Editorial
ISSN (Print): 2394-6954
ISSN (Online) : 2394-9775
Karnataka Anaesthesia Journal Vol 17(3&4), July-December 2019, p. 51-54
DOI: 10.4103/kaj/2019/v17i3-4/164161

Conscious Sedation for Awake Fibreoptic Intubation – How Conscious and Cautious should we be?

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The first intubation for the purpose of providing anaesthesia was reported by Dr. William Macewen, a surgeon, in 1878 using a blind digital technique[1]. First fibreoptic intubation was performed by Dr. Peter Murphy an English anaesthesiologist in 1967 using a surgical choledochoscope. Anaesthesiologists journey towards management of difficult airway has moved from direct laryngoscopy and blind nasal intubation to THRIVE and ECMO. With the aid of ultrasound in airway assessment, regional nerve blocks and availability of various newer local anaesthesia techniques and gadgets, one may choose to maintain spontaneous ventilation with minimal sedation for Awake Fiberoptic Endoscope Intubation (AFOI)[2].

If intubation is done without adequate sedation, patient may experience discomfort, cough, offer severe resistance during fibreoscopy or intubation, increased catecholamine release by sympathetic stimulation leading to severe hemodynamic responses, arrhythmias, myocardial ischemia etc. Sedation during the procedure helps the patient to be comfortable, improves cooperation, provide better intubating conditions and better haemodynamic control[3]. One needs to be careful when administering as it may pose difficulty in maintaining patent airway and ventilation in a suspected difficult airway. Inadequate airway management may result in hypoxaemia, hypoventilation, aspiration, brain damage or even death. It needs expertise to strike a balance between patient comfort and good intubating conditions on one hand and maintaining ventilation and a patent airway on the other. The challenge associated with the procedure is to provide adequate sedation while maintaining patent airway and ventilation with conscientious administration and continuous monitoring, while inadequate sedation could lead to discomfort, anxiety and excessive sympathetic discharge[4]. It is remarkable to see patients undergoing sedated but awake AFOI to have decreased anxiety, discomfort and hemodynamic disturbances.

Today we have many drugs and drug combinations available starting from benzodiazepines, opioids, ketamine, propofol, α2 adrenoceptor agonists etc. which can be given as boluses or intravenous infusions[5]. The ideal drug for fibreoptic intubation should be short-acting, easily titratable to obtain an adequate sedation level with minimal effects on spontaneous ventilation and hemodynamic disturbances, does not present excessive oropharyngeal secretion or blood, suppresses cough and gag reflex and patient should be comfortable with good anxiolysis, analgesia and amnesia and rapidly reversible. However, we may have to use combination of drugs to achieve favourable conditions[6].

Different pharmacological approaches have been reported to obtain conscious sedation and prevent cardiovascular changes during AFOI[7]. Intravenous midazolam, fentanyl, propofol and dexmedetomidine are most commonly used sedatives for AFOI[8]. Inhalational agents have the unique advantage of being applicable in paediatric patients with a difficult airway, as well as adult patients with a difficult airway who are uncooperative for Awake Intubation under topical anaesthesia. One should

avoid or minimize sedation in conditions like trismus, stridor, trauma, morbid obesity and critically ill patients. Minimal sedation is defined as "a drug-induced state during which the patient responds normally to verbal commands, whilst the airway, spontaneous ventilation and cardiovascular function are unaffected". An independent anaesthesiologist should be delivering and titrating sedation with continuous cautious monitoring of electrocardiograph, noninvasive blood pressure and pulse oximeter cautiously. Ramsay sedation score should be maintained between 2-3 for conscious sedation[9]. Bispectral index can also be used to titrate the sedation.

Supplemental oxygen should be administered throughout the procedure[10]. It provides a safety barrier for the rare circumstances where Awake Intubation precipitates complete airway obstruction. Supplemental oxygen can be administered via nasal cannula for oral intubation or an upside-down face mask placed over the mouth for nasal intubation. If available, high-flow nasal oxygen should be the technique of choice[11].

