



SOFRELINER TOUGH **S**

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Soft Denture Reline Material

Clinical Report .2

Interim Denture Management

-- Using soft reline materials in implant treatment --



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Fujita: I'd like to discuss the topic of interim denture management in implant treatment. First, can you say something about the importance of understanding dentures for implant prosthesis?

Teranishi: In the past, when patients had many missing teeth, the common-sense approach to implant prosthesis was to use something like a bone-anchored full bridge. But in practice, it's often difficult to treat edentulous maxillary defects with a bone-anchored full bridge while still meeting cosmetic goals and restoring speech functions. When ease of cleaning is also a factor, many cases require advanced surgical treatment like bone augmentation. It is also true that the needs for implant overdentures is extremely high, considering the economic situations. One would think an implant overdenture is a type of prosthesis that requires maintenance and support of implants. But it is a removable denture, potentially causing various problems, unless we provide proper treatment following the guidelines of complete denture prosthetics and the basic principles of dentures. Even with fixed implant prosthesis, when restoring the correct occlusal vertical dimensions and considering that cosmetic factors include more than tooth shapes in the oral cavity, we naturally need treatment dentures for the inevitable process of trial and error. Executing implant prosthesis requires knowledge on ideal tooth arrangements and occlusion. In this sense, I think an understanding of dentures and denture treatment techniques is essential.

Fujita: Corresponding to this topic, I brought with me the records for an edentulous patient. Following initial treatment, I was able to preserve just the UR3 tooth in the maxilla (Figure 1). In my treatment planned to insert implants at UL3 and UR7-UL7 and make an overdenture with four magnetic attachments. I also planned to extract all of the mandibular teeth and use a hybrid bone-anchored full bridge. To identify the correct occlusal vertical dimensions of the maxillary anterior teeth and the correct position of the

occlusal plane, I arranged artificial teeth using base plates as part of the exploratory course. At this point I had the laboratory make the immediate dentures based on the base plates and the study model obtained in the exploration (Figures 2 and 3). Immediately after the tooth extraction, I seated the treatment dentures using tissue conditioner [TC hereafter] (Figure 4). At this stage, I carefully returned the immediate dentures to the correct positions. Since the dentures for edentulous jaws are based on study models with teeth, there is a risk that the center of the dentures or the occlusal plane might be inclined. Problems like this not only delay the treatment progress, they also affect the patient's confidence in the dentist. Specifically, I considered this and proceeded carefully, as follows. For the maxilla, when I first relined TC, I poured the TC only to the alveolar ridge region of the denture while maintaining consistency to stabilize it at the palate region. I've always had difficulty with the mandible, but I tried to stabilize the denture by using the partly missing alveolar ridge as much as possible. I used resin flat tables for the mandibular molar teeth, making occlusal adjustments easier. Even if the denture shifts, I can adjust it dynamically. I want to adjust the occlusion after I have partially completed the form of the denture edge. Still, in practice, I have enough to do with adjustments during the two weeks in which the patient wears the treatment dentures, explaining to the patients that the dentures won't stabilize until the tooth extraction sites have healed.



Figure 1:
Condition at the time of the initial visit. Only the UR3 tooth was preserved. The treatment plans called for inserting implants at UL3 and UR7-UL7 using an overdenture with magnetic attachments. Then plan also called for extracting all mandibular teeth and using a hybrid bone-anchored full bridge.



Figure 2:
During the course of exploration, artificial teeth were arranged on the base plates.



Figure 3:
Immediate dentures were made based on the study model obtained in the exploration and the base plates for the study model.



Figure 4:
The treatment dentures were carefully returned to the correct positions.

After the form of the denture has stabilized somewhat, I replace the TC by the indirect method. If I use the direct method, the position of the denture moves every time, and the thickness of the TC never stabilizes. So I prefer to use the indirect method from early on. Personally, as a dentist, I probably enjoy setting immediate dentures more than anything else it is an area where a dentist's skills can shine. Later on, Dr. Teranishi, I would like to hear how you use certain techniques for these treatments, providing specific examples.

