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**A Comparison of Intravenous Sedation with Dexmedetomidine and Midazolam for Unilateral Third Molar Extraction under Local Anaesthesia**

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*Aim.* To compare dexmedetomidine and midazolam for intravenous sedation during unilateral third molar extraction under local anaesthesia.

*Methods.* The study was double blind. Patients were randomised to receive either dexmedetomidine (up to 1 mcg/kg) or midazolam (up to 5 mg). The drug was infused until the Ramsay Sedation Score reached 4 or the maximum dose had been administered. Intraoperative vital signs and adverse events were recorded. Numerical rating pain scores and analgesic consumption were charted up to three days after surgery. Mini Mental State Examination (MMSE) scores before and after surgery were compared. Amnesia was tested by asking patients to recall two pictures shown after sedation.

*Results.* Forty-four patients have been recruited and undergone interim analysis. Sedation was achieved by median doses of 0.90 mcg/kg [dexmedetomidine] or 3.55 mg [midazolam]. Desaturation (SpO<sub>2</sub>) occurred in 5 patients (23%) who received dexmedetomidine and 4 patients (18%) who received midazolam. There was no significant difference in respiratory rate. Heart rate and blood pressure were lower in dexmedetomidine group during surgery. Patients' and surgeons' satisfaction, pain scores and MMSE scores did not differ significantly between groups. Midazolam was associated with greater amnesia.

*Conclusions.* Our preliminary results show that dexmedetomidine produces comparable sedation to midazolam, with lower haemodynamic parameters and less amnesic effect.

**Examination of Intravenous Sedation for Implant Operations in General Dental Clinic**

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*Aim.* This study aims to assess the present state of employing intravenous sedation for the purpose of implant operations at general dental clinics.

*Subject and Method.* Subjects included patients on which ninety-four implant operations under intravenous sedation were conducted at twelve general dental clinics between April of 2005 and March of 2006. The age, sex, anamnesis of the patients, procedure of the treatment, treatment time, medication during the operation, and complications involved in the operation were examined in this study.

*Results.* The patients were 43 males and 51 females, and the average age was  $53.3 \pm 12.4$  years old. 20.2% had anamnesis, and hypertension was recorded most prevalently among those suffering from anamnesis. The average number of implants in the operations was  $3.6 \pm 2.1$ . Operations in which a sinus lift or a bone graft was necessary, accounted for 28.7%. The average time required for the operations was  $85.8 \pm 47.3$  minutes. Regarding medication, midazolam was used as the sole drug in most cases, and the average dosage was  $8.1 \pm 2.9$  mg. As for complications occurring during operations, elevation of blood pressure was observed in one case, and arrhythmia in another case.

*Considerations.* Implant operations have become increasingly advanced and complicated as they have gained in popularity over recent years. Intravenous sedation has been applied in more and more implant operations. Thus, in response, dental anesthesiologists are expected to make efforts to ensure and improve safety and comfort in dental care operations.

### **A Study to Assess the Values of Bispectral Analysis in Intravenous Sedation with Midazolam during Dental Surgery under Local Anaesthesia**

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**Aims.** To determine whether the bispectral index (BIS) can be used to titrate sedation with intravenous midazolam during dental surgery under local anaesthesia and to assess suitability for postoperative discharge.

**Methods.** In the first part, 30 healthy patients undergoing third molar extraction were recruited. They were sedated with intravenous midazolam according to clinical end points. BIS values were recorded when sedation was satisfactory and when clinical recovery criteria were met postoperatively. In the second part, another 30 patients were sedated to the range of BIS values obtained from part one. Recovery was assessed postoperatively when the BIS values reached the recovery range from part one. Degree of amnesia, adverse events, operating conditions and patient satisfaction were recorded.

**Results.** BIS titrated patients required less midazolam than those receiving clinical titration when sedation was ready ( $p < 0.001$ ). Total median dose of midazolam given during the whole procedure was also lower in part 2 ( $p 0.025$ ). Lower BIS values were associated with a higher degree of amnesia ( $p = 0.015$ ). There was no significant difference in other parameters. Two patients from part I developed desaturation ( $SpO_2 < 90\%$ ) during the procedures and none in part 2.

**Conclusions.** BIS is not effective as a sole indicator of satisfactory intravenous sedation. However, in conjunction with clinical assessment, the total dose of midazolam can be reduced, which may help to improve safety by preventing oversedation.

### **Assessing the Reliability and Usefulness of the Bispectral Index Monitoring System® on Dental Patients with Intellectual Disabilities**

*Douglas Stewart, University of Sydney, Australia*

Providing dental treatment to patients who exhibit dental or needle phobias, or have intellectual or physical disabilities, has always been a challenge to dentists. Patients who will not sit in the dental chair or cooperate with the dental team are often referred for a general anaesthetic in either a hospital or a day stay center. Patients with intellectual disabilities are often difficult to sedate due to the lack of rational verbal communication and other typical signs of levels of cooperation. The Bi-

spectral Index seemed to be a good indicator of the level of consciousness and this study aimed to observe whether there is an average Bis score for adequate sedation to allow completion of dental pain management. The Bispectral Index monitor has shown itself to be a potentially valuable tool in assessing the level of consciousness of dental patients undergoing sedation. Judging the level of sedation! consciousness has been a dilemma for the practitioner when treating patients who can not communicate normally, and the Bispectral Index monitor looks to be of great value in quickly determining a satisfactory working level for conscious sedation.

### **Flexible LMA and Oral Guard are Useful Equipments for Extraction of Third Molar Teeth under Deep Sedation**

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**Aim.** Respiratory depression and aspiration are big problems of oral surgery under deep sedation. Therefore we tried to use flexible LMA and Oral Guard when extract of third molar teeth during deep sedation. This report is pilot study of our procedure.

**Methods.** This study consists of impacted third molar teeth extraction patients. Patients must fast for 8 hours prior to surgery. We inserted LMA after administering propofol and gave no paralytic or narcotic agents. Then we gave bite block and Oral Guard with saliva ejector into the mouth. Prilocaine with felypressine injected for Gow-Gate technique and Lidocaine with epinephrine injected for infiltration anesthesia. Four l/min nitrous oxide, 2 l/min oxygen and propofol administered for maintenance of anesthesia.

**Results.** There were 4 patients (3 male, 6 female) in this study and  $164 \pm 5.9$  cm of height,  $54 \pm 8.6$  kg of weight and  $31 \pm 9.7$  years old of age. There were  $42.4 \pm 23.0$  min of procedure time,  $99.6 \pm 35.1$  min of anesthetic time,  $12.1 \pm 8.4$  min of wake up time and  $69.4 \pm 34.9$  min discharge time. There were no patients who had abnormal oxygen saturation, blood pressure and heart rate, however one patient obstructed airway because LMA moved. Also there were no sore throat patients.

**Conclusions.** We should look out for the LMA position in the throat space; however, we believe flexible LMA and Oral Guard were useful equipment for extracting third molar teeth under deep sedation.

### Spread of Lidocaine to the Maxilla and Brain in Rats

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**Aim.** The objective of this study was to determine the quantity of 2% lidocaine which permeates the maxilla and brain after injection in the palates of rats.

**Methods.** Subjects were Wister strain rats. The rats were anesthetized with 50–60 mg/kg of pentobarbital intraperitoneally. Spontaneous respiration was preserved. Twenty  $\mu$ l of 2% C<sup>14</sup>-labeled lidocaine was injected into the palatal gum. The rats were sacrificed at 2, 5, 10, 15, 30 and 60 minutes after the injection. The maxilla, brain and liver were taken from the deceased rats. Each sample (100–300 mg wet weight) was transferred to a scintillation vial, with 1 ml of solvent added, incubated for 3 hours at 60 degrees Celsius, and neutralized with 50  $\mu$ l of acetic acid. The samples were mixed with 10 ml of scintillation cocktail, and left for 24 hours at room temperature. The radioactivity in the samples was measured by liquid scintillation counting.

**Results.** The radioactivity in the maxilla and the brain reached its peak at 5 min and 2 min after the injection respectively. The peak radio activity in the liver was observed at 20 min after the injection. The radioactivity in the lower part of right maxilla, including the injection site, was fifteen times higher than in the right incisive bone, the second highest part.

**Discussion and Conclusions.** The results of this study indicate that lidocaine permeates more horizontally than vertically in the maxilla, and spreads to the brain quickly in rats.

### Effect of Mepivacaine Injection Speed on the Anesthetic Effectiveness and Localization

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**Aim.** To study the effectiveness of local anesthesia with Mepivacaine at different injection speed.

**Methods.** 30 patients aged 18–32 without somatic diseases took part in the study. We used two speeds (0,03 ml/sec and 0,006 ml/sec) to inject Mepivacaine with automatic syringes to each patient twice. The volume of injected solution was 1,7 ml. Pain control was assessed by the visual analog pain scale and pain threshold of teeth.

**Results.** The study shows that at the speed of 0,03 ml/sec painless treatment was in 47% of cases and pain

threshold increased in 5,5 + 0,7 times during 20 min. At the speed of 0,006 ml/sec painless treatment was in 78% of cases and pain threshold increased in 9,8 + 1,1 times during 40 min after injection. Estimation of anesthetic effect localization shows that reduced sensitivity of only teeth joining an injection area results from low speed.

**Discussion and Conclusions.** Automatic syringes allow us to use low speeds of Mepivacaine injection and have higher effectiveness and duration of anesthesia.

