ANAESTHESIA FOR A PATIENT SUFFERING FROM FAMILIAL DYSAUTONOMIA (RILEY-DAY SYNDROME)

Case Report

BY

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SUMMARY

A case of familial dysautonomia (Riley-Day syndrome) is presented. Details of the anaesthetic technique employed whilst a gastrostomy and hernia repair were performed are reported. Moderately heavy sedation and propranolol together with atropine as the premedication employed may have been responsible for the uneventful course of anaesthesia. The pathophysiology of the condition is presented in terms of the implications for the anaesthetist who undertakes the management of such a case.

When a case of familial dysautonomia was presented for surgery, for the first time in the author's experience, the potential risk resulting from general anaesthesia had to be evaluated. Although the literature contains reference to the profound risk involved (Smith and Dancis, 1963) there is no account of the management of anaesthesia in these cases.

The patient with dysautonomia suffers from a gross imbalance of the parasympathetic and sympathetic systems, causing the blood pressure to be extremely labile. Incidents of postural hypotension as well as attacks of hypertension occur. The exact pathophysiology is not yet determined, but a denervation hypersensitivity of the vasomotor receptors has been suggested (Moses et al., 1967). Increased sensitivity to cholinergic drugs and to noradrenaline has been shown to exist.

CASE REPORT

The first child of Jewish parents was a male, born 10 days before term and with a birth weight of 2.72 kg. Foetal distress following two attempts at breech extraction made delivery by caesarean section necessary. Resuscitation of the baby was required but he breathed spontaneously after 10 minutes.

Feeding difficulties were experienced from birth. Severe difficulty in swallowing was observed, and on a denervation hypersensitivity of the vasomotor receptors, it was decided that the safest method of management would be to establish a feeding gastrostomy. It was also decided that a right inguinal hernia should be repaired at the same time. General anaesthesia was requested and agreed to be the wisest course for the performance of the two surgical procedures.

Anaesthesia and surgery.

The patient was 7½ months of age and weighed 6.1 kg. Atropine 0.06 mg and propranolol 0.05 mg were given intramuscularly 4 hours pre-operatively. Trimethaphazine tartrate 18 mg was given via nasogastric tube 1½ hours pre-operatively to produce moderately heavy sedation. Although he was easily aroused, he did not become upset when an intravenous infusion of 4.1 per cent dextrose in N. saline was established using a scalp vein. The pulse rate was 130 beats/min and the e.c.g. showed no abnormality. Anaesthesia was then induced with nitrous oxide 70 per cent, oxygen 30 per cent and halothane in gradually increasing concentrations up to 3 per cent.

During these attacks he made agitated, writhing movements. He had episodes of abdominal distension followed by intestinal hurry. The provisional diagnosis of familial dysautonomia was supported by an absent corneal reflex, failure to produce tears, relative indifference to pain and the apparent absence of fungiform papillae on the tongue.

Further tests confirmed the diagnosis. Urinary HMMA excretion was significantly reduced (89 µg in 12 hours) and there was absence of an axon flare response after the intradermal injection of 1:1,000 histamine. Rapid pupillary constriction followed the installation of 2.5 per cent methacholine eye drops. Cineradiography showed "gradual loss of stripping action in the oesophagus below the first third, this was progressively worse, until in the lower third there was no visible movement at all".

Because of the continued severe feeding difficulties and failure to thrive, it was decided that the patient should be fed almost entirely by nasogastric tube and spent nearly all of the first 6 months of his life in hospital recovering from episodes of aspiration pneumonia.

At this stage, aged 6 months, he was noticed to have repeated attacks of pallor, sweating and skin mottling.
Familial dysautonomia (Riley-Day syndrome) was first described in 1949 (Riley et al., 1949) and since that time several reports of these unusual cases have appeared. A useful review of the essential features of the syndrome was published by Riley and Moore (1966) and other investigators have added to our knowledge of these cases (Moses et al., 1967; Schmidt et al., 1970; Dancis and Smith, 1970).

The condition is mainly confined to the Ashkenazi Jews and is an inherited syndrome of the autosomal recessive type. There is, basically, an abnormality of the autonomic, sensory and central nervous system, present from birth, which manifests itself as an abnormally low level of activity of the parasympathetic system with sporadic bursts of intense activity from the sympathetic system. This gross imbalance has been termed "dysautonomia" by Day.

The imbalance of the autonomic systems often causes failure of co-ordination in swallowing and therefore feeding difficulties, choking attacks and cyanosis together with episodes of respiratory infection due, probably, to aspiration pneumonia.

A major feature is vasomotor instability, recognized clinically as attacks during which the patient is either pale, collapsed and hypotensive, or else flushed and hypertensive.

Other features include an inability to produce tears due to parasympathetic insufficiency, a relative insensitivity to pain and the absence of fungiform papillae on the tongue which is associated with absence of taste sense.

Tests demonstrate a failure to produce an axon flare when histamine is injected into the skin and the production of a meiosis when 2.5 per cent methacholine is instilled into the eye. The normal pupil does not respond to methacholine and this test provides further evidence of cholinergic supersensitivity. There is usually a decreased excretion of HMMA in the urine.

From the published data concerning the pathophysiology of the condition, several potential dangers have to be anticipated when management of anaesthesia is considered.

