KingVision® and dexmedetomidine for opioid-free awake intubation in a patient with Klippel-Feil syndrome for complex percutaneous nephrolithotomy in a prone position: a case report

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Anestezjologia Intensywna Terapia
2019; 51, 4: 345–348

Dear Editor,

We would like to report a case of opioid-free awake intubation by KingVision® videolaryngoscope (VL) of an ASA 3 70-year-old male with Klippel-Feil syndrome (KFS) as a feasible, safe, and effective alternative method to fibre-optic intubation.

KFS represents a rare congenital disease characterized by different types of fusion of the cervical vertebrae. The prevalence of KFS is unknown due to the lack of studies. It is estimated to occur 1 in 40,000 to 42,000 newborns worldwide [1].

The patient was scheduled for a percutaneous nephrolithotomy (PCNL) in a prone position, a well-established minimally invasive technique to shatter and remove renal stones more than 2 cm in size. There has been considerable debate about the best anaesthetic management. The procedure is usually performed under general anaesthesia (GA), but the published literature regarding the use of neuraxial anaesthesia for PCNL is currently sparse. The advantages offered by GA include safety because the patient's airway is secured in prone position, feasibility to control tidal volume during percutaneous access puncture to minimise injury to the pleura and lungs, and prolonged anaesthesia duration allowing the surgeon to make multiple and higher punctures with minimal patient discomfort, especially in cases with large stone load. It is safe to conduct the procedure under GA for complicated or prolonged procedures [2–4].

The fusion of cervical vertebra in KFS causes cervical instability and limitation of movements. In these cases, the gold standard for a GA is the awake tracheal intubation by using a flexible fibre-optic bronchoscope (FOB) [5, 6]. So that cervical movements, which could produce neurological damages, are minimised. Furthermore, airway management can be challenging in most of these patients because of limitation in the range of neck movement due to cervical immobility, and cervical instability could enhance the risk of neurological injury during intubation. Nowadays awake intubation with VL is a new method that is gaining more and more interest as an alternative to FOB [7]. Although awake intubation by using FOB should be mastered by all modern anaesthesiologists, its use is potentially influenced by several points. First of all, the technique using the FOB is difficult to learn and master because it needs extensive practice and training. However, in clinical practice very few cases require awake intubation. Second, the presence of oedema, excess airway tissue, secretions, or blood in the airway will obscure the image. Finally, it is expensive and requires disinfection between two uses.

Drugs, such as opioids, that might depress the breathing centre should be avoided with both techniques.

Patients should always be adequately informed about risks and ben-

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Należy cytować anglojęzyczną wersję: Pagano T, Scarpato F, Chicone G, et al. KingVision® and dexmedetomidine for opioid-free awake intubation in a patient with Klippel-Feil syndrome for complex percutaneous nephrolithotomy in a prone position: a case report. Anaesthesiol Intensive Ther 2019; 51, 4: 339–341. doi: https://doi.org/10.5114/ait.2019.89170

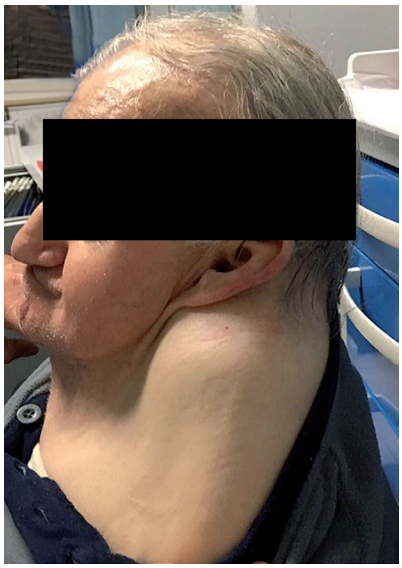

FIGURE 1. Patient profile view

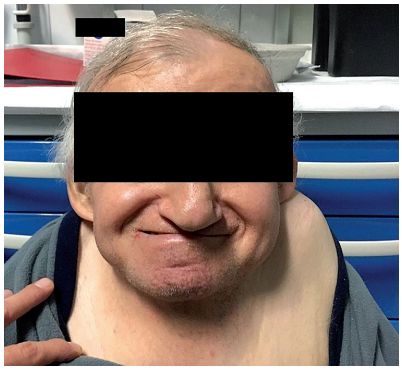

FIGURE 2. Patient front view

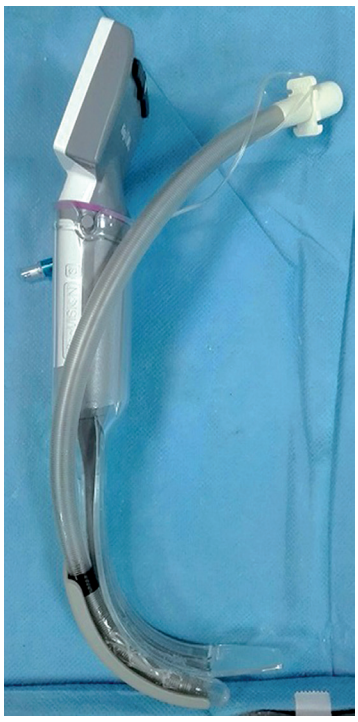

FIGURE 3. KingVision® with channelled blade and armoured endotracheal tube

efits. Written, informed consent was previously obtained from the patient for our case.

