

**THE ENCYCLOPAEDIA OF
GENERAL PRACTICE**

THE ENCYCLOPÆDIA OF GENERAL PRACTICE

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COLOUR BLINDNESS

TO

FUNGUS DISEASES

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COLOUR BLINDNESS

E. C. Glover

The vast majority of cases of colour blindness are congenital and frequently some degree of heredity may be traced. Most often the condition is a male sex linked character, recessive in the female.

It follows from this that the condition is far commoner in males than females; the proportions have been variously reported up to 10 to 1 or even more. About 8 per cent of males are affected in some degree.

Acquired colour blindness is not really a practical problem because in most cases it is associated with a failure of central form vision, usually following retrobulbar neuritis or toxic amblyopia from tobacco or one of a few industrial substances. Medication with some drugs—digitalis, santonin, atebirin or tridione—may produce a sensation of colour.

Types

Though modified by modern research work, the trichromatic theory of colour vision is still broadly accepted and may be used to understand the various forms of colour blindness.

Persons with normal colour vision can match any colour including white with suitable mixtures of three primary colours; red, blue, and green. Colour blind people are either partly or completely insensitive to one or more of these primary colours. If they are relatively insensitive to red, they will need more red in a mixture of colours to match a given test colour than would a normal person.

If an individual is completely insensitive to one of the three primary colours, he is a dichromat. That is, he will be able to match any colour or white by mixing the other *two* primary colours in the right proportions. This does not mean he will be as efficient as a normal person in differentiating colours. Nevertheless, he may go through life without being aware of his defect, unless he is subject to special tests, or unless circumstances combine to remove the ordinary adjuncts which experience has taught him to help to overcome his disability.

Something over a hundred cases have been reported of monochromatic vision, where all colours are seen as various shades of grey. This condition corresponds closely to twilight vision in the dark adapted eye.

Occupational requirements

Certain jobs require good colour vision and apart from those actually concerned with colour (paint and textiles, for example) most of them particularly require discrimination between red and green.

Seamen and communication officers and ratings in the Royal and Merchant Navies, air crew and ground control staff of the Royal Air Force and civil aviation, and railway operating staff are obvious examples.

Drivers of private motor cars are not specifically asked about their colour vision. Regulations for drivers of public vehicles are not uniform and colour testing is done in some localities.

Firms concerned with paint manufacture, textiles and dyeing, photography, electric cables, colour printing, ink making and so on, may in many cases test prospective employees before they are engaged but there is no uniformity. The Ishihara tests are in commonest use.

Tests

Confusion charts

Confusion or pseudo-isochromatic charts are the commonest and easiest to apply. Ishihara are the best known and in practice are largely satisfactory. A number of white cards are covered with irregular spots which are so coloured that the normal person can distinguish a figure or pattern while the colour blind person cannot do so—or vice versa.

The test cards should be viewed in daylight and should be renewed from time to time as they tend to fade and get dirty.

While they give a good indication of the state of colour vision, they are not now accepted for the Royal Navy, Merchant Navy, or British Railways.

Lantern tests

Entrants to the Royal Navy are tested by the Martin lantern. This fairly simple device shows only red, white and green with two different sizes of aperture, but unfortunately it is not available to private practitioners and in any case is prohibitively expensive, so that a young boy, unless he can get himself tested at a naval establishment, cannot find out before his official medical examination whether he can pass this essential test or not.

British European Airways, British Railways, and the Board of Trade (for the Merchant Navy) use the Edridge Green Lantern.

The Royal Air Force test is based on the Ishihara plates and the Giles Archer Lantern.

Matching tests

Anomaloscope.—This is a device where mixtures of primary colours may be varied by the candidate to achieve match with a standard colour.

Holmgren wools.—The test, one of the oldest, is now little used as the various coloured wools are very liable to fading and dirt.

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 (See also the chapter dealing with diagnostic techniques.)

COMA

Robert Hunt Cooke and G. S. C. Sowry

Definition

Coma is a loss of consciousness from which the sufferer cannot be roused by any form of stimulation. His life is in danger not only from the factors responsible for his coma, but also from asphyxia due to prolapse of the paralysed tongue over the glottis, or to the collection of autogenous or foreign material in the vicinity thereof, which may interfere with the patency of an airway no longer under the protection of the normal reflexes.

