

DIFFICULT AIRWAY MANAGEMENT WITH BONFILS FIBERSCOPE IN CASE OF EMERGENCY: ACUTE ABDOMEN WITH ILEUS

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SUMMARY – This clinical report describes an emergency case of a 49-year-old man, ASA E III status, with clinical symptoms of acute abdomen and ileus, who was scheduled for urgent surgery. Predictors of difficult intubation (Mallampati test Class III, short thyro-mental (<6 cm) and sterno-mental distance (<10 cm) with limited mouth opening (inter-incisor gap <3 cm) were associated with significant comorbidity (rheumatoid arthritis, heart disease, obesity (body mass index 32.6 kg m⁻²), cervical spine mobility and generalized vascular disease). A specialist experienced in airway management decided on one attempt of Bonfils fiberoptic intubation as primary intervention and urgent tracheotomy, if needed, as secondary intervention. Immediately after assuming supine position on the operating table, the patient lost consciousness and cardiac arrest developed. Successful intubation with oxygenation was followed by cardiopulmonary resuscitation. Upon stabilization of the patient's vital functions, urgent surgery was performed. In the emergency case presented, we succeeded quickly to secure the airway with Bonfils fiberoptic intubation, which allowed for appropriate oxygenation and starting resuscitation. The high risk of the possible aspiration was avoided by timely provision of airway in the experienced anesthetist's hands.

Key words: *Difficult airway; Emergency airway management; Bonfils intubation fiberscope*

Introduction

Difficult intubation is a particular challenge for the anesthesiologist in emergency situations in which the risk of morbidity and mortality is increased. The American Society of Anesthesiologists (ASA)¹ has issued clear recommendations for specialized equipment in the management of difficult airway, which include at least one portable storage unit that contains direct laryngoscope blades of alternate design and size, indirect fiberoptic laryngoscope, the bougie

for intubation, laryngeal mask airway and flexible fiberoptic bronchoscope. In suspected or known difficult airway, in a cooperative patient, awake intubation using a flexible fiberoptic bronchoscope is the method of choice¹. The management of difficult airway in emergency situations depends on the condition of the patient, the equipment available, and the knowledge and technical skill of the anesthetist.

In the presented emergency case, a specialist in anesthesia, resuscitation and intensive care medicine, experienced in airway management decided to use Bonfils fiberoptic stylet, rigid fiberscope (Karl Storz Co., GmbH, Tuttlingen, Germany). It is 40 cm long, 5 mm in diameter with anterior curvature (40°) on distal side and a handle on proximal side. Optical fibers are housed in the stylet and connected proximally to an eyepiece. It has a connector that fits onto the

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15-mm tracheal tube adapter and a side connector used for insufflation of oxygen or instillation of local anesthetic (allows gas flow between the body of the Bonfils and the intubation tube)². Suctioning is not possible. Study results showed that the learning period requires about 20 intubations to master intubation techniques with intubation time of about 80 seconds, when performing endotracheal intubations in patients undergoing general anesthesia without difficult airway^{3,4}.

Case Report

A 49-year-old man (weight 56 kg, height 131 cm, obese (body mass index, BMI 32.6 kg m⁻²), ASA E III status), immobile, with significant comorbidity including rheumatoid arthritis from childhood; he was also observed for metabolic and/or chromosomal disorder, but without definitive diagnosis at that time. Both hip and knee total joint arthroplasty were performed ten and twenty years before. He also had a history of generalized vascular disease. Five years before, he had two myocardial infarctions. After implantation of coronary stenting, stable angina pectoris was present. There was arterial occlusion of lower extremities. Due to gangrene of the left foot, it was necessary to perform amputation in regional anesthesia a month before. Recommended ultrasonography of carotid arteries could not be performed due to cervical spine deformity. It was difficult to determine if the cardiovascular dysfunction was secondary to rheumatoid arthritis or arteriosclerosis. He was taking daily methylprednisolone 4 mg, bisoprolol 5 mg, valsartan 80 mg, acetylsalicylic acid 100 mg, diclofenac-Na 50 mg, indomethacin 25 mg, pantoprazole 40 mg, simvastatin 40 mg, and omega-3-acid 1000 mg.

