NEUROLOGICAL ASSESSMENT

PART 2 – PUPILLARY ASSESSMENT

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Pupillary assessment is an important part of neurological assessment because changes in the size, equality and reactivity of the pupils can provide vital diagnostic information in the critically ill patient (Smith, 2003).

Both pupils should be the same shape, size and react equally to light. Although not part of the Glasgow Coma Scale (covered in part three of this series next week), examination of the pupils is an essential adjunct to it, especially when the patient’s level of consciousness is impaired (Bersten et al, 2003).

The aim of this second practical procedure on neurological assessment is to understand how to perform pupillary assessment.

ANATOMY AND PHYSIOLOGY

The pupil is the ‘black hole’ in the centre of the iris, a flattened muscular diaphragm which is attached to the ciliary body (Marcovitch, 2005). Relaxation and contraction of the muscles of the iris causes it to dilate (in darkness) or constrict (in bright light).

Evaluation of pupillary reaction is effectively an assessment of the third cranial nerve (oculomotor nerve), which controls constriction of the pupil. Compression of this nerve will result in fixed dilated pupils (Fairley, 2005).

Any changes in the patient’s pupil reaction, size or shape, together with other neurological signs, are an indication of raised intracranial pressure (ICP) and compression of the optic nerve.

PUPIL SIZE AND SHAPE

Pupil size should be measured, ideally with reference to a neurological observation chart or similar. The average size is 2–5mm (Bersten et al, 2003). The pupils should be equal in size.

Pupil shape should be ascertained. It should be round; abnormal shapes may indicate cerebral damage; oval shape could indicate intracranial hypertension (Fairley, 2005). The pupils should be identical in shape.

REACTION TO A BRIGHT LIGHT

Pupil reaction to light should be brisk and after removal of the light source, the pupil should return to its original size. There should also be a consensual reaction to the light source, that is the opposite pupil also constricts when the light source is applied to one eye (Jevon, 2007). Pupil reaction should

PROFESSIONAL RESPONSIBILITIES

This procedure should be undertaken only after approved training, supervised practice and competency assessment, and carried out in accordance with local policies and protocols.
be documented as per local policy, for example B (brisk), S (sluggish) or N (no reaction). Both pupils should react equally to light.

Unreactive pupils can be caused by an expanding mass, for example a blood clot exerting pressure on the third cranial nerve; a fixed and dilated pupil may be due to herniation of the medial temporal lobe.

PUPILLARY ASSESSMENT

Prior to undertaking pupillary assessment:
- Note if the patient has any pre-existing irregularity with the pupils, for example cataracts, false eye or previous eye injury;
- Check if there are any pre-existing factors that can cause pupillary dilation, for example medications including tricyclics, atropine and sympathomimetics and traumatic mydriasis (Bersten et al, 2003);
- Check if there are any pre-existing factors that can cause pupillary constriction, for example medications including narcotics and topical beta-blockers.

The procedure
- Explain the procedure to the patient, even if she or he is unconscious (Fig 1).
- Undertake pre-procedure checks (see above) to ascertain if there are any pre-existing irregularities with the patient’s eyes or factors that can influence pupillary assessment findings.
- Assemble equipment: a pen torch and the patient’s observation chart (in some situations a neurological assessment chart).
- If possible, dim the overhead light source (Fig 2) (a darkened room is ideal but practically this will rarely be possible); dim light will facilitate a better view of the pupils and their reaction to light.
- Wash and dry hands.
- Adopt a position in front of the patient.
- Look into each of the patient’s eyes, examining the size of the pupils (Fig 3).
- Note the size (mm) of each pupil; if available use the scale printed on the neurological assessment chart as a comparison (Fig 4).
- Compare the sizes of the pupils.
- Note the shape of each pupil.
- Compare the shapes of the pupils.
- After providing prior warning to the patient, move the torchlight from the side of the head towards the pupil (Fig 5) and note any change in pupil size and the speed of the reaction (brisk or sluggish).
- Taking care to avoid shining the light in the other eye, observe whether the opposite pupil also reacts (consensual reflex).
- Repeat the above procedure in the opposite eye.
- Document the findings of the pupillary assessment as per local policy and guidelines (Fig 6).
- If necessary, inform the nurse in charge of any changes or abnormalities.

REFERENCES


