

The Clinical Use of N₂O-O₂ Inhalation Sedation in Japan

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Joseph Priestley discovered nitrous oxide in 1728. In 1800, a superintendent of the Pneumatic Institute, Sir Humphrey Davy at the age of 22, suggested that the inhalation of nitrous oxide might be used to diminish pain during surgical procedure (Davy, 1969). He also gave the nickname laughing gas. Unfortunately, both Davy and other medical professions fail to take serious notice of nitrous oxide and employ it for the relief of pain during surgery, because laughing gas demonstrations was a popular source of entertainment and enjoyment among young people.

At a popular science lecture on 10th December 1844, Hartford, Connecticut, USA, the intoxicating effects of laughing gas were demonstrated. An attendant, Horace Wells, a local dentist saw a volunteer who inhaled laughing gas injured his leg but continued to run about as though nothing had happened, and considered there might be a clinical application for this laughing gas. On the following day, nitrous oxide was administered to Dr. Harace Wells, rendering him unconscious and able to have a wisdom tooth extracted without any awareness of pain (Raper, 1945). In the early 1840s medications for the prevention and relief of pain did not exist. The world had been changed at this moment.

Dentistry has long recognized that many persons are frightened of the dental experience. In approach to the management of pain and anxiety, the dental profession has remained in the forefront of all the health professions. In 2000s, a variety of techniques are available when fearful patients require treatment. Nitrous oxide inhalation sedation is one option.

During 1940s, 100 years after nitrous oxide had been introduced as a means of eliminating pain, the use of local anesthesia as a primary means of pain control became more accepted and nitrous oxide was no longer the ideal drug for the relief of pain. Nitrous oxide could now be used for the management of anxiety and the production of relaxation (sedation) rather than the elimination of pain as its primary goal. The technique of inhalation sedation with nitrous oxide (N₂O) and oxygen (O₂) possesses many advantages over other technique, and represents nearly ideal sedative procedure.

Harry Langa developed the concept of planes of analgesia within Stage 1 of Guedel's stages of anesthesia, and inhalation sedation with N₂O is called relative analgesia sedation in 1968 (Langa, 1968). The aim of relative analgesia sedation are to alleviate fear by producing anxiolysis, to reduce pain by inducing analgesia and improve patient cooperation so that dental treatment can be performed. N₂O-O₂ inhalation sedation was introduced to dental practice in early 1970s in Japan, and clinical researches were taken place. The first book about analgesia (sedation) in dentistry, Illustrated Analgesia (Furuya et al, 1974) and Nitrous oxide inhalation sedation for dental practice (Noguchi et al, 1974) were published respectively in November and December 1974. Now, this technique is widely employed. The major indication of N₂O-O₂ inhalation sedation is, of course, the management of fear and anxiety related to the dental experience. Furthermore, the medically compromised patient and the management of gagging are the primary indications. For this technique, (1) the low to moderate titrated concentra-

tion of N₂O in O₂ is administered to patients who remain conscious, (2) a machine which is designed specifically for N₂O-O₂ inhalation sedation should be used, and (3) semi-hypnotic suggestion should be used to positively reinforce feeling of relaxation.

I will speak the criteria of indications and contra-indications for N₂O-O₂ inhalation sedation, equipment, monitoring and possible complications, and introduce a technique which is most frequently employed in the Nippon Dental University Hospital.

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