I would like to show the next case. Here, I inserted five implants in the mandible by the two-step method (Figure 5). Although the patient had enough bone mass for the one-step method, I chose the two-step method because I thought completely closed wounds would be better, both for stability and to facilitate adjustments to the denture after surgery. I would like you to examine the No. 6 sites, the regions farthest to the back. The implants were inserted where the bone had sufficient width, making completely closed wounds. Two days after surgery, I ground the TC on the inner surface of the denture and returned it. I took care to provide support for the load of the denture and the load of the occlusion with the border and the mucosa farthest to the back, where the tissue was not cut. A week after the surgery, I replaced all the TC on the treatment denture by the indirect method. Three weeks after surgery, the mucosa began to dehisce over the fixtures farthest to the back on both sides (Figure 6). Three months after surgery, the mucosa was completely dehisced (Figure 7).

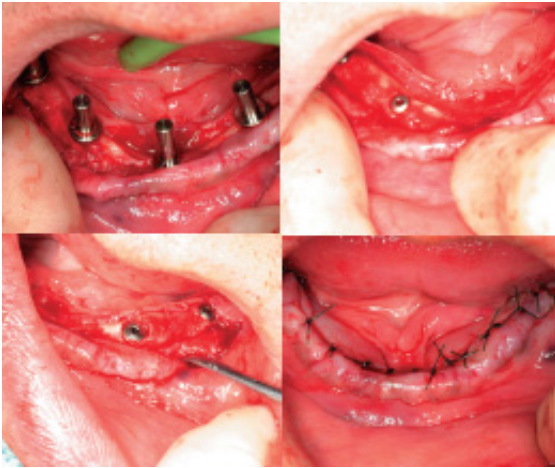


Figure 5:
The implants were inserted by the two-step method, considering stability after surgery.



Figure 6:
Condition three weeks after surgery. The mucosa over the fixtures farthest to the back had begun to dehisce.



Figure 7:
Condition three months after surgery. The mucosa over the fixtures farthest to the back had completely dehisced.

X-ray images taken at one week and at four months after the surgery indicate significant marginal bone resorption around the dehiscence at the position of the implants (Figure 8). I have rarely encountered this in partially edentulous cases. What led to these symptoms? My guess is that the patient was unable to visit the clinic for a month after the first surgery for reasons related to work. He continued to wear the treatment dentures during this period. With his edentulous jaws, the alveolar ridge received occlusal pressure, which resulted in dehiscence of the mucosa in the molar region, where the TC entered. The constant chewing pushed plaque into the dehiscence, leading to rapid bone resorption. This case made it painfully clear that treatment denture management after implant surgery involving edentulous patients requires great care. Later, I placed screw-retaining abutments and healing caps, hollowed out the inner surface of the denture so that the denture could be mounted over them, and adjusted the denture with TC and self-curing resin (Figures 9 and 10). The final dentures were made as planned: an implant overdenture with a metal frame for the maxilla and a bone-anchored full bridge made of artificial teeth and acrylic resin for the mandible (Figure 11).

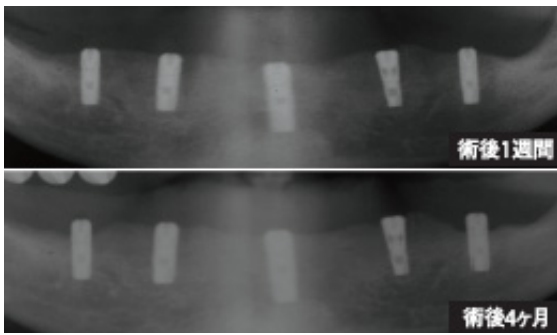


Figure 8:
X-ray images at one week and at four months after surgery. The images indicate significant marginal bone resorption around the dehiscence at the position of the fixtures.



