**
- **Rule of thumb - leave 1/3rd accommodation in reserve**
- **Check clarity and range. Double check with (+) and (-) additions**

Pre-senile cataract

- Cataract is likely to reduce accommodation
- May be unilateral
- Unequal reading adds ?
- May have reduced VA

Insufficiency of accommodation

- Amplitude consistently lower than normal for age
- Fairly common
- "premature presbyopia"

Aetiology of insufficiency

- General debility
- Malnutrition
- Anaemia
- Glaucoma (?)

Symptoms of insufficiency

- Asthenopia
- Blurred vision for near work (? distance)
- Over or under convergence

Investigation of insufficiency

- Exclude...

Local cause

- the glaucoma's (IOP, fields, AC, funduscopy)
- anterior uveitis (slit lamp)

Central cause

- e.g., neurological lesion (fields, motility, pupils)

General cause

- e.g. illness

Treatment management of insufficiency

- Eliminate cause
- Occasional prescribing of temporary appliance e.g., in case of debilitating illness

Ill sustained accommodation

- **Amplitudes are normal but rapidly diminish with use. Is this the start of a true insufficiency ?**

…or… rapid onset fatigue ?

Aetiology

Commonest cause - debilitating illness

Investigation & Treatment

...in the same way as insufficiency

Inertia of accommodation

- Difficulty in changing focus from distance to near and vice versa
- Diagnosis often based on symptomatology

Aetiology/associations

- Prolonged close work
- Ocular motor imbalance

Treatment

- Discuss visual hygiene
- Correct any ocular motor anomaly

Paralysis of accommodation

- May be partial or total, unilateral or bilateral

Signs and symptoms

- Blurred vision
- Micropsia
- More accommodative effort required to see near object which is then perceived to be nearer than it actually is and therefore smaller
- Markedly reduced amplitude(s) of accommodation
- If lesion is localised to the lens or ciliary body then these will be the only signs and symptoms
- If IIIrd Oculomotor nerve is affected then there will be other signs

What does N IIIrd innervate ? ….

Aetiology

- Congenital defects e.g., no ciliary muscle
- Cycloplegic drugs
- topical eye drops Þ intentional or unintentional
- Systemic drugs
- Degenerative conditions e.g. Parkinson’s
- Exogenous poisons e.g., snake bites, bee stings
- III N lesion (tumour, aneurysm, haemorrhage)
- Ocular disease (anterior uveitis, glaucoma)
- Trauma to head or eye (temporary or permanent paralysis)
- Visual Conversion Reaction

Management

- If recent onset and not previously investigated then refer and, if of sudden onset, urgently
- Subsequent intervention will include spectacles and management of any diplopia

Spasm of accommodation

Tone of ciliary muscle is increased and a constant accommodative effort is expended by the parasympathetic nervous system. Pseudo myopia produced.

Symptoms

- Blurred vision depending on patient's refractive status
- Macropsia
- Asthenopia during close work
- Pain (brows/headache)
- Poor concentration
- Miosis
- Convergence anomalies (excess or insufficiency)

Investigation

Cycloplegic refraction used to determine true refraction

Aetiology

- Spasm can be further categorised into:
- (a) Functional spasm
- (b) Organic spasm

Functional spasm

- A response to over fatigue and "eye strain". Precipitated by 3 factors:
- Bad visual hygiene e.g., poor lighting, glare unaccustomed work
- Optical or ocular motor difficulties e.g., anisometropia, early presbyopia, convergence anomalies
- psychological factors e.g., VCR (see Barnard & Edgar)

Treatment

- Eliminate exciting cause
- Consider occupation, general health, mental state
- Correct refractive error and/or ocular motor anomaly

Aetiology

- Ciliary spasm
- drug induced e.g., physostigmine, pilocarpine, morphine, digitalis
- lesions of brain stem and OM trunk
- Inflammation
- e.g., anterior uveitis
- Trigeminal neuralgia
- Others
- e.g., diphtheria, tooth extraction

Treatment of organic spasm

- Manage the cause

Summary

- Anomalies of accommodation are very common
- Management of these anomalies is an integral part of optometric practice

References

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