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Author(s)	Hayashi, Toshihiko; Kuribayashi, Kazuyo; Maeda, Taku et al.
Citation	British journal of oral and maxillofacial surgery, 57(7), 697-698 https://doi.org/10.1016/j.bjoms.2019.05.014
Issue Date	2019-09
Doc URL	https://hdl.handle.net/2115/79145
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Rights(URL)	https://creativecommons.org/licenses/by-nc-nd/4.0/
Type	journal article
File Information	Br J Oral Maxillofac Surg_57_697.pdf

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Title: Novel Video Fluoroscopic Chewing Examination for Patients using Dentures after Mandible Reconstruction

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Title

Novel Video Fluoroscopic Chewing Examination for Patients using Dentures after Mandible Reconstruction

Key words:

Video fluoroscopic examination; Chewing; Mandible reconstruction; Denture; Autologous bone graft

We developed a novel video fluoroscopic chewing examination in which pancakes containing barium sulfate were prepared, and patients chewed on the pancakes in their habitual pattern to allow visual observation of the manner in which food boluses were chewed in the oral cavity. This test made it possible to objectively observe on video fluoroscopy what kind of changes occur in masticatory function after mandibular reconstruction in patients wearing and not wearing dentures.

Method of Examination

This study involved patients who underwent novel chewing test after mandibular reconstruction from 2011 at our hospital. The study subjects included patients who could be fitted with mandibular dentures following mandibular reconstruction using an autologous bone graft after undergoing mandibular segmentectomy to treat carcinoma. We prepared pancakes containing barium using 3 mL of barium sulfate solution (“barium solution”), approximately 4 g of barium jelly, and approximately 4 g of pancake (Figure 1). Following mandibular reconstruction, the patients were instructed

to chew the barium pancakes in their habitual chewing pattern while wearing and not wearing mandibular dentures. Video fluoroscopy was performed, and the images were analyzed in the anteroposterior position to observe how the food boluses were being chewed in the oral cavity (Figure 2).

Case

This patient was a 64-year-old man with right gingival cancer who received a vascularized fibula graft following mandibular segmentectomy (Figure 3). A vestibuloplasty was performed after 12 months from mandible reconstruction, followed a dental prosthesis was inserted (Figure 4). We performed a video fluoroscopic chewing examination 1 months after he started wearing dentures (Video 1-A, B).

According to previous reports, methods of examining post-mandibular reconstruction chewing include testing using occlusal force[1], testing using the mandibular movement

path[2], investigating food bolus formation time while wearing and not wearing dentures[3], testing on food mixing ability[4], and testing with Manly's method using peanuts[5]. However, no reports have visually confirmed how chewing is actually done. Firstly, we performed a video fluoroscopic swallowing exam with barium, which is conventionally performed on patients who have undergone mandibular reconstruction. Furthermore, we developed a novel video fluoroscopic chewing examination. We prepared barium pancakes and instructed patients to chew them in their habitual pattern while wearing and not wearing dentures in order to observe food bolus dynamics in the oral cavity using video fluoroscopic chewing examination. This test allowed us to visually observe whether food boluses tended to be chewed on the reconstructed or non-reconstructed side. The barium pancakes were prepared fulfilling the following four requirements: 1) appropriate hardness, 2) not easily crushed, 3) appropriate liquidity, and 4) could be reliably examined with video fluoroscopy. The results showed that the patients exhibited a visual tendency to not chew on the reconstructed side regardless of whether the conventional dentures were worn. We reported our novel testing method as well as the dynamics of food boluses in the oral cavity during mastication when dentures are

worn or not following mandibular reconstruction. Using this method, we want to objectively observe changes in chewing function after mandible reconstruction in a larger patient population with different types of dentures in future.

Conflict of interest

We have no conflicts of interest.

Ethics statement/confirmation of patients' permission

Ethics approval not applicable. The patient's permission was obtained.

Financial disclosure

None.

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Legends

Figure 1. Barium pancake

Figure 2. Video fluoroscopic chewing examination in the anteroposterior position

Figure 3. Panoramic radiograph at postoperative 3 years

Figure 4. Denture wearing

Video 1-A. Video fluoroscopy of chewing the pancake while not wearing denture.