### Pharmacokinetic Parameters After Repeated Submucosal Injection of Articaine and Lidocaine with Epinephrine—Results of a Clinical Study

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**Introduction.** Articaine and Lidocaine are commonly used local anesthetics in dentistry. Artic. contains an ester group and is hydrolysed by plasmacholinesterases. The metabolism of Artic. is much faster than the metabolism of Lidoc., half-time (t<sub>1/2</sub>) is about 20 min. Pharmacokinetic parameters, peak serum levels, rate of metabolism determine the risk of systemic toxic reactions of LA., especially when higher doses are given.

**Methods.** 14 healthy volunteers (male: 7; female: 7; age: 18–50 years; body-weight 50–90 kg) were enrolled in an intra-individual cross-over study. Submucosal injection of 3 × 80 mg Artic. 4% and Lidoc. (epinephrine 1:200.000) was performed every 20 minutes. Blood-samples were taken before LA. was performed and 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60 and 90 mm after the injection (Lidoc. 120 and 180 mm). Serum-concentrations of Artic., the metabolite articainic acid and the Lidoc.-concentrations were measured using HPLC-chromatography.

**Results.** Mean values of the maximum serum-concentration were 0.87 mg/L (A) and 0.88 mg/L (L) (p > 0.05), time of the maximum serum concentration (t<sub>max</sub>) was 54 min in the Artic.-group and 71 min in the Lidoc.-group (p < 0.01). Mean AUC (0–90 min) was 216.8 in the Artic.-group and 50.1 after injection of Lidoc. (p < 0.001).

**Discussion.** After repeated injections of Artic. and Lidoc. (3 × 80 mg) serum levels of Artic. decrease significantly faster than Lidoc. The use of Artic. is safer, if repeated dosages are given.

### Comparison between Two Regional Anaesthesia Techniques Performed by Novices: The Gow-Gates Block versus the Kenneth Reed Block

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**Aim.** Inferior alveolar nerve block (IB) is often used but has a high failure rate (15–20%). Techniques proposed to overcome this include Gow-Gates mandibular nerve block (GG) (success rate 95%). Aim to compare the GG and the IB, as described by Kenneth Reed (KR) when carried out by novices.

**Methods.** 60 patients for molar extraction, randomly assigned to 2 groups received GG (Gp1), or KR (Gp2), using 2.2ml (Gp1) & 1.8ml (Gp2) of 3% mepivacaine. One unskilled dental student performed all blocks under supervision. We recorded failure rate, onset/offset times, aspiration rate, anaesthesia, complications, patient acceptance. Local anaesthetic diffusion assessed by MRI. Data presented as mean  $\pm$  SD. Comparisons were performed using ANOVA/Yates corrected  $\chi^2$  test. Statistical significance was indicated by P values  $<0.05$ .

**Results.** Randomization ensured the homogeneity of groups. Failure rate was 16.6% for Gp1 & 23.3% for Gp2. Onset/offset times were greater in Gp1 ( $p < 0.01$ ); pain level was more for GG ( $p < 0.05$ ). Aspiration was positive in 2 gpl patients. Patient acceptance was similar. MRI showed similar diffusion.

**Discussion and Conclusions.** The more cranial penetration site of KR may explain anaesthetic diffusion in the pterygomandibular space, similar to that during GG. Absence of blood aspiration during KR is maybe explained by the greater distance from the mandibular foramen/neurovascular bundle. The success rate was similar with both techniques. The shorter duration of KR may be explained by the wide diffusion of a smaller anaesthetic volume.

### Relative Efficacy and Safety of the P-ASA and AMSA Injections

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We compared, using a random, balanced, crossover design, the efficacy and safety of (1) the P-ASA injection versus labial infiltration over the lateral incisor and (2) the AMSA injection versus buccal infiltration over the first premolar in 60 healthy volunteers. All injections were made with the Wand (Milestone Scientific) at the slow setting using 2% lidocaine with 1:100,000 epi-

nephine (1.5 mL). Electric pulp testing was performed on the ipsilateral canine and incisor teeth (for the P-ASA and labial injections) or second premolar, canine, and central incisor (for the AMSA and buccal injections) before injection, immediately afterward, and then at 5-min intervals for 30 min and every 10 min thereafter until sensation returned. Pain of needle injection was assessed with a VAS. Postoperatively, pain and adverse events were recorded for 2 days. Onset of anesthesia was the quickest with the P-ASA injection, with onsets varying from  $0.5 \pm 2.1$  min (mean  $\pm$  SE) for the central and  $2.7 \pm 6.0$  min for the canine, and the slowest after the AMSA injection, ranging from  $6.8 \pm 13.0$  min for the second premolar to  $12.1 \pm 11.3$  min for the central. Mean durations of anesthesia were in the 30 to 45 min range. Efficacies varied considerably by tooth and injection. Needle insertion was significantly more painful with the P-ASA and AMSA injections than with their comparators. Postoperative events were also more frequently associated with the palatal injections, with the P-ASA injection causing pain, numbness, and/or swelling in 42% of subjects versus only 4% with the labial injection. These results suggest the P-ASA and AMSA injections are not generally preferable to standard techniques.

### Dental Anesthesia with Articaine + 1:400,000 Epinephrine

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Articaine is the most commonly used local anesthetic in dentistry in Germany. Commercial preparation for dental use is a 4% solution with epinephrine 1:100,000 or 1:200,000. In spite of the low concentration of epinephrine, reduction of epinephrine concentration may be useful in cardiac patients to minimize the risk of systemic complications.

In clinical studies, local anesthetic efficacy and serum levels of articaine with 1:400,000 epinephrine were evaluated in dental patients resp. volunteers compared to commercial preparations of articaine resp. lidocaine (both with epinephrine) resp. mepivacaine.

Complete anesthesia was in the same range when articaine was used, irrespective of the epinephrine concentration, but higher compared to lidocaine. Peak serum levels of articaine were irrespective of epinephrine concentration and in the same range compared to lidocaine, while metabolism of articaine was much more faster than of lidocaine,  $t_{0.5}$  was about 20 min (articaine) resp. 100 min (lidocaine).

It is concluded, that 4% articaine with 1:400,000 epinephrine is as effective for dental anesthesia as 4% ar-

ticaine with 1:200,000 or 1:100,000 epinephrine, but more effective than lidocaine. Safety of articaine is higher compared to lidocaine due to fast metabolism. Articaine with 1:400,000 epinephrine is effective for dental anesthesia and has a high level of safety due to low concentration of the vasoconstrictor. This preparation is useful for dental patients suffering from cardiovascular diseases.

### **The Cardiovascular Effect of Local Anesthesia with Ubistesine<sup>™</sup> versus Lidocaine in Medically Compromised Cardiac Patients: A Prospective Study**

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**Aims.** This study compared the cardiovascular response to local anesthesia (LA) with Ubistesine<sup>™</sup> (4%/1:200,000 adrenalin) or lidocaine (2%/1:100,000 adrenalin).

**Methods.** Patients with a history of hypertension, angina pectoris, myocardial infarct or congestive heart failure who were considered medically balanced before the initiation of the study were recruited. Fifty cardiovascular patients were randomly assigned to dental treatment using one of two local anesthetic injections: (A) Ubistesine<sup>™</sup> or (B) lidocaine. Dental treatment consisted of restorative procedures. Patients were monitored longitudinally for cardiovascular parameters beginning 5 minutes pre-LA injection until 4 minutes after the end of the dental treatment. A computerized system (Datex-Ohmeda 5/5 and Collect software, Datex-Ohmeda, Finland) allowed continuous data collection throughout the monitoring duration. Electrocardiography, pulse oxymetry, blood pressure values and end-tidal CO<sub>2</sub> were recorded in parallel. Patient and clinician perception of pain during LA was scored using visual analogue scale (VAS). T-test and ANOVA were used to compare the two treatment modes. Results: There were no clinical severe adverse effects. One transient local parasthesia occurred in group B. There was no statistical significant difference between the two groups in respect to LA effect on the heart-rate, systolic-blood pressure (BP), diastolic-BP and O<sub>2</sub> saturation. The statistical analysis showed that age, gender, jaw treated, treatment duration and the VAS did not confound the results of the comparison.

**Discussion and Conclusions.** LA with Ubistesine<sup>™</sup> was comparably as safe as LA with lidocaine in cardiovascular patients. The two local anesthetic solutions resulted in a similar low level of pain at the injection site.

### **New Method of Anesthetic Risk Assessment in Pediatric Dentistry**

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**Introduction.** Children selection and assessment prior to conscious sedation is essential. At present, the ASA PS classification system serves as example of risk assessment. However, ASA PS does not determine the true risk for conscious sedation. For determination the risk of anesthesia offered to children for dental treatment we use Pediatric Assessment Scale How to Anesthetise (PASHA). Total possible PASHA scoring ranges from 0 to 16 (higher score indicating greater anesthetic risk). Patients with PASHA score less than 3 are suitable for conscious sedation.

**Aim.** The major objective of our investigation was to compare ASA PS alone with PASHA.

**Methods.** A retrospective review of preoperative assessment data was performed. These data included patient ASA PS, Venham scale score, Mallampati evaluation, age, expected duration of dental treatment and PASHA score. The data of 105 randomly selected children from the patient pool of the CDC No.4 were processed. Mean age 5.3 + 0.6 year. Gender male 54, female 51. Forward stepwise logistic regression was used to build the model.

**Results.** Most children (98%) were classified as ASAII; two patients were classified as ASAIII. At the same time 17% of children had PASHA score >3 and were not suitable for conscious sedation.

**Conclusions.** The results of this survey suggested that Physical Status is not main cause of high risk score for anesthesia in pediatric dentistry.

