Anaesthetic management of a patient with familial amyloid polyneuropathy of the Portuguese type

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Although familial amyloid polyneuropathy of the Portuguese type (FAP-PT) was first described in 1952, there is little in the medical literature detailing the anaesthetic management of such patients. FAP-PT is a disease with multiple clinical manifestations which include disturbances of sensibility, progressive paresis starting in the lower extremities, autonomic dysfunction, cardiac conduction disturbances, gastro-intestinal disorders, nephrotic syndrome, sexual and sphincter disorders, extreme emotionalism and apprehension. Several intermingling problems have to be considered in the anaesthetic management of each individual case.

In our patient a sinus dysrhythmia resolved after isoflurane and this seems to be a good choice for general anaesthesia in patients with FAP-PT, if they are in an early stage of heart involvement.

Key words

ANAESTHETICS, VOLATILE: isoflurane; HEART: arrhythmia, sinus; INHERITED DISEASE: familial amyloid polyneuropathy, Portuguese type.

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Familial amyloid polyneuropathy of the Portuguese type (FAP-PT) – Portuguese amyloidosis or Andrade's disease – is a progressive sensorimotor polyneuropathy with autonomic disturbance. Inheritance is autosomal dominant and manifestations usually begin in middle adult life lasting some seven to ten years, with a high mortality rate.¹ Neurovegetative disturbances and cardiac dysrhythmias are encountered early and usually constitute major anaesthetic problems.²⁻⁴ FAP-PT affects families of the North-west coast of Portugal and of emigrants from this area. Similar types of familial amyloid polyneuropathy (FAP) have been reported from Japan, England, Scandinavia and the USA.⁵ The following case report describes a sinus dysrhythmia which resolved with isoflurane, in a patient with FAP-PT, in an early stage of heart involvement.

Case report

A 34-year-old 45 kg female teacher, height 154 cm, was scheduled for multiple dental extractions. She was diagnosed as having FAP-PT with symmetrical muscular weakness and atrophy of the lower limbs, slight tongue paresis and speech difficulties, cardiac arrhythmia with atrial premature beats and runs of paroxysmal supraventricular tachycardia, and orthostatic hypotension. No respiratory, hepatic, or renal involvement was noticed. Laboratory investigation showed: haemoglobin 12.4 g · dl⁻¹, haematocrit 43 ml · dl⁻¹ and total serum proteins 5.7 g · dl⁻¹.

Past history revealed four episodes of sudden arterial hypotension following stress and/or anaesthetic procedures. During a plasmapheresis treatment, arterial blood pressure suddenly decreased to 60/35 mmHg. An attempt to perform multiple dental extractions under local anaesthesia had failed because severe tachycardia with arterial hypotension, respiratory distress and loss of consciousness developed after the infiltration of two per cent lidocaine with 1:200,000 epinephrine. We could neither confirm nor rule out the possibility of an anaphylactic reaction to lidocaine, sodium metabisulfite or methyl-

paraben. A general anaesthetic was postponed because severe hypotension occurred after intravenous thiopentone. Finally, dental extractions under hypnosis were cancelled because of a fall in blood pressure to 60/30 mmHg.

Preoperative evaluation revealed a very anxious patient who refused local anaesthesia and repeatedly demanded general anaesthesia. Premedication consisted of diazepam 5 mg PO 45 min before surgery. Arterial blood pressure was monitored by means of an automatic cuff (Dinamap) with paper record; heart rate and lead MC5 of the ECG were continuously monitored by a Hewlett Packard monitor with paper record. Upon arrival in the operating room the patient was still very anxious, with a blood pressure of 145/70 mmHg and the ECG showed a non-respiratory dependent sinus arrhythmia with phasic acceleration-deceleration and normal A-V conduction, with a mean heart rate of 78 beats $\cdot$ min⁻¹. A peripheral IV line was inserted. General anaesthesia was induced with midazolam 7.5 mg IV, fentanyl 0.05 mg IV, and inhalation of N₂O (60 per cent), O₂ and isoflurane (0.5 per cent). Under manually assisted ventilation anaesthesia was gradually deepened with isoflurane up to 2.5 per cent (inspired concentration). At this concentration the surgical plane of anaesthesia was reached, with an arterial blood pressure that progressively decreased to 79/38 mmHg. As soon as the patient was asleep the ECG became normal at a fixed sinus rate of 70 beats $\cdot$ min⁻¹. Laryngoscopy and nasotracheal intubation were carried out under oxygen-isoflurane anaesthesia and anaesthesia was maintained with isoflurane (1–1.5 per cent) using manually assisted ventilation.

Dental extractions were completed in 28 min, while the ECG stayed normal and stable. Systolic blood pressure varied between 97–76 mmHg and the diastolic pressure ranged from 55 to 35 mmHg during the surgical procedure. Some 35 minutes after induction, anaesthesia was discontinued, the pharynx was aspirated carefully and the nasotracheal tube removed. When consciousness returned, phasic non-respiratory rate dependent sinus arrhythmia resumed at an average rate of 66 beats $\cdot$ min⁻¹ and the blood pressure remained stable at 116–64 mmHg. The postoperative period was uneventful.

