

The Growing Appetite for Vegan Anaesthesia

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Introduction

In recent years there has been an increasing number of vegans and vegetarians worldwide.^{1,2,3} This introduces a novel and unfamiliar challenge for anaesthesia providers as the incidence of patient refusal of animal-containing drugs, of which there are many^{6,7}, with a subsequent request for alternatives is rising.^{4,5,6} This is especially challenging as the perioperative assessment and discussion does not traditionally broach the subject of patient preference relating to veganism. Moreover, while some literature exists about the general suitability of common drugs⁴, there is a dearth of literature on this matter under the purview of anaesthesia.

The aim of this article is to discuss the perioperative considerations in delivering safe and patient-centered anaesthetic care to patients who strictly adhere to the vegan and vegetarian philosophy. Furthermore, it purports to provide relevant information pertaining to potential drug alternatives.

Vegans and Veganism

Veganism is a lifestyle choice which seeks to exclude, as far as is possible and practicable, all forms of exploitation of, and cruelty to, animals for food, clothing or any other purpose.⁸ Historically, records of vegetarianism date back to as early as the 7th century B.C.⁹ A vegetarian is someone who lives on a diet of grains, pulses, legumes, nuts, seeds, vegetables, fruits, fungi, algae, yeast and/or some other non-animal-based foods with or without dairy products, honey and/or eggs. A vegetarian does not consume foods which consist of, or their production involves any part of the body of a living or dead animal. This includes meat, poultry, fish, shellfish, insects, by-products of slaughter or any food made with processing aids created from these.¹⁰ By-products of slaughter include gelatin, isinglass (used for fining of beer and wine) and rennet. There are several types of vegetarians based on the inclusion or exclusion of eggs and milk products - lacto-ovo-vegetarians, lacto-vegetarians and ovo-vegetarians. Vegetarians generally abstain from the consumption of meat and flesh and may also include abstention from by-products of animal slaughter. Vegans abstain from the consumption of all animal derived products.

Raw food vegans and/or vegetarians believe in eating only plant-derived foods that have not been cooked, processed, or otherwise altered from their natural state.¹² Vegan and vegetarian philosophy are not limited simply to a dietary lifestyle but extends to a profound moral and political commitment not only to matters of food but also to wearing or using animal products for any purpose.¹⁰

Health Implications of Vegan Diet

The nature of vegan diet confers a relatively higher intake of dietary fiber, magnesium, folic acid, vitamins C and E, iron and phytochemicals. Vegan diets also tend to be lower in calories, saturated fat and cholesterol. However, these are also deficient in vital dietary components such as long chain omega-3 fatty acids, Vitamin D, calcium, zinc and vitamin B12. As a consequence of the latter, the addition of fortified foods is necessary in order to prevent conditions associated with vitamin deficiencies.¹¹

On a whole, vegans and vegetarians tend to have lower incidence of cardiovascular disease, diabetes and are comparatively thinner with less body fat¹² which bears its own anaesthesia related benefits in terms of patient risk.

Clinical Implications

As alluded to above, the positive health effects of a fortified vegan diet are numerous.¹¹ Such patients would, in the absence of significant co-morbidities, generally be deemed low risk candidates for routine anaesthesia.

Nevertheless, certain forms of veganism such as raw veganism have been found to be associated with lower bone density in clinically important areas.¹² Patient positioning for prolonged surgery or the necessity of compressions in the event of cardiac arrest¹³ are important considerations. Vegans without supplementary dietary fortification with associated vitamin D and B12 deficiencies may present with osteomalacia or anaemia both of which may require preoperative optimisation and intraoperative attention. Enteral or parenteral supplementation of the aforementioned deficits is easily achieved preoperatively and is in keeping with the vegan and vegetarian philosophy. Anaemia in a vegan patient may prompt further investigations to out rule a non-dietary cause.

Chronic B12 and folate deficiency in parturients are well known to be associated with increased incidence of neural tube defects of the newborn¹⁴ which could result in clinical ramifications perinatally.

Further consideration must also be afforded for patients with a lower body mass index as drugs that would not otherwise require weight-based dosing may require adjustment at the extremes of weight to avoid toxicity.¹⁵

Conflicting drugs and alternatives

All drugs used in practice are required to undergo animal testing.¹⁷ Moreover, a considerable proportion of drugs, in their final form, are also found to contain animal products.

A limited study on patient and physician awareness of drugs containing animal products, however, revealed that both patients and physicians alike were unaware of animal-based ingredients that were contrary to the patients' religious beliefs.¹⁸ The majority of the physician group (70%) deemed that disclosure of the fact to the patient was important.¹⁸

As part of this review a thorough product specification review of the most common drugs used in our anaesthesia practice was carried out. The drug forms containing animal products were highlighted as either compatible with vegetarians (depicted in green) and incompatible with both groups (depicted in yellow). Drugs that are appropriate for the vegan and vegetarian patient population are provided along with potential alternatives in so far as is reasonably possible.

The table (**Table 1**) provides a rough guide only as different manufacturer formulations might contain different additives. Reference to the manufacturer's Summary of Product Characteristics (SPC) is recommended for clarification.