Figure 9:
Condition immediately after the second surgery. Screw-retaining abutments and healing caps are in place.



Figure 10:
The inner surface of the denture is ground and adjusted with TC and self-curing resin.



Figure 11:
Final state. An overdenture with a metal frame for the maxilla and a bone-anchored full bridge made of artificial teeth and acrylic resin for the mandible.

Now, Dr. Teranishi, I'd like to hear how you adjust treatment dentures after the surgery, what are you most concerned about, what materials do you use, and when do you perform various steps.

Teranishi: There is no doubt that setting the immediate dentures correctly at the time the teeth are extracted is very difficult. It is not easy to return them to the original positions and it is important to refer to the invariant positions. As you said, Dr. Fujita, one invariant position on the maxilla is the hard palate. Another is the hamular notch, which is where the maxillary bone, the palatine bone, and the sphenoid bone join, and is a compact bone. It is also a position that remains unchanged before and after tooth extraction. In the case of the maxilla, I think it is a good idea to get a solid fix on the position of the hard palate and the hamular notches and relin TC or Sofreliner (Tokuyama Dental) at the large space made. But the mandible has few reference positions, and conditions make it difficult to return the denture.

One position that does not change much on the mandible is the buccal shelf. Here, if the molar region lacks teeth from the start and we insert the immediate denture by extracting the anterior teeth, it is easy to set the denture using the buccal shelf as a secure support area. If we need to extract the teeth from the molar region, this region will also change, making it difficult to create an immediate denture that also covers the buccal shelf. The result is a short-flange denture; in this case, I think it would be very difficult to return the denture using the buccal shelf as a reference. In all honesty, after all this, my approach to returning the denture is based on trial and error. This is a very tricky approach for less experienced dentists. So, one piece of advice is as follows. In cases that seem impossible to return the denture correctly, do not try inserting it immediately after tooth extraction. If the tooth to be extracted is not a non-vital tooth, perform only the pulp extirpation for convenience prior to the extraction, cut the tooth to the root surface when setting the denture, and return the temporary denture or immediate denture to the root. Since the root provides the support, it is relatively easy to return the denture, then relin using TC or Sofreliner from there, after the denture stabilizes, extract the root and fill there. With this two-step approach, young dentists can place the immediate dentures relatively easily.

Fujita: How do we choose between TC and Sofreliner?"

Teranishi: It depends on the final prosthesis. For example, if it is a complete denture and not an implant, tissue conditioning is inevitable. The old denture applies severe pressure on the mucosa and squashes it, so it is important to restore them to a fresh state. Tissue conditioning is the recommended treatment for this process. This is inevitable in complete denture prosthesis. I use TC when my treatment plan calls for a complete denture. A disadvantage is that the TC tends to become increasingly thick based on changes in the residual ridge immediately after the tooth extraction. In these cases, when that becomes an issue I use a hard reline material, not a soft reline material. It is better to change the material to TC after the wound has healed and after the residual ridge resorption has gone through at least some of the major initial changes. If the final treatment plan is not a complete denture but implant prosthesis, and if implant prosthesis is fixed, there is less need to adjust the denture so much in response to changes in the residual ridge. It will not require much tissue conditioning, either. I think it is a good idea to reline the denture with Sofreliner or some similar material and continue using it.

I will comment here on the significance of mucosa management for treatment dentures. In the case described by Dr. Fujita, I think the bone resorption after the first surgery can be explained entirely by dehiscence. The dehiscence exposes the cover screws, and the soft tissue around the implants is extremely thin. Various studies show, the distance from the crest of the implant to the top of the mucosa, the biological width of the implant, needs to be 3.2 mm to 3.5 mm. But if that amount of soft tissue is missing, bone resorption proceeds to secure this amount of missing soft tissue. I think it is safe to assume that bone resorption will always accompany the dehiscence.

Fujita: I see.