Discussion

The pathological picture of FAP-PT is one of accumulation of abnormal prealbumin material (amyloid) in the peripheral nerve fibres. Amyloid first affects the finest branches of sensory, motor and autonomic nerves as well as the intracardiac conduction tissue^{1,6} leading to their degeneration.

Anaesthetic implications of FAP-PT are related to skeletal muscle, autonomic system and heart conduction. Skeletal muscle paralysis is symmetrical and progres-

sive and finally affects respiratory function. Motor involvement may affect the pharyngeal muscles and present an increased danger of aspiration. Our patient had tongue but not pharyngeal paresis with well preserved respiratory function. Succinylcholine may produce a sudden and dangerous hyperkalaemia in several neuromuscular diseases⁷ and is theoretically contraindicated in FAP-PT. Pancuronium seems to be a good choice.⁴

Dysfunction of the autonomic nerves and intracardiac conduction disturbances dictate the anaesthetic management of patients with FAP-PT. Dysfunction of the autonomic nerves includes decreased sympathetic tone and vagal denervation.³ These features may lead to increased susceptibility to cardiodepressive anaesthetics, resulting in depressed cardiac automaticity and conductivity, which may cause sinus arrest in more advanced phases of the disease.⁵ Impulse formation and conduction disturbances, hyporesponsiveness to isoproterenol and orthostatic hypotension² are the early cardiovascular features of the disease. According to the time of symptomatic evolution, different patterns of heart involvement can be present and a progressive deterioration of intracardiac conduction, from sinus node disease or first degree A-V block to advanced forms of A-V block, even complete heart block, have been identified.^{2,3} Sudden, severe bradycardia, due to complete heart block, as well as sinus arrest have been described following induction of general anaesthesia and atropine has been reported as useless or potentially detrimental.⁴ Congestive and restrictive heart failure are rare.²

Most important, we observed that by the time of loss of consciousness, the sinus arrhythmia reverted to a fixed sinus rhythm. The arrhythmia was a dysautonomic pattern which is "normal" in the early stages of FAP of the Portuguese type. As this sinus arrhythmia resolved during isoflurane anaesthesia and reappeared when isoflurane was discontinued, we conclude that the antiarrhythmic effect of isoflurane was real and not coincidental. Bosnjak and Kampine⁹ found that, in the isolated guinea-pig heart halothane, enflurane and isoflurane similarly decreased the rate of phase 4 depolarization of SA node cells, but that there were differences between these observations and those commonly noted in intact animals and humans. Although isoflurane, halothane, and enflurane decrease systemic arterial pressure, the mechanisms differ.¹⁰ Isoflurane appears to depress arterial pressure mainly by reducing total peripheral resistance. In contrast, halothane and enflurane primarily affect the blood pressure by reducing cardiac output.¹⁰ Briefly, isoflurane seems to be an acceptable choice for patients with FAP-PT compared to intravenous balanced anaesthesia. Whether or not midazolam and fentanyl contributed to the antiarrhythmic effect of isoflurane remains unanswered.

In conclusion, isoflurane seems to be an adequate choice of anaesthesia for patients with FAP-PT, in an early stage of heart involvement.

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Résumé

La polynévrite amyloïde familiale de type portugais (PAF-TP) a été décrite par Corino de Andrade en 1952. Cette maladie qui se transmet héréditairement sur le mode autosomique dominant constitue un défi sérieux pour les anesthésistes. De par son caractère inexorablement évolutif et de par ses répercussions multiples, la PAF-TP pose des problèmes dont la variété et la gravité doivent être pondérées pour chaque cas individuelle. Ces problèmes peuvent être schématisés comme suit: troubles de la sensibilité (hypoesthésies, analgésie, paresthésies); parési progressive à partir des membres inférieurs (hyperkaliémie reliée à la succinylcholine, monitoring neuromusculaire lors de l'emploi des non-dépolarisants, atteinte respiratoire possible); dysautonomie (hypotension orthostatique, dénerivation vagale, hyposensibilité à l'isoprotérénol); troubles de la conduction intracardiaque (dysrythmies plus ou moins sévères: besoin d'entraînement électrosystolique temporaire); troubles gastro-intestinaux (diarrhée, malnutrition, déséquilibre électrolytique, hypovolémie); atteinte rénale (syndrome néphrotique); impuissance sexuelle, dérèglement des sphincters, troubles psychiques et grande anxiété.

Nous présentons un cas clinique (femme de 34 ans) où l'isoflurane a normalisé une arythmie sinusale non reliée à la respiration. Nous discutons les implications anesthésiologiques de la FAP-TP et nous soulignons que cette maladie mérite une plus grande attention de la part des chercheurs en anesthésiologie.