Case Report

Morbidly obese patient with obstructive sleep apnoea for major spine surgery: An anaesthetic challenge

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ABSTRACT

Morbidly obese patients with clinical features of obstructive sleep apnoea can present a myriad of challenges to the anaesthesiologists which must be addressed to minimise the perioperative risks. Initiation of continuous positive airway pressure (CPAP) therapy early in the pre- and post-operative period along with appropriate anaesthetic planning is of paramount importance in such patients. This case report emphasises the usefulness of CPAP therapy, even for a short duration, to minimise morbidity, improve recovery and hasten early discharge from the hospital after major surgery.

Key words: Continuous positive airway pressure, obese, obstructive sleep apnoea

INTRODUCTION

Patients with obstructive sleep apnoea (OSA) can present special challenges that must be addressed to minimise the perioperative risks.[1] Several risk factors such as obesity, male gender, age, and hereditary factors are associated with an increased prevalence of OSA in the general population. Among these, obesity is the strongest risk factor for sleep apnoea.[2-5] The American Society of Anesthesiologists' practice guidelines for the perioperative management of patients with OSA recommend pre-operative initiation of continuous positive airway pressure (CPAP), particularly if OSA is severe.[1] There is scant data on the prevalence of OSA in surgical patients and anaesthetic management in Indian literature. As a result, there is no properly defined management protocol for such patients especially pre-operative use of CPAP to minimise the post-operative complications.

Pre-operative initiation of CPAP therapy along with appropriate anaesthetic planning is of paramount importance in such patients. This case report emphasises the usefulness of CPAP therapy, even for a short duration, to minimise morbidity, improve recovery and hasten early discharge from the hospital after major surgery.

CASE REPORT

A 36-year-old male, weighing 158 kg, body mass index of 49 kg/m^2, had neck pain, numbness in bilateral upper limbs and left lower limb weakness with foot drop for 1 year. Magnetic resonance imaging of his cervical spine revealed prolapsed intervertebral discs at multiple levels (C4-7). He was posted for anterior cervical discectomy (C5-7) with fusion.

During pre-anaesthetic evaluation, the patient gave a history of snoring and daytime somnolence which was a

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routine feature for him for the past 6 years, to the extent that he went off to sleep during the examination. He was a chronic smoker, 30 cigarettes/day for last 6 years.

His heart rate was 88 beats/min and regular. Blood pressure was 130/70 mmHg. Airway examination revealed modified Mallampati classification II, neck circumference was 50 cm. Examination of cardiovascular (including the pre-operative echocardiography), respiratory and other systems were unremarkable.

Biochemical and haematological investigations were within normal limits.

After a detailed clinical examination, the patient was advised polysomnography, which revealed apnoea/hypopnoea index (AHI) of 47.7 suggestive of severe OSA. During the sleep study, his average minimum oxygen saturation was 74%.

The patient and the surgeon were informed about the risks of anaesthesia and about the need for pre-operative CPAP therapy for better outcome following surgery. In view of severe OSA, the patient was advised to stop smoking and simultaneously CPAP therapy (12 cm H_2O during the night) and incentive spirometry thrice daily for 72 h before surgery were started to optimise his respiratory functions.

Preoperatively, the patient had better oxygenation levels during sleep at night, lowest level of SpO_2 in the pre-operative period after initiating CPAP being in the range of 85–88%. Furthermore, the patient and his relatives reported decreased episodes of waking up or choking at night during sleep. The patient also had a better sense of well-being.

In the operation theatre, intravenous access was secured with a 16-gauge cannula and left radial artery was cannulated under local anaesthesia. Anaesthesia was induced with fentanyl 1 μg/kg, propofol 2 mg/kg and after having confirmed mask ventilation, rocuronium 0.8 mg/kg was administered for intubation with oral endotracheal tube (8.5 mm internal diameter) with GlideScope™ to minimise cervical spine motion. Anaesthesia was maintained with O_2/air 45/55%, desflurane (minimum alveolar concentration [MAC] 0.8–1.0) and intermittent doses of fentanyl (0.5 μg/kg) and atracurium (0.2mg/kg) with controlled intermittent positive pressure ventilation. Monitoring included electrocardiogram, oxygen saturation (SpO_2), invasive blood pressure, end tidal CO2 ($EtCO_2$) core temperature and urine output. During surgery, the patient remained haemodynamically stable. At the end of the procedure, surgical incision site was infiltrated with 10 ml 0.25% bupivacaine to achieve post-operative pain relief.

