

SOFRELINER TOUGH^S SOFRELINER TOUGH^M

Soft Denture Reline Material

Clinical Report .1



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A thorough understanding of soft reline materials

Background of the Development of Soft Reline Material

The relationship between residual ridge mucosa and dentures is an extensively studied area in relation with their conformity. In particular, impression taking has been studied by many researchers and various techniques have been devised and practiced. These techniques include combining impression materials and techniques suitable for each region, based on the conditions of the residual ridge (thickness, appearance of the mucosa and other factors in a specific region). An issue taken up subsequently involved dimensional changes in denture base resins during polymerization; many researchers sought to develop denture base resin materials or polymerization methods with the goal of minimizing polymerization shrinkage. The occlusal patterns of artificial teeth, which are associated with such issues as force transmitted to the mucosa surface, drew significant attention. Researchers developed new artificial teeth with patterns mimicking those of natural teeth, patterns corresponding to specific occlusal schemes, and patterns to prevent the transmission of force to the mucosa surface by incorporating metal to increase occlusal biting efficiency. Today, we have a wide range of adjustment methods at our disposal to accommodate the motions of a patient's jaw, as well as numerous diagnostic instruments.

In the past, dentists were expected to be able to provide satisfactory treatment to edentulous patients (considered difficult cases) by drawing fully on the materials and equipment developed, by keeping up to date on presentations based on the experience of many clinicians, and by learning new techniques. To a certain extent, we have succeeded. But times are changing. In Japan, a super-elderly society not previously seen anywhere in the world has led to growing numbers of patients who have been edentulous for several decades. I believe we have entered an age in which improving the quality of life of patients who cannot be treated by conventional methods will require the development of more satisfactory dentures.

Some elderly patients have sharp bone edges or bone tori that cannot be removed by surgery due to systemic illness. Dr. Takehiko Kato, one of my teachers, used to treat these patients with dentures, avoiding sharp bone edges or bone tori. Compared to the dentures previously worn by patients, Dr. Kato's dentures provided significantly more satisfaction. However, compared to patients with healthy residual ridges, patients often had to make certain adjustments to various food textures. These dentures also offered somewhat lower masticatory efficiency. Dr. Kato states he began his own research on soft reline

materials starting in the late 1980s to achieve improvements in this area. Based on the idea that better results could be achieved by using a soft reline material on the mucosal surface, he continued working with scientists and engineers, eventually developing a material that met his basic requirements. Later, to allow use of this material in clinical settings, he passed on these ideas to the dental department of Tokuyama Corporation (now Tokuyama Dental). The company commercialized the material and introduced it as Tokuyama Soft Relining, the product preceding Sofreliner.

Using Sofreliner for the First Time

On graduating from university in 1988, I did my training in Dr. Kato's clinic. Kato Dental Office treated many edentulous patients suffering from more advanced ridge resorption than the patients I had encountered in my university clinical training. For example, one patient exhibited an unusually sharp bone edge in the center of the completely flat mandibular ridge—so sharp that the slightest touch produced a grimace. Another patient exhibited a remaining bone torus covered by a thin layer of mucosa. Dr. Kato provided these patients with the appropriate base forms, occlusal positions, and occlusal patterns. He also applied soft reline materials in his treatment. In witnessing the effusive gratitude of Dr. Kato's patients, I saw the need for soft reline materials.

Nevertheless, when I began my own practice in the 1990s, I did not encounter patients who required soft reline materials. I came to believe that the patients who had visited Dr. Kato's clinic represented extremely rare and difficult cases and that only exceptional cases required soft reline materials. In looking back, I believe I lacked the ability at the time to diagnose edentulous jaws or the technique to make complete dentures. I failed to provide my patients with adequate satisfaction; nor did my patients expect more from me.

Conditions changed around 2000, as Japan transitioned from an elderly society to a super-elderly society. The number of difficult cases involving the provision of treatment dentures along with rehabilitation increased in my clinic. For certain patients, however, making the final dentures proved quite difficult, although oral functions continued to recover throughout the rehabilitation period. "I can eat better than before," said patients, "but I still can't chew with any force." Some patients reporting the absence of any problems nevertheless exhibited mucosa that somehow looked different from healthy mucosa (Figure 1). I could no longer coast in the belief that extremely rare and difficult cases appeared only at the Kato Dental Office. When I relined dentures with a tissue conditioner, the complaints faded, and the mucosa recovered. If I relined dentures with a hard reline material, the symptoms reemerged. After seeing this pattern repeatedly, I began to wonder if these cases indicated the need for soft reline materials. Some typical remarks at that time reflect the prevailing attitude toward soft reline materials: "Soft reline materials lead to bone resorption"; "We can treat sharp bony edges with relief and occlusal adjustments"; "Bad dentists rely on soft reline materials as a crutch." As a dentist in the process of learning—and I am still in the process of learning—I hesitated to use soft reline materials on my patients. "I want to use a hard base material if I can," I said to myself. Or: "I wonder if I've overlooked some other cause."