General approach

The immediate practical approach to a case of coma depends to some extent on whether or not the condition has arisen in a patient whose medical condition and history are known to the doctor. In the first instance he is in a privileged position when arriving at his differential diagnosis, and in the latter he has to start *de novo* and some at least of his immediate treatment will be either empirical or intelligent guesswork based on experience. It is probable that the majority of such cases seen by the general practitioner are conditions associated with some cerebrovascular catastrophe.

Classification

The commoner forms of coma fall into one of the following groups. (1) Cerebrovascular lesions. (2) Toxaemias, that is alcohol, diabetes mellitus, uraemia, and carbon monoxide and other toxic inhalants. (3) Fits, especially epilepsy. (4) Drugs; barbiturates or opium derivatives. (5) Cranial injuries involving the brain. (6) Intracranial neoplasms or inflammation.

Management

Where it is difficult to obtain a case history an accurate clinical examination will give sufficient information to make a close enough diagnosis for treatment. The general rules for the treatment of "any insensible patient" appear in all the manuals of first aid. The fundamental importance of maintaining a clear airway cannot be stressed too strongly. The patient has lost the ability to prevent the entry of foreign material into his respiratory tract and it is easy for vomit, especially, to cause a rapidly fatal blockage or a later terminal pneumonia. The posture should be adjusted at once so that the flaccid tongue falls away from the pharynx and fluids pooling in the nasopharynx may drain from the mouth. Deficiency of cerebral oxygenation may cause irreversible damage to the brain in those cases that recover from their coma. The comatose patient should be transported from the scene of the occurrence to the place of treatment in the prone or semi-prone position. A firm bandage across the stretcher handles supporting the forehead will allow drainage without the face coming into contact with the stretcher canvas.

CEREBROVASCULAR LESIONS

Diagnosis

The onset of coma has a diagnostic significance. A patient with cerebral embolus loses consciousness in a matter of seconds with no time to complain of symptoms. In a case of cerebral haemorrhage the patient has a matter of minutes in which to complain of sudden headache or numbness, whereas a cerebral thrombosis may take some hours to reach its maximum effect. Very severe headache, with or without paresis, is more likely to be a subarachnoid lesion. Coma developing in a concussed patient, for example following a knock-out at boxing, points to rupture of a basal or of a more superficial cerebral vessel with consequent gradual onset of cerebral compression. Here an accurate observation of the sequence of onset of the symptoms and signs of the more serious condition sometimes indicates the localization of the bleeding point.

Management

In addition to the general management described above, venesection may be of value. The writer has seen the most dramatic improvement, even once a return to consciousness, in the plethoric, hypertensive, blue, congested patient (classical apoplexy) with an obvious heavy burden on the overloaded right heart, by immediate venesection of a pint of blood by opening a vein in the antecubital fossa. This procedure is even more rapid than using a large-bore

needle. Any larger volume of blood must be removed only with caution and the pulse rate and blood pressure carefully watched to avoid any uncontrollable fall. The treatment thereafter is that of the lesion diagnosed.

TOXAEMIAS

Alcohol

Acute alcoholic poisoning is a very dangerous condition and may rapidly be fatal. It is essential to decide whether the coma is a single condition or complicated by a cerebrovascular lesion.

Alcohol, apart from its local irritative effect on the gastric mucosa, is a central nervous system poison and its manifestations are therefore symmetrical. Any asymmetry in reflexes or responses should immediately be suspect. If all reflexes including the conjunctival are absent, vigorous treatment is essential. The patient in alcoholic coma has gone beyond the use of apomorphine. Gastric lavage with a soft large-bore stomach tube must be started at once. It may be necessary to guide the tube by touch or vision past the glottis. Large quantities of bicarbonate solution (1 drachm to the pint; 4 ml. to 500 ml.) must be used until there is no evidence of gastric residue in the washings. When it is certain that no alcohol remains, the stomach is emptied and glucose dissolved in warm water or strong black coffee (1 oz. to half a pint (30 G. to 250 ml.) of solvent) is introduced. Thereafter warmth and good nursing are the essential factors in treatment. Morphine must never be given. Respiratory failure may be countered by oxygen with or without coramine. Oxygen should be administered by a B.L.B. or anaesthetic mask, or rubber nasal catheter, at about 4 l. a minute. Coramine 1 ml. intravenously, repeat if necessary: in extreme emergency this may be injected direct into the left ventricular muscle.