### **Safety of Nonintubated Anesthesia in Pediatric Dentistry**

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A retrospective review of 1019 consecutive cases of nonintubated, in-office pediatric dental anesthesia cases was conducted to evaluate the type and incidence of adverse events commonly associated with this technique. Patients (552 males and 467 females) ranged in age from 18 months to 12 years (with 61% from 1 to 4 years) and weighed between 8 and 60 kg. Each patient was induced with a combined IM injection of 2.5

mg/kg ketamine, 0.1 mg/kg midazolam, and 0.008 mg/kg (up to a maximum of 0.2 mg) glycopyrrolate. Anesthesia was maintained with a continuous IV infusion of propofol, averaging  $136 \pm 45$  mcg/kg/min (mean  $\pm$  SD). Incremental doses of fentanyl, midazolam, and ketamine were used in some cases. The anesthesia time was  $98 \pm 35$  min. There were 25 (2.5%) adverse events, 22 of which involved respiratory problems (oxygen saturation  $<90$  mm Hg or necessitating treatment with positive pressure oxygen). Laryngospasm/breath-holding was the most common emergency (14 cases). Two of these patients needed succinylcholine administration, but none required emergency intubation. Most cases of laryngospasm occurred at the start of treatment during suctioning and nasopharyngeal airway placement. Other adverse reactions included apnea (5), upper airway obstruction (3), arrhythmias (2), and acute allergy (1). There were no instances of intraoperative emesis or aspiration. These results suggest that nonintubated in-office anesthesia for pediatric dentistry is associated with a low incidence of intraoperative complications. Most of the complications are airway related and managed by airway manipulation, suctioning, positive-pressure oxygen, and anesthesia adjustment.

### The Use of Conscious Sedation in the Dental Management of Special Care Patients

Michael N Wood, *Legrave Dental Anaesthetic Clinic, UK*

I intend to make use of case studies to demonstrate various routes, drugs and techniques in the management of patients who are medically compromised, are physically or mentally challenged. There will be examples of using these techniques in very young children, adults and in elderly patients. The routes include inhalational sedation, intranasal sedation, oral sedation, intravenous sedation. Drugs used include midazolam, ketamine, fentanyl, propofol and hydroxyzine. Techniques may include multiple routes of sedation.

### Management of Mouth Preparation Prior to the Surgery in Congenital Heart Disease Patients

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It is estimated that the number of children suffering from congenital heart disease who came to cardiology clinic of Hasan Sadikin General Hospital, including ASD and VSD, reaches 740 patients in the last year (2005).

Patients who need surgery are often consulted to special care dentistry (SCD) unit of Oral Surgery Depart-

ment Faculty of Dentistry, University of Padjadjaran/Hasan Sadikin General Hospital for a mouth preparation. Since most of these pediatric patients suffer from anxiety when they have to receive dental treatment, behavioural management alone is not sufficient. Therefore, oral sedation agent is frequently given to these patients. Sometimes, it is even necessary to give general anesthesia to these patients.

In these articles, the author wants to describe procedures for providing dental treatment service at the SCD unit of Oral Surgery Department, Faculty of Dentistry, University of Padjadjaran/Hasan Sadikin General Hospital Bandung, Indonesia.

### The Study of the Efficacy of New Selective Anxiolytic for Premedication in Out-Patient Dental Treatment

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*Purpose.* The study of usage possibilities of the new selective anxiolytic Afobazol in out-patient dental treatment. To estimate the patients' condition a complex of methods was used: EEG, ECG, AP and heart rate measuring, registration of somatosensory generated potentials, miography, photo-plethismography, skin-galvanic tests, psychological tests. 10 mg of the medicine were prescribed in 30 minutes before the dental treatment. 37 patients were studied aged 27-64 of both sexes. The study was carried out in start state and in 30, 60 and 120 minutes.

*Results.* According to the achieved figures Afobazol showed a particular anxiolytic effect in out-patient dental patients. In patients with asthenic features anxiolytic effect was combined with activating effect, although in sthenic the signs of VNS stabilization were registered. According to EMG results, no sign of miorelaxation was found.

*Discussion.* Achieved results show that Afobazol can be effectively used for premedication in out-patient dental treatment and is a medicine of choice in this case.

### Paradoxical Reactions in Anesthesia & Sedation

Norman Trieger, *Albert Einstein College of Medicine, USA*

*Aim.* Typical reactions include a fugue-like state with closed eyes, lack of cooperation, crying, and amnesia. This may be seen uncommonly in anxious, young teenage females after receiving benzodiazepines, barbiturate, propofol and inhalation anesthesia.

*Method.* Recently an article by Tamas et al entitled “Excitatory Effect of GABAergic Axo-Axonic Cells in Cortical Microcircuits” appeared in *Science*—Jan 13, 2006 pgs. 233–235, from the University of Szeged, Hungary.

*Results.* These cells have been shown to evoke excitatory instead of inhibitory responses in cortical networks.

This would provide a likely explanation for these paradoxical unanticipated adverse effects under anesthesia and sedation.

Our method of management has been to use specific reversal agents to curtail these reactions (where available) and proceed under local anesthesia. Tamas also speculates that these axo-axonic cells may have a function in triggering pathological events in schizophrenia and epilepsy.

### **Anesthesia for Tympanoplasty with Seckel Syndrome—A Case Report**

*Naomi Kojima, Hitoshi Tanabe, Oto Aramaki, Kyoko Shiina, Minoru Nomura, and Makoto Ozaki; Tokyo Women Medical University, Japan*

*Aim.* Seckel syndrome is a rare inherited autosomal recessive disorder. Patients have growth and mental retardation and show characteristic ‘bird-headed’ facial appearance. It was reported that dental malocclusion, receding chin and growth retardation might be the signs of difficult intubation. Some of them have cardiovascular complications. We report general anesthesia for Seckel syndrome.

*Methods.* The patient was a 28-year-old woman with a height of 135 cm and weighing 35 kg. She was complicated by epilepsy and mental retardation, and showed proportional dwarfism, typical beak-like triangular nose and malocclusion. The operation was planned for chronic tympanitis. We prepared enough for the airway management referring to the ASA Difficult Airway Algorithm preoperatively.

*Results.* Without premedication, anesthesia was induced with fentanyl and propofol. She had progenia, so mask fitting was difficult even though epiglottis was visualized fortunately.

*Discussion and Conclusions.* We report general anesthesia for Seckel syndrome and describe the progress.

### **Dental Anesthesiology in France**

*Jean-Frederic Andre, EFAAD (European Federation for the Advancement of Anesthesia in Dentistry), France*

Patient management in France is somehow a victim of our Latin culture, where pain has long been considered

a normal and expected consequence of disease. Finding an appropriate translation for patient management in French still is a challenge.

So much for the caricature. Times are slowly changing.

All aspects of local anesthesia are covered within the dental school graduate cursus. Pain control in dentistry is beginning to be a concern.

Sedation techniques are taught in a recently created (2002) post-graduate tuition named: University Diploma of Conscious Sedation for Dental Treatment.

The one-year cursus consists of 120 hours of teaching including about half lectures and half clinical practice. Among the subjects treated are: definitions of sedation and anesthesia, pharmacology of sedatives, description of pain and anxiety, indications. However, nitrous oxide sedation holds the main role, and mainly for special needs patients.

Setting up an everyday, pain-control dedicated, private practice in outpatient treatment using sedation still is problematic: the main obstacle being the impossibility to find modern sedative drugs for the dental office. Fortunately, Europe is a reality, and enables those daring to travel to extend their knowledge, practice and competence in patient management. The UK offers convenient IV sedation courses within an hour’s flight, and a world-class faculty. EFAAD, the European Federation for the Advancement of Anesthesia in Dentistry gathers as many components available on the continent. Information and experience are shared, in English.

In conclusion, enjoying a modern dental practice in France, involving the latest and safest patient management techniques is a possibility for the practitioner. However, France alone does not yet offer all the keys.

### **Dental Anxiety is Very High in The Republic of Kiribati**

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*Aims.* The purpose of the study was to evaluate the levels of dental anxiety in Kiribati using the Corah Dental Anxiety Scale (DAS).

*Methods.* Kiribati (pronounced Kiri-bas) is a group of 33 coral atolls scattered in the Pacific Ocean, straddling an area greater than Australia. The capital Tarawa is about halfway from Australia to Hawaii. 100 participants between the ages of 18–50 were interviewed in Tarawa. The participants rated their anxiety using DAS with a range of possible scores between 4 (no anxiety) and 20 (maximal anxiety).

*Results.* One person had never been to the dentist and was excluded from analysis. 48 males and 51 females had a mean age of 30.2 years with a range of

18–50 years. The mean DAS was 11 ( $\pm 3.9$ ) and ranged from 4–18. 42.4% of the participants were anxious i.e. DAS 13 with a mean age of 31 ( $\pm 10.5$ ) years. When examined by gender, males had a lower mean DAS of 10.4 compared with females who had a mean DAS of 11.5. The difference noted was of borderline significance ( $P 0.48$ ). Almost one quarter (23.2%) had a high level of anxiety ie DAS 15 or more with a mean age of 30 ( $\pm 10.5$ ) years. 20.8% of males and 25.5% of females had a high level of anxiety. There was no relationship between age and anxiety.

*Discussion and Conclusion.* An extremely large proportion of the sampled population had moderate to high dental anxiety that were relatively young adults of approximately 30 years of age. This is an important public health problem for Kiribati. These baseline studies can serve as a reference point to monitor if dental anxiety changes over time.