The presented case concerns an ASA 3 70-year-old male patient with KFS type I (Figures 1 and 2), severe cervical rotoscoliosis detected by computed tomography, mandibular prognathism, and known difficult airway management, who was given an infusion of dexmedetomidine as sedation for an opioid-free awake orotracheal intubation with VL. Our patient had a coronary artery bypass graft, and he suffered from arterial hypertension and diabetes mellitus [8]; body mass and height were 60 kg and 162 cm, respectively. We decided to avoid any opioid drugs due to the absence of respiratory depression. The patient was brought to the operating room, and his vital parameters were non-invasively monitored. When a peripheral venous access was obtained, the patient received midazolam 2 mg, and the infusion of dexmedetomidine was started at 1.4 μg kg^{-1} h^{-1}. Tongue, oropharynx, hypopharynx, and vocal cords were previously topicalised with 2% lidocaine. After 10 minutes the dexmedetomidine infusion was decreased to 0.8 μg kg^{-1} h^{-1} to reach a Ramsay Sedation Scale of 3. Vital parameters remained stable, and when adequate sedation was obtained, awake orotracheal intubation by KingVision® VL (Figure 3) was performed with the help of a channelled blade. During videolaryngoscopy we had a partial view of the glottis (Modified Cormack-Lehane score 2a) through the camera, which was sufficient to accurately place an armoured endotracheal tube (7.0 mm). End-tidal CO_2 by capnography and auscultation of bilateral breath sounds confirmed the correct placement of the endotracheal tube. GA was then promptly induced by administering 100 mg of propofol followed by 40 mg of rocuronium and was maintained with 5% desflurane in a fresh gas flow 60/40 of air/O_2 at 3 L min^{-1} while the infusion of dexmedetomidine had been set at 1 μg kg^{-1} h^{-1}. At this point, the patient was accurately prone-positioned, and the urologist could practice local anaesthesia (ropivacaine 0.5%) before percutaneous punctures. During the loading dose and throughout the infusion of dexmedetomidine, heart rate, blood pressure, and oxygen saturation were monitored and remained stable. During intubation, the patient did not experience any coughing, desaturation, or neck movements. Total time to complete awake intubation since the start of dexmedetomidine infusion was 15 min. Throughout the entire operation heart rate, respiratory rate, systolic blood pressure, end-tidal CO_2, and pulse oximetry saturation were within normal ranges. The PCNL was uneventful and lasted four hours. At the conclusion, desflurane was closed completely and dexmedetomidine was decreased to 0.3 μg kg^{-1} h^{-1}. The patient received 200 mg of sugammadex for a safe neuromuscular reversal. Immediately after that, the patient started to breathe spontaneously and follow commands. Then the infusion of dexmedetomidine was stopped, and three minutes after application of the surgical dressing the endotracheal tube was removed in safety.

Adequate sedation, together with instillation of local anaesthetic in the pharynx and hypopharynx, is necessary to reduce patient discomfort and to achieve successful awake intubation. Firstly, we think that VL could be more easily learned by inexperienced anaesthesiologists with a shorter learning curve. Secondly, in contrast to the blind passage of the tracheal tube along the FOB, its placement can be directly observed with VL, decreasing the risks of tube impingement on the glottis and airway trauma. Thirdly, VL is comfortably portable, more accessible, and easier and faster to set up. But it should be underlined that awake videolaryngoscopy is not suitable for all types of difficult airways, so it cannot fully replace FOB. A very limited mouth opening, for example, can render the use of VL impossible, such as an interdental distance less than 30 mm.

Regarding dexmedetomidine, it was authorised in Europe in Septem-

ber 2011 by the European Medicines Agency for sedation of adult ICU (Intensive Care Unit) patients requiring a sedation level not deeper than arousal in response to verbal stimulation and non-intubated adult patients prior to and/or during diagnostic or surgical procedures. Hypersensitivity to the active substance or to any of the excipients, advanced heart block (grade 2 or 3) unless paced, uncontrolled hypotension, and acute cerebrovascular conditions represent contraindications. It works at the locus coeruleus without producing significant respiratory depression, as well as maintaining patient collaboration [9–11]. It is a second-generation selective α-2-adrenergic receptor agonist, which activates G-proteins for inhibiting adenyl-cyclase, eventually leading to a decrease in the amount of cyclic adenosine monophosphate and inhibiting the release of endogenous catecholamines at different adrenoreceptor sites, which is attributed to its antihypertensive, analgesic, and sedative properties. It was chosen for awake intubation thanks to its known desirable pharmacological features regarding anxiolysis, sedation, analgesia, and anti-sialagogue effects with lack of a significant respiratory depression effect [12, 13]. Its primary action is a natural, sleep-like sedation from which the patient can be easily aroused. It has poor analgesic effects and may not be the ideal drug for very painful procedures [14, 15]. Besides, it made easier and safer the extubation of the patient when he had no measurable inhalational agent onboard and no opioids that could have potentially compromised his airway.

Small amounts of midazolam have been helpful in preventing patient recall and did not influence his response to stimuli. No signs of delirium were noted.

The whole procedure was opioid-free. The results we obtained, and the patient comfort and safety support our choices. In our experience we found awake intubation by VL to be as safe, effective, and feasible as by FOB, and we found the dexmedetomidine infusion to be a highly effective approach that, in future, could become the gold standard sedative drug for awake intubation. Further research is needed.

ACKNOWLEDGEMENTS

1. For his precious support in every moment of this work, we would like to thank Dr. Mario Iannotti, head of the Anaesthesia and Intensive Care Unit of "Umberto I" Hospital in Nocera Inferiore (Salerno – Italy).
2. Financial support and sponsorship: none.
3. Conflict of interest: none.

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