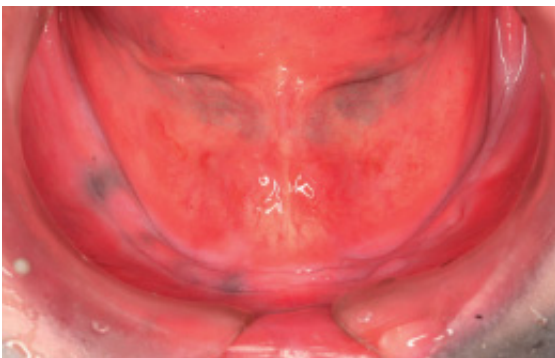


Figure 1: Mucosa with unhealthy appearance

On one occasion, Dr. Kato visited my clinic during the clinic's hours. I was working at that time with a patient who exhibited mucosa with the somehow unhealthy appearance mentioned above. I saw this as my big opportunity. The patient said that he had no complaints about eating or speaking, but given the conditions, I hesitated to make the final dentures. "My teacher stopped by to visit," I said to the patient. "He and I will both examine you, if you will allow it." Dr. Kato examined the patient. "A soft reline material is indicated for this patient," he said.

This endorsement gave me the resolve to proceed. In the first case, I tried Tokuyama Dental's Sofreliner on the treatment dentures. I felt uneasy until I saw the patient at the next visit. The uneasiness faded as soon as I saw the patient's expression. He wore a big grin. His first words were "These dentures feel so

gentle. I can eat without any worries." "I wish I'd used it sooner," I thought to myself. I also experienced regret and remember thinking: "I feel sorry for my patients..." At the same time, I was delighted I could provide greater satisfaction. After experiences like this, I added Sofreliner as a new tool in my toolbox for denture clinical practice.

Indications for Sofreliner

Not all cases indicate soft reline materials. In addition to obvious cases with only slight ridge resorption, soft reline materials are unsuitable in cases involving severe ridge resorption that can be treated with a hard resin base, since soft reline materials weaken bite force and make it difficult for the patient to break off chunks of food. In addition, soft reline materials do not eliminate pain in cases in which the form of the denture base is inappropriate; if the occlusal vertical dimension, occlusal plane, or mandibular position is wrong; if the artificial teeth are arranged incorrectly; or if the occlusal patterns are improperly provided by occlusal adjustments. The dentist must first design the dentures based on the neutral zone, according to basic principles, take an impression and perform bite registration appropriately, and make dentures that fit the denture space (See "+TD," Vol. 2). Soft reline materials are indicated in cases presenting sharp bony edges that cannot be treated or a bone torus covered by thin mucosa (Figure 2), cases in which the mucosa are fragile due to systemic illness or other causes, or cases in which the movement of the mandibles are beyond the control of the patient, due to oral dyskinesia or other causes (Figure 3).



Figure 2:
Case involving generally thin mucosa and bone torus in the mental region



Figure 3:
Case involving oral dyskinesia causing stress on mucosa

I have divided the scope of applications into two categories, based on symptoms: cases requiring entire relining and those requiring partial relining. If all of the mucosa is fragile and it is better to reduce as much of the pressure on the entire residual ridges as possible, I reline the entire base to protect the mucosa. If minute movements of the denture cause unavoidable pain or damage to the mucosa in a restricted region, depending on bite force distribution or residual ridge shape, I reline only the specific region.

We need to distinguish between the two types of cases for the following reasons; a soft reline material offers greater elasticity than a resin base without relining, and the soft reline material itself deforms when the denture moves. This poses the risk of increasing the marginal adsorption or weakening the bond between the resin and the soft reline material. For these reasons, I use the material sparingly and within a restricted scope, except in cases in which doing so is not possible.