Video 1-B. Video fluoroscopy of chewing the pancake while wearing denture.

Figure 1

Figure 2

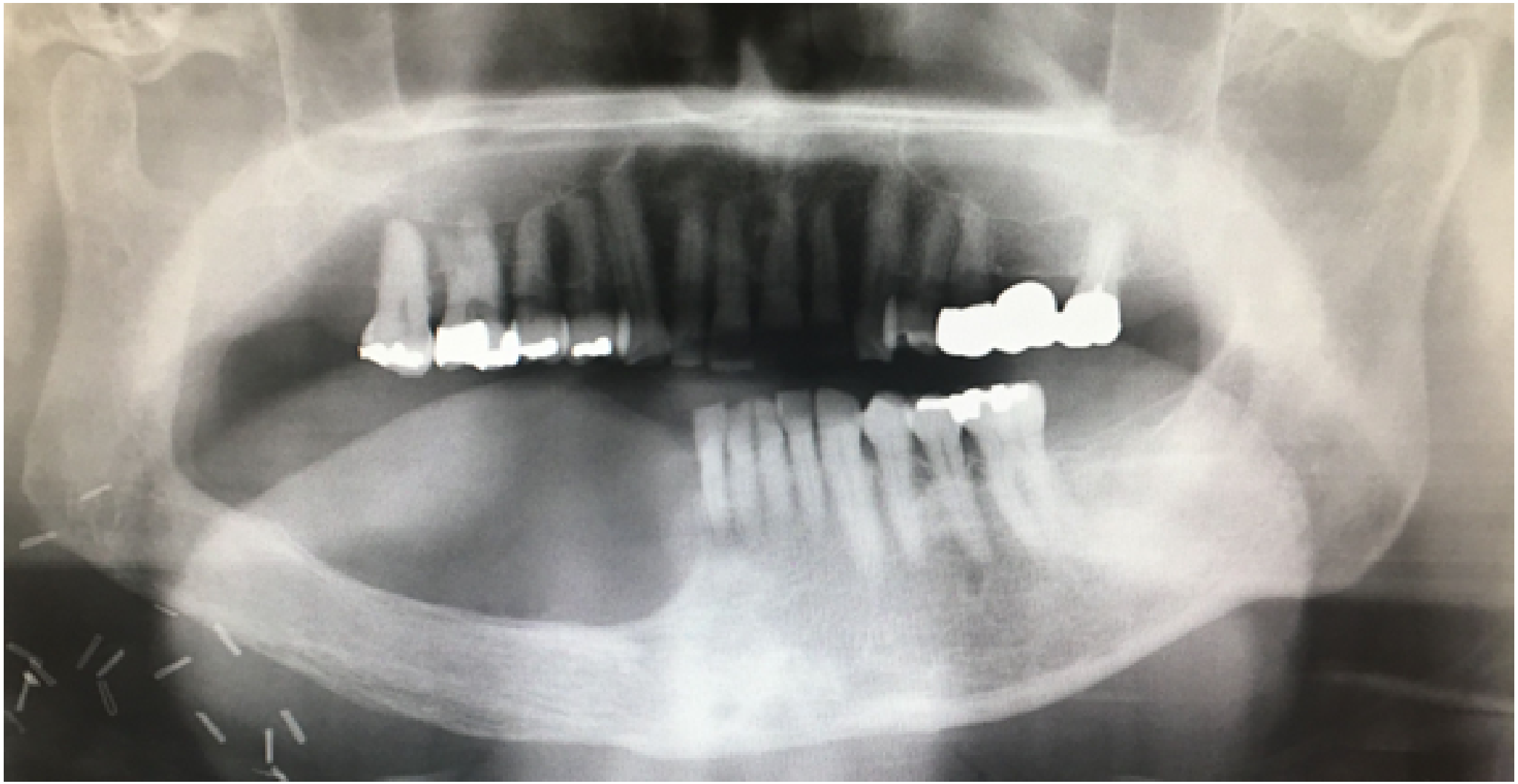

Figure 3

Figure 4