Surgery lasted for 5h. The patient received 2 L of crystalloids. Urine output was 400 ml. He was extubated at the end of surgery once he became conscious, breathing spontaneously adequate tidal volume and had a satisfactory neurologic recovery. Arterial blood gas analysis was within normal limits. Post-operative analgesia was managed with intravenous paracetamol 1 g 6 hourly and diclofenac sodium 75 mg 12 hourly. He received nasal CPAP in the immediate post-operative period and during sleep (12 cm H_2O) for 4 days.

The benefits of CPAP was rewarding and included decreased nocturnal oxygen desaturation index and decreased the percentage of time with SpO2 <90%.

Furthermore, it was seen that the patient had reduced depression and troublesome sleep. Patient was motivated to carry out incentive spirometry 3–4 times in the day. All this helped in reducing the length of stay in the hospital and economic burden on the patient. He was discharged with good neurological recovery on the 5th post-operative day.

DISCUSSION

Obesity has reached epidemic proportions in India in the 21st century, with morbid obesity affecting 5% of the country's population. India is following the footsteps of other developed countries that are steadily becoming more obese. According to the National Family Health Survey, 10% of India's population was either overweight or obese in 2006.[6]

Incidence of OSA in Indian population is varied from 4.4% to 13.7%, and OSA hypopnoea syndrome varies from 2.4% to 2.8%.[7] Acceptance of nasal CPAP in Indian OSA patients is low, the cost of the circuit, being the major impediment. Discontinuation of CPAP was observed in 25% with leakage from the nasal mask being the major cause.[8] However, there is a paucity of Indian data on the prevalence of patients with OSA presenting for surgical procedures.

On literature search, we found one such study that was conducted by Agrawal *et al*., on 204 surgical patients where they observed that 24.5% subjects were at high risk for OSA (STOP-BANG >3) with a male predominance. This high-risk group of patients had a higher prevalence of associated cardiorespiratory and endocrinal disorders. They had further observed a concordance among the surgical population in India with that of the Western population pertaining to the risk of OSA. The authors concluded that a high degree of suspicion and knowledge of association of OSA and medical diseases may help in detection of such cases and decrease the rate of perioperative complications thus improving patients' safety.[9]

Nevertheless, a significant number of Indians suffers from OSA, so it is prudent to optimise them with pre-operative CPAP so as to avoid post-operative complications. There are case reports that have illustrated the use of post-operative CPAP or high flow oxygen therapy to treat post-operative hypoxemia.[10] Ours is probably the first case report that highlights the pre-operative use of CPAP to help improve the patient outcome, following major surgery.

In a study carried out by Liao *et al*., patients received arbitrary auto-titrated positive airway pressure treatment for three pre-operative days before surgery and had reduced post-operative AHI and improved oxygen saturation in the patients with moderate and severe OSA. In our patient, we had used CPAP (12 cm H_2O only in the night) for 3 days before surgery. However, whether initiation of CPAP 3 days preoperatively is optimal is unknown and needs to be further evaluated.[11] We used CPAP (12 cm H_2O only in the night) for 3 days before surgery.

Obesity and particularly central adiposity can increase sleep apnoea susceptibility by increasing upper airway mechanical loads and/or decreasing compensatory neuromuscular responses.[12] Thick and short neck, limitation of cervical extension, reduction of thyromental distance, reduction of the calibre of the airways and increased neck circumference are common in these patients which may pose hindrance in securing the airway. Three-minute pre-oxygenation and use of positive pressure in the airways during induction improves oxygenation and prevents airway obstruction.[13]

Further, it has been reported that the difficulty in securing the airway in these patients is up to 8 times more frequent than the control group.[14] Therefore, it is mandatory to have a difficult airway cart ready in the operating room. As our patient had cervical myelopathy, GlideScope™ was used for facilitating endotracheal intubation to limit cervical spine movement.

