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CONTENTS

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Fundamental Concepts of Circadian Entrainment and the Impact of General Anesthesia：From Chrono-Physiology to Chrono-Dentistry

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Abstract

Circadian rhythms are endogenous biological oscillations with an approximately 24-hour period that regulate a wide range of physiological functions, including sleep-wake cycles, body temperature, hormonal secretion, and oral functions such as salivary secretion. In mammals, these rhythms are centrally coordinated by the suprachiasmatic nucleus (SCN) of the hypothalamus and are synchronized to the external environment primarily by light. Proper entrainment of the circadian clock is essential for maintaining physiological homeostasis and adapting to socially imposed daily schedules. General anesthesia has traditionally been understood as a reversible state of unconsciousness and immobility. However, accumulating evidence indicates that general anesthetics can also modulate the circadian system itself. Experimental studies have demonstrated that exposure to general anesthetics induces phase shifts in behavioral circadian rhythms in a time-dependent manner, suggesting that anesthesia can function as a non-photic zeitgeber. These effects cannot be explained solely by transient suppression of arousal but instead reflect alterations in the temporal organization of biological rhythms. Recent advances in chronobiology, combined with continuous physiological monitoring using wearable devices and noninvasive brain imaging techniques, have enabled the evaluation of circadian function in humans under real-life conditions. These developments bridge experimental chronophysiology and clinical medicine, highlighting the relevance of circadian timing in dental anesthesia and oral healthcare. This review summarizes fundamental concepts of circadian entrainment, outlines the impact of general anesthesia on circadian phase regulation, and proposes the concept of *chrono-dentistry*, which integrates chronobiological principles into dental practice across the lifespan.

Keywords：CIRCADIAN RHYTHM, BIOLOGICAL CLOCK, GENERAL ANESTHESIA, PHASE SHIFT, CHRONO-DENTISTRY
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Negative Pressure Pulmonary Edema Following Intravenous Sedation in a Patient with Intellectual Disability：A Case of Suspected Laryngospasm

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Abstract

We report a case of negative pressure pulmonary edema (NPPE) following intravenous sedation for dental treatment in a 29-year-old male patient with intellectual disability. Post-procedure, the patient exhibited persistent coughing and copious oral secretions. These stimuli likely triggered laryngospasm during the recovery phase, resulting in acute hypoxemia. Positive pressure ventilation and CPAP were promptly initiated, which led to a temporary improvement in oxygen saturation. However, the patient's SpO_2 levels dropped again when CPAP was discontinued, necessitating continued respiratory support. An arterial blood gas analysis showed hypoxemia (PaO_2 56 mmHg), and a chest X-ray revealed bilateral hilar opacities, consistent with NPPE. The patient was admitted for observation and was treated conservatively, including oxygen therapy and antibiotics for suspected aspiration pneumonia. His respiratory condition improved over the course of three days, and he was discharged without complications.

NPPE is a potentially serious but reversible condition caused by a strong inspiratory effort against an upper airway obstruction. While commonly associated with general anesthesia, it can also occur following intravenous sedation, especially in procedures involving the upper airway. This case highlights the importance of ongoing airway monitoring and support during the recovery phase after sedation. In patients with intellectual disabilities, particular caution is required because of potential difficulties in airway protection and secretion clearance.

Keywords：NEGATIVE PRESSURE PULMONARY EDEMA, LARYNGOSPASM, INTRAVENOUS SEDATION, DENTAL TREATMENT, INTELLECTUAL DISABILITY, AIRWAY MANAGEMENT
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Suspected Development of Functional Neurological Symptom Disorder after General Anesthesia and Intravenous Sedation Management：A Case Report

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Abstract

Functional neurological symptom disorder includes motor or sensory disturbances that occur unintentionally as a result of stress or psychological trauma. In this report, we describe a case of suspected functional neurological symptom disorder occurring after general anesthesia and intravenous sedation.

The patient was a 16-year-old female with a medical history of mild intellectual disability and auditory and tactile hyperesthesia, making dental treatment difficult.

The first intensive dental treatment was performed under general anesthesia. After returning to the patient ward, the patient complained of pain, weakness, and motor disturbances in her right upper and lower limbs, and she was subsequently transferred to a different hospital.

Considering the physical and emotional stress of general anesthesia, intravenous sedation was chosen for the second treatment. However, symptoms similar to those occurring after the first treatment also occurred after the second treatment, although the symptoms disappeared more quickly.