### Evaluation of Dental Local Anaesthesia by the Dentist

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*Aim.* This study focuses attention on dentists' personal experiences considering assessment, knowledge and their patients' reactions to local anaesthesia comparing Germany versus USA.

*Methods.* 130 German (G) and 31 American (A) dentists were studied attending courses on dental local anaesthesia. They were asked to complete a questionnaire of 26 free and closed questions anonymously.

*Results.* 52 female and 94 male with ages from 26 to 67 years (median 45 years) and medical registration from 1969 to 2005 (median 1988) responded. Nearly all feel absolutely secure in carrying out local anaesthesia. 61,1% of all G and 90,3% of all A think that patients overreact receiving an injection. About two-third of the G and 100% of the A participants believe to be able to give painless injections. 76% of the A dentists use topical anaesthesia prior to every injection, whereas G use it in less than 20%. The majority of 96,5% aspirates during every injection, almost two-third of all participants aspirates in two levels during block anaesthesia. One-third of all dentists prefer to be treated always under local anaesthesia themselves. In Germany 50% recommend their patients starting treatment without anaesthesia and inject by arising pain, whereas 81% of all A advise treatment always under local anaesthesia.

*Discussion and Conclusions.* These results outline that there are certain differences in the perception of

pain between the dentist and the patient and also between the dentists in both countries. Safety is an important concern in Germany and the US.

### Local Anesthetic Efficacy of Levobupivacaine with Epinephrine—Evaluation with Somatosensory Evoked Potentials in Rats

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*Aim.* Levobupivacaine (LB) consists of only S(–) bupivacaine and has a lower potential for producing toxicity to the central nervous system and cardiovascular system. We estimated the efficacy of LB with epinephrine (E) on infiltration anesthesia to oral mucosa using somatosensory evoked potential (SEP) in rats.

*Methods.* Wister male rats were anesthetized with pentobarbital sodium. A bipolar stimulating electrode was inserted into the pulp of the upper incisor and the SEPs following tooth pulp electrical stimulation were recorded from the first somatosensory area. The first positive wave (P1) and the first negative wave (N1) were detected and their peak-to-peak amplitude (P1-N1) was measured. 50 of 2% lidocaine with E (1/80,000), 0.75% LB without E and with E (1/200,000 and 1/500,000) were injected into the palatal mucosa. 50 of lactated Ringer's solution was injected as a control.

*Results and Conclusions.* P1-N1 was decreased following the injection of either local anesthetic agent. The suppression of P1-N1 in the group of 0.75% LB without E was similar to that of 2% lidocaine with E. The recovery of P1-N1 in the group of 0.75% LB with B (1/500,000) was slower than that of 0.75% LB without E. P1-N1 was strongly suppressed by 0.75% LB with E (1/200,000) and did not recover 180 minutes later. These results suggest that the concentration of E should be extremely low (less than 1/200,000) when LB with E is used for infiltration anesthesia in dental procedure.

### Anesthetic Efficacy of Ropivacaine Compared with 2% Lidocaine with Epinephrine

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*Aims.* The objectives of this study were to evaluate the efficacy of ropivacaine for nerve block and infiltration anesthesia in clinical dentistry.



**Methods.** Subjects were 73 healthy volunteers, 19–29 year-old. Inferior alveolar nerve block (n = 38) and infiltration anesthesia to the upper incisor area (n 35) were performed. They were divided into the three groups, 0.5%R (0.5% ropivacaine), 1%R (1% ropivacaine), and 2%L (2% lidocaine with 1/80,000 epinephrine), respectively. The analgesic effects on the lower right first molar and the upper right central incisor were evaluated by an electric pulp tester for 120 min after the injection.

**Results.** In the inferior alveolar nerve block, the changes over time of the analgesic effects showed similar trends in each group. In ropivacaine groups, the anesthetic duration was longer with significant differences from 2%L. In infiltration anesthesia, the duration in 0.5%R and 1%R was shorter for both the upper and lower teeth than in 2%L.

**Discussion and Conclusions.** The results suggest that ropivacaine is more clinically useful than 2% lidocaine with 1/80,000 epinephrine for the nerve block in cases requiring a longer treatment, or with prospected severe and long postoperative pain. Ropivacaine for infiltration anesthesia seems to have no benefit over 2% lidocaine with 1/80,000 epinephrine.

### Effect of Dexmedetomidine Added to Lidocaine on Regional Blood Flow

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**Aim.** Dexmedetomidine (DEX) is a highly selective  $\alpha_2$  receptor agonist. The prolongation effect of analgesia adding DEX to local anaesthetics is unclear. We investigated the effect of DEX which had been added to local anaesthetics as a vasoconstrictor.

**Methods.** Young, healthy adult volunteers were enrolled in this study. Each subject was administered 0.3 ml of 2% lidocaine containing 0.75  $\mu$ g DEX (LD) as a hypodermic injection on the forearm, and the blood flow in the tissue was measured using a laser tissue rheometer. Furthermore we examined the effect of 2% lidocaine (L) and 2% lidocaine containing 1/80,000 epinephrine (LE) on the blood flow. During the study period, the haemodynamic changes were also recorded.

**Results.** Six volunteers were enrolled in this study. Throughout this examination, the blood flows in the tissue after the LE injections were significantly lower than that of after the L injection. The blood flow in the tissue from 3 to 7 minutes after the LD injection was significantly lower than that of after the L injection.

**Discussion.** It was thought that the dose of DEX we

added to the local anesthetic in this study briefly decreased the blood flow on the forearm surface without changing the hemodynamics.

### Can Sodium Chondroitin Sulfate be Used as a Substitute for Epinephrine in Local Anesthetic?

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**Aim.** A vasoconstrictor is contained in the dental local anesthetic to enhance local anesthetic effect. Epinephrine or felypressin is usually used for dentistry in Japan. However, these agents can be dangerous to a patient with cardiovascular diseases. We have looked for an alternative agent which does not cause hemodynamic changes. Sodium chondroitin sulfate (SCS) is a candidate for this purpose and was compared with epinephrine and felypressin.

**Methods.** Wister Rats were used for this study. A bipolar electrode was inserted into the upper incisor pulp canal to stimulate the tooth pulp electrically. One of the local anesthetic agents described below was administered into the palate; 2% lidocaine with 1/73,000 epinephrine (LE), 2% lidocaine with 1% SCS (LC), 0.75% ropivacaine with 1% SCS (RC) or 3% propitocaine with 0.03 IU/ml felypressin. The amplitude of the primary somatosensory evoked potentials (SEPs) responses induced by electrical stimulation were measured and used as an indicator of effects of anesthesia.

**Results.** The duration of anesthetic effect was 90 min by LE:, 80 min by LC:, 70 min by RC: and PF, respectively. The maximum anesthetic effect was obtained from 8 minutes to 10 minutes after the injection, and the potencies were as follows; LE = LC = RC > PF. LC and RC showed similar duration and efficiency with LE.

**Conclusion.** The results suggest that sodium chondroitin sulfate enhances anesthetic effect and can be an alternative of epinephrine or felypressin, although its precise mechanism is unknown.

### Development of Magnetosensitive Local Anesthetic

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**Aim.** To develop a combination of ferromagnetic carrier and local anesthetic which provides magnetic susceptibility and directed transport of this local anesthetic.

**Methods.** As a magnetic component we used highly dispersive ferric powder, as a biocompatible polymeric capsule-tailored polyakrylamid in a certain proportion of

components. We fixed a local etheric anesthetic to polyakrylamid (Ferrocain) and using adsorptions method did research on animals.

**Results.** The magnetosensitive carrier was injected to animals with simultaneous influence of external magnetic field. Maximal Ferrocain accumulation in biological tissues occurs in 20–120 mm. Thus Ferrocain deposits on the side of influence in biological tissues on average in 16–19 times more than on the opposite side. In soft tissues of an animal Ferrocain deposition is on average in 1,6 times more than in bone tissue.

**Discussion and Conclusions.** The magnetosensitive local anesthetic is selectively capable of being deposited in biological tissues under the influence of external magnetic fields. Its address delivery is possible and allows to reach high local concentration of a substance and its prolonged action.

### **Comparison of Infiltration Techniques for Anaesthesia of Permanent Mandibular First Molars**

*John G. Meechan, Mohammad D. Kanaa, Ian P. Corbett, and John M. Whitworth; University of Newcastle upon Tyne, UK*

**Aim.** This study compared buccal and buccal plus lingual infiltrations for anaesthesia of permanent mandibular first molars.

**Methods.** 31 subjects received the following injections of 4% articaine with 1:100,000 epinephrine:

- 1) Buccal infiltration of 1.8 mL
- 2) Buccal (0.9 mL) and lingual (0.9 mL) infiltrations.

Injection discomfort was noted on 100 mm visual analogue scales. Electronic pulp testing was performed before, and every 2 minutes for 30 minutes after injection. Changes in pulp sensitivity and number of episodes of no response to maximum stimulation were noted at each time. Data were analysed by McNemar, and paired t tests.

**Results.** VAS scores were 20.9 mm after the larger buccal dose and 15.2 mm after the smaller ( $p = 0.017$ ). Changes in pulp sensitivity did not differ between treatments. Number of no responses to maximum stimulation did not differ between treatments (242 after buccal and 236 after combined;  $p = 0.58$ ).

**Discussion and Conclusions.** The discomfort of buccal infiltration with articaine was volume-dependent. Buccal and buccal plus lingual infiltrations with articaine did not differ in their efficacy for mandibular permanent first molar anaesthesia.