Table 1: Drug Formulations

Drug	ANIMAL	TYPE OF ANIMAL PRODUCT	ALTERNATIVE
Adrenaline	No		
Atropine	No		
Amiodarone	No		
Buscopan (hyoscine)	Yes	White Beeswax, Talc	Topical form,
Bisoprolol	Tablet form -Yes	Lactose monohydrate	i.v. form
Bupivacaine	No		
Capsaicin	No		
Chlorphenamine	No		
Clonidine Tablet	Yes	Lactose, Talc	IV form
Clonidine IV	No		
Dexamethasone	No		
Doxapram	No		
Dexketoprofen (keral)	No		
Diazepam (oral, i.v., rectal)	Tablets -Yes	Lactose	IV/PR
Digoxin	Tablets -Yes	Lactose	IV
Diclofenac Sodium	Suppositories yes, Tablets yes	Suppositories: Hard fat	IV
		Tablets - Lactose monohydrate, Talc	
Dopamine	No		
Dobutamine	No		
Ephedrine	No		
Esmolol	No		
Flumazenil	No		
Gelofusine	Yes	Gelatin	Other colloids.
Glucose	No		
Glycopyrrolate	No		
Glyceryl Trinitrate	No		
Heparin	Yes	Sodium heparin (from porcine	Argatroban ⁵
Hartmann's	No		

Table 1: Drug Formulations (Continued)

Drug	ANIMAL	TYPE OF ANIMAL PRODUCT	ALTERNATIVE
Hydrocortisone	No		
Insulin	No		
Intralipid	Yes	Purified egg phospholipids	Not available
Ketamine	No		
Keral (dexketoprofen)	No		
Lidocaine	No		
Labetalol (IV)	No		
Levetiracetam	Yes	Talc	Not available
Metaraminol	No		
Magnesium sulphate	No		
Midazolam (i.v. or buccal)	No		
Milrinone	No		
Morphine	No		
MST	No		
Naloxone	No		
Nifedipine	Yes (capsules)	Lactose monohydrate	Tablets
Noradrenaline	No		
Nicardipine	Capsules yes	Gelatin	IV form
Ondansetron	Tablets Yes	Lactose	IV form
Pancuronium	No		
Paracetamol (including	Tablets - Yes,	Tablets - Talc	Oral
Phenylephrine	No		
Phenytoin	No		
Pregabalin (Lyrica)	Yes	Lactose, Gelatin, Talc	
Protamine	No		
Propofol	Yes	Egg phospholipid	Thiopentone,
Quetiapine	Tablets Yes,	Lactose monohydrate	Oral
Ranitidine (oral and i.v.)	No		
Rocuronium	No		
Salbutamol	No		
Seretide	Yes (Accuhaler)	Lactose monohydrate	Evohaler
Sugammadex	No		
Suxamethonium	No		
Tinzaparin	No		
Temazepam	Tablets yes,	Lactose monohydrate	Oral solution
Tramadol	Tablets yes,	Xanthan gum	IV
Thiopental / Thiopentone	No		
Tranexamic Acid	Tablets Yes	Talc	IV
Zopiclone	Yes	Lactose monohydrate	Not available
Fentanyl	No		
Fentanyl Lozenge	No		
Remifentanil	No		
Tapentadol	Yes	Lactose	Not available
Targin (naloxone +	Yes	Lactose monohydrate	Not available
Oxycodone (oxycotin)	Yes	Lactose monohydrate	Not available
Oxycodone (oxynorm)	Yes	Gelatin	Other opioids
Oramorph	No		

*Note: Paediatric drug formulations are also often available as suspension forms with different inactive ingredients. Check SPC for clarification.

Consent

Consent is a ubiquitous factor in the practice of medicine. Initiating a discussion about the inactive ingredients in commonly used drugs as part of the perioperative assessment might currently be considered beyond the scope of the anaesthesiologist. Every drug used in practice is required to undergo animal testing.¹⁷ A limited study on patient and physician awareness of drugs containing animal products revealed that both patients and physicians alike were unaware of animal-based ingredients that were contrary to the patients' religious beliefs.^{16,18} The majority of the physician group (70%) deemed that disclosure of the fact to the patient was important.¹⁸ The question then arises as to whether the responsibility lies with the patient or the physician in terms of initiating this conversation. In the absence of literary guidance, it is suggested that once the patient has declared their dietary status, the relevant information should be disclosed, and the option of alternatives considered.

Delivering safe and patient centered health care may give rise to a number of challenges in an ever changing and culturally diverse society. Up to now, there has been minimal literary guidance on the use of animal-free perioperative medications.

If the patient expresses preferences against animal-based products, a number of suitable and equally effective alternatives may be offered. This should be done at the discretion of the anaesthesiologist where deemed appropriate.

In conclusion, the increasing numbers of vegans and vegetarians worldwide is likely to impact on our practice. As clinicians, we should be in a position to provide anaesthetic care tailored to the individual patient's needs. The table provided is a compilation of the most commonly used drugs in our practice, highlighting unsuitable drugs and could be used as guidance to choosing equivalent alternative where available.

Declaration of Conflicts of Interest:

The authors have no conflicts of interest to declare.

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