Clinical Reports

Unintentional intra-operative awareness during sufentanil anaesthesia for cardiac surgery

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Purpose: The aim of this clinical report is to describe a case of unintentional intraoperative awareness during sufentanil anaesthesia in a patient undergoing elective aortocoronary bypass grafting.

Clinical findings: After premedication with morphine (5 mg) and scopolamine (0.2 mg), this 51-yr-old woman received sufentanil ($10 \mu\text{g} \cdot \text{kg}^{-1}$), midazolam (4 mg) and isoflurane (0.3–0.4% end-tidal). The patient recalled specific events and discussions which took place in the operating room during surgery. This patient's report was clear and corroborated by operating room personnel. The patient denied having felt pain, anxiety or emotional distress.

Conclusion: Although awareness during opioid anaesthesia has been previously described with morphine and fentanyl, as far as we know this is the first clinical report of awareness with sufentanil. Given that recent efforts of early extubation in cardiac surgery patients may involve a reduction in the amount of opioid administered, this report serves as a reminder of the ever present potential for this disturbing complication.

Objectif: Rapporter une observation de reprise accidentelle de la conscience pendant l'anesthésie au sufentanil d'une

Key words

ANAESTHETICS, INTRAVENOUS: sufentanil;
COMPLICATIONS: awareness;
SURGERY: cardiac.

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patiente opérée pour une chirurgie de revascularisation myocardique non urgente.

Constatations cliniques: Après une prémédication à la morphine (5 mg) et à la scopolamine (0,2 mg) cette patiente de 51 ans a reçu du sufentanil ($10 \mu\text{g} \cdot \text{kg}^{-1}$), du midazolam (4 mg) et de l'isoflurane (téléexpiratoire 0,2–0,4%). La patiente s'est souvenue des événements spécifiques et des discussions qui se sont déroulées en salle d'opération pendant la chirurgie. Les faits rapportés étaient précis et ont été corroborés par le personnel de la salle d'opération. La patiente a nié avoir ressenti de la douleur, de l'anxiété ou de la détresse émotionnelle.

Conclusion: La reprise de conscience a déjà été rapportée avec la morphine et le fentanyl, mais d'après les auteurs, il s'agit ici du premier cas mettant en cause le sufentanil. Étant donné la tendance actuelle vers l'extubation précoce pouvant nécessiter une réduction de la quantité de morphinique, l'observation actuelle nous rappelle le danger constant de cette inquiétante complication.

We describe a case of unintentional intraoperative awareness during sufentanil anaesthesia in a 51-yr-old woman undergoing elective aortocoronary bypass grafting. The anaesthetic included premedication with morphine and scopolamine and intraoperative supplementation with midazolam and isoflurane. Although awareness during opioid anaesthesia has been previously described with morphine and fentanyl, there have been no reports of this complication with sufentanil.

Case report

A 51-yr-old woman was admitted for elective aortocoronary bypass grafting for crescendo angina and angiographic evidence of severe coronary artery disease. The history of the present illness included repeated hospital admissions for congestive heart failure with a diagnosis of ischaemic cardiomyopathy. A recent cardiac catheter-

ization was performed in order to investigate a crescendo pattern of angina. This revealed severe diffuse left ventricular dysfunction with a left ventricular ejection fraction of 20%, complete occlusion of the proximal left anterior descending artery and of the proximal right coronary artery, and subtotal (98%) occlusion of the left circumflex artery. She had a medical history of non-insulin dependent diabetes mellitus and reactive airways disease. Remote surgical history included tonsillectomy, cholecystectomy, and a total abdominal hysterectomy. The patient initially denied any previous anaesthesia-related problems. Her usual medications included: lorazepam 1 mg *po* BID *prn* for anxiety as well as diltiazem, nitroglycerin, digoxin, furosemide, mexilitine, cimetidine, captopril, metformin, gemfibrozil and salbutamol aerosol. The patient denied any history of ethanol or illicit drug abuse.