Case Essentially Requiring Sofreliner

Figures 4-a through 4-f illustrate the case of an 80-year-old woman. I began making complete dentures when the patient was 74 years of age. Based on maintenance visits every six months, she appeared to be free of problems and doing well. Then, at the start of last year, she missed a maintenance appointment. I was unable to contact her, and I worried. Finally, she visited at the end of that year. She said her longstanding bronchial asthma had grown worse and that she had been hospitalized, had come down with an MRSA infection, and thereafter spent nearly a year in the hospital. The primary reason for her visit was the following complaint: "When my mouth moves, the dentures hit the mucosa. The pain is unbearable." On examination, she exhibited signs of oral dyskinesia, with her mouth moving constantly and her tongue moving in and out. The dentures had good adhesion to both jaws. Somehow, she said, she could eat. However, she did not wear the dentures except at mealtime, because her mandibles moved, and the mandibular dentures struck the mucosa.



Figure 4a:
Searching for the mandibular position that eliminates dyskinesia.

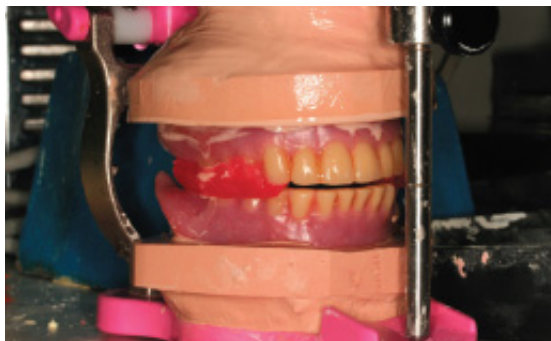


Figure 4b:
The occlusal position was transferred to the articulators.



Figure 4c:
The artificial maxillary teeth were cut and fixed in occlusion with the mandible.



Figure 4d:
The mandibular ridge sloped from the external oblique line to the mylohyoid line.



Figure 4e:
TissueCare tissue conditioner was applied to protect the region affected by the moving mandible.



Figure 4f:
After confirming TissueCare resulted in improvements, we replaced it with Sofreliner.

I ground the painful point and tried to reduce the occlusal angle. However, the area of pain caused by the frequently moving jaw was extensive and did not remain at one place. I could not treat the case conventionally. I consulted her doctor and tried to control the drug that might have induced the oral dyskinesia. This did not remedy the situation. In the end, since ridge resorption had occurred during her time in the hospital and given the slightly lower mandibular position, I decided to restore these areas first, then reline the mucosal surface over the painful point with Sofreliner Tough Soft. She was subsequently able to wear the dentures in her oral cavity without pain. After one month, as the mandibular position stabilized, the oral dyskinesia symptoms disappeared, much to the patient's delight. I believe soft relining materials are essential in such cases.

In our super-elderly society, we must directly confront the cases previously thought to be difficult. Eating is an essential human activity. If a patient must endure any pain or discomfort when he or she eats, I believe the dental treatment provided remains incomplete. At all times, we must seek to make it easier for all patients to eat free of discomfort. My patients have taught me that using soft relining materials based on a correct diagnosis is an important treatment option for helping the patients to eat more comfortably.

Clinical Cases and Techniques

Clinical Cases and Techniques

Sofreliner can be used in two ways: the indirect method, in which the denture is invested in a flask for relining after the impression is taken; and the direct method, in which the denture is relined in the patient's oral cavity. I generally use Sofreliner by the indirect method, since this provides more satisfactory long-term stability and bonding characteristics. Here, I will first describe the indirect method, which is fairly easy and involves relatively little time and effort.

Since the release of the products in the Sofreliner Tough series, in cases of partial application not requiring Sofreliner Tough relining to the denture edge, we can also achieve long-term stability by the direct method. I will describe this method as well. I generally select Sofreliner Tough to cover the entire surface and select Sofreliner Tough Soft for partial applications.



SOFRELINER TOUGH Medium

Long-term soft reline material for denture bases (Direct method/Indirect method)

Simultaneously provides long-term softness and tough bonding. Long-term soft reline material suitable for relief of pain caused by sharp ridges of the alveolar bone and for cases involving conspicuous undercuts in the residual ridges

(Controlled medical devices) Certification number
21400BZZ00004000



SOFRELINER TOUGH Soft

Long-term soft reline material for denture bases (Direct method/Indirect method)

A long-term soft reline material that is softer than Sofreliner Tough Medium, Sofreliner Tough Soft is as soft as conventional Sofreliner Soft while providing excellent strength and durability.

(Controlled medical devices) Certification number
222AABZX00184000

Indirect Method

In cases involving not just sharp bone edges but generally fragile mucosa, the denture must be relined to the edges with Sofreliner Tough. In such cases, the indirect method is ideal. For partial applications, the indirect method can provide greater durability than the direct method.



01-02:

Case involving generally fragile mucosa and a sharp ridge along the mylohyoid line; full relining with Sofreliner Tough is recommended.



