In dental clinics, we often encounter cases where patients require full mouth rehabilitation after receiving a series of other basic treatments previously. The design of the full mouth rehabilitation is critical for the final outcome of the entire treatment process, including the degree of satisfaction that the patients would have. This is because a good design in the full mouth rehabilitation procedure does not only help to restore the basic dental functions for the patients but could also improve the esthetic impression of the patient's facial features in general. For these reasons, the harmony of design and final facial appearance in full-mouth rehabilitation can have influential effect on the overall satisfaction of the patients regarding the treatments they receive and also for the success of the treatments as a whole. The focus of this report is to introduce the application of SHILLA system designed and developed by Dr. Haruhiko Abe in a full-mouth rehabilitation case.

As I alluded to earlier, in addition to the functional restoration, aesthetic impression is also an important component in the full-mouth rehabilitation. These two are in fact interrelated. For example, if the facial midline and the occlusal plane do not match with the facial mid-sagittal plane and the horizontal plane, respectively, facial asymmetry would form. Such facial asymmetry will directly or indirectly affect the post-treatment balance of the functions. Fig 1 shows one of such examples.

During full-mouth rehabilitation, articulator is an essential component of the process. Usually, articulators are designed assuming a complete symmetry of skulls along both the
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mid-sagittal plane and the horizontal plane (Fig 2). In most cases, this is generally true. However, in cases where there are any degree of asymmetry in the maxilla and/or the mandible, problems may arise when we try to mount the casts articulator (Figs 3, 4). In these situations, we may mount the casts with asymmetric and incorrect relationships. SHILLA is a system that can take care of these problems. The basic idea is that it has been shown in many studies that the alveolar ridge of maxilla may change due to various factors, such as resorption, but the area of mid-palatal line on maxillary palatal plane and about 12mm bilateral extension in area of palatine fovea remains stable for most people. Based on this observation, using the SHILLA I system or esthetic face bow (Figs 5, 6) to mount the cast of the upper jaw on the articulator can achieve the goal of maintaining the symmetry along the mid sagittal plane and the horizontal plane.

The original meaning of "SHILLA" in Korean is "compass". The idea in SHILLA I is to use 4 points on maxillary palatal surface to determine a plane (Fig 7). Basing on this plane and combining the use of SHILLA II for mounting upper cast (Figs 8, 9), the esthetic face bow can achieve the wanted result. SHILLA system uses the Gothic Arch Tracing Device to determine the centric relation. Finally, SHILLA III is used to determine the design of the occlusal plane (Figs 10-12).

Case report

A 38 year-old female patient complained that her old full mouth fixed restorations was bothersome for her for over 10 years. It generated discomfort during chewing and the restorations were loosening in the upper right portion. Multiple periapical swelling and pus formation often existed. Though the temporomandibular joints generated clicking sounds, no joint or muscle pains were found. Patient was seeking improvement in these problems (Figs 13-22).

After casts mounted, diagnostic wax up was examined.
and the provisionals were made and set inside the patient's mouth for observation. Posterior cross-bite was found on the left side but not on the right side. Patient exhibited a class III tendency in her occlusion relationship, which would be corrected as much as possible during the provisional phase (Figs 23-26).

After a few days of observation, the patient returned for a follow up and expressed dissatisfaction due to the asymmetrical facial appearance. Based on the pictures taken when the patient was in her 20s, it was determined
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Figs 19-22 Determined and marked the sagittal plane. Used the sagittal plane guide indicator (black) on the esthetic face-bow to determine the difference. Adjusted the screw on the left arm of the face-bow to line up the indicator and the mark on the sagittal plane. Recorded the upper jaw relationship for mounting upper cast.

Figs 23-26 The provisionals made from the diagnostic wax up were installed in the mouth of the patient.

Figs 27-28 Comparison between provisionals phase and pre-treatment picture in her 20s, it was concluded that the facial asymmetry was a pre-existing characteristic and not a result of the use of provisionals.

Fig 29-31

that this asymmetry was not the result of the installation of provisionals but was, rather, a pre-existing characteristic of the skull. The complaints could also stem, in part, from the high expectations that patients often had when receiving treatments of this sort. After communicating with the patient and explaining to her the situations, the patient was more accepting towards the treatments she received. However, to improve the patient's satisfaction, I decided to make some modifications to correct some of the asymmetry observed in her facial features.

The upper jaw was re-impressed and remounted to the articulator using the SHILLA system. A new set of provisionals was made to try to correct the asymmetry problem on the facial features (Figs 29, 30). This time, two systems (HANNAU and SHILLA) that used in two different mounting methods and respective resin occlusal index (Fig
Fig 34  
→ A point mounting: the Lt posterior cross-bite was not observed and facial asymmetry was less noticeable.
→ B point mounting: Lt posterior cross-bite was observed and facial asymmetry was more noticeable.
31) were used to verify whether the patient has the situation described before regarding the facial asymmetry causing the difficulty in correct mounting on the articulator (Figs 3, 4), as mentioned earlier. The prediction was that if the face-bow in the conventional system (HANNAU) was not able to achieve the harmony between the occlusal plane and the FH plane (Fig 32) but the SHILLA system was able to (Fig 33), it would support the suspicion that the patient s asymmetric skull characteristics were the reasons for the earlier problems.

I used Gothic arch tracing device to take the CR record, A point (instead of B point) mounting lower cast to correct the facial asymmetry appearance (Fig 34). A second set of provisionals strengthened with orthodontic wires was used to shift the lower jaw slightly to the right. As shown in Figs 35-42, the posterior cross-bite was no longer visible. The basic treatments involving periodontal treatment, root canal treatment and implant surgery were completed and further observation was made subsequently. About one year's treatments and observation after, the patient felt that the temporomandibular joint was not comfortable and the upper left provisionals frequently broke. Due to these complications, I came to the conclusion that mounting with A point record to attempt to correct for the facial asymmetry should not be done at a cost of the harmony between temporomandibular joint and occlusion. The decision was made to return to the B point for mounting lower cast.

After the installation of implant abutments, a third set of provisionals was made using B point centric relation mounting and the patient was observed in the following 10 months (Figs 43-45). TMJ photographs showed the acceptable relationship between the condyle head and the condyle fossa. Based on the lateral TMJ photographs, it was clear that there was a congenital size difference between the condyle heads. This explained the facial asymmetry observed on the patient (Figs 46, 47).

After another a year s observation, the patient showed
much improved harmony in the TMJ and the occlusal function (Figs 57-58). The occurrence of clicking sounds was much reduced. The function in chewing and the pronunciation also showed significant improvement. The decision was made to proceed to the final stage of the treatment.

SHILLA III was used to determine the occlusal plane during wax patterning (Figs 48-51). We designed the final prosthesis with occlusal pattern of group functions (Figs 55, 56). Because of the severe alveolar ridge resorption in the upper left significantly troubled the placement of the implant fixture, we made some compromises prior to the first bicuspid and the posterior cross-bite only started from the second bicuspid (Figs 52-54).

After the 3-year-long treatment program, not only the symptoms but also the patient's dental functions and self-
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Fig 65 before treatment (1999).
Fig 66 after treatment (2002).

Fig 67 after treatment (2004).

confidence were much improved (Figs 59-67). At this point, the patient expressed much satisfaction. On 2004, in a follow up examination, X ray film detected periodontal furcation in the lower left third molar but no inflammation and regression was found on the gum tissues. This tooth was kept in the original plan only for the supporting purpose in provisional phase and could be removed anytime if more problems arise.