The patient was 94 kg in weight and 165 cm tall. Respiratory rate was 18/bpm, pulse $100 \cdot \text{min}^{-1}$ and BP 110/70 mmHg. Laboratory data revealed an elevated random serum glucose of $9.4 \text{ mmol} \cdot \text{L}^{-1}$ and a room air arterial PO_2 of 57 mmHg (O_2 saturation 94%). Her ECG showed sinus rhythm with a left bundle branch block. All other investigations yielded normal results.

The patient was scheduled for elective aortocoronary bypass grafting. Premedication consisted of two puffs of salbutamol aerosol, 5 mg morphine *im* and 0.2 mg scopolamine *im* 60 min before surgery. After placing the ECG recording leads (II and V₅), and the pulse oximeter probe on the left ear, the left antecubital vein was cannulated under local anaesthesia as was the right radial artery (for continuous measurement of arterial pressure). After three minutes of preoxygenation, anaesthesia was induced with 500 μg sufentanil *iv*. Vecuronium 10 mg and 2 mg pancuronium were given *iv* to facilitate tracheal intubation. A pulmonary artery catheter was inserted via the right internal jugular vein. Other monitors consisted of capnometry, anaesthetic agent concentration, and a temperature probe (nasopharyngeal). Anaesthesia was maintained throughout the operation with divided intravenous doses of sufentanil (Figure) to a total dose of 950 μg ($10 \mu\text{g} \cdot \text{kg}^{-1}$). In addition, isoflurane (end-tidal concentration 0.3–0.4%) was administered intermittently (from a vaporizer which was confirmed to be full) before and after cardiopulmonary bypass (CPB). A total of 4 mg midazolam was given during and immediately after CPB. Neuromuscular relaxation was maintained with intermittent boluses of pancuronium (Figure). During CPB, the nasopharyngeal temperature was reduced to 29°C. Aortocoronary bypass grafting was performed with four saphenous vein grafts. Weaning from CPB was achieved with 1 g calcium chloride and a dobutamine infusion of 3–5

	1	2	3	4
time (hour)	08	09	10	11
suf (μg)	500	100	100	50 50 50
midaz (mg)			2	2
ET iso (%)	0.4 0.3 0.4			0.3 0.4 0.3
vec (mg)	10			
panc (mg)	2	2	2	4
dob ($\mu\text{g} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$)			3	4 5

1 CPB on
2 CPB off
3 foot movement
4 eyes open leaving OR

FIGURE Anaesthetic record of aortocoronary bypass operation during which recall of intraoperative events occurred. (CPB: cardio-pulmonary bypass, suf: sufentanil, midaz: midazolam, ET Iso: end-tidal isoflurane, vec: vecuronium, panc: pancuronium, dob: dobutamine).

$\mu\text{g} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$ *iv* which was continued to the end of the case.

During sternal closure, 15 min after discontinuation of CPB, the patient moved her left foot from side to side. She was then reassured by the anaesthetist and given 2 mg midazolam and 50 μg sufentanil *iv*, followed by 2 mg pancuronium. The end tidal isoflurane concentration at the time of intraoperative movement was not recorded. There was no evidence of diaphoresis and the heart rate for the hour following CPB varied between 87 and $98 \cdot \text{min}^{-1}$. As well, there were no episodes of hypertension during this period. The patient opened her eyes to verbal command upon leaving the operating room.

On the following day, the patient claimed that she was aware of intraoperative events. Her recount began with her description of hearing discussion of the adverse outcome of a patient who could not be weaned from CPB on the previous day and of the complexity of her own operation. She denied pain or anxiety when she was aware but did sense "touching and pressing" on her chest. The patient tried to indicate that she was awake by unsuccessfully attempting to open her eyes, vocalize and move her arms. Finally, she was able to move her left foot laterally. She also described technical details discussed by the surgeons such as inspecting "the back of the heart" and placing pacemaker wires. Her last recollection from this period was hearing the surgeons discuss sternal closure. This entire recount was unequivocal and corroborated by staff present during the operation. The only factual error made was regarding the position of her arms which she claimed were at 90° from her body when, in fact, they were tucked in by her sides. The patient was interviewed by anaesthesia staff on the first postoperative day and prior to discharge. The patient, on further questioning, also described a similar event during anaesthesia about 20 yr earlier. It was not possible to obtain the record of the anaesthetic during which the patient first experienced awareness.

