Cutline info about this image. Could you provide at least two or more lines to fill in this space.

Predictable and Precise Tooth Preparation Techniques

For PLVs in Complex Cases

Galip Gurel, DDS

When it comes to restoring the mouth with porcelain in order to improve the aesthetics, the PLVs are one of the most conservative and aesthetic techniques that we can apply. The longevity of the veneers are quite long and durable especially if the right indications are chosen and the correct techniques are applied.[1]

The main idea in any restorative case is to keep it simple and concentrate on one idea which is the conservation of the sound tooth structure.

The dentin-enamal junction (DEJ) where they get together is very important in the structural stregth of the tooth. The explanation lies in the most fascinating feature inherent to the natural tooth-a complex fusion at the DEJ, which can be regarded as a fiber-reinforced bond.[2] Because when we limit our preparations on enamel, the tooth will not flex and it will stay as rigid as a tooth can be.[3] Even if our preparation line passes through the DEJ margin and enters into dentin, it won't create a major problem for minor invasions. However, if we end up finishing our preparation on large amounts of dentin, we very well may end up with other kind of problems. This will not only create complex bonding issues on dentin, but will also free the "flexing" factor on the tooth structure. Over preparing the rotated or aggresive preparation of protrusively placed teeth will cause us to end up in the dentin structure which will lower our bonding values as well as causing the flexing of the tooth structure. When we end up in the dentin structure, it's not only lowering our bonding values[4] but it also causes the flexing of the tooth structure. And when the tooth starts flexing, a different phenomena occurs as this situation. First of all, we have the tooth which is agressively prepared that wants to bend, to flex, and on top of it we're bonding a veneer, a porcelain material, which is very rigid and in between those two structures we'll be using the adhesive luting resin which will stay in between and will try to absorb all the stresses. If the tooth receive some different occlusal forces and keep on flexing, the luting resin at the magrin will start peeling off slowly. So at these situations we will most probably end up with some micro-leakage or delamination.

In order to minimize those effects and problems, we have to be very precise and careful about case selection and tooth preparation.[5] The ideal cases which we would want to place the veneers are when the teeth are aligned perfectly on the dental arch and maintaining their original facial volumes which means that the facial

FIGURE 1A—Teeth exhibiting large composite fillings.

FIGURE 1B—Teeth are bleached. Note the colour difference between the bleached parts of the incisors and the existing composite fillings.

FIGURE 1C—Note the existing large composites and cavity on the palatal side.

structures of the teeth isn't worn as it happens by aging. That means, we exactly need to remove the tooth structure equivalent to the thickness of the veneer that we will be placing on the tooth itself. For that reason we can simply use our standard tooth preparation techniques (Figs. 1A, B & C).

STANDARD PREPARATION TECHNIQUE

In that kind of situations, since we will not be changing mostly the shape, the volume or the contours of the tooth, then it's a standard preparation which makes it easier for us to execute.[6] Shortly, what we needed to do is to remove the exact depth that we would need our porcelain to be built up and when these steps are followed, finishing the final restorations will never be a problem (Figs. 2A, B, & C)

First we start with the depth cutter,[7] which indicates the exact depth that we want to prepare and that basically depends on the material selection or the colour of the tooth that we want to restore (Fig. 3 & Illustraion). Once this is established, we paint the surface of the tooth onto a different colour and then use our round-ended fissure bur to finalize our facial reduction. The important factor here is that we have to use our bur in three different angulations inorder to be respectful to the facial convexity of the tooth structure. Only that way, we can achieve the same thickness from all around the porcelain material; or better to say, porcelain build-up.