Diabetes mellitus

The problem that here confronts the practitioner is divisible into two parts, the coma in a patient known to be diabetic and that in the undiagnosed case. In the latter there is no problem of hypoglycaemia being mistaken for diabetic coma (better called ketosis).

The diagnosis rests on the cardinal signs of dehydration and collapse, low blood pressure, thin pulse, dry skin and tongue, together with the typical smell of ketones in the breath. It is confirmed by the findings of heavy glycosuria and ketonuria.

Management

The essentials of treatment comprise adequate quantities of soluble insulin, restoration of body fluids and electrolytes, and generally, antibiotic treatment of any precipitating infection.

Initially 100 units of soluble insulin (of which 50 may be given intravenously) is a suitable dose. Subsequent soluble insulin is given intramuscularly at three-hour intervals as required, the dose being judged by the state of the patient or by blood sugar levels. A useful guide to the dose is to give the number of units of soluble insulin obtained by dividing the blood sugar (expressed in mg. per 100 ml.) by 10; for example, blood sugar 500, dose 50 units.

In full coma fluid replacement must be by the intravenous route, giving in a few hours up to 5 l. of normal saline solution alternating with saline lactate solution with added potassium chloride not exceeding 1 G. per l. Where intravenous infusion is impossible, fluids by mouth such as milk drinks, salt-containing soups and so on, should be given as soon as the patient can swallow. Vomiting may, however, prevent the absorption of orally administered liquids and since gastric dilatation is common lavage by Ryle tube is helpful, leaving a solution of bicarbonate of soda—half a pint (250 ml.) containing 1 or 2 drachms (4 or 8 ml.)—in the emptied stomach. Where obvious infection exists, appropriate antibiotics are given. It is wise in severe cases to start with penicillin 1 mega unit with streptomycin 1 G.

Insulin coma

Insulin coma or hypoglycaemia in a diabetic under treatment is a medical emergency. Its differentiation from diabetic coma is of paramount importance. Such a patient if misdiagnosed and given further insulin may suffer irreversible cerebral damage. Death may occur in a few hours or, if the patient comes out of his coma, he may be left with dementia, paralysis or epilepsy.

The onset is rapid, often with sweating and excitement. Epileptiform convulsions are common. Any patient found in post-epileptic coma should be searched for his diabetic card or for tell-tale injection marks. The urine may be misleading in that the contents of the bladder may contain sugar excreted before the onset of the hypoglycaemic state. Heavy ketonuria is uncommon. The tongue is moist (and may have been bitten). The pulse is full and bounding but the blood pressure may be low.

Immediate intravenous injection of 20–50 ml. of 50 per cent glucose solution is required and may need to be followed by a further such injection. Recovery is in most cases dramatic and occurs within minutes. After care and diabetic restabilization is necessary.

Uraemia

The presence of oedema and a ketonic smell in the breath, coupled with a dirty moist tongue and twitching movements in the muscles,

point to the diagnosis. The treatment is that of the causative renal failure.

Carbon monoxide and other toxic inhalants

Where a person has been found in a state of coma or in a condition approaching thereto, attention should be directed to the ventilation of the surroundings or to the presence of fume-producing heaters or stoves. Leaking gas mains due to fracture, or defective taps in adjacent rooms or dwellings where there is under-floor space connections can cause coma by slow inhalation over a period, even if there is not enough concentration to be obvious immediately. Variations in the sense of smell are very wide and almost complete absence is by no means uncommon.

Drug addiction by inhalants is not infrequent. Anaesthetists and workers in certain types of aromatics are subject to this.

FITS

During the first examination of the patient search is made for trauma typical of the convulsive phase; for example, blood or bloody froth at the angles of the mouth from a bitten tongue or cheek, bruises especially of the dorsum of the hands, residual local spasm. It is not uncommon for urine from a full bladder to be voided during the fit but incontinence of faeces is rare. Short of status epilepticus the coma phase is brief and natural recovery without treatment is to be expected. Where the unconsciousness is prolonged the bowel should be well washed out by careful colonic lavage, and if convulsive movements continue paraldehyde 5-10 ml. injected intramuscularly. This dose may be repeated in not less than two hours.