For the third treatment, general anesthesia was selected at the patient's request. Induction and maintenance went well, and although a general rigidity was observed after extubation, the patient returned to the patient ward with no weakness or motor disturbance.

The onset of symptoms was diagnosed as a psychogenic sensory disorder, and we suspected a functional neurological symptomatology.

After the general anesthesia, we worked to establish a trusting relationship with the patient. We also tried to reduce the patient's stress as much as possible by prescribing premedication and avoiding any invasive punctures of the right upper and lower limbs, which we believe led to a reduction in symptoms.

Keywords：FUNCTIONAL NEUROLOGICAL SYMPTOM DISORDER, PSYCHOGENIC SENSORY DISORDERS, INTELLECTUAL DISABILITY, HYPERSENSITIVITY

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Nasal Fiberoptic Intubation Using Transnasal Humidified Rapid-Insufflation Ventilatory Exchange（THRIVE）in a Patient with Limited Mouth-opening and Predicted Mask Ventilation Difficulty

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Abstract

Transnasal Humidified Rapid-Insufflation Ventilatory Exchange（THRIVE）, proposed by Patel et al. in 2015, is an extension of conventional apneic oxygenation that delivers heated and humidified high-flow oxygen via a nasal cannula. Optiflow THRIVE^{TM}（Fisher & Paykel Healthcare, New Zealand）enables effective preoxygenation and prolonged safe apneic time during general anesthesia. Since oxygen is administered nasally, most previous reports have focused on its use in oral intubation, while reports describing nasal intubation remain limited. We present the case of a patient with a mandibular fracture and severely restricted mouth-opening, in whom both mask ventilation and oral intubation were anticipated to be difficult. Nasal intubation was successfully performed using Optiflow THRIVE^{TM} in combination with a bronchofiberoscope under general anesthesia. This case highlights the potential utility of Optiflow THRIVE^{TM} in difficult airway management, particularly when nasal intubation is necessary due to anatomical or surgical considerations.

Keywords：NASAL FIBEROPTIC INTUBATION, PREDICTED MASK VENTILATION DIFFICULTY, TRISMUS, TRANSNASAL HUMIDIFIED RAPID-INSUFFLATION VENTILATORY EXCHANGE, APNEIC OXYGENATION
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Peripheral Facial Palsy and Trigeminal Neuropathy after Osteotomy, Nail Removal, Genioplasty, and Contouring Surgery：A Case Report

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Abstract

Peripheral facial palsy and trigeminal neuropathy are recognized possible complications of orthognathic surgery. Trigeminal neuropathy occurs relatively frequently in procedures such as genioplasty. In contrast, peripheral facial palsy post-orthognathic surgery is exceedingly rare, occurring in less than 2%.

A 38-year-old female patient underwent nail extraction, genioplasty, facial contouring surgery, and upper lip revision. On the first postoperative day, hypoesthesia was observed in her chin and upper lip. On postoperative day 7, motor dysfunction developed in the left side of the lip. Due to the lack of improvement with pharmacologic intervention, a stellate ganglion block（SGB）was administered on the left side, along with low-level laser therapy targeting the right stellate ganglion.

Over a five-month period, there was gradual recovery of both sensory function and facial motor activity. Despite measurable improvements in sensory testing, the patient continued to complain of symptoms including numbness, involuntary oral twitching, incomplete lip closure, and drooling, which significantly impacted her daily activities. Consequently, weekly acupuncture sessions rooted in traditional Oriental medicine were initiated.

Nine months after surgery, following nine acupuncture sessions, only mild paresthesia that no longer affected her daily functioning persisted, so the treatment was discontinued.

In this case, a combination of SGB and acupuncture improved traumatic trigeminal neuropathy and peripheral facial palsy resulting from nail extraction, genioplasty, and facial contouring surgery. Early SGB initiation contributed to the amelioration of acute symptoms and acupuncture might have addressed residual complaints not captured by standard clinical assessments.