Teranishi: We have to provide treatment denture management to prevent dehiscence. In my case, I would ask patients stop wearing treatment dentures for one week after the surgery. But in contemporary society, we are unwilling venture out in public without teeth, particularly in the upper jaw. Now, I ask my patients to wait one day. On the following day, I let them wear the denture, on the condition that they remove it at mealtime. I let them chew food after the stitches are removed, but obviously healing in some regions will be incomplete at this stage. If TC or Sofreliner enters these wounds and remains untreated, the wound epithelializes and readily opens up without healing. So, when setting the treatment denture, it is imperative to find a way to keep TC or Sofreliner from entering the surgical wound. One way to do this is to cut a piece of sterile paper towel to the appropriate size and use it to cover the wound surface. When a small amount of saline is applied to the paper towel, the towel sticks to the residual ridge like a resorbable membrane. At this point, you can set the treatment denture relined with TC or Sofreliner over the paper towel. I use this method when setting the treatment denture, whether immediately after surgery or when removing the stitches. Normally, TC of 2 mm in thickness is sufficient. But at the implant placement site, I would recommend at least 3 mm.; it is also important to replace the TC before it degrades and hardens to maintain cushioning performance. It is much like handling the treatment denture after the second surgery. Use a sterile paper towel or a similar material to ensure that the TC or Sofreliner does not enter the wound.

Fujita: when working with edentulous jaws, we can not avoid the problem of occlusal pressure on the mucosal surface with the denture, which leads to dehiscence. In the clinical case here, I inserted the immediate dentures immediately after the tooth extraction. If it were you, Dr. Teranishi, would you address this pressure by keeping the teeth in the mandible, even if that is a bit problematic?

Teranishi: I do not think that is necessary. Considering the increase in the number of surgeries, I would also extract the teeth all at once, like you did. But I am bothered by the placement depth you said that as far as the X-ray images showed, the patient had sufficient bone width. Still, since the transmission image is strong in the upper part, I think the bone there is not as wide as in the lower part. Compared to the others, I think these two are slightly higher. For an edentulous jaw, I think it is better to keep the position at the same height as the crest or slightly lower.

Fujita: Of course, it is better to insert the implants at a position lower than the crest, it is less likely to lead to dehiscence.

Teranishi: All things considered, in the case of edentulous mandibles, a one-step method is sufficient.

Fujita: I agree. It might have been better if I had used a one-step method with Sofreliner instead of TC.

Teranishi: Here is another case. This female patient in her fifties has a completely edentulous maxilla, her mandible retained the LL1234 teeth. Both the maxilla and the mandible exhibited very sharp knife-edged bone (Figures 12 to 14). A dentist I know had been treating her and had temporarily relined her dentures with TC as a quick fix (Figure 15). He decided the case was beyond his skills, and he referred her to me. The UL3 tooth in the maxilla proved to have been extracted recently, and the stitches were still intact. On the mandible, a partial denture was set as if to retain and preserve the remaining teeth. For the maxilla, the patient said she did not want the palate region covered. She looked much older than her actual age (Figure 16). As with Dr. Fujita, based on the concept of complete denture prosthetics, I took a bite registration using both maxillary and mandibular wax rims and arranged the artificial teeth during the chairside diagnosis (Figure 17). Up to this point, we're still in the diagnosis stage of treatment. We use all this information to work out several treatment plans that could be performed for the patient. One possible treatment plan is as follows: since the maxilla has a knife-edged bone with insufficient bone width, we could place a fixed implant prosthesis after a veneer bone graft or other similar procedures for bone augmentation. For the mandible, we might extract the remaining teeth and place an implant prosthesis after bone augmentation in the molar region.



