

# Awareness during Cardiopulmonary Resuscitation

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## ABSTRACT

Checking responsiveness is the mainstay in cardiopulmonary resuscitation (CPR). It is rare in the clinical situation when the patient requires resuscitation despite the presence of wakefulness. We report a case in which the patient presented with flat arterial line and absence carotid pulse while he was awake. A thorough literature review will also be discussed.

**Keywords:** Cardiopulmonary resuscitation, Life support, Responsiveness.

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## INTRODUCTION

Cardiac arrest (CA) is almost always associated with loss of consciousness. Consciousness during CA and cardiopulmonary resuscitation (CPR) is rare,<sup>1-3</sup> but it is most likely with high-quality CPR with few interruptions, adequate depth of chest compression, and use of mechanical devices for chest compression. We describe the course of a patient who was awake and communicating during CPR. However, despite timely diagnosis and early initiation of CPR, the patient died.

There are no recommendations on the management of consciousness or awareness during CPR from the International Liaison Committee on Resuscitation (ILCOR).<sup>4</sup> All guidelines for the resuscitation of CA recommend checking responsiveness before starting CPR if the patient is unresponsive. Both basic life support and advanced cardiac life support recommend starting cardiac compressions if the patient shows no responsiveness with absent pulse during carotid check.

## CASE DESCRIPTION

A 62-year-old man with diabetes, hypertension, and ischemic heart disease presented with abdominal pain, abdominal distention, absolute constipation, and weakness, which began 2 days prior to his presentation. He also reported 10 kg weight loss in the preceding 2 months.

Intestinal obstruction secondary to mass in cecum was diagnosed on computed tomography of the abdomen. So, emergency exploratory laparotomy, total colectomy, and ileostomy were performed. The patient was transferred to the intensive care unit (ICU) postoperatively and extubated onto bilevel positive airway pressure (BIPAP) 24 hours later. He remained hemodynamically stable but BIPAP dependent for the next 24 hours. While the ICU consultant was on morning round his nurse noticed flattening of the right radial arterial line trace. However, the patient was awake and speaking to his son, describing mild chest tightness. Sinus rhythm was observed on electrocardiogram monitoring. The arterial line and transducer were flushed and assessed for faults while the left brachial and carotid pulses were palpated.

Pulses were not palpable, and CPR was started to manage pulseless electrical activity. During CPR, the patient's eyes remained open and he obeyed simple commands (e.g., to open his mouth) despite the compression-based arterial wave form which became flat during pulse check. An endotracheal tube was inserted without

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sedation or analgesia. The patient lost consciousness after the third cycle of CPR. Return of spontaneous circulation was not achieved despite 40 minutes of CPR. So, the patient's family was informed, further attempts at resuscitation were stopped and death was declared.

During CPR, several healthcare providers were involved but none of them had ever experienced such situation in which the patient was fully awake during CPR. It was distressing to all of them, and they were uncertain about the management of patient during CPR related to his consciousness. Either such patients should be sedated/restrained or not.

## DISCUSSION

Patient awareness during CA and CPR is thought to be extremely rare. It can cause diagnostic uncertainty and delay management. Moreover, it may be extremely distressing for the patient, their family, and healthcare professionals.

The delivery of high-quality CPR with minimum interruptions, adequate depth of chest compression, and the use of mechanical devices can generate 20–30% of the prearrest cardiac output.<sup>5</sup> This can maintain cerebral perfusion pressure and allow consciousness.<sup>6</sup>

Manual chest compression rarely produces a mean arterial pressure (MAP) of over 40 mm Hg.<sup>4</sup> Two cases have reported that patients were awake with MAP over 50 mm Hg.<sup>4</sup> Conversely, there are reports of higher MAP being achieved during CPR but patients remained unconsciousness.<sup>7</sup> Individual factors, such as autoregulation of cerebral blood flow,<sup>8</sup> ischemic threshold,<sup>3</sup> and comorbidities,<sup>2</sup> influence brain oxygenation and may contribute to CPR-induced consciousness. Furthermore, early CPR and skilled CPR

by trained personnel (e.g., in-hospital witnessed arrest) are likely to be key factors leading to CPR-induced consciousness.<sup>9</sup>

Lundsgaard et al. reviewed seven papers on consciousness during CPR and concluded that awareness during CPR or CPR-induced consciousness remains rare but is increasingly reported. Two decades ago Martens and Mullie asked whether a guideline was required for sedation during CPR.<sup>5</sup> Yet, there are still no recommendations on the management of consciousness or awareness during CPR from the ILCOR.<sup>4</sup>

Further research is needed before definite guidance can be given. Local advice should be followed regarding the use of sedation and analgesia during CPR.<sup>10</sup>

In the book *Life after life*, Moody<sup>11</sup> described the experiences of 150 people who had been close to death.<sup>4</sup> He coined the term near-death experiences for the recurring features reported by these survivors. Moody's observations were not only limited to the survivors of CA but also included people considered sufficiently ill to have died without medical intervention. Near-death experiences have been reported in up to 12–18% of CA survivors.<sup>12</sup>

Parnia et al. conducted a 4-year prospective multicenter observational study on awareness during CPR. They interviewed 140 CA survivors to measure<sup>1</sup> awareness/memories during CA and<sup>2</sup> objectively verified claims of awareness using specific tests. Of their cohort, 46% had memories with seven major cognitive themes as follows: fear, animals/plants, bright light, violence/persecution, déjà vu, family, and recalling events post CA. Importantly, 2% described awareness with explicit recall of "seeing" and "hearing" actual events related to their resuscitation. One patient had a verifiable period of conscious awareness at a time when cerebral function was not expected. They concluded that CA survivors commonly experience a broad range of cognitive themes, with 2% exhibiting full awareness. Other recent studies have also suggested that consciousness may be present despite clinically undetectable consciousness. This may contribute to post-traumatic stress disorder (PTSD) and other cognitive deficits post CA.<sup>13</sup> Gray<sup>14</sup> also reported a case who was aware during CPR. He survived and reported chest discomfort during CPR.

Now question arises whether these patients should be sedated or not during CPR. Because Olausen et al.<sup>15</sup> reported two associations with CPR-induced consciousness (CPRIC). It was independently associated return of spontaneous consciousness with and survival to hospital discharge and those patients who received opiates, benzodiazepines, or muscle relaxants during CPR took longer time to obtain return of spontaneous consciousness and were less likely to survive to discharge.

## CONCLUSION

As more advanced paramedic services adopt evidence-based and clinically proven resuscitation practices, our concern is there will be a growing number of patients who will be aware during

resuscitation after CA. This necessitates further research, education, and training of hospital care providers in the management of patients experiencing CPR-induced consciousness. We also need to develop guidelines to handle such situations in a better way.

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