Keywords：TRIGEMINAL NEUROPATHY, PERIPHERAL FACIAL PALSY, STELLATE GANGLION BLOCK, ACUPUNCTURE, ALLODYNIA

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Dental Treatment under General Anesthesia Using Remimazolam in a Pediatric Patient with Kabuki Syndrome and Fontan Circulation

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Abstract

Hypoplastic left heart syndrome (HLHS), one of the most complex forms of Kabuki make-up syndrome, is characterized by hypoplasia of the ascending aorta and left ventricle. The Fontan operation is the final stage of surgical treatment for this condition. "Fontan circulation" refers to a configuration in which a single ventricle pumps blood returning from the lungs to the body, and the blood returning from the body flows to the lungs directly via the vena cava connected to the pulmonary artery, not passing through the right ventricle. In this configuration, blood circulation regulation is considered insufficient to withstand induction for general anesthesia.

This is the case of a 10-year-old girl with Kabuki make-up syndrome and HLHS, who underwent a Fontan operation when she was three years old. She came to the hospital for dental treatment under general anesthesia. For normotension and cardiac output maintenance in the Fontan circulation, we used remimazolam during the induction and maintenance of general anesthesia. After monitoring via pulse oximetry, electrocardiography, noninvasive blood pressure measurement, and the Patient State Index, remimazolam and fentanyl were administered. We also used sevoflurane, as it facilitates induction of sleep for general anesthesia. Upon confirming patient sedation, rocuronium was administered, and we performed endotracheal intubation. There was no perioperative complication.

To the best of our knowledge, there is a paucity of case reports of pediatric patients for general anesthesia management using remimazolam. Remimazolam can be considered a reasonable choice when performing a dental treatment under general anesthesia in a pediatric patient with Fontan circulation, however achieving effective induction with remimazolam anesthesia remains challenging. Further studies on its impact on children should be conducted.

Keywords：KABUKI MAKE-UP SYNDROME, HYPOPLASTIC LEFT HEART SYNDROME (HLHS), REMIMAZOLAM, GENERAL ANESTHESIA, PEDIATRIC PATIENT

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Successful Management of Chronic Migraine-related Odontalgia with Mirogabalin and Amitriptyline : A Case Report

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Abstract

Introduction : Migraine is a primary headache disorder with diverse manifestations and frequent comorbidities such as cutaneous allodynia and depression, both of which contribute to migraine chronification. While odontalgia is usually of dental origin, in some cases it may represent a manifestation of migraine.

Case Presentation : A 43-year-old woman presented with throbbing pain in her upper right molars. She was initially diagnosed with dentin hypersensitivity and treated accordingly, but her symptoms persisted, leading to referral to our clinic. She had a long history of migraine managed with prophylactic and acute medications. Six months earlier, following a job change, the frequency of her migraine attacks had increased, and she subsequently developed tooth pain triggered by cold stimuli. Based on her history and clinical findings, chronic migraine-associated odontalgia was diagnosed. As she was already receiving standard migraine therapy, adjunctive treatment with mirogabalin (10 mg/day) and amitriptyline (10 mg/day) was introduced to address both odontalgia and comorbid depression.

Conclusion : Cutaneous allodynia and depression are established risk factors for migraine chronification. Although allodynia usually affects the skin of the head and neck, in this patient odontalgia represented a neuropathic pain. Adjunctive therapy with mirogabalin and amitriptyline relieved odontalgia and improved depressive symptoms, disrupting the cycle that sustained chronic migraine. This case demonstrates that odontalgia may be a manifestation of migraine-related neuropathic pain and highlights the necessity of comprehensive management that addresses both comorbid odontalgia and depression to achieve optimal migraine control.

Keywords : MIGRAINE, ODONTALGIA, ALLODYNIA, MIROGABALIN, AMITRIPTYLINE
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Building Communication with Patients Who Feel Stressed About Dental Treatment

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Abstract

In dental practice, patients seek not only advanced clinical techniques but also psychological support that allows them to undergo treatment with a sense of security. This article introduces the practice of sedation dentistry performed by a dental anesthesiologist for patients with dental anxiety, severe gag reflex, a history of panic disorder, or traumatic dental experiences. Although sedation is an effective approach, sufficient communication and the establishment of a trusting relationship with patients are essential prerequisites. At our clinic, extended initial consultations are conducted to emphasize attentive listening and empathy, enabling the development of individualized treatment plans. Furthermore, a team-based approach involving staff education and optimization of the clinical environment is employed to enhance safety and patient satisfaction. These efforts demonstrate the effectiveness of a new patient-centered dental care model in which dental anesthesiologists play a central role.

Keywords：DENTAL ANESTHESIOLOGIST, INTRAVENOUS SEDATION, FREE MEDICAL TREATMENT, DENTAL PHOBIA, RELATIONSHIP OF TRUST