### **Does Intraligamentary Anesthesia MAR the Healing of Extraction Sockets?**

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**Aims.** We investigated the frequency of the occurrence of dry sockets after the use of intraligamentary anesthesia at ITO Dental Clinic, Yaizu, from September 2002 through October 2003.

**Methods.** We observed the healing of extraction sockets after the use of intraligamentary anesthesia. The needle was inserted on the mesial, on the distal, and also on the palatal/lingual surfaces of the targeted extraction tooth, expressing 0.25m1 each of local anesthetic, 2% lidocaine with adrenaline.

**Results.** #1. Incidence of dry socket: out of a total of 447 teeth extracted, there were 16 cases of dry socket. The incidence was 3.6%. #2. When 45 mandibular third molar teeth were extracted, dry socket occurred in 6 cases. The incidence was 13.3%.

**Discussion and Conclusions.** Meechan et al reported that the incidence of dry sockets was 10.9% after the use of 2% lidocaine with adrenaline when the intraligamentary anesthesia was employed. Using conventional local anesthetic methods, i.e., infiltration and block anesthesia, the incidence of the dry socket differed among different vasoconstrictors in the anesthetic solution. 3.3% of cases resulted in dry socket following the use of adrenaline, and 0.9% following the use of felypressin (octapressin). Regarding mandibular third molar extraction in this investigation, the incidence of the dry socket was slightly higher than the report of Meechan et al at 13.3% (compared to 10.9%). Using our intraligamentary anesthesia techniques, we found dry socket occurred in 3.6% of cases. In no case did we observe inflammation symptoms after tooth extractions, or find that the intraligamentary anesthesia disrupted or marred the healing of extraction sockets.

### **Topical Anaesthetic Use amongst UK General Dental Practitioners**

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**Aim.** Use of topical anaesthetic amongst UK general dental practitioners.

**Method.** Questionnaire.

**Results.** Responses were received from 528 dentists;

28% indicated that they always used topical anaesthetic, 67% sometimes and 5% never.

Topical anaesthetic preparations used included 5% lidocaine ointment, 10% lidocaine spray and 20% benzocaine gel. A similar number of practitioners used lidocaine (51%) and benzocaine (41%), a minority having more than one preparation; 8% could not identify the drug used.

The majority of practitioners did not prepare the mucosa prior to application of topical anaesthetic (59%), one-third prepared the mucosa by drying with gauze or pressurised air. Eighty three percent performed no further preparation prior to injection of local anaesthetic, 7% removed the topical with gauze and 4% washed the mucosa. Topical anaesthetic use did not differ between recent graduates ( $\leq 5$  years post-qualification) and experienced practitioners.

**Conclusions.** A minority of UK general dental practitioners do not use topical anaesthetics prior to injection. The most commonly used topical anaesthetic in the UK is lidocaine.

### **Effectiveness of Using Nerve Block Techniques on the Bottom Jaw**

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**Aim.** To assess the use of nerve block anesthetic techniques on the bottom jaw by means of Egorov and Gow Gates' methods.

**Methods.** We investigated pain thresholds, somatosensory evoked potentials, central and peripheral hemodynamics, and clinical effectiveness of nerve blocks in 320 patients.

**Results.** In Egorov's case spatium pterygomandibulare is filled up with the solution from the bottom pole to the top one, in the Gow-Gates block-from the top pole to the bottom one accordingly. The number of complications is lower while effectiveness is higher than in other techniques, especially in case of inflammation. The weakness of the Gow-Gates technique is complex individual reference points. The aim is achieved by combination of fingers of the left hand after the attitude to the bottom jaw. The anatomic arrangement at which the target item is in immediate proximity to the inferior alveolar nerve is reached through forming the certain position of the bottom jaw and injecting.

**Discussion and Conclusions.** The comparative assessment of anesthetic techniques for inferior alveolar nerve using Egorov and Gow-Gates' methods with updating has shown their effectiveness and safety especially in pain control of the inflamed tissues.

### **Is Onset Time of Subjective Lip Numbness a Predictor of Mandibular Block Success?**

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**Aim.** To assess the relationship between the onset of subjective lip numbness and objective pulp anaesthesia following inferior alveolar nerve block injection (IANB).

**Methods.** Thirty-eight volunteers received an IANB with 2 mL lidocaine 2% and epinephrine 1:80,000. Subjects were asked to report the onset of subjective lip numbness. Pulpal anaesthesia in first molars, first premolars, and lateral incisors was recorded electronically every 2 minutes for 10 mins, and then at 5 min intervals to 45 mins post-injection. The criterion for successful anaesthesia was no response at maximal stimulation of the pulp tester (80 on two consecutive readings. Data were analysed by Student's t test.

**Results.** All but three subjects developed lip numbness. There was a significant difference for onset of lip numbness between successful and failed cases of molar pulp anaesthesia (93 s and 211 s respectively;  $p = 0.021$ ). Similar results were found with premolars (118 s and 243 s respectively;  $p = 0.04$ ) and lateral incisors (89 s and 181 s respectively;  $p = 0.048$ ).

**Discussion and Conclusions.** The results of this study showed that the onset time of subjective lip anaesthesia is related to the success of IANB.

### **Sedative and Analgesic Effects of Intravenous Infusion of Adenosine and ATP in Healthy Volunteers**

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**Aim.** Adenosine and ATP may offer a wide range of clinical uses and they have been successfully combined with general anesthetics. However, there are few human studies demonstrating their sedative and analgesic properties. We determined the sedative and analgesic effects of IV administration of adenosine and ATP in healthy volunteers.

**Methods and Results.** Sedative study: Ten healthy volunteers were randomly assigned in a double-blind crossover study. Each subject was evaluated in 2 separate sessions, and received either an IV loading dose

of midazolam (0.04 mg/kg) followed by placebo (saline) infusion in one session, or the same dose of midazolam followed by continuous infusion of ATP (100 mcg/kg/min) at another session for 40 min. The degree of sedative/hypnotic effects were assessed using both subjective and objective behavior responses and Bispectral Index (BIS) measurements. Co-administration of ATP and midazolam significantly decreased BIS values as compared to those of midazolam alone ( $54.0 \pm 1-11.0$  vs  $72.4 \pm 1-11.2$ , respectively), confirming the findings of behavioral observations wherein ATP potentiated the sedative/hypnotic actions of midazolam.

**Analgesic Study.** Seven healthy volunteers were randomly assigned in a double-blind crossover study. Subjects participated in 3 separate sessions and their sequence was randomly assigned. Adenosine, ATP or placebo at an infusion rate of 100 mcg/kg/min for each one of the studied drugs was administered for 60 min. Pain thresholds of electrical tooth pulp stimulation were assessed during and after the infusion. Continuous infusion of adenosine and ATP slowly and progressively elevated the pain threshold significantly ( $P < 0.05$ ) reaching the peak effect after the infusion was ended.

**Conclusion.** These results demonstrate that IV infusion of adenosine and ATP had measurable and distinctive effects of sedation (rapid onset and short duration of action) and analgesia (slow onset and long-lasting) in humans.

### **Exogenous ATP Potentiates and Aminophylline Reverses Propofol-Induced Sedative/Hypnotic Effects**

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It has been reported that exogenous purine potentiate the sedative effect of intravenous (IV) anesthetics, and aminophylline, an adenosine receptor antagonist, reverses the sedative effects of benzodiazepines, barbiturates, ketamine and opioids. We investigated whether ATP, purine nucleosides, could potentiate the sedative/hypnotic effects of propofol and whether the propofol effects could be reversed by aminophylline.

**Method.** After institutional approval, twelve volunteers participated in the study in two trials: (trial 1) administration of propofol alone at 1 µg/ml plasma target concentration for 50 min, and (trial 2) co-administration of propofol and ATP (100 µg/kg/min) for 50 min. Using the

BIS, CNS activities were continuously monitored and responses to verbal command were tested every five min. Forty min after the start of propofol alone, or combined with ATP, the deeply sedated subjects were injected with aminophylline (5 mg/kg) in over 30 s. The following variables were also monitored: blood pressure, heart rate, respiratory rate, tidal volume, minute ventilation, arterial oxygen saturation, end-tidal carbon dioxide, plasma propofol and theophylline concentrations. RM-ANOVA followed by SNK test for multiple comparisons were used for statistical analysis ( $P < 0.05$ ).

**Results and Discussion.** Propofol infusion produced significant reduction in BIS values associated with sedation/hypnosis. Co-administration of ATP and propofol further decreased the BIS values as compared to those of propofol alone, suggesting that ATP potentiated propofol's sedative actions. IV aminophylline effectively reversed propofol actions despite continuing propofol infusion. Within minutes all subjects were readily responsive to verbal commands, and the BIS values were restored to awake levels in both groups. These results strongly suggest a possible involvement of central adenosine receptor activities in the mechanisms of propofol-induced anesthetic state.

### **Dividing Doses of Lidocaine with Epinephrine Reduces Plasma Catecholamine Levels**

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**Aim.** To determine the effect on plasma catecholamine levels following a single or dual dose of the local anesthetics lidocaine with epinephrine and prilocaine with felypressin.

**Methods.** Twenty-four ASA I male adult volunteers with an average age of 23.7 years and weight of 67.2 kg, from whom written informed consent had been obtained, were recruited and randomly divided into three groups. The local anesthetic was infiltrated. Group 1 received 2% lidocaine with 1:80,000 epinephrine (E) as a 4 ml bolus, Group 2 received E initially as a 0.5 ml administration followed 3 minutes later 4.0 ml dose and Group 3 received an initial administration of 0.5 ml of 3% prilocaine with 0.031 U felypressin followed by 4.0 ml of E 3 minutes later. Venous blood samples were taken for plasma catecholamine analysis.