DRUGS

Barbiturate drugs

Due to the modern almost uninhibited use of tranquillizers and sedatives there is a dangerous quantity of the barbiturate drugs in circulation, and a loss of respect for their potency. Apart from the given or taken deliberate overdose, there are many cases where a temporary amnesia induced by a first underdose results in the patient taking a second or third quantity not carefully measured. The taking of alcohol as a "night cap" on a probably empty stomach in conjunction with a member of this group of sleeping tablets results in a very rapid absorption and a dangerously high blood concentration. Generally speaking the more rapid the action of the substance taken, the more rapid is its breakdown and excretion, and therefore

the fatal dose is greater, but also it is possible more rapidly to build up a fatal blood concentration.

Diagnosis

There may be a phase of delirium with muscular incoordination preceding but rapidly passing into coma. The patient looks ill. There is some cyanosis, especially of the extremities, owing to depression of the respiratory centre and shallow breathing. The pupils become widely dilated and inactive to light. The blood pressure falls. The reflexes are difficult to obtain but a bilateral extensor response may persist longer than the others.

The shorter acting members of this group in overdose tend to give a rapid onset of coma and death from central respiratory failure. The longer acting drugs cause pulmonary congestion and death from pneumonia.

Management

As a preliminary to admission to hospital immediate gastric lavage with large quantities (gallons) of water can be life saving. The use of alkaline solutions, especially bicarbonate of soda, is strongly contra-indicated as the barbiturate goes into solution therein and absorption is hastened before all is removed. Colonic lavage also hastens excretion. An immediate injection of penicillin (1 mega unit) will initiate the longer term treatment of the almost inevitable complication of pulmonary infection. The most important consideration is the maintenance of respiration by central stimulation, and if the patient is cyanosed oxygen is given. There are no specific antagonists but the use of Megimide (50 mg. intravenously at 10-minute intervals to a total of 1 G.) has superseded the once favoured picrotoxin as having less danger of convulsive toxic effects. Intravenous fluid should be used with care to avoid overloading the right heart and lungs.

Morphine and its related drugs, pethidine and others

All the substances in this group are drugs of addiction. They establish tolerance and require increasing doses to produce their effects. Gross overdosage is, however, becoming increasingly rare owing to the rigid control exercised in their dispensing. After a brief euphoria deep coma results from depression of all the central nervous system. The vital centres gradually succumb and a state resembling profound shock develops. A cold, clammy skin, muscular flaccidity, cyanosis together with the classical pin-point pupils are the cardinal diagnostic signs. Nalorphine hydrobromide

(Lethidrone) is a specific antidote. It should be administered intravenously in doses of 10–40 mg. The action of this drug is rapid and if no response is noticed in 3–5 minutes it should be repeated. If the morphine has been taken orally gastric lavage using potassium permanganate (1 in 200) solution should be done and thereafter the treatment is that of the shocked condition.

HEAD INJURIES

Coma resulting from cranial injuries involving the brain requires immediate admission of the patient to a specialized unit where possible, and if this cannot be done to the nearest hospital. The general practitioner should confine his treatment to the arrest of haemorrhage and to rendering the essential first aid that will enable the patient to travel without further damage occurring. Any wound should be covered with a sterile dressing firmly applied, to give support but avoiding direct pressure on any cranial defect.

INTRACRANIAL NEOPLASMS AND INFLAMMATION

Coma developing in these conditions is due in the majority of cases to rise in intracranial pressure. It is relatively slow in onset and the symptoms and signs are those of the underlying conditions. It is extremely unlikely to arise as the first intimation of disease unless there is a sudden haemorrhage into the growth as the result of a minor trauma not in itself sufficient to cause coma. Rupture of an undiagnosed abscess is too unlikely to merit serious consideration and in any event its treatment is very specialized.

HYSTERICAL COMA

It is necessary to make a brief reference to hysterical coma. Its reputation as a diagnosis carrying a grave prognosis is based on the fact that it is all too frequently made in cases where there are symptoms and signs which do not appear to fit any recognized condition. This diagnosis should only be made upon convincing evidence of hysterical stigmas.

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(See also the chapters dealing with the specific conditions mentioned in this chapter.)