The vasomotor instability, labile blood pressure, postural hypotension, emotional hypertension and skin blotching may result from denervation of the vasomotor receptors and their subsequent supersensitivity (Moses et al., 1967). There is probably reduced release of sympathetic transmitter (Smith, Taylor and Words, 1963) with increased sensitivity of the tissues to these transmitter substances (Smith and Dancis, 1967). Inadequacy of the vagal response probably also exists (Smith and Dancis, 1963) and it has been suggested (Riley, 1967) that the basic defect is a deficiency of the enzyme dopamine hydroxylase which results in an imbalance between the dopamine and acetylcholine systems within the brain. This complicated instability and supersensitivity of the tissues make sudden episodes of hyper- or hypotension difficult to deal with under anaesthesia. It was hoped that moderately heavy sedation would prevent hypertension due to emotion or excitement during the induction period and this probably proved effective in the case described. Because these cases have what amounts pharmacologically to sympathetic denervation there exists a state of adrenergic supersensitivity and perhaps the rational sedative for use would have been chlorpromazine, having the added advantage of an atropine-like and adrenolectic activity. Propranolol was given prophylactically in the belief that beta-receptor blockade would further reduce the...
likelihood of hypertensive episodes and cardiac arrhythmia. In the event, the combined effect of propranolol and halothane resulted in a small fall in blood pressure and bradycardia. Preparations were made to treat any episode of hypotension with increased intravenous fluid therapy and, if necessary, small incremental doses of angiotensin. Similarly, phenoxybenzamine was prepared for use in case any similar episode of hypertension occurred. Atropine produced a normal response when the bradycardia was treated and atropine is indicated as part of the premedication schedule because of hypersensitivity to cholinergic drugs.

A decreased sensitivity of the respiratory centre to carbon dioxide and hypoxia in these cases has been reported (Filler et al., 1965). For this reason, as well as because it is our normal practice in small infants, intermittent positive pressure ventilation was employed using 30 per cent oxygen in the inspired gas. At the end of operation no difficulty was experienced in restoring spontaneous ventilation.

The defect in acetylcholine metabolism, storage and release (Moses et al., 1967) taken in conjunction with the observations on nerve conduction (Brown and Johns, 1967) suggest that an altered response to muscle relaxants may be anticipated. This sort of problem is more likely to arise with tubocurarine but in our case the response to suxamethonium appeared to be entirely normal.

It is important to record negative results and, in view of the ominous warnings of anaesthetic disaster in these patients referred to in the literature, this is a record of an uneventful anaesthesia for a case of familial dysautonomia. The use of moderately heavy sedation, atropine and propranolol probably played a significant part in preventing vasomotor crises. The use of suxamethonium permitted gentle intubation at a very light level of anaesthesia without hypoxia and the response was normal.

It is possible that previous cases earned the reputation of being “bad risks” because of inadequate preparation and because any minor problem encountered would in all probability cause an exaggerated vasomotor response.

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REFERENCES

ANESTHESIE CHEZ UN MALADE PRESENTANT UNE DYSAUTONOMIE FAMILIALE (SYNDROME DE RILEY-DAY): OBSERVATION D'UN CAS

SOMMAIRE
Il est fait état d'un cas de dysautonomie familiale (syndrome de Riley-Day). On rapporte en détail la technique anesthésique utilisée tandis que l'on procédait à une gastrotomie et à une cure de hernie. Il est possible que l'obtention d'une sédation modérée parallèlement à l'administration de propranolol conjointement à l'atropine, à titre de prémédication, soit responsable de la conduite sans incident de l'anesthésie. L'étude physio-pathologique de cette affection est présentée sous une forme intéressant directement l'anesthésiste qui doit prendre en charge l'anesthésie dans un tel cas.
ANAESTHESIE EINES AN FAMILIÄRER DYSAUTONOMIE LEIDENDEN PATIENTEN (RILEY-DAY SYNDROM)

ZUSAMMENFASSUNG
Es wird ein Fall von familiärer Dysautonomie (Riley-Day Syndrom) beschrieben, und über Einzelheiten der angewandten Anaesthesie-Technik während einer Gastrostomie und einer Hernienkorrektur berichtet. Der Patient wurde maßig stark sediert und mit Propanolol und Atropin praemediziert, was einen ereignislosen Verlauf der Anaesthesie garantierte. Die Patho-Physiologie dieser Krankheit wird in Anbetracht der Bedeutung für den Anaesthesisten, der die Führung eines solchen Falles übernimmt, dargestellt.

ANESTESIA PARA UN PACIENTE CON DISAUTONOMIA FAMILIAR (SÍNDROME DE RILEY-DAY): COMUNICACIÓN DE UN CASO

RESUMEN
Es presentado un caso de disautonomía familiar (síndrome de Riley-Day). Se informa sobre los detalles de la técnica de anestesia empleada mientras se efectuaba una gastrostomía y reparación de hernia. Una sedación bastante intensa y propranolol con atropina como premedicación pueden ser los factores que permitieron una anestesia sin complicaciones. La fisiopatología de esta enfermedad es discutida en relación con las implicaciones para el anestesista que es encargado del cuidado de tales casos.

THE SOCIETY FOR ANAESTHESIA AND REANIMATION OF THE GERMAN DEMOCRATIC REPUBLIC is to organize the
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The meeting will be held together with “Anaesthesia 72” in the Hygienemuseum in Dresden from JUNE 5 to JUNE 9, 1972.

Programme
1st day Brain function under anaesthesia after skull-brain lesions, and after reanimation.
2nd day The status of electronic data processing in anaesthesiology—perspectives and prognosis.
3rd day Round-table discussion, including anaesthesiologists, medical technicians and medical engineers, concerning recent developments in patient supervision.
4th day Training and education in anaesthesiology, with special reference to specialization and sub-specialization.

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