**Results.** Plasma epinephrine levels reached a peak after five to ten minutes in all groups and gradually decreased thereafter.

**Discussion and Conclusions.** This technique may be

particularly useful and important in certain patients and situations; however, clinical trials are warranted.

### **Dynamics of Sensitivity and Peripheral Blood Flow in Prosthetic Treatment with Ceramic Veneers under Intraseptal and Infiltration Anesthesia**

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*Aim.* The dynamics of return of sensitivity and peripheral blood flow in treatment with ceramic veneers under intraseptal (ISA) and infiltration (IFA) anesthesia.

*Methods.* 20 patients aged 16–30 took part in the study. 4% articaine solution with epinephrine 1:100,000 was used for ISA or IFA (0.5 ml) during preparation. We assessed pain threshold (PT) and the pulp blood flow by means of reography.

*Results.* At the stage of prosthetics PT dynamics is different depending on a local anesthetic method: PT decreased after ISA, but it was increased after IFA. PT return was in 30 days after ISA and in 7–10 days after IFA. The study of PT shows that blood flow in the pulp is more affected in the ISA than in the IFA. The ISA demonstrates the cut of circulation intensity in 3.3 times in 60 min compared to the IFA. There is a circulation return in 14–17 days after preparation in the former case compared to 7–10 days in the latter one.

*Discussion and Conclusions.* Veneer prosthetics raises reversible changes of pulp sensitivity and blood flow regardless of local anesthesia. The ISA leads to more functional disorders than the IFA.

### **Efficacy of Intravenous Sedation Using Dexmedetomidine in Oral Surgery**

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*Aim.* Dexmedetomidine (DEX) is a highly selective  $\alpha_2$ -adrenergic agonist. Recently, DEX has been used for sedation for patients undergoing respiratory support through tracheal intubation in intensive care units. However, there are few reports of intraoperative sedation in oral and maxillofacial surgery. We researched the efficacy of DEX for intraoperative sedation in oral surgery.

*Methods.* Sixteen patients were enrolled in this research. Atropine (0.1 mg/kg) and meperidine (1 mg/kg) were injected intramuscularly as premedication. After the intravenous route was obtained, midazolam (MDZ, 0.04 mg/kg) was injected, following 6 mcg/kg/

hr of DEX administered as a loading dose for 10 min. Then, 0.5 mcg/kg/hr of DEX was continued. MDZ (0.02 mg/kg) was reinjected an hour after the first administration. We investigated mean arterial pressure (MAP), heart rate (HR), SpO<sub>2</sub> BIS, intraoperative complications (body motion, cough reflex and snoring), intraoperative memories, and recovery time.

*Results.* MAP and HR decreased slightly compared to control values during the loading and maintaining doses of DEX. In only one patient, SpO<sub>2</sub> decreased to 88% after the reinjection of MDZ. BIS decreased to 70s after the administration of DEX. A small number of cases experienced body motion, cough reflex and snoring. It took about 2 hours to awaken completely.

*Conclusion.* Sedation using DEX in combination with MDZ is useful in oral surgery because of less respiratory depression; however, a long recovery time is required.

### **Which is Better for Sedation with Dexmedetomidine, 0.2 or 0.4 $\mu\text{g}/\text{kg}/\text{h}$ ?**

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*Aim.* Dexmedetomidine (DEX) is a unique sedative to control patients consciousness level easily. We investigated an influence on respiration, circulation, sedation, recovery process and amnesic action in two different methods.

*Methods.* 11 healthy adult volunteers were sedated with DEX with an initial dose of 6  $\mu\text{g}/\text{kg}/\text{hr}$  for 5 minutes and a continuous dose of 0.2  $\mu\text{g}/\text{kg}/\text{hr}$  (Method 0.2) or 0.4  $\mu\text{g}/\text{kg}/\text{hr}$  (Method 0.4) for 25 minutes, and recovery process was observed for 60 minutes after the end of DEX administration. Method 0.2 and Method 0.4 were performed in the different day. The data of tidal volume, respiratory rate, end tidal CO<sub>2</sub> percutaneous oxygen saturation, mean blood pressure, heart rate, bispectral index (BIS), Trieger dot test (TDT) and amnesic action in both groups were collected at each time point during and after DEX administration.

*Results.* In Method 0.2, BIS decreased significantly from 15 to 30 minutes after the start of DEX administration. In Method 0.4, it decreased significantly from 10 minutes after the start of DEX administration to 30 minutes after the end of DEX administration.

*Discussion and Conclusions.* In BIS, awaking of Method 0.4 was delayed behind Method 0.2 though Method 0.4 reached to sedative level earlier than Method 0.2. Therefore, a device that awakes early after the end of DEX administration is necessary in Method 0.4.

### **Intravenous Conscious Sedation with Dexmedetomidine for Minor Oral Surgery**

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The analgesic effect and slight respiratory depression of Dexmedetomidine (Dex) are advantageous characteristics in conscious sedation for dental treatment. We used Dex in intravenous sedation for minor oral surgery and compared the changes of blood pressure, heart rate, percutaneous arterial oxygen saturation (SpO<sub>2</sub>) and Bispectral Index (BIS) with Dex to those with propofol (Prop).

Dex was continuously administered for 10 minutes at a dose of 6 µg/kg/hr as the initial loading until an optimum level of sedation was obtained. After that it was continuously administered at dose of 0.2~0.7 µg/kg/hr to the end of the treatment. In the Prop group, Prop was continuously administered at dose of 2~6 mg/kg/hr following a bolus administration of 0.5 mg/kg. In Dex group, blood pressure was increased just after the start of initial loading, but it was gradually decreased. Heart rate was decreased during the initial loading, but it was increased after starting the treatment. In Prop group, blood pressure was decreased and heart rate was not changed. SpO<sub>2</sub> was slightly decreased during the treatment in Dex group. The fluctuation of BIS was rather great and there were no constant tendency in Dex group.

These results suggest that careful monitoring of hemodynamics is necessary in order to apply Dex for intravenous conscious sedation. In addition, difficulty of evaluating the sedation level may be a problem, because patients will be aware by some irritation of the dental treatment although they are in rather deep level of sedation.

### **Is Bispectral Index; BIS Monitor Necessary during Intravenous Conscious Sedation?**

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**Aim.** To assess the availability of BIS and correlation with heart rate (HR) and blood pressure (BP) during conscious sedation and local anesthetic injection (LA) using propofol (P group) or midazolam (M group).

**Methods.** BIS, HR and BP was prospectively examined in each 20 patients at baseline, during conscious

sedation (Observer's Assessment of Alertness/Sedation score; S 3), during LA (S 3) and recovery (S 5).

**Results.** BIS was different during sedation (P = 69–75 and M = 74–79) at S 3. HR was higher than baseline at M group during sedation and lower than baseline during recovery at P group. HR increased during LA at only P group. BIS was increased during LA in both groups. Both groups showed comparable decreases in BP during sedation. Only systolic BP increased in both groups during LA. During recovery period, BP returned to baseline with M but remained below baseline with P. There is no correlation of BIS and HR changes in both groups.

**Discussion and Conclusions.** BIS has a drug-specific, it is improper to rely on its single value to assess sedation level. No correlation between BIS and HR during LA was shown. BIS is a useful but not a necessary criterion for adequate sedation.

### **Effects of Dexmedetomidine on Hemodynamics and Autonomic Nervous Systems**

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**Aim.** Dexmedetomidine (DEX) is a selective α<sub>2</sub>-agonist, used as a sedative agent. The purpose of this study is to investigate the effects of DEX on hemodynamics and autonomic nervous systems by means of impedance cardiography and blood pressure (BP) and heart rate (HR) variability.

**Methods.** Eleven healthy volunteers were enrolled in this study. They were given DEX intravenously at the rate of 6 µg/kg/h for 10 minutes as an initial dose followed by 0.4 µg/kg/h for 20 minutes as a maintenance dose. HR, BP, cardiac index (CI) were measured. HR and BP variability were analyzed with the Wavelet method. Sympathetic and parasympathetic nervous activities were evaluated by low frequency component of systolic BP variability (SBP LF) and of high frequency component of HR variability (HR-HF), respectively.

**Results.** HR decreased soon after the DEX administration, while systolic BP decreased 15 minutes after the beginning of the DEX administration. CI decreased during only the initial dose period. SBP-LF decreased after the DEX administration, while HR-HF did not change statistically.

**Discussion and Conclusions.** Our results suggest that DEX reduce the sympathetic activity and have little or no effect on parasympathetic activity. It is concluded that the decreased HR, systolic BP, and CI are attributed to the reduction of sympathetic activity.

### **A Comparative Study of Propofol versus Dexmedetomidine in Sedation**

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**Aim.** We investigated a comparison Propofol (P) and Dexmedetomidine (D) on respiration, circulation, sedation, recovery process and amnesic action in sedation.

**Methods.** 16 healthy adult volunteers were divided into P group and D group. In P group, 8 subjects were sedated with an initial dose of 6 mg/kg/h for 10 minutes and a continuous dose of 4 mg/kg/h for 20 minutes, and recovery process was observed for 60 minutes after the end of P administration. In D group, 8 subjects were sedated with an initial dose of 6  $\mu$ g/kg/h for 5 minutes and a continuous dose of 0.2  $\mu$ g/kg/h for 25 minutes, and recovery process was observed for 60 minutes after the end of D administration. The data of tidal volume, respiratory rate, end tidal CO<sub>2</sub> percutaneous oxygen saturation, mean blood pressure, heart rate, sedative score, Trieger dot test (TDT) and amnesic action were collected at each point during and after administration.