The problem of awareness was discussed with the patient who was given the opportunity to express her thoughts and feelings. The patient was discharged home ten days after her surgery.

Discussion

We present a case of recall of intraoperative awareness in a 51-yr-old woman undergoing elective aortocoronary bypass grafting during sufentanil-based anaesthesia supplemented with isoflurane and midazolam. The patient recalled intraoperative events which occurred after discontinuation of cardiopulmonary bypass during a period of time leading up to sternal closure. The patient did not recall any sensation of pain or anxiety although she did experience the urgent need to alert the operating room staff that she was aware. The dose of sufentanil ($10 \mu\text{g} \cdot \text{kg}^{-1}$) used for induction and maintenance of anaesthesia is at the lower end of that recommended for a pure sufentanil technique¹ and was supplemented with midazolam and isoflurane.

We have identified three factors possibly increasing the risk of intraoperative awareness in this patient: obesity, a previous episode of awareness and preoperative use of a benzodiazepine (lorazepam). Although not commonly considered a risk factor for intraoperative awareness,²⁻⁴ Guerra, in a review of awareness and recall, noted obesity to be the only common factor in 37% of a series of cases in which no other factor could be implicated.⁵ Previous awareness may indicate an unusual tolerance to anaesthetic agents. Chronic benzodiazepine use may have predisposed this patient to intraoperative awareness through alterations in drug clearance or benzodiazepine receptor regulation. In fact, it is also possible that other of the medications this patient was taking preoperatively caused hepatic microsomal enzyme induction thus leading to increased metabolism of benzodiazepines and opioids.

This is the first report of awareness with sufentanil. Recall of intraoperative awareness during anaesthesia with morphine and fentanyl has been reported⁶⁻¹¹ and the difficulty of reliably producing unconsciousness with opioids has been addressed.^{12,13} Why then has there been no previous report of awareness with sufentanil? Awareness with sufentanil may be as frequent as with other opioids but is not reported either because of concerns regarding medico-legal liability or because the risk of awareness with opioids is already well known. It is also possible that the incidence of awareness with opioids in general has been reduced because the knowledge of this risk has led to more frequent supplementation with other agents such as benzodiazepines and/or volatile agents. It is however, equally possible that the incidence of awareness with sufentanil is less than with

fentanyl. Supporting this hypothesis, Bowdle and Ward showed that sufentanil when given in equipotent doses (based on EEG measures) is more likely to produce unresponsiveness to verbal command and loss of eyelid reflex than fentanyl when given without any other induction agent or premedication.¹⁴ On the other hand, some animal data do not support a difference between sufentanil and fentanyl regarding their anaesthetic sparing effect.¹⁵ Clearly, this issue remains unresolved. Given that recent efforts of early extubation in cardiac surgery patients may involve a reduction in the amount of opioid administered, this report serves as a reminder of the ever present potential for this disturbing complication.

It is important to mention that on follow-up, one day and two weeks postoperatively, the patient was interviewed and encouraged to discuss her recollection of awareness. This follow-up included empathic listening, explicit acceptance of the occurrence of awareness as well as an explanation to the patient of the nature of this complication. Interestingly, this patient denied any emotional distress at the time of awareness or any other time thereafter.

Although amnestic agents may often prevent conscious recall,¹⁶ recall of awareness occurred in this case despite the administration of amnestic agents (scopolamine 0.2 mg preoperatively and midazolam 4 mg intraoperatively). As was previously observed by Moerman *et al.*,¹⁷ this indicates that recall of awareness can sometimes occur despite the administration of amnestic agents.

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