Impact of Body Mass Index on the Outcomes of Open Reduction for Mandibular Fractures

Sachiko Ono, DDS, MPH, * *Miho Ishimaru, DDS,* † *Yosuke Ono, MD,* ‡ *Hiroki Matsui, MPH,* § *Kiyohide Fushimi, MD, PhD,* ‖ *and Hideo Yasunaga, MD, PhD* ¶

Purpose: Little is known about the impact of body mass index (BMI) on the postoperative outcomes of open reduction for mandibular fractures. The aim of this study was to investigate the relationship between BMI and short-term outcomes of surgery for mandibular fractures.

Materials and Methods: We searched the Japanese Diagnosis Procedure Combination database to identify patients who underwent open reduction for mandibular fractures from July 2010 to March 2013. BMI was divided into three groups: less than 18.5 kg/m^2 (underweight), 18.5 to 24.9 kg/m^2 (normal weight), and 25 kg/m^2 or greater (overweight). The outcomes included postoperative complication rates, duration of anesthesia, length of stay, and total costs. We analyzed the relationships between BMI and the outcomes by multivariable regression analyses.

Results: We analyzed 309 patients who underwent open reduction for mandibular fractures during the study period. The group with a BMI of 25 kg/m^2 or greater had a significantly longer hospital stay (3.8 days; 95% confidence interval, 0.5 to 7.1 days) than the group with a normal BMI. BMI was not significantly associated with duration of anesthesia, postoperative complication rates, or total costs.

Conclusions: Regarding open reduction for mandibular fractures, overweight status may be associated with a prolonged length of stay but may have little impact on operating time, postoperative morbidity, or overall costs.

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Oral and maxillofacial surgery for overweight patients is more difficult than that for normal-weight or underweight patients because of excessive soft tissue and restricted mouth opening. These conditions as well as poor general health of the patients can result in unfavorable postoperative outcomes.[1-3]

Previous studies on body mass index (BMI) and outcomes of oral and maxillofacial surgery were based on small sample sizes. Several studies reported that increasing BMI was correlated with a longer operative time in general surgery, whereas postoperative mortality and complication rates varied among different surgical sites and procedures.[4-6] Few studies have examined the impact of excess weight on oral and maxillofacial surgery. The relatively low mortality and morbidity rates make it difficult

*PhD Candidate, Department of Clinical Epidemiology and Health Economics, School of Public Health, The University of Tokyo, Tokyo, Japan.

†Graduate Student, Department of Clinical Epidemiology and Health Economics, School of Public Health, The University of Tokyo, Tokyo, Japan.

‡Graduate Student, Department of General Medicine, National Defense Medical College, Saitama, Japan.

§Assistant Professor, Department of Clinical Epidemiology and Health Economics, School of Public Health, The University of Tokyo, Tokyo, Japan.

‖Professor, Department of Health Policy and Informatics, Tokyo Medical and Dental University Graduate School of Medicine, Tokyo, Japan.

¶Professor, Department of Clinical Epidemiology and Health Economics, School of Public Health, The University of Tokyo, Tokyo, Japan.

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Address correspondence and reprint requests to Dr S. Ono: Department of Clinical Epidemiology and Health Economics, School of Public Health, The University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-0033, Japan; e-mail: sachikoono-tky@umin.ac.jp

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to evaluate the impact of excess weight on oral and maxillofacial surgery.

This study used a large-scale database to assess *1)* the impact of BMI on surgery for mandibular fractures and *2)* the associations between BMI and the occurrence of postoperative complications.

Materials and Methods

DATA

We extracted data for this study from the Diagnosis Procedure Combination database, a national inpatient database in Japan, from July 2010 through March 2013. The details of the database were described elsewhere.[7] In brief, the database includes administrative claims data and discharge data. All 82 academic hospitals are obliged to participate in the database, whereas participation by community hospitals is voluntary. In 2012, data for about 7 million inpatients were collected from approximately 1,000 hospitals, which covered around half of all short-term hospitalizations in Japan. However, the database includes information on medical services only and lacks data on dental care. Therefore the data include open reduction for mandibular fractures conducted only by physicians and not by dentists.

The database includes the following clinical information: age; gender; diagnoses, comorbidities at admission, and complications after admission recorded in accordance with *International Classification of Diseases, Tenth Revision* codes and text data in Japanese; Japanese original surgical codes; duration of anesthesia; length of stay; and total costs.

The study was approved by our institutional review board. The requirement for informed consent was waived because of the anonymous nature of the data.

PATIENTS

We identified patients aged 18 years or older who underwent open reduction for mandibular fractures between July 2010 and March 2013. We excluded patients who underwent surgical procedures other than open reduction for mandibular fractures. We also excluded patients whose BMI data were missing and patients who underwent more than 2 operations during hospitalization.

We extracted the following data: age; gender; height; weight; comorbidities at admission; smoking index; site of surgery (unilateral or bilateral); and type of plate (small plate, reconstruction plate, combination of small and reconstruction plates, or absorbable plate). BMI was divided into the following three categories: less than 18.5 kg/m^2 (underweight), 18.5 to 24.9 kg/m^2 (normal weight), and 25 kg/m^2 or greater (overweight).

OUTCOMES

The outcomes included *1)* complication rates, *2)* duration of anesthesia (in minutes), *3)* length of stay (in days), and *4)* total costs (in US dollars). Postoperative complications included infection (including pneumonia) and facial nerve paralysis. Both complications were identified using Japanese text and *International Classification of Diseases, Tenth Revision* codes.

STATISTICAL ANALYSES

Univariable comparisons between the groups were performed using the χ^2 test and Fisher exact test for complication rates and using the Kruskal-Wallis test for duration of anesthesia, total costs, and length of stay. We conducted multivariable linear regression analyses to examine the associations between the variables and the outcomes (duration of anesthesia, length of stay, and total costs). All tests were 2 tailed, and $P < .05$ was considered significant. All statistical analyses were performed with SPSS software, version 22 (IBM, Armonk, NY).

Results

During the study period, we identified 314 patients who underwent open reduction for mandibular fractures. Five patients with missing data for BMI were excluded. Descriptive statistics for the remaining 309 patients are summarized in Table 1. The patients were predominantly men (76.8%). The mean age of the patients was 40.4 years (SD, 20.1 years). The mean duration of anesthesia was 208 minutes (SD, 95 minutes), and the overall rate of postoperative complications was 10.2% (n = 32). The most common postoperative complication was facial nerve paralysis (n = 24, 7.6%), followed by postoperative infection (n = 8, 2.5%).

Table 2 shows the outcomes in the 3 BMI groups. Duration of anesthesia did not differ significantly among the BMI groups. Length of stay was shortest in the normal BMI group ($P = .056$). Total costs did not differ significantly among the groups.

Table 3 shows the rates of postoperative complications in the 3 BMI groups. No significant associations were observed between the complication rates and the BMI groups.

Table 4 shows the results of the linear regression analyses for duration of anesthesia, length of stay, and total costs. Patients aged 60 years or older had a significantly shorter duration of anesthesia compared with those aged 39 years or younger. Length of stay was significantly longer in the group with a BMI of 25 kg/m^2 or greater (3.8 days; 95% confidence interval, 0.5 to 7.1 days) compared with the normal BMI group. BMI was not significantly associated with duration of anesthesia or total costs.