Other options for intubation in such cases include awake fibreoptic intubation, video-assisted devices (C-trach) and intubating laryngeal mask airway. Difficulties faced during pre-operative mask ventilation and tracheal intubation should be kept in mind before deciding to extubate such patients. An airway exchange catheter should be left *in situ* if reintubation is expected. A supraglottic airway device or nasopharyngeal airway should be within reach as well.

These patients are sensitive to central nervous system depressant drugs, hence minimal doses of sedatives and narcotics are advisable. Our patient also needed low dose fentanyl and propofol for induction of anaesthesia despite his increased body weight. Residual effects of inhalational anaesthetic agents may be harmful in these patients for which, our patient was maintained at a MAC of 0.8. To ensure complete reversal from neuromuscular blockade, we used atracurium to provide muscle relaxation after the initial intubating dose of rocuronium.

CONCLUSION

A minimum of 3 days of CPAP therapy in morbidly obese patients with OSA in the pre-operative period can be helpful which has to be continued in the post-operative period and help in achieving good recovery from major spine surgery and early discharge from the hospital.

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Conflicts of interest
There are no conflicts of interest.

REFERENCES

1. American Society of Anesthesiologists Task Force on Perioperative Management of patients with obstructive sleep apnea. Practice guidelines for the perioperative management of patients with obstructive sleep apnea: An updated report by the American Society of Anesthesiologists Task Force on Perioperative Management of patients with obstructive sleep apnea. Anesthesiology 2014;120:268-86.

2. Davies RJ, Stradling JR. The relationship between neck circumference, radiographic pharyngeal anatomy, and the obstructive sleep apnoea syndrome. Eur Respir J 1990;3:509-14.
3. Shinohara E, Kihara S, Yamashita S, Yamane M, Nishida M, Arai T, *et al*. Visceral fat accumulation as an important risk factor for obstructive sleep apnoea syndrome in obese subjects. J Intern Med 1997;241:11-8.
4. Young T, Peppard PE, Gottlieb DJ. Epidemiology of obstructive sleep apnea: A population health perspective. Am J Respir Crit Care Med 2002;165:1217-39.
5. Young T, Peppard PE, Taheri S. Excess weight and sleep-disordered breathing. J Appl Physiol 2005;99:1592-9.
6. Gothankar JS, Patil RS. Prevalence of obesity and its associated co-morbidities amongst adults. Natl J Community Med 2011;2:221-4.
7. Sharma SK, Ahluwalia G. Epidemiology of adult obstructive sleep apnoea syndrome in India. Indian J Med Res 2010;131:171-5.
8. Suri JC, Sen MK, Ojha UC. Acceptance and compliance issues of nasal CPAP amongst Indian patients of obstructive sleep apnea. Indian J Sleep Med 2006;1:197-203.
9. Agrawal S, Gupta R, Lahan V, Mustafa G, Kaur U. Prevalence of obstructive sleep apnea in surgical patients presenting to a tertiary care teaching hospital in India: A preliminary study. Saudi J Anaesth 2013;7:155-9.
10. Rahimi E, Mariappan R, Tharmaradinam S, Manninen P, Venkatraghavan L. Perioperative management and complications in patients with obstructive sleep apnea undergoing transsphenoidal surgery: Our institutional experience. J Anaesthesiol Clin Pharmacol 2014;30:351-4.
11. Liao P, Luo Q, Elsaid H, Kang W, Shapiro CM, Chung F. Perioperative auto-titrated continuous positive airway pressure treatment in surgical patients with obstructive sleep apnea: A randomized controlled trial. Anesthesiology 2013;119:837-47.
12. Schwartz AR, Patil SP, Laffan AM, Polotsky V, Schneider H, Smith PL. Obesity and obstructive sleep apnea: Pathogenic mechanisms and therapeutic approaches. Proc Am Thorac Soc 2008;5:185-92.
13. Soares RR, Valadares FW, Araujo MB, Lorentz MN. Importance of pre-anesthetic evaluation: Case report of a patient with obstructive sleep apnea. Rev Bras Anestesiol 2011;61:786-92.
14. Becker HF, Koehler U, Stammnitz A, Peter JH. Heart block in patients with sleep apnoea. Thorax 1998;53 Suppl 3:S29-32.