Once this major reduction is done, then we finish our preparation on the gingival margins and then extend it towards the papilla to finish our interproximal elbow preparation which actually is very important especially when we are dealing with discolorations. Because, if that depth is not prepared correctly what will happen is that when we look at those teeth from an angle, we'll see the joint/the connection between the dark coloured tooth and the light coloured porcelain which will not be aesthetically pleasing. And in order to prepare this dog leg preparation we hold our burs almost 60 degrees towards the pallet and once we decide that we have achieved the exact depth that we needed to prep, then we upright our burs and finish our interproximal preparation.[8] And finally we would need the butt joint preparation of the incisal edge to give enough room to the lab technician to build up all his artistic translucence opalescense effects, incisal silhouette, etc. (Figs. 4A & B). As in every PLV case the direct or prefabricated provisionals are placed after im-

FIGURE 2C—Full smile and it's integration with the face.

FIGURES 2A & B—Finished and bonded veneers with facial and lingual view after two years.

FIGURE 3—Retraction cord is placed in the sulcus to prevent any possible soft tissue damage during tooth preparation and for beter magrin displacement during impression making. First the depth cutters are used for exacting the depth of the preparation.

FIGURE 4A—Last reduction is from the incisal edges. First the necessary depth is created with a fissure bur of choice by creating some ditches and then these are connected to each other in order to create a butt joint.

FIGURE 4B—After the actual preparation is finished on the existing composites are removed and the margins are rounded to finish the final preparation.

pression making (Fig. 5)

WHAT IF THE TEETH ARE NOT ALIGNED PROPERLY?

One of the major indications of utilizing PLV is space management. We should be dealing with spaced dentitions, crowded teeth or both. It becomes more of a challange if the teeth are spaced or the teeth are not aligned properly on the dental arch, such as crowding. There are two problems which comes along when the teeth are not aligned properly on the dental arch: a) visualizing the aesthetic outcome, b) tooth preparation.

AESTHETIC COMMUNICATION

Creating natural-looking smiles

When considering an approach for a new smile design, the dentist undertakes the creation of a new but natural aesthetic effect. With each restoration, the patient must be considered as a whole instead of focusing merely on one or two teeth. Each tooth exists as part of the mouth and face, assisting in creating a smile that reflects the patient's personality. To create a restoration, harmony in the size, shape and arrangement of the teeth are required in order to enhance each patient's facial features. When the teeth, the surrounding soft tissue and the patient's facial charasteristics are taken into consideration, a three-dimentional canvas is examined. The dentist must be aware of the ratio between the anterior teeth and the surrounding tissue and analyze them to arrive at the desired result.

A combination of only a few teeth may create an impact larger than the sum of the parts and an aesthetic case may vary from a simple aesthetic contouring of a corner of a single tooth to the complete recreation of a new smile involving the entire dentition. The mouth and its physiological make-up for each individual patient must be studied carefully by the aesthetic dentist; analyzing and anticipating any problems that may arise in carrying out the treatment.

First problem is about handling the aesthetic desires of the patient. Because of these kind of situations we would be creating a new smile design which needs to be communicated perfectly with the patient.

This cooperation and communication between the patient and the dentist will determine the success or failure of the treatment. The aesthetic dentist needs to be completely "in tune" with the attitude of the patient, the verbal requests, and the less-obvious nonverbal cues. The dentist who is able to generate a confident, competent and observant attitude makes the patient feel relaxed, and inspires confidence in him or herself and in the proposed treatment. The dentist's perception of a desirable smile and the style of design should be discussed with the patient and be considered along with the patient's personal thoughts on their appreance. The patient may wish to reinstate the appearance that has been established over a long period of time or may request an alteration that is totally unrealistic for their face. Perhaps one of the most difficult task is to select the right treatment in order to achieve success in aesthetic dentistry. The ability to say "no" will save the dentist sleepless nights and it should also be remembered that one setback can easily erase many brilliant and successful procedures. If the aesthetic dentist and patient find it difficult to agree on the objectives, it is in the best interests of everyone not to begin the treatment.

ILLUSTRATION—Standard tooth preparation.

FIGURE 5—Previously built shell provisionals tried in the mouth and then filled with composite and temporarily bonded on the prepared teeth.