**Results.** Sedative score in D group increased significantly from 10 minutes to 60 minutes after the end of D administration. However, no significant difference was detected between groups in TDT.

**Discussion and Conclusions.** Although the recovery of psychomotor function in both administration methods was same, awaking of the D group was delayed behind the P group in sedation score. This indicates that D has the characteristic in which the conscious level is recovered if necessary even when sedative effect is obtained. However, sedation with D should discontinue administering earlier than that with P.

### **The Effect of Psychosedation on Mandibular Position and Movement**

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**Aim.** We examined influences of propofol-induced sedation in the horizontal and the vertical direction of the lower jaw movement.

**Methods.** The analysis device of the mandibular movement was examined by Gnatho-hexagraph. We measured the front and the side movement with Gnatho-hexagraph on the rest position of mandible, tapping, opening and closing mouth. Infusing propofol by TCI pump, BIS values were calculated. Blood concen-

tration in the brain of propofol was made 0.3, 0.6, 0.9 and 1.2  $\mu$ g/ml.

**Results.** The front movement and the side movement on a rest position of mandible, tapping, opening and closing mouth at the time of 0.3, 0.6  $\mu$ g/ml were as same as the non-sedation, and intercuspal position converged on the same mandibular place. A rest position of mandible changed in more than 0.9  $\mu$ g/ml, and mandibular movement might not become stable, either. Especially the front and an end place in the side movement were more unstable than opening and closing mouth movement.

**Discussion.** Though propofol-induced sedation had influence on a mandibular position and movement, it did not depend on BIS values. Therefore, the possibility that repression of the CNS by propofol influenced the activities of muscles was suggested.

### **A Comparison of the Effects of Propofol and Dexmedetomidine Sedation on Upper Airway Collapsibility**

*Yuko Hoshino, Takao Ayuse, and Kumiko Oi; Nagasaki University Graduate School of Biomedical Sciences, Japan*

**Aim.** It has been reported that dexmedetomidine can be used for sedation in ICU without causing major obstruction on upper airway. However there is little data examining quantitative assessment of upper airway collapsibility. Recently, we reported that the upper airway critical closing pressure (Pcrit) and upper airway resistance (Rua) during midazolam sedation was comparable with Pcrit during natural non-REM sleep during moderate midazolam sedation (Ayuse T et al: J. Dent. Res. 2005; 84(6):554-558). The aim of this study is to test the collapsibility of upper airway during Dexmedetomidine sedation.

**Methods.** Five male subjects (age 24.3 years, BMI 21.1 kg/m<sup>2</sup>) were studied. We used a pressure-flow relationship to evaluate critical closing pressure (Pcrit) and upper airway resistance (Rua) in Dexmedetomidine sedation. The pressure and inspiratory flow at subjects nose mask were recorded and Polysomnographic parameters (electroencephalograms, electrooculograms, submental electromyograms, plethysmogram) were also recorded. Pcrit was measured in each subject during propofol infusion (target blood concentration = 1.6~2.0  $\mu$ g/ml) and Dexmedetomidine infusion (3  $\mu$ g/kg/hr 10 minutes loading + 0.4~0.6  $\mu$ g/kg/hr 20 minutes infusion). The level of sedation was assessed by Ramsay OASS score (level 3~4) and BIS value (50~70).

**Results.** Pcrit in propofol sedation was  $8.6 \pm 4.6$

cmH<sub>2</sub>O and R<sub>ua</sub> was 39.6 ± 29.1 cmH<sub>2</sub>O. Pcrit in dexmedetomidine sedation was 8.6 ± 6.5 cmH<sub>2</sub>O and R<sub>ua</sub> was 52.9 ± 15.4 cmH<sub>2</sub>O.

**Conclusions.** Our findings demonstrate that upper airway neuromuscular reflex mechanisms may remain intact during both propofol and dexmedetomidine sedation.

### Effects of Sedative Doses of Propofol and Dexmedetomidine on Body Temperatures

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**Aim.** We have already shown that even low doses of propofol have effects on body temperatures (Eur J Anaesthesiol, 2002). In this study, we evaluated the effect of the sedative doses of propofol and dexmedetomidine, and compared the effects.

**Methods.** Male volunteers participated in two different sessions. In Group P, propofol was given with the following infusion rate: 8 mg/kg/h for the first 10 min, followed by 4 mg/kg/h for the last 20 min. In Group D, dexmedetomidine was given with 6 µg/kg/h for the first 10 min, followed by 0.2 µg/kg/h for the last 20 min. In both groups, scaling was performed over 10 min, from 20 to 30 min after the start of the infusion. The level of sedation was evaluated by BIS. Body temperatures were measured at five locations; tympanic membrane as central core temperature, and the chest, the upper arm, the thigh and the calf as skin temperatures. The mean skin temperature was calculated from the four skin temperatures.

**Results.** In both groups, the value of BIS decreased after the start of the infusion, and recovered gradually after the discontinuation of the infusion. Statistical difference was not found between the both groups until 50 min. Tympanic membrane temperature decreased in both groups, and the decrease of Group P was significantly greater than those of Group D from 25 min to 40 min. The mean skin temperature in Group P showed tendencies to increase until 45 min, and to decrease after then. In Group D, it showed a tendency to decrease after 40 min. The changes of the mean skin temperatures were not significant.

**Discussion and Conclusions.** These results indicate that the sedative doses of propofol and dexmedetomidine induce body heat redistribution, and the effect is greater in propofol than in dexmedetomidine at the same level of sedation.

### Cerebral Blood Flow in a Sedative State by Midazolam Administration

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**Objective.** It is known well that Midazolam has the strong effect on amnesia. However, the mechanism of the action in central nervous system is not understood well. Then, this research was planned to clarify the amnesia effects of midazolam on the central nervous system with visual memory tasks using 3T functional MRI (fMRI), which can detect visually areas of increase in brain blood flow.

**Methods.** Subjects were 4 healthy adult volunteers and were 28–40 (mean 32) years old. We assessed the changes in brain blood flow after visual memory task (task 1; composed of fifteen pictures, task 2; composed of twelve words) before and during intravenous sedation with midazolam (0.6 mg/kg iv) using fMRI. And we also evaluated score about the visual memory task before and after the administration to evaluate the influence of midazolam on the memory.

**Results.** The brain blood flow of the occipital lobe after visual memory tasks increased before and 10 minutes after, but not 5 minutes after midazolam administration. The activation was regarded also in the left temporal lobe and the thalamus besides an occipital convolution depending on the memory tasks in some cases. The number of correct answers was 6 ± 2.0/15 in task 1 and 4 ± 2.4/12 in task 2 before sedation, and 0 after 5 minutes and 10 minutes during sedation.

**Conclusion.** It is suggested that midazolam depresses the conduction pathway of memory information from occipital lobe to higher central nervous system, and it is also surmised that it depressed the input of memory visual information on the way to occipital lobe.

### The Alternative Medication for Sedation in Dentistry

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**Aim.** The objective of this study was to evaluate the stress-protective effectiveness and safety of homeopathic Epinephrine in C6, C12, or C30 potency used in outpatient dental practice.

**Methods.** 110 patients aged 16–65 years with a high level of personal anxiety were divided into three groups and received 5–10 sublingual granules of one of the homeopathic preparations: Epinephrine 6 CH, Epinephrine 12 CH or Epinephrine 30 CH. The control group



(16 patients) received Relanium (0,2–0,3 mg/kg per os). The effectiveness of these preparations was estimated clinically and through testing catecholamine (CA) levels in saliva using HPLC with electrochemical detector before treatment and 30 minutes after it.

*Results.* All preparations were useful for inhibiting hemodynamic excitatory action of psychoemotional stress. Homeopathic preparations of Epinephrine normalized the levels of CA. Epinephrine 30 CH was more active. Relanium depressed the levels of CA. The patients received the homeopathic Epinephrine showed no adverse effect during this treatment.

*Discussion and Conclusions.* The clinical investigation showed clinical effectiveness and safety of various potencies homeopathic Epinephrine, especially Epinephrine 30 CH. This method can be used as alternative to conventional sedation in outpatient dental practice.

### Treatment under Sedation with Midazolam

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University of Mainz, Germany

*Aim.* Teeth extractions and incisions in anxious patients can be conducted under oral premedication with Midazolam.

*Method.* Between 2002 and 2005 Midazolam was given in an amount of 0,2 mg/kg bodyweight half hour before treatment orally. Articain 4% with Epinephrine 1:200,000 was used as local anesthetic. Treated patients were kept under surveillance for 1 hour after treatment. Conducting dentists evaluated the sedation effect scoring the compliance of the patients during treatment between therapy denial under sedation, bad, medium and good sedation. Patients with pulmonal symptoms or muscular diseases were excluded from treatment. Anamnesis was strictly to conducted and the patients were not allowed to eat or drink 6 hours before treatment.

*Results.* A mean of 0,199 mg/kg Midazolam was applied for premedication. 423 patients between 1 to 44 years old (Median 4,9) were treated during the 4 year period, mainly children. Sedation depth was specified as good in 42,3% of the cases, in 34,3% as medium, and 21,7% as bad. Only 1,7% patients refused treatment during sedation. Up to 8 extractions or incisions were conducted during treatment. The cases were mainly single exodontias (43,5%) because of caries or abscess.

*Conclusions.* Oral premedication with Midazolam in an amount of 0,2mg/kg bodyweight is easy to handle for the dental practioner. A precondition is a strict exclusion of patients with pulmonal or muscular diseases and complete sobriety before premedication.