03-04:

Apply TissueCare tissue conditioner before applying Sofreliner Tough. TissueCare is convenient; it does not become too thick and maintains reasonable softness.



05:

Mucosal surface of TissueCare after three days of use.



06:

Mark the boundary from which the TissueCare is replaced with Sofreliner Tough.



07:

Invest the denture in the lower denture flask up to the marked boundary line.



08:

Cover the undercut region with silicone putty to make it possible to remove the denture afterwards.



09:

Attach the upper denture flask and fasten the upper and lower flasks with a clamp.



10:

After curing, separate the upper and lower flasks.



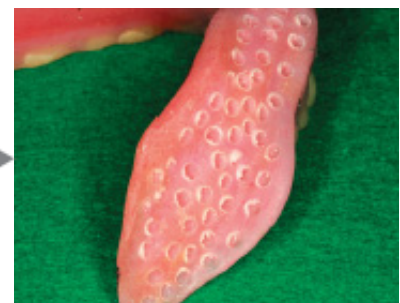
11:

Remove the denture remaining in the upper flask.



12:

Use a bur with a 2-mm radius to drill the guides for removing the mucosal surface.

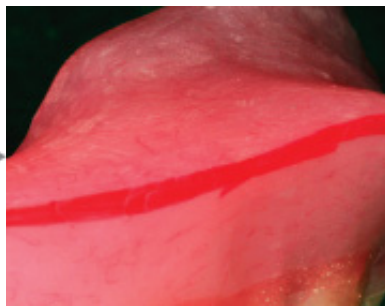


13:

Effective use of Sofreliner Tough requires a thickness of 2 mm. Drill holes 2-mm deep as guides.



14:
Remove the entire surface so that the guide holes are no longer visible.



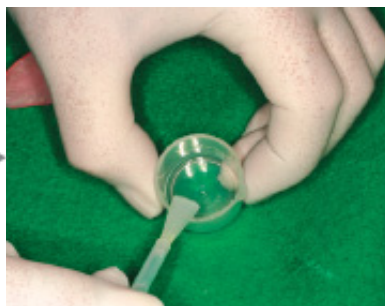
15:
Form the edge (boundary) at 90 degrees to the polished surface.



16:
Even Sofreliner Tough requires this relief. Assess by palpation in advance to check the position.



17:
Mark the region requiring the relief, form the relief with cement, and coat with separator.



18:
Apply the adhesive. To apply a thin layer of adhesive, remove excess liquid by pressing and rubbing the brush once lightly on the edge of the container.



19:
Apply a layer of adhesive on the mucosal surface and return the denture to the upper flask. Avoid thick layers; this will degrade the bond strength of the adhesive.



20:
Apply and dispense Sofreliner Tough while working carefully to keep bubbles from entering the edges of the gypsum surface.



21:
To eliminate bubbles, dispense Sofreliner Tough so that the mixing tip does not emerge from the Sofreliner Tough paste.



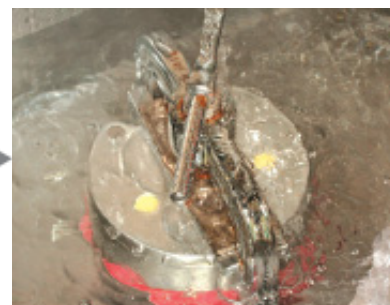
22:
Apply and press Sofreliner Tough to the mucosal surface of the denture returned to the upper flask. Apply from the edges.



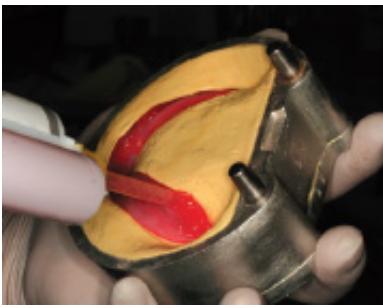
23:
As with the gypsum surface, apply and press Sofreliner Tough to the entire surface while taking steps to eliminate bubbles.



24:
Join the upper and lower flasks and fasten with a clamp.



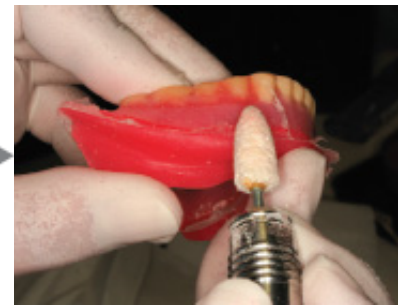
25:
To promote curing, immerse in warm water at 40°C and wait approximately 10 minutes.



