



## Regional Anaesthesia with Non Invasive Ventilation and Conscious Sedation: An Alternative to General Anaesthesia in Morbidly Obese Patients with Obstructive Sleep Apnea in Retrograde Intrarenal Surgery

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### ABSTRACT

Obstructive sleep apnea (OSA) is a syndrome characterized by obstruction in the upper airway during sleep. OSA patients undergoing procedures under GA are at increased risk for hypoxemia, pneumonia, difficult intubation, atelectasis, myocardial infarction making it a challenge for anesthesiologist. Retrograde intrarenal surgery (RIRS) is normally performed under GA to prevent respiratory embarrassment. There are very few studies focusing on Regional anesthesia in RIRS procedure.

A Sixty-three-year-old male known case of morbid obesity (BMI- 35 kg/meter square), OSA (on CPAP support at night) presented with left renal pelvis calculus, STOP BANG score (=5) therefore making it a case of difficult airway. Respiratory discomfort improved at 30-35-degree head up due to existing OSA considering the severe OSA and anticipated difficult airway, the surgery was planned under Lumbar subarachnoid block with preparation for management of difficult airway if conversion to GA required. 3 ml of 0.5 percent Bupivacaine heavy and 25 mcg fentanyl injected into subarachnoid space. T6 level block achieved after 3 minutes. The patient was put on his home CPAP machine with 5cm H<sub>2</sub>O PEEP. The patient was maintained on spontaneous ventilation and monitored using EtCO<sub>2</sub> at aliquot of 1mg midazolam given to mimic natural sleep pattern.

The surgery was uneventful and the risk of induction of GA and difficult intubation was successfully avoided.

Patient with regional anaesthesia who are prone to converted to GA due to multiple risk factors, i.e., OSA with anticipated difficult airway can create a chaotic situation. So as a preliminary step NIV can be used, and along with it, mild sedation can be supplemented to improve acceptance and to avoid asynchrony. In this case NIV was used as a preemptive ventilation strategy even before actual requirement of BiPAP by mimicking the natural sleep pattern and make patient comfortable while a smooth conductance of the procedure.

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## Introduction

**A**irway management is the most important skill that all airway managers (anesthesiologists, intensivists, emergency physicians, resuscitation team members) require to master. The ultimate goal for management of difficult airway is to prevent the patient's oxygenation from deteriorating to dangerous, life-threatening levels.

Obstructive sleep apnea (OSA) is the syndrome characterized by periodic partial or complete obstruction in the upper airway during sleep. This causes repetitive arousal from sleep to restore airway patency which may result in daytime sleepiness or other daytime manifestations of disrupted sleep. The patients with OSA undergoing procedures under anesthesia are at increased risk for hypoxemia, pneumonia, difficult intubation, myocardial infarction, pulmonary embolism, atelectasis and unanticipated admission to the ICU making it a challenge for anesthesiologist [2].

Retrograde intrarenal surgery (RIRS) is one of the most common surgical procedure for renal calculi less than 2cm. This procedure is minimally invasive associated with less post operative pain, shorter hospitalization time and is also achieving a higher stonefree rate than ESWL and PCNL. It is normally performed under general anesthesia to prevent aspiration and respiratory embarrassment. There have been some randomized trials that indicates that regional anesthesia helped to reduce postoperative discomfort and other serious problems resulting in shortened hospital stay; however there is no studies focusing on regional anesthesia in RIRS procedure.

Non invasive ventilation (NIV) is the delivery of oxygen via facemask and therefore eliminating the need of endotracheal airway. This is recognized as an effective treatment for respiratory failure in COPD, cardiogenic pulmonary edema and other respiratory conditions without complications i.e respiratory muscle weakness, upper airway trauma, ventilator associated pneumonia. It achieves comparative physiological benefits, to conventional mechanical ventilation by reducing the work of breathing and improving gas exchange.

## Case Report

63 years old male, a known case of morbid obesity (BMI 33 kg/m<sup>2</sup>), type 2 Diabetes Mellitus for 10 years (well controlled on Oral hypoglycemic agents (metformin 500mg, sitagliptin 100mg both once daily), OSA (on CPAP support at night for 8 years, and Bronchial asthma for 4 years (well controlled on MDI formoterol fumarate 6mcg and budesonide 200mcg twice daily, and salbutamol 100 mcg, 2 puff as rescue) with past history of acute urinary retention 2 years back for which

he was started on alpha blocker (Figure1). The Patient was taking on above medications for 2years, now presented with complaints of recurrent UTI.



**Figure 1- Patient comfortable on home CPAP with stable vitals**

He was admitted and evaluated. NCCT KUB was suggestive of left renal pelvis calculus of size 23.1×18 mm. The patient had a history of distal bulbar urethral stricture and history of left Retrograde intrarenal surgery with left DJ stent insertion. Now patient is posted for RIRS surgery.

