

## Sevoflurane and ventricular tachycardia

### Introduction

Sevoflurane (Sevorane®) is an anaesthetic registered for *induction and maintenance of anaesthesia in general clinical and ambulatory surgery in adults and children* [1]. It was granted a marketing authorisation in 1995. Sevoflurane is administered as liquid inhalation gas diluted in water, contains no additives and belongs to the group of halogenated anaesthetics. Section 4.4, warnings, of the SPC mentions the risk of atrioventricular junctional rhythm. Section 4.8 lists bradycardia in elderly patients.

### Reports

Until 12 December 2005 the Netherlands Pharmacovigilance Centre Lareb has received 7 reports of ADRs on sevoflurane concerning 6 patients, being four children and two adults. Three cases of ventricular tachycardia were reported in which two times a QT interval prolongation was detected.

Patient A is a 10-year-old boy who developed ventricular tachycardia with torsade des pointes several minutes after administration of sevoflurane. Concomitant medication was amoxicillin. Upon postoperative cardiac examination, the long QT interval found during anaesthesia was attributed to sevoflurane.

Patient B concerns a 14-years-old boy with leukaemia who received general anaesthesia for placement of a port-a-cath system. This case has been published in literature [2]. At the end of the procedure he developed a ventricular tachycardia without output, which resolved after cardiac massage and intravenous lignocaine. The authors concluded that the event was probably related to the prolonged QT interval due to the combination of cisapride and fluconazol and provocation with sevoflurane.

Patient C is a girl aged 14 who suffered from tachycardia, hypercapnia and hyperthermia about ten minutes after initialisation of sevoflurane anaesthesia. She recovered.

### Other sources of information

#### Literature

Volatile anaesthetics like halothane, isoflurane, and enflurane are well known to prolong the QT interval [3,4].

The first case report of intraoperative torsade de pointes during sevoflurane was published in 1998 [5]. A 65-year-old woman developed torsades des pointes ventricular tachycardia ten minutes after initiation of sevoflurane anaesthesia which

converted into ventricular fibrillation. The arrhythmias subsided upon discontinuation of sevoflurane and application of several DC countershocks while magnesium proved ineffective. This patient had no prolonged QT interval during the arrhythmias.

Kuenszberg *et al.* performed a blind randomised controlled study in unpremedicated women who underwent anaesthesia with either propofol or sevoflurane for surgery. In the sevoflurane treated group (n=18) the corrected QT interval (QTc) increased from 434±5 ms to 459±6 ms (mean±SEM) [6].

## Mechanism

Sevoflurane depresses  $I_K$  outward currents during the late repolarisation phase in isolated guinea-pig cardiac myocytes that would account for observed prolongation of action potential duration [7].

## Databases

The database of the Uppsala Monitoring Centre of the WHO contains 500 reports on sevoflurane. Rhythm related ADRs that were reported twice or more are listed in table 2.

Table 2. Number of reports of rhythm related ADRs on sevoflurane ROR in the WHO database.

ADR	n	ROR
bradycardia	32	10.2 (7.1-15)
tachycardia	30	5.4 (3.7-7.8)
tachycardia supraventricular	4	9.7 (3.6-26)
tachycardia ventricular	3	7.0 (2.2-22)
ecg abnormal	2	8.1 (2.0-33)
cardiac arrest	28	10.4 (7.1-15)
fibrillation atrial	4	4.3 (1.6-12)
fibrillation ventricular	2	5.2 (1.3-21)
heart block	4	27.2 (10-73)

## Conclusion

The association of ventricular tachycardia during sevoflurane anaesthesia was reported three times to Lareb. Ventricular tachycardia with or without QT interval prolongation with sevoflurane is a class effect of volatile anaesthetics and is supported by data from the WHO and literature.

## References

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