Figure 12:
Inside the oral cavity at the time of the initial visit: front view, view of the maxillary surface, and view of the mandibular surface

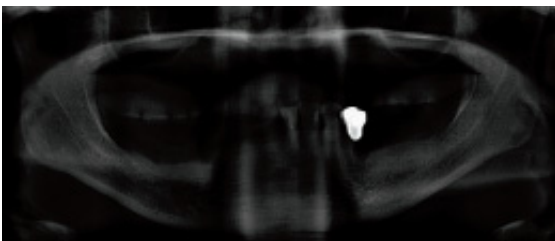


Figure 13:
Orthopantomography at the time of the initial visit

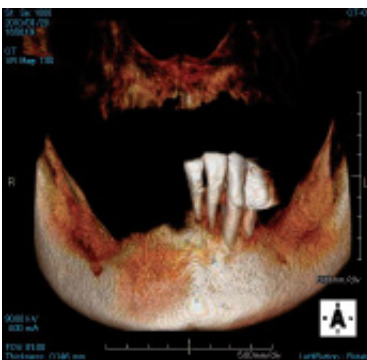


Figure 14:
3D-CB/CT image at the time of the initial visit

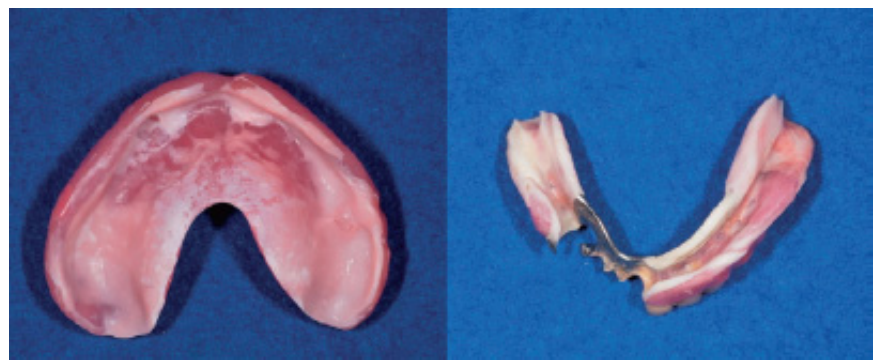


Figure 15:
Mucosal surface of old maxillary and mandibular dentures, TC was used as a quick fix.



Figure 16:
Front view of the patient's face at the time of the initial visit. Facial asymmetry is visible; the patient looks slightly older than her actual age.

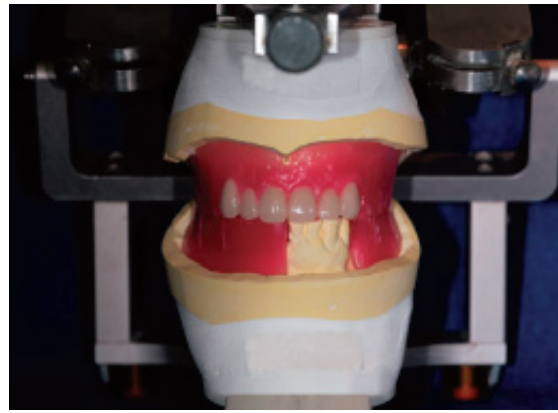


Figure 17:
Study casts mounted on an articulator

Another treatment plan is as follows. since the maxilla is thin, and limited to a restricted region, we might use an overdenture with four implants inserted at an angle in the alveolar tubercle after a split-crest procedure. For the mandible, we might use a hybrid bone-anchored bridge or an overdenture once again. The patient's request was not to cover the palate region and not to perform a veneer bone graft. So, we treated the maxilla with the overdenture with four implants inserted. I recommended a fixed mandibular prosthesis, but she said she wanted a removable mandibular denture, based on her own experience, since the maxillary denture was removable. So I treated both maxilla and mandible with overdentures.