The patient came to the emergency department because of the development of ileus. It was necessary to perform quick airway and cardiorespiratory evaluation. The history of difficult airway management was unknown. Physical examination of the temporomandibular joint and cervical spine showed arthritic changes in terms of limited mouth opening (<3 cm) and cervical spine mobility. Mallampati test (Class III) with short thyro-mental (<6 cm) and sterno-mental distance (<10 cm) in the presence of obesity (BMI 32.6 kg m⁻²) were predictors of difficult intubation.

A year before, ultrasound examination of the heart showed a reduced ejection fraction of 47%. Also, antero-septal scar with negative T-waves and sinus tachycardia of 110/min were recorded on electrocardiography (ECG), without new changes preoperatively. Chest x-ray of the heart and lung showed a high position of diaphragm.

Anemia (Hgb 105 g L⁻¹, Htc 0.307 L/L), leukocytosis (25.5 x 10⁹ L⁻¹), coagulation abnormality (PT 54%, APTT 33 s) and high D-dimer (4.46 mg L⁻¹) were found on preoperative blood testing. One should keep in mind that even if an increased platelet count (599x10⁹ L⁻¹) is present, their major function may be abnormal due to aspirin and other anti-inflammatory drugs use. Glucose intolerance was present (blood glucose 7.6 mmol L⁻¹). Electrolytes were low: K 3.1 mmol L⁻¹, Na 129 mmol L⁻¹. Nasogastric tube and urinary catheter were placed preoperatively. Hours before surgery, the patient was administered 500 mL of 0.9% sodium chloride with 30 mmol solution of potassium chloride, dalteparin 2500 IU s.c., phytomenadione 20 mg i.v., pantoprazole 40 mg i.v., hydrocortisone 100 mg i.v. Also, we ordered fresh frozen plasma 550 mL and two doses of red cell concentrate.

The initial idea was to perform awake nasotracheal intubation using a flexible bronchoscope. Our goal was to avoid tracheotomy and with preserved reflexes reduce the risk of aspiration. The patient was previously informed about the procedure and our considerations. After he was placed on the operating table and our standard hemodynamic and respiratory monitoring was applied (ECG, noninvasive arterial blood pressure, oxygen saturation, respiratory frequency), he deteriorated rapidly. Bradycardia of 40/min was present on ECG, blood pressure fell to 100/80 mm Hg. We gave 4 mg atropine-sulfate but without response and oxygen saturation dropped below 90%. The patient lost consciousness and asystole developed. We started cardiorespiratory resuscitation and administered 1 mg of suprarenin i.v. He developed ventricular tachycardia without pulse and was defibrillated with 150 J. After that, sinus rhythm appeared. In the meantime, another trained operator brought in the Bonfils and performed intubation with the right retromolar approach. We gave etomidate 20 mg i.v. The anesthetist opened the mouth limited with his left hand. He also attempted the jaw thrust maneuver to increase



Fig. 1. Maximal neck extension.



Fig. 2. Maximal neck rotation.



Fig. 3. The patient after resuscitation and intubation.

the size of the retropharyngeal space and facilitate insertion, but without much success, while holding the Bonfils in his right hand. Bonfils was advanced along the molars, with anterior rotation, the glottis aperture visualized. The tracheal tube with inner diameter of 7 (ID 7 mm) was inserted into the trachea and connected to the control mechanical ventilation. Correct tube placement was confirmed by the presence of respiratory sounds on auscultation bilaterally and the occurrence of square wave trace on capnography. Non-depolarizing muscle relaxant (vecuronium, 0.1 mg kg^{-1}) was given after intubation and checking for tube position. Intubation time was less than 60 s (Figs. 1 and 2).

Anesthesia was maintained with inhalation gas mixture of O₂: air = 50:50 (%), sevoflurane (MAC 1) and i.v. bolus doses of vecuronium (0.03 mg kg^{-1}) and sufentanil $0.1\text{--}0.2 \text{ } \mu\text{g kg}^{-1}$. During intraoperative period, noradrenaline $0.5 \text{ } \mu\text{g kg}^{-1} \text{ min}^{-1}$ was used to maintain blood pressure. The surgery lasted for about 2.5 hours, after which the patient was transferred to the Intensive Care Unit (ICU).

