The objective of a cleft palate reconstruction is to restore normal velopharyngeal function and acquire good speech function. Reconstruction of the palatal muscular group is critical for a successful surgery, and there are many reports that describe the surgical procedures and their functional results. Moreover, the prevention of a postoperative palate fistula is critical for the acquisition of good speech articulation.

In Japan, infant patients often undergo a palatoplasty around the age of 1 year, an age by which they have acquired various movements associated with eating, such as mastication and deglutition, and it is important to reduce the palatal load associated with these movements.

Currently, we use fluid foods such as liquid food, food paste, and soft food. These foods help by reducing the physical stress on the palate; however, nutritional inadequacies associated with fluid food necessitate the need to develop a new diet specifically for postpalatoplasty patients. Although evaluating the influence of a palatoplasty on eating function is important for the development of a new diet, no data have been published on this topic. Thus, to evaluate the influence of a palatoplasty on eating function, we analyzed postoperative changes in the eating condition of cleft palate patients. We performed a retrospective study. All participants had undergone surgery for a cleft palate at our hospital. Nurses recorded the amount of food that patients consumed as a ratio of the whole meal, and we extracted data on the food type and the amount consumed at each meal from their medical records. After the ratio was expressed as a percentage of the whole meal (eating rate), we calculated the mean value of the percentage of the subject group and examined chronological changes. The eating rate was very low on postoperative day 1, it improved over time and was constant on postoperative day 7. From this result, we concluded that palatoplasty greatly influences the eating function of patients, and the influence lasts for at least a week after surgery.

**SUBJECTS**

The participants were patients with a cleft palate who underwent a palatoplasty and postoperative management at the Department of Plastic and Reconstructive Surgery, Osaka City University Hospital, between 2003 and 2006. In this study, we excluded those with other concomitant abnormalities or apparent developmental disorders.

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At our hospital, we managed the postoperative diet of cleft palate patients according to the following protocol: on the day of surgery, if patients could drink water when fully awake, we began the oral feeding of liquid food. On postoperative day 1, we gradually provided a more solid meal by including food paste and then soft foods. The timing of changing the food type was individually determined for each patient. We determined the optimal time to change the food type based on the food consumption of the patient, information from the caregiver regarding attitude (aggressive or passive), and the meal duration compared with the preoperative meal duration. The goal of our protocol was helping patients to develop the ability to tolerate soft food by postoperative day 7.

### METHODS

This was a retrospective, single-center, experimental study. At our hospital, nurses recorded the amount of food that a patient consumed as a ratio of the whole meal. Hence, we could extract data on the food type and the amount consumed at each meal from their medical records. After the ratio was expressed as a percentage of the whole meal (eating rate), we calculated the mean value of the percentage of the subject group and examined chronological changes. Although we started oral feeding on the day of the operation, data were limited because food consumption was very low.

### RESULTS

Nineteen patients participated in this study (Table 1). All patients underwent a push-back palatoplasty. There was one case of postoperative palatal fistula during the hospital stay.

Figure 1 shows the food types used postoperatively, with the average eating rate superimposed. The eating rate on postoperative day 1 was around 20%. This improved over time, reaching 60% on postoperative day 6, after which the improvement slowed down. Further, the eating rate and soft food intake ratios tended to similarly increase. However, because we changed the food type depending on the eating conditions, we did not perform a statistical examination of any correlations.

### DISCUSSION

Recently, many plastic surgeons have been permitting food intake at an early postoperative stage, and over 50% of plastic surgeons allow patients to immediately eat after a palatoplasty. Additionally, a study reported that eating in the immediate postoperative period did not increase the incidence of postoperative complications, including a palate fistula, which supports the abovementioned trend.

In this study, the eating rate increased over time until postoperative day 6, although increases in the eating rate did slow down. This may have been because the palatoplasty greatly influenced the eating function in the immediate postoperative period, and this lasted for at least a week. However, we could not detect the duration of influence because of the short time frame of our study. This was because the

### Table 1. Patient Characteristics

| Variables          | Values |
|--------------------|--------|
| Age (mo) Range     | 12–17  |
| Mean               | 14.1   |
| Sex                |        |
| Male               | 9      |
| Female             | 10     |
| Diagnosis          |        |
| CP                 | 7      |
| UCLPA              | 11     |
| SCP                | 1      |
| Complication Palatal fistula | 1 |

CP, cleft palate only; SCP, submucosal cleft palate; UCLPA, unilateral cleft lip and palate, alveolar.

![Fig. 1. Changes in the food type ratios and eating rate. The bar graph shows the ratio of provided food type and the lines show the change in the mean eating rate. The eating rate is the percentage of food consumed for a whole meal. PO, postoperative day.](image-url)
patients began to be discharged from the hospital around postoperative day 8.

Another concern is the nutritional value of the various types of food. As mentioned above, we used fluid foods to minimize excessive stress. However, these foods tend to have a high water volume, reducing the nutritional value of the meal. The nutritional value and water volume of liquid food, food paste, and soft foods used at our hospital are included in Table 2. Liquid food and food paste have a low nutritional value compared with infant staple foods. The nutritional value of soft food is closer to that of staple food, although it does have a higher water volume than staple food. It is clear that a child cannot obtain sufficient nutrition from this because the functional gastric capacity of a child is very low: it is assumed to be 30 g/kg body weight per meal.8

Development of a new food type that is more suitable for postpalatoplasty patients is needed to increase the eating rate in the early postoperative period, facilitating a more effective nutritional intake. Additionally, the new food will need to remain soft to minimize palatal stress associated with dilation. We believe that a food type that can overcome these problems will be useful and suitable for the postoperative management of cleft palate patients.

CONCLUSIONS

We studied the effect of a palatoplasty on eating function. We believe that these results will be helpful in the development of a new food type that is especially developed for postpalatoplasty patients.

Table 2. Dietary Standard Values of Japanese Infants9 and Nutritional Composition at Our Hospital

|                  | Standard Value9 | Infant Staple Food | Liquid Food | Food Paste | Soft food |
|------------------|-----------------|--------------------|-------------|------------|-----------|
| Total energy (kcal/d) | 950 (male) 1,100 | 600                | 600         | 950        |
| Carbohydrate (% energy) | 50–60 54.5 | 66.7               | 66.7        | 58.9       |
| Protein (g/d)       | 20              | 25                 | 20          | 25         |
| Total fat (% energy) | 20–30 18.9     | 22.5               | 22.5        | 25.7       |
| Water volume (g/d)  | None            | 1000               | 1250        | 950        | 1500      |

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