Psychological preparation is equally important and should be initiated by an anaesthesiologist who explains the procedure in simple language[2]. Premedication include drugs for clear and drier airway, antiaspiration prophylaxis and anxiolysis. Glycopyrrolate (7 to 10 μg/kg IV) is a good antisialogogue with an onset of action within 1 to 2 min with a peak effect around 1 hour. Atropine (7 to 10 μg/kg IV) has lesser antisialogogue action as compared to glycopyrrolate. Antisialogogues can be given intramuscularly 30-40 minutes prior to the procedure. Both drugs cause vagolysis, with atropine producing a greater increase in heart rate than glycopyrrolate. Use of antisialogogues provides a relatively dry field that facilitates good visibility and ensures that local anaesthetic agents used for topical anaesthesia do not get diluted or suctioned during AFOI[12]. A combination of an H_2-receptor blocker such as ranitidine or cimetidine, a prokinetic agent such as metoclopramide a non-particulate antacid (15 to 30 mL of 0.3 M sodium citrate solution) can be given for antiaspiration prophylaxis.

Benzodiazepines provide good anxiolysis and anterograde amnesia. Midazolam can be injected in boluses of 0.5–1 mg (20 to 40 μg/kg), usually not exceeding 0.05 mg kg^{-1} (maximum dose of 100 to 200 μg/kg)[13]. The added advantage of amnesia may improve patient experience and result in improved compliance with any future awake intubations. Because of its lack of analgesic properties, it is commonly used in conjunction with fentanyl. Bolus injection can result in over sedation and its effects can be antagonized with flumazenil.

Opioids are also used for sedation and anxiolysis. Fentanyl (1 to 2 μg/kg) or remifentanil 0.05 to 0.5 μg/kg are administered intravenously[14.] Remifentanil is now very widely used during AFOI[15]. It is a potent μ-opioid receptor agonist, with the advantage over other opioids of a very rapid offset of action. This is due to hydrolysis by non-specific plasma and tissue esterases, independent of renal and hepatic function. It has excellent anti-tussive and analgesic properties. It is commonly used in conjunction with other agents, such as midazolam or more recently propofol, to reduce the high incidence of recall. Remifentanil has numerous side-effects that are potentially problematic during AFOI[16]. These include bradycardia, hypotension, apnoea, hypoxia and chest wall rigidity. Target-controlled Infusions (TCI) reduce the incidence of complications and provides better intubating conditions. When used in combination with midazolam or propofol, an effect-site concentration of 2–4 ng ml^{-1} is said to be appropriate.

Propofol is a highly lipid-soluble alkylphenol derivative that can be injected in boluses, as a simple infusion or as a TCI. Propofol can be administered in incremental doses of 0.25 mg/kg IV to produce adequate sedation for performing AFOI under good topical anaesthesia[17]. Propofol has also been used as TCI and few studies have used loading dose followed by infusion. Achieving the appropriate sedation level is challenging when using propofol as a sole sedative agent. Concomitant administration of opioids or benzodiazepines can improve efficacy. Current evidence would suggest that propofol is best used as TCI with effect-site concentrations up to 1 μg ml^{-1}, in conjunction with remifentanil[18].

Dexmedetomidine is an imidazole compound, specific alpha-2 adrenoceptor agonist, having sedative, analgesic and anaesthetic-sparing effects[19]. It has gained popularity as a sedative agent for AFOI because of several favourable properties. In addition to sedation, it also provides anterograde amnesia, anxiolysis, analgesia potent antisialogogue action and importantly it produces sedation maintaining spontaneous ventilation[20]. A study by Hemavathi *et al.* revealed that both dexmedetomidine and propofol provide favorable intubation conditions,

but dexmedetomidine in addition provides better haemodynamic stability and conscious sedation[21]. It is used in a loading dose of 0.7-1 μg/kg IV over 10-15 min, followed by a continuous infusion of 0.2–0.8 μg/kg/hour[22].

Cautious use of minimal sedation is beneficial. Sedation should not be used as a substitute for inadequate airway topicalization. Safe sedation can be administered by slowly administering the drugs and continuous communication with the patient. Essential monitoring, oxygenation and conscious administration of sedation by the independent anaesthesiologist constitute a part of the sequence of awake fiberoptic endotracheal intubation. Proper patient preparation by an empathetic anaesthesiologist along with adequate sedation while maintaining patent airway and ventilation is a challenge.

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