Based on the study casts, I made a treatment denture for the maxilla and an immediate denture for the mandible. I relined the maxillary treatment denture with TC. For the mandible, I reduced the lower teeth into stumps prior to the tooth extraction and placed the immediate denture relined with TC over them. After extracting the lower teeth, I adjusted the denture by trial and error while waiting for the wound to heal (Figures 18 and 19). We allowed approximately two months for healing. Since the patient was satisfied with the occlusal vertical dimensions and the esthetics, I made the surgical guide for the diagnosis in this state and proceeded with CT diagnosis and planning. In the maxilla, I inserted implants at UR3-UL3 after a split crest procedure by the two-step method. I also inserted implants at a slight incline at the alveolar tuberosity on both sides. In the mandible, I performed bone formation, inserted four implants by the one-step method, and attached healing abutments to finish the treatment (Figure 20).



Figure 18:
Treatment denture relined with TC for tissue conditioning



Figure 19:
Front view of treatment denture set in the oral cavity

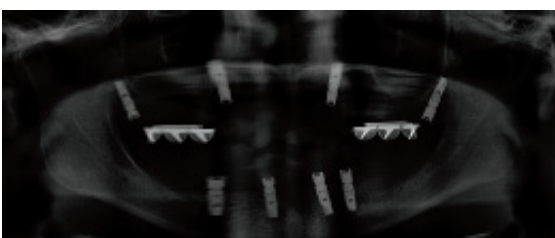


Figure 20:
Orthopantomography after the first implant surgery. In the maxilla, the split crest procedure was performed at UR3-UL3 by the two-step method. In the alveolar tuberosity on both sides, implants were inserted at a slight incline. In the mandible, four implants were inserted by the one-step method after bone formation.

I then performed the second maxilla surgery. After the wounds healed, I inserted the overdenture abutments on the implants in both the maxilla and the mandible and took a final impression and a bite registration. The procedure for the implant prosthesis is the same as for complete dentures (Figure 21). After this step, I arranged the artificial teeth. When the polymerization was complete, I placed temporary attachments, remounted the Gothic arch tracing, took lateral check bites and a centric bite, and remounted the dentures on the articulator (Figure 22 and 23). After occlusal adjustments on the articulator, the final maxillary and mandibular prosthetic appliances were completed (Figure 24~26).

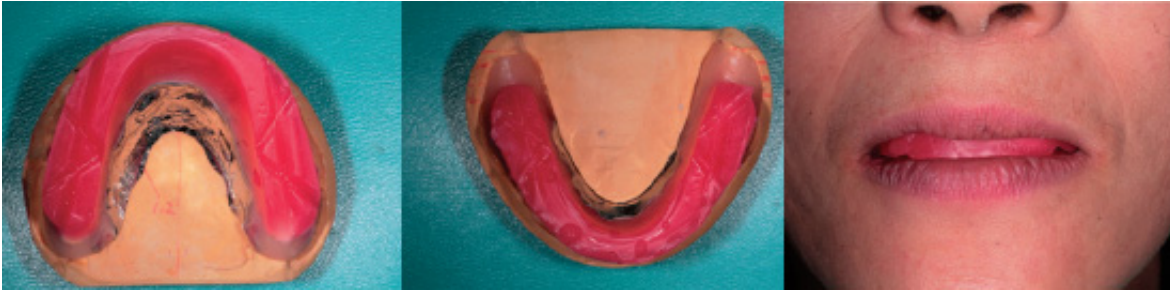


Figure 21: Bite registration with bite plates. The occlusal vertical dimension and lip support were adjusted based on information from the treatment denture.



Figure 22: Gothic arch tracing with the completed denture



Figure 23: Lateral bite checks on both sides and a centric bite check were taken. The completed dentures were remounted with these bite checks.

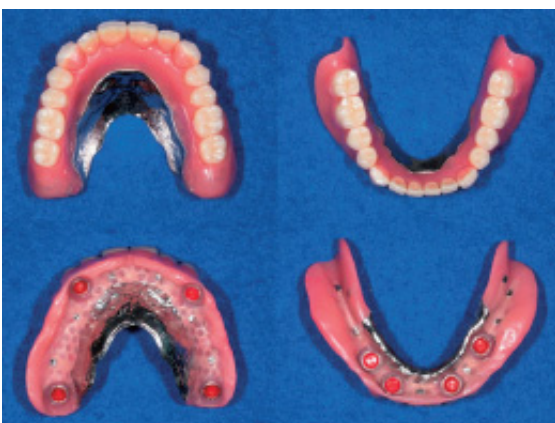


Figure 24: Completed final maxillary and mandibular dentures



Figure 25: Front view of the facial appearance after treatment. The patient has appropriate occlusal vertical dimensions and lip support.