### Effectiveness of Midazolam Monotherapy Compared to the Combination of Midazolam with Nitrous Oxide for Sedation

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*Aim.* To ensure a decreased stress surgical therapy under (conscious sedation) through midazolam is limited suitable for children. In some cases additional application of hypnotic techniques showed an advantage. However not every patient showed these signs of success. Consequently, a prospective study was conducted to evaluate the additional use of nitrous oxide.

*Methods.* Sedation was applied with children up to 9 years to prepare tooth extraction under local anaesthesia. The surgical intervention was conducted with one hundred children (single and multiple extractions). Two groups were allocated randomly: oral intake of midazolam with and without combination of nitrous oxide. The stress level during treatment was evaluated by parents, surgeon and anaesthesiologist through a questionnaire. Additionally, parameters of blood pressure/pulse as well as arterial oxygen saturation were evaluated. The objective measurement of pain was achieved through the CHIPPS scale (Children and Infants Postoperative Pain Scale).

*Results.* The blood pressure and pulse showed an increase up to 20% at the time of the injection and extraction, irrespective of the method of sedation. The increased CHIPPS values showed that particularly the combined treatment of nitrous oxide and midazolam was problematic for children up to the age of 4. The reason was that they did not tolerate the nasal inhaler of the scavenger system. Approximately 40% of this target group reached CHIPPS values of 5 and more as well as the evaluation of compliance from medium to non-existent. Children between 5 to 9 year showed a significantly higher compliance value (29%).

*Discussion and Conclusions.* The success of an additional use of nitrous oxide is age dependent. Sedation with midazolam in combination with nitrous oxide can improve surgical treatment. It must be clarified if application of nitrous oxide alone would have the same effect.

### Optimal Intravenous Sedative Levels for Patients with Developmental Disease who are unable to Cooperate in Dental Treatment

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*Aims.* The objective of this study was to find an index for an optimal intravenous sedative level for develop-

mental-disease patients who are unable to cooperate in their dental treatment.

**Methods.** Using a TCI pump, we performed an intravenous infusion of propofol and checked the following: drooping of the eyelid (Verrill's sign); disappearance of an eyelash reflex; and disappearance of body movement at the time of bite block insertion. We raised the sedative level when these were not checked. At the level where the eyelash reflex and body movement disappeared, we started dental treatment. We observed intraoperative body movement and evaluated the optimal sedative level.

**Results.** Verrill's sign was the first to disappear, followed by the disappearance of eyelash reflex. We inserted the bite block as soon as body movement disappeared. Dental treatment was difficult, however; respiratory depression was not found even when we started dental treatment after disappearance of body movement at the time of bite block insertion.

**Discussion and Conclusions.** A utility had bite block insertion possibility for an index of an optimal sedative level. Inserting the bite block after checking the disappearance of Verrill's sign seemed adequate.

### **The Effectiveness of 40% N<sub>2</sub>O Inhalation Sedation in Severely Disabled Persons**

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**Aim.** 40% N<sub>2</sub>O inhalation sedation is contraindicated for severely mentally retarded patients. In addition, severely disabled people cannot breathe through their noses when instructed to do so. Severely disabled persons may be sedated by inhaling 40% N<sub>2</sub>O using a face mask at induction.

We reviewed the effectiveness of 40% N<sub>2</sub>O inhalation sedation (using a face mask) to persons with severe mental retardation.

**Methods.** The subjects were 6 severely disabled persons. After they breathed 40% N<sub>2</sub>O for 5–10 minutes using face mask, we started their dental treatment. Their behaviours were recorded during the dental treatments in VTR and subsequently investigated.

**Results.** The developmental age of our subjects is less than 1 year old. When placed in a dental chair, all of the subjects demonstrated maladaptive behaviour. After inhaling 40% N<sub>2</sub>O they entered a sedative state within 10 minutes. Furthermore, they did not show maladaptive behaviour while we used infiltration anesthesia nor during the dental treatment.

**Discussion and Conclusions.** In our study, the N<sub>2</sub>O inhalation sedation of 40% was available for the severely

disabled person that developmental age was less than 2 years old. In conclusion, we believe it is worth using N<sub>2</sub>O sedation for people with severe physical and mental disabilities.

### **Intravenous Sedation for Dental Patients with Dementia**

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**Aims.** This study examined the safety and availability of intravenous sedation for dental patients with dementia.

**Methods.** After establishing routine hemodynamic and respiratory monitors, a total of 30 dental treatments were carried out on 11 patients under intravenous sedation by midazolam and/or propofol. In addition, a bispectral index (BIS) monitor was used in 9 cases. We investigated perioperative complications.

**Results.** All patients had preoperative complications such as hypertension, cardiac and/or cerebrovascular disease as well as severe dementia. Therefore, they exhibited uncooperative attitudes toward dental treatment. The subjects were given a mean bolus injection of 1.7 ± 0.6 mg of midazolam and/or continuous infusion of propofol at a rate of 0.5 to 4.0 mg/kg/hr to undergo tooth extraction and/or restoration. Although there were some intraoperative complications from the sedation, all dental procedures were carried out successfully. These complications tended to occur at lower BIS values.

**Discussion and Conclusions.** Intravenous sedation was useful for patients with dementia. However, it should be remembered that close observation of the patient is required because of increased risk for complication even at a low doses of sedatives. BIS monitoring is helpful in assessing the depth of sedation for dental patients with dementia.

### **Clinical Study on Systemic Management during Dental Treatment of 29 Patients with Dementia**

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**Aim.** The purposes of this study were to investigate how to manage dental treatment of patients with dementia generally, and to determine what problems occur during the management.

**Methods.** The population studied consisted of 29 patients with dementia who underwent dental treatment between 2000 and 2005 at the Outpatient Clinic of the Dental Anesthesiology Department of Hokkaido University Hospital. We retrospectively analyzed the patients' charts and management records to document the preoperative status of each patient, the method of management, and any reported complications.

**Results.** The subjects consisted of 12 males and 17 females. The patients completed a total of 135 dental treatment sessions. One of these treatments was managed with general anesthesia, 88 treatments with intravenous sedation with midazolam, 7 treatments with intravenous sedation with propofol, and 39 treatments with cardiorespiratory monitoring. There were two main reasons why intravenous sedation was selected: to control their behavior during dental treatment, and to relieve stress due to the invasive procedure and prevent perioperative complications because they had multiple diseases. Twenty patients were treated once or twice each, and 4 patients were treated more than ten times. These patients received sedation in a positive way for prosthodontic treatment or maintenance of their oral condition with cooperation of their families.

**Discussion and Conclusions.** Although there were some cases that were difficult to manage because the patient struggled against maintaining the IV line, movement during treatment or wandering, most patients could be managed satisfactorily. Sedation is useful to manage patients with dementia.

### Intravenous Sedation for Elderly in the Dental Clinic

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**Aims.** We investigated three kinds of intravenous sedation for the elderly: propofol; midazolam; and concomitant midazolam and propofol, in an attempt to reduce the stresses of intraoral anesthesia injections and dental treatment, and to lessen the risks that acute medical emergencies may occur.

**Methods.** Subjects were elderly patients who needed dental treatment carried out, under intravenous sedation, at ITO Dental Clinic, from May 2002 through April 2006. We recorded the number of the cases, classified the dental treatments, calculated the amounts of sedative drugs, the sedation levels, and the occurrence of local or general complications during and after treatment.

**Results.** We had previously determined the appropriate sedative drugs by classifying the dental treatment and calculating the time required for the treatment. In the propofol group, 30 mg of propofol was administered as an initial dose; propofol was continuously administered until the completion of the dental treatment. In the midazolam group, midazolam was gently and slowly administered, using only 1.5–4 mg at the beginning of treatment. In the concomitant midazolam and propofol group, 3 mg of midazolam was administered by intramuscular or intravenous injection, and following that, propofol was continuously administered. In each group, optimum sedation levels and amnesic effects were obtained.

**Discussion and Conclusions.** Careful management and monitoring is necessary throughout the procedure, watching for any sign of a drop in SpO<sub>2</sub>. In addition, it is not rare for the elderly to be suffering from multiple chronic conditions and diseases, and the administrator of the drug therapy needs to be aware of these conditions and take them carefully into account. It is extremely advantageous for the elderly to be able to have access to intravenous sedation, to reduce stress and to help prevent the occurrence of acute medical emergencies, and the aggravation of medical conditions and diseases.

### Deep Sedation for Dental Treatment in Municipal Dentistry Clinic

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**Introduction.** The purpose of this study was to compare the effectiveness of two methods of deep intravenous sedations, propofol + midazolam + fentanyl and propofol + ketamine.

**Materials and Methods.** Seventy-four patients who were scheduled to receive dental treatment under intravenous sedation participated. The patients ranged in age from 18 to 63 years (mean age, 34 years) and were randomly assigned to receive a dose of propofol 2 mg/kg/hr and ketamine 0.25 mg/kg/hr (control group) or propofol 2 mg/kg/hr + midazolam 0.03 mg/kg/hr + fentanyl 0.25 mg/kg/hr. The sedation level, movement, and HR, BP, RR, SpO<sub>2</sub>, recovery time were evaluated.

**Results.** Both methods were found to be statistically equal.

**Conclusion.** Propofol with ketamine proved to be an appropriate agent for sedation in the extremely anxious patients. The depth of sedation is easily and rapidly controlled by the rate of the infusion. The recovery was rapid, the patients were clear headed and devoid of any early and late postoperative sequelae.