

# Implant Surgery for a Patient with Parkinson's Disease Controlled by Intravenous Midazolam: A Case Report

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*A 72-year-old male patient with Parkinson's disease referred to the Dental Hospital of Kyushu University, Fukuoka, Japan, presented with movement of an implant-supported prosthesis, slight pain, and purulent drainage from the gingiva in the anterior region of the maxilla, where implants had been placed more than 20 years earlier. He requested that the mobile implant and prosthesis be removed and was in need of implant therapy in his maxilla. In addition to Parkinson's disease the patient had a severe gag reflex, which made treatment difficult. A total of 6 treatments were required. New implants were successfully placed while the patient was under anesthesia (a combination of intravenously administered 3% prilocaine hydrochloride and vasopressin); midazolam was also administered intravenously. The results of this case indicate that use of regional anesthesia in combination with midazolam can be recommended for implant surgery in patients with Parkinson's disease. Intravenous midazolam can be considered the sedative of choice for the surgical treatment of patients suffering from systemic disease. INT J ORAL MAXILLOFAC IMPLANTS 2004;19:288-290*

**Key words:** dental implants, midazolam, Parkinson's disease, sedation

Parkinson's disease is a well-known neurologic disorder characterized by hypokinesia, tremors, and muscular rigidity caused by the idiopathic degeneration of the corpus striatum or substantia nigra. Implant surgery was performed on a patient who suffered from both a severe gag reflex and Parkinson's disease who was being medicated with levodopa.

## PATIENT AND TREATMENT

A 72-year-old male patient, weighing 56 kg, with a mobile maxillary implant-supported prosthesis, slight pain, and a purulent discharge from the gin-

giva in the peri-implant region (ie, from the right second premolar to the left first molar) was referred to the Dental Hospital of Kyushu University, Fukuoka, Japan. Five implants had been placed more than 20 years earlier. The patient now suffered from Parkinson's disease, which had progressed to stage 2 on the Hoehn and Yahr scale,<sup>1</sup> and had been taking levodopa for several years. Orthopantomography showed that all 5 implants remained in the right maxilla, along with 3 pathologically involved teeth (Fig 1). In addition to Parkinson's disease, the patient had a severe gag reflex that complicated dental treatment. All treatment was performed at the Fukuoka Wajiro Hospital in Fukuoka, Japan.

Since the patient had difficulty wearing a conventional maxillary denture, it was decided following assessment by computerized tomography (CT) scan examination that all of the implants and pathologically involved teeth should be removed. New implant-supported prostheses were planned for both the maxilla and the mandible. Because of the gag reflex, 0.04 mg/kg midazolam was administered intravenously before the initial impressions of the patient were made. Under intravenously administered anesthesia (3% prilocaine hydrochloride and

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**Fig 1** Orthopantomography reveals the presence of peri-implantitis and failing endosseous implants in the maxilla.



vasopressin) and intravenous midazolam (initial dose 0.04 mg/kg; supplemental dose 0.02 mg/kg), the implant-supported prosthesis was removed during surgery on the alveolar process of the maxilla on August 6, 1999. The operation was performed successfully without any complications. Blood pressure was monitored continuously during the operation in an uninvasive manner; the systolic pressure ranged from 150 to 170 mmHg, while the diastolic pressure ranged from 80 to 90 mmHg. Electrocardiogram monitoring and SpO<sub>2</sub> monitoring were also performed continuously; SpO<sub>2</sub> ranged from 96% to 100% during the procedure. In addition, oxygen (4 L/min) was supplied by a nasal cannula. On August 20, 1999, 2 Brånemark implants (Mark III, 5.0 mm in diameter, 11.5 mm and 13 mm in length; Nobel Biocare, Göteborg, Sweden) were implanted in the mandibular right molar region using the same regional anesthesia and intravenous midazolam. The bone quality was type 2 according to the classification proposed by Lekholm and Zarb.<sup>2</sup> These implants were restored with a definitive prosthesis in December 1999.

Additional implant surgery in the maxilla was performed using the same procedure on 2 subsequent occasions. Four 3i implants (three 3.75 × 13 mm and one 3.75 × 15 mm; Osseotite; Implant Innovations, Palm Beach Gardens, FL) were implanted in type 4 bone<sup>1</sup> in the maxillary right premolar and molar regions in January 2000. Subsequently 1 Brånemark implant (5.0 mm in diameter, 8.5 mm long; Mark IV, Nobel Biocare) and 2 3i implants (3.75 mm in diameter, 13 and 10 mm long; Osseotite, Implant Innovations) were placed from distal to mesial in the left maxilla uneventfully in

type 4 bone in February 2000. A secondary operation for abutment connection was performed 5 months after the first surgery without any complications. The same regional anesthetic and midazolam were used. A definitive implant-supported prosthesis was placed in the maxilla in August 2000, as is shown in Fig 2.

## DISCUSSION

Parkinson's disease is a well-known neurologic disorder similar to Alzheimer's disease. Patients with Parkinson's disease are usually prescribed levodopa. It is necessary to avoid inducing any stress in patients taking levodopa, because stress could elevate patients' endogenous catecholamines or blood pressure to dangerous levels. The injection of regional anesthetic agents that contain large amounts of epinephrine when performing surgery on patients treated with levodopa can also elevate catecholamine levels or blood pressure. The anesthetic agent 3% prilocaine hydrochloride was used in combination with vasopressin because it does not produce hypertension during surgery.<sup>3</sup> Midazolam was required because this patient had a severe gag reflex, aggravated by impression procedure in the maxilla and mandible. It was also used to reduce stress caused by anxiety. Midazolam produces cardiovascular stability during surgery such as implant placement performed with a regional anesthesia. It also causes less respiratory change and fewer neurovascular effects. For patients who have systemic diseases, midazolam is convenient because of its slow onset of action, the prolonged postanesthetic recovery, and retrograde amnesia.



**Fig 2** An orthopantomogram taken 6 months after placement of a definitive implant-supported prosthesis.

Although it was not possible to place implants in the anterior region of the maxilla, they could be placed bilaterally in the premolar and molar regions, as shown in Fig 2. The implant-supported prosthesis demonstrated both good fixation and function.

According to Heckmann and coworkers,<sup>5</sup> dental implants can provide great benefits to severely handicapped Parkinson's disease patients, including improvements in both chewing and predigestion capacity. However, such patients require careful management during implant surgery, especially when undergoing regional anesthesia, because of the associated elevation of endogenous and exogenous catecholamines in the blood. In this patient, implant surgery could be performed safely by combining regional anesthesia with intravenous midazolam. Implant therapy has been widely accepted, and the ratio of elderly patients who can benefit from implant therapy has also dramatically increased. However, the risks of implant surgery are also increased because many elderly patients are afflicted with systemic diseases. The efficacy and safety of parenteral sedation, which is used not only during implant surgery,<sup>6</sup> but also during other oral and maxillofacial surgical procedures<sup>7,8</sup> in combination with other sedatives such as propofol<sup>9</sup> or fentanyl,<sup>10</sup> have been demonstrated previously.

## SUMMARY

An elderly male patient with Parkinson's disease was successfully treated with implant-supported prostheses. Based on the provided treatment and other

documented therapies, the use of regional anesthesia in combination with intravenous midazolam is the treatment of choice for patients with systemic disease undergoing implant surgery.

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