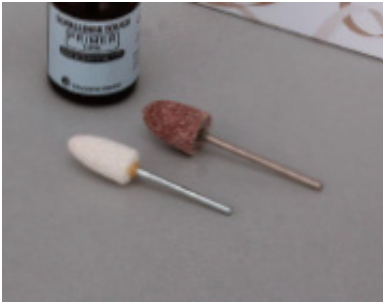
26:
After curing, separate the upper and lower flasks and remove the denture from the upper flask.



27:
Denture with burs, immediately after removal from flask



28:
Remove the burs with a dedicated point.



29:
Use the dedicated point to facilitate removal.



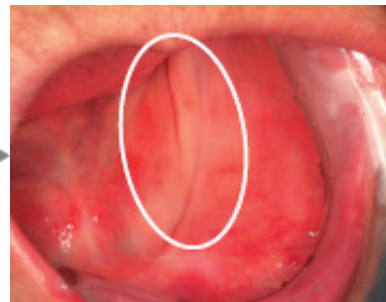
30:
Completed denture fully relined with Sofreliner Tough

Direct Method

For partial applications, the direct method is also possible. Since it can be performed at chairside, it reduces the time and number of procedures.



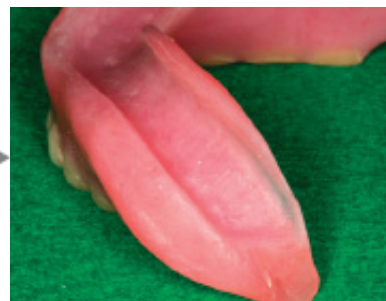
01-02:
The mandible moves constantly due to oral dyskinesia. The denture strikes around the mylohyoid line and around the region on the residual ridge sloping to the inside. The plan is to use a soft reline material only in the region needed.



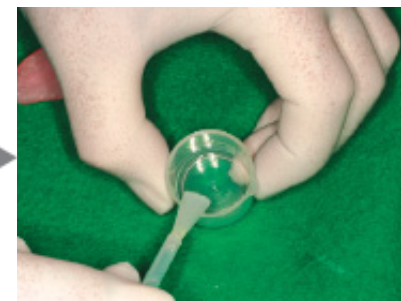
03:
Mark the region to be replaced with Sofreliner Tough Soft.



04:
As a guide for removal, drill holes 2-mm deep in the region



05:
Remove the surface so that the drilled holes are removed. This



06:
Apply the adhesive. As with the indirect method, to make a thin

marked.

secures the space for relining Sofreliner Tough Soft to a thickness of 2 mm.

layer of adhesive, remove excess liquid by pressing and rubbing the brush once lightly on the edge of the container.



07:
Apply the adhesive to the surface of the area ground. Avoid thick layers; they will degrade the bond strength.



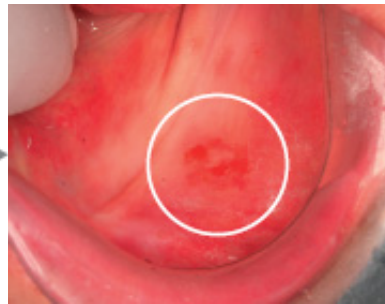
08:
Dispense Sofreliner Tough Soft from the dispenser while pressing the tip against the dispensed paste to help eliminate bubbles from entering the edge of the area ground.



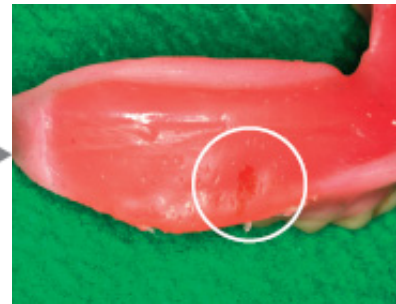
09:
Set the denture into the oral cavity. Allow the patient to make the range of normal motions with the mouth, then occlude gently.



10:
Denture removed after curing. Remove excess Sofreliner Tough Soft from the treated area.



11:
Since the relief cannot be performed by the direct method, you must mark and grind the region requiring the mental foramen or relief.



12:
Mental foramen region marked



13:
Remove it with a dedicated point.



14:
Fit Tester Separator used to separate Sofreliner Tough Soft and the Tokuyama Fit Tester fitness test material



15:
Test the fitness every time after applying the separator.



16:

This separator allows fitness tests with Tokuyama Fit Tester even after the denture is relined with Sofreliner Tough Soft.

17:

Tokuyama Fit Tester is easily removed for worry-free use.

18:

Completed denture partially relined with Sofreliner Tough Soft.