Figure 26: Appearance of the completed dentures set inside the oral cavity: front view, view of the maxillary surface, and view of the mandibular surface

Up to this point, we have discussed edentulous and cases close to edentulous, involving patients missing many teeth. The question is whether other cases require TC or Sofreliner. My answer is: Yes. Even in partially edentulous patients, if the patient has a large edentulous free-end space, I make a treatment partial denture, which I reline with TC or similar material to protect the soft tissue. If the case involves a patient missing one to three intermediate teeth, the patient may not accept a temporary denture extending to the other side. If the patient has many remaining teeth, would the remaining teeth provide adequate occlusal support?

Why use a temporary acrylic denture in such cases? Many patients respond with for cosmetic reasons. Since they can eat with the remaining teeth, few patients give chewing as a reason. Of course, speech function is another issue. We should maintain tooth position and space. If the extracted tooth is an intermediate tooth and nothing is inserted, we need to address this problem when treatment planning the implant prosthesis. In some cases, a temporary denture is used not for occlusal support or mastication, but to maintain space. In these cases, I make a temporary denture without a metal clasp, in fact, I use Sofreliner here, to protect the mucosa. When it enters the undercut of the adjacent teeth, the denture is positioned securely and with good adhesion. The denture keeps the adjacent tooth from moving and protects the mucosa, ensures the cosmetic results patients ask for.

Some people misunderstand when we say, "So a partial denture is ok with Sofreliner relining and non-clasp." No. This method works only in special cases: for example, a case in which the patient "still has remaining teeth providing sufficient occlusal support front, back, right, and left, with adequate mastication ability even without the denture-but..." relining a non-clasp, non-rest temporary denture with Sofreliner for use as a space retainer is a technique I find extremely helpful in implant prosthesis (Figures 27 to 30).



Figure 27: Position of the planned implant. A non-clasp temporary denture relined with Sofreliner is positioned here as a space retainer.



Figure 28: The denture is relined with Sofreliner by the direct method.



Figure 29:
Condition of the mucosal surface of the non-clasp temporary denture relined with Sofreliner.

Figure 30:
Since relining with Sofreliner protects the mucosa and improves adhesion, the patient can wear the non-clasp temporary denture without stress.

Fujita: Especially with implants, in most cases, we do not grind the abutment teeth, so it is hard to hold the clasp. It helps a lot if we do not need a clasp to hold.

Teranishi: As a reminder, as I mentioned earlier, when relining the denture with Sofreliner after the surgery, do not forget to use the sterile paper towel to prevent it from entering the wound (Figures 31 to 34).



Figure 31:
Condition after implant surgery. A non-clasp temporary denture relined with Sofreliner is used here.



Figure 32:
The wound surface is covered with a piece of sterile paper towel to prevent Sofreliner from entering the wound.



Figure 33:
Silicone Remover (Tokuyama Dental) used to remove Sofreliner



Figure 34:
The denture is relined with Sofreliner once again to protect the mucosa after surgery and to reduce the stress associated with wearing a non-clasp temporary denture.

Here we have discussed the topic of treatment denture management. When a young dentist sees a package of TC or Sofreliner, he or she tends to think "Oh! that is for dentures!" But these materials are also very handy for use in implant prosthesis. You can use them when you are preparing the treatment denture; when you're adjusting the treatment denture by trial and error; or if you want stability after implant surgery. They should not be considered just denture materials. Implant prosthesis and removable dentures are both prostheses for missing teeth, and it is important to make meaningful use of consistent theories, methods, and materials.