During pre-anesthetic evaluation, basic blood investigations, ECG, random blood sugar, and chest X RAY were within normal limits. Albeit, 2D ECHO showing mildly dilated RA, RV with LVEF of 60%. Post bronchodilator PFT suggestive of FEV1/FVC of 67.2%. The patient had MO of 3 fingers breadths, MMPS class III, adequate neck movement, Thyromental distance of 4 cm, and neck circumference of 41 cm with STOPBANG score of 5, therefore making it a difficult airway. Spine examination revealed palpable spine with mild scoliosis. The patient was uncomfortable while supine, but respiratory discomfort improved at 30 to 35 degree head up, probably due to existing OSA.

Considering the severe OSA and anticipated difficult airway, the surgery was planned under regional anesthesia (lumbar subarachnoid block) with preparations for management of difficult airway, if conversion to general anesthesia required. Written and informed consent was taken for anesthetic risk. Patient was taken to operation theatre, standard ASA monitoring was done. After securing IV access, the patient was positioned in sitting position, sterile dressing and draping done. Following standard procedure and local infiltration with 3 ml of 2% lidocaine, and under aseptic precautions, 3ml of 0.5% bupivacaine heavy and 25ug of fentanyl injected into subarachnoid space using 25G Quincke needle. The patient was made supine, T6 level of block achieved after 3 minutes. The patient was put on his home CPAP machine with 5cmH<sub>2</sub>O PEEP (considering comfort and familiarity of the patient). The patient was maintained on spontaneous ventilation and monitored using EtCO<sub>2</sub>, and aliquot of 1 mg midazolam given to mimic natural sleep pattern as sleep disruption was identified as a factor in NIV failure.

The surgery was successful and uneventful.

## Discussion

Administration of sedatives, anesthetics and analgesics in OSA patients may worsen obstruction of pharynx. In OSA patients under general anesthesia there is greater depression of upper airway muscles than the diaphragm as general anesthesia directly inhibits laryngeal respiratory modulated mechanoreceptors and therefore upper airway reflexes, thus breathing efforts continue while upper airway muscles activity is markedly reduced predisposing these patients to upper airway collapse during inspiration. It was an anticipated difficult intubation. Although, the incidences of cannot ventilate-cannot intubate are rare (about 0.01-2/10000) [1], considering the medical history and clinical examination it might complicate the clinical course of the patient.

Surgical team was in consensus with the anesthesia team and the surgery was planned under regional anesthesia (lumbar subarachnoid block). Thus, avoiding the risk of difficult intubation and general anesthesia.

Proper ventilation and oxygenation were achieved using CPAP machine with PEEP of 5cm H<sub>2</sub>O (Figure 1). The patient was maintained on spontaneous ventilation and monitored using EtCO<sub>2</sub>, and aliquot of 1 mg midazolam given. There was risk of CO<sub>2</sub> retention and tongue fall obstruction as sedation was required to reduce anxiety and discomfort of patient but as patient was habitual of putting NIV during sleep, it was tried to mimic natural sleep pattern of the patient as sleep disruption was identified as a factor in NIV failure. Use of midazolam for sedation caused few adverse respiratory events as compared to other drugs i.e propofol, fentanyl, inhalation anesthetics, ketamine, dexmedetomidine [3].

The success of NIV depends on many factors i.e. patient-device interface, comfort, anxiety and apprehensions. Patient's home CPAP machine was used as the patient was comfortable, and familiar with machine and procedure.

If we regard NIV as a stage in the progression from intermittent mandatory ventilation to spontaneous breathing then there must be a parallel expectation of a progressive reduction in use of sedation, hence acceptance and compliance of NIV is related with sedation since neither can be expected from and insensate patient nor are they likely to be forthcoming if the patient is agitated, uncomfortable or disoriented. So, the necessity of a sedation regimen that brings the patient to a state of calm, alert and cooperative is clearly implied by these considerations. Benzodiazepines are frequently used as anxiolytic and sedation. But the role of sedation during NIV use is eluding physicians since its inception, however when dealing with difficult to intubate cases while under regional anesthesia but chances of conversion to general anesthesia or requirement of sedation, the use of such NIV therapy in addition must be considered as an alternative to improve patient outcome and avoid difficult situations.

In this case NIV was used as a preemptive ventilation strategy even before actual requirement of BiPAP by mimicking the natural sleep pattern and make patient comfortable while a smooth conductance of the procedure.

## Conclusion

Patient with regional anaesthesia who are prone to converted to GA due to multiple risk factors, i.e., OSA with anticipated difficult airway can create a chaotic situation. So as a preliminary step NIV can be used, and along with it, mild sedation can be supplemented to improve acceptance and to avoid asynchrony. In this case NIV was used as a preemptive ventilation strategy even

before actual requirement of BiPAP by mimicing the natural sleep pattern and make patient comfortable while a smooth conductance of the procedure.

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