Follow up laboratory testing showed slightly elevated troponin ($T 0.586 \text{ } \mu\text{g L}^{-1}$) and creatinine kinase MB isoenzyme (CK-MB $87 \text{ U/L } 37 \text{ } ^\circ\text{C}$), without new changes on ECG. The high value of creatine kinase (CK $1627 \text{ U/L } 37 \text{ } ^\circ\text{C}$) may be an indicator of intestinal rupture. On the next day, cardiac enzymes dropped ($T 0.462 \text{ } \mu\text{g L}^{-1}$ and CK-MB $66 \text{ U/L } 37 \text{ } ^\circ\text{C}$), but CK was higher ($2885 \text{ U/L } 37 \text{ } ^\circ\text{C}$). The day after, CK ($1494 \text{ U/L } 37 \text{ } ^\circ\text{C}$) was lower and the patient became febrile with increased inflammatory parameters: $L 16.5 \times 10^9/\text{L}$, C-reactive protein (CRP) 148.1, and procalcitonin 6.42 ng/mL as an indicator of sepsis. We tried several times to disconnect the patient from mechanical respiratory support and to extubate him, however, without success, and he underwent surgical tracheotomy (Fig. 3).

Discussion

New instruments have been developed to overcome difficult intubation and we choose those instruments with which we have acquired greatest experience. By mastering the technique of intubation with different devices, we avoid complications associated with repetitive attempts to apply the same techniques for difficult

intubation. Since recently, in our operating theaters we have the portable storage unit, which contains equipment for the management of the routine and difficult airway. Until today, most of our anesthetists have become familiar with the techniques of handling the devices because of their availability. In this particular case of emergency, there are several reasons why we decided to apply Bonfils. It has the advantage over the intubating laryngeal mask airway of achieving a secure airway more rapidly, which may be particularly important in patients at a high risk of aspiration⁵. The same holds for indirect fiberoptic laryngoscopes⁶. Despite good visualization, difficulties have been noted when placing the tube. Bonfils intubation fiberscope is recommended in patients with limited neck mobility and reduced mouth opening^{5,7}. In comparison with the flexible bronchoscope, intubation was faster in difficult airways⁸; also, it is well tolerated in awake patients with predicted difficult intubation^{7,9}. Its use can be recommended in emergency difficult airways because it is easier to use, portable, less fragile, less expensive, and easy to clean and maintain^{10,11}. It should be noted that the conclusion of a difficult intubation was made on the basis of clinical assessment, which may be of limited sensitivity and specificity.

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Sažetak

ZBRINJAVANJE OTEŽANOG DIŠNOG PUTA FIBEROPTIČKOM INTUBACIJOM BONFILSOM U
HITNOM SLUČAJU: AKUTNI ABDOMEN S ILEUSOM

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Opisuje se hitan slučaj 49-godišnjeg bolesnika statusa ASA E III s jasnim kliničkim simptomima akutnog abdomena i ileusa, koji je bio predviđen za hitan kirurški zahvat. Uza začajan komorbiditet (reumatoidni artritis, bolesti srca, pretilost (indeks tjelesne mase 32.6 kg m⁻²), deformitet vratne kralježnice te generaliziranu aterosklerozu) kliničkim pregledom otkriveni su i prediktori teške intubacije (Mallampati test klasa III., kratka tiro-mentalna (<6 cm) i sterno-mentalna udaljenost (<10 cm) s ograničenim otvaranjem usta (razmak između sjekutića <3 cm). Iskusni anesteziolog u zbrinjavanju dišnog puta primarno se odlučio za fiberoptičku intubaciju Bonfilsom, odnosno sekundarnu hitnu traheotomiju ako se intubacija Bonfilsom ne uspije učiniti iz prvoga pokušaja. Neposredno nakon premještanja bolesnika na operacijski stol te njegovog namještanja u leđni položaj bolesnik gubi svijest uz razvoj asistolije srca. Odmah je izvedena uspješna intubacija, omogućena oksigenacija bolesnika praćena kardiopulmonalnom reanimacijom. Nakon stabilizacije vitalnih funkcija bolesnika uspješno je dovršen i hitan kirurški zahvat. U prikazanom hitnom slučaju smo fiberoptičkom intubacijom uz Bonfils uspješno i brzo osigurali dišni put te time osigurali dostatnu oksigenaciju i brz početak reanimacije. U ovom slučaju je pravodobna intubacija u rukama iskusnog anesteziologa bila presudna za zaštitu dišnoga puta bolesnika od prijeteće aspiracije uz prisutan ileus.

Cljučne riječi: *Otežani dišni put; Zbrinjavanje dišnog puta, hitan slučaj; Fiberoptička intubacija Bonfilsom*

