NODIC technique - (Nasal oxygenation during infraglottic coblation) to increase the safe apnoea time

Sir,

Coblation (plasma ablation) procedures are performed for various infraglottic conditions like subglottic stenosis, laryngeal papillomatosis (LP) to name a few. Various anaesthesia protocols used for these procedures include the use of a smaller sized endotracheal tube but it often hampers the surgical vision or infraglottic jet ventilation, which is associated with the risk of barotrauma. Others include either maintaining spontaneous ventilation, which can lead to a moving surgical field or apnoeic oxygenation with intermittent ventilation, which is limited by short apnoea time and oxygen desaturation leading to frequent disruptions in between the procedure.

Despite the institutional practice of the use of nasal prongs for high flow oxygen during apnoea, there is a paucity of literature on this subject. Therefore, we describe this simple technique of nasal oxygenation during infraglottic coblation (NODIC) at 10–12 L/min of oxygen with a nasal cannula to increase the safe apnoea time in 5 patients scheduled for infraglottic coblation procedures.

All the patients were pre-oxygenated with 100% oxygen at 20 degrees head-up position till fractional end-tidal oxygen was >92%. Nasal cannula @ 6 L/
Letters to Editor

Anaesthesia was induced with injection fentanyl 2 mcg/kg with propofol 2–3 mg/kg and injection atracurium 0.5 mg/kg was given for neuromuscular relaxation after confirming mask ventilation. Oxygen flow through nasal prongs was increased to 10–12 L/min once the mask was removed. Without endotracheal intubation, Millers blade with endoscope was inserted, and surgery was allowed to proceed under apnoeic oxygenation with continuous nasal oxygenation through the nasal prongs.\(^1\) Arterial blood gas analysis was performed before the initiation of apnoeic oxygenation (T1) and at the end of the apnoeic period (T2). After the culmination of the procedure, the patients were ventilated, and end-tidal CO\(_2\) (ETCO\(_2\)) was measured. Following, the return of spontaneous respiration, neuromuscular blockade was reversed. The patients were shifted out of the operation theatre when the ETCO\(_2\) reached the baseline value.

The ETCO\(_2\) before and after the apnoeic period, the partial pressure of CO\(_2\) (paCO\(_2\)), the partial pressure of oxygen (paO\(_2\)), pH, minimum oxygen saturation and complications were also recorded. The time when the face mask was removed to the time either the procedure was complete or the saturation was <92% was defined as a single safe apnoeic time (SAT).

| Age yr | Wt Kg | Diagnosis                      | Apnoea Time Min | Min SpO\(_2\) % | PaO\(_2\) (1) mmHg | PaO\(_2\) (2) mmHg | PaCO\(_2\) (1) mmHg | PaCO\(_2\) (2) mmHg | CO\(_2\) rise/min mmHg/min | pH (1) | pH (2) |
|--------|-------|--------------------------------|-----------------|-----------------|--------------------|--------------------|--------------------|--------------------|---------------------------|--------|--------|
| 2      | 12    | LP                             | 6.2             | 92              | 320                | 102                | 62                 | 89                 | 4.3                       | 7.22   | 7.13   |
| 4      | 14    | LP                             | 7.4             | 96              | 450                | 156                | 48                 | 78                 | 4                         | 7.34   | 7.12   |
| 5      | 13    | Tracheal stenosis              | 9.8             | 94              | 466                | 144                | 53                 | 88                 | 3.5                       | 7.38   | 7.16   |
| 11     | 17    | Tracheal stenosis              | 5.5             | 97              | 159                | 79                 | 63                 | 73                 | 1.8                       | 7.26   | 7.18   |
| 28     | 58    | Tracheal mass                  | 24              | 95              | 280                | 130                | 26                 | 66                 | 1.5                       | 7.42   | 7.24   |

(Time periods: (1) - before the procedure, (2)- after the procedure)

Oxygen was kept at 10–12 L/min for all patients. Despite the higher flow of oxygen/kg in children, the adult patient had a much longer SAT, which could be attributed to relatively lesser oxygen consumption, lower functional residual capacity and degree of stenosis compared to children. In children, even mild to moderate stenosis can result in faster desaturations. Owing to smaller children with laryngeal pathology we kept the threshold of 92% for single SAT.\(^3\) Although, none of our patients had any airway difficulty, the use of the NODIC technique in this group of patients may pose additional challenges. The higher baseline PaCO\(_2\) levels could be due to the existing laryngeal pathology.\(^4\) Apnoeic ventilation further accentuated this resulting in respiratory acidosis. Rajan et al. observed an increase of 3.7 mmHg CO\(_2\)/min in their study, which was higher than our series.\(^5\)

Transnasal humidified rapid-insufflation ventilatory exchange (THRIVE) is another technique, which uses high-flow nasal oxygen up to 70 L/min, creating a flow depend on positive pharyngeal pressure. Lyons et al. successfully demonstrated the use of THRIVE to increase the apnoeic time during laryngeal surgeries.\(^6\)

Compared to THRIVE, a nasal cannula for apnoeic ventilation is affordable and much easier to administer. Although nasal prongs have been used for apnoeic oxygenation during the peri-intubation period, our series highlights its extended application for short laryngeal procedures with appropriate monitoring. However, further validation by randomised controlled trials is warranted.

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Nil.

**Conflicts of interest**

There are no conflicts of interest.
Vascular micro‑thrombotic disease in pregnancy

Sir,

Vascular micro-thrombotic disease (VMTD) includes conditions like thrombotic thrombocytopenic purpura (TTP) and TTP-like syndrome and is associated with adverse outcomes if not promptly diagnosed and treated. Challenges in diagnosing TTP-like syndrome stem from a vague presentation and overlapping features with conditions like pre-eclampsia, HELLP and disseminated intravascular coagulation (DIC). We discuss a case of a pre-eclamptic patient with thrombocytopenia in the postnatal period.

A 39 weeks pregnant patient with controlled pre-eclampsia was admitted for labour. Assisted foetal delivery resulted in third-degree perineal tear which was promptly repaired. Placenta was delivered intact. Slow bleeding continued post-delivery despite uterotonics and a firm fundus. Haemoglobin dropped to 6.6 g/dL and platelets to 101 × 10⁹/L. Coagulation studies showed prolonged prothrombin time (PT), partial thromboplastin time (PTT) and fibrinogen dropped from 200 to 92 mg/dL. Thromboelastography showed no fibrinolysis. Hepatic function panel was normal. Packed red blood cells, fresh frozen plasma and platelets were given. Blood loss continued, prompting emergent dilatation, curettage and Bakri balloon insertion. Persisting bleeding prompted bilateral uterine artery embolisation. Bleeding was controlled and haematocrit stabilised. The next day, platelets dropped from 58 to 31 × 10⁹/L without active bleeding. Patient remained afebrile and haemodynamically stable. Peripheral blood smear showed few schistocytes. LDH measured >3000 IU/L while fibrinogen and fibrin degradation product levels were normal. Platelets reached a nadir of 13 × 10⁹/L.