FIGURE 6—The unaesthetic appeareance of the smile with relatively dark in colour, short crowns, uneven gingival levels, crowded incisors, uneven incisal silhouette and a decidious canine on the second quadrant.

FIGURE 7—Analyzing the smile at an angle clearly shows the crowding of the centrals.

ANALYZING THE SMILE

In order to have a solid understanding about the visualization of the final outcome, the existing smile should be analized carefully from a 3 dimensional aspect.

Cutline info about this image. Could you provide at least two or more lines to fill in this space.

Facial view
When the smile is analized from a facial view we can only deal with the mesia-distal or vertical problems that we can see.

In this particular case we can easily see that the centrals are overlapping. This causes a vertical canting of the midline which actually can be easily seen by the lay people. The existing teeth are basicaly short for the face proportionaly and the gingival levels are uneven (Fig. 6).

45 degrees angle view (checking buccal-lingual dimension)
This angle gives us the opportunity to check the crowding in a more solid way. In this case we can see that the mesial incisal tip of # 11 is more buccally placed relative to tooth # 21 (Fig. 7). However at this very beginning stage, we may not know which incisal edge position we can use as a reference point in a buccal-lingual dimension. Should we build up the tooth #21 buccally or bring the tooth #11 lingually?

Aesthetic Occlusal Plane (AOP)
The third dimension to be checked in our aesthetic evaluation is the AOP. This can simply be done from a sagital view and in this particular case the area where there is still a decidious canine exists (tooth #63) which creates a problem related to AOP since it is too short (Fig. 8). At this point the angulation of the centrals is prefered to be perpendicular to the AOP.

Functional evaluation
The restorations we should be delivering should be long lasting and for that we have to be careful about the foundations. When we check the root of the deciduous tooth #63 on the x-ray, it is obvious that it won't be able to withstand the lateral forces during occlusion especially and it won't be able to survive if a canine guided occlusion is to be planned.

FIGURE 8—AOP (Aesthetic Occlusal Plane) from this view it can easily be evaluated; the decidious canines displaying a distinct concavity.

FIGURE 9—First of all the incisal edges are aligned with a composite mock up and the incisal edge position is defined. Then a reverse mock up is applied over the soft tissues in order to determine where the soft tissues should be after the perio operation. Meanwhile the length to width ratio of the teeth are carefully watched out.

FIGURE 10—After perio surgery, a new mock up is produced in order to get the new proportions and relations amongst the teeth in a beter way.

FIGURE 11—Teeth are bleached after the crown lengthening. Note the altered gingival margins.

TREATMENT PLANNING
And at this stage, how can somebody be sure about the final outcome just by looking at this case intra or extra-orally? It's almost impossible.

Now, with all these problems or imperfections in our mouth, the first step is to try to visualize and realize the aesthetic final outcome and share this knowledge or information with the patient. The answer to that starts with the composite mock-up.[9]

MOCK-UP
Simply, a free hand carved composite can be used for us to visualize the final outcome of those veneers and one can try to see how the smile will look like when we place these composites (Fig. 9). At that time this should not be as precise as a wax up but rather it would give us the idea on how/ where the length of these teeth should be; about where to place the facial bulkiness and it's effects on the lip structure, on phonetics and to a stand, on occlusion[10] This mock up will be a great tool or guide for the lab technician to build up his wax up. And at the end, we will be sharing this information with the patient so that first step of functional and aesthetic outcome is proved by the dentist and the patient.[11]

SECOND MOCK UP
However in the cases of where we need to alter the gingival levels which will change the length of the crown apicaly, it is always more reliable to make a second mock up. This will show the new proportions and the smile design a lot better than a reverse mock up. So, after the periosurgery is finished and 6 to 8 weeks passes, a new mock up

is produced (Fig. 10). This second mock up after the periosurgery will help the dentist and the ceramist for precising the teeth proportions relative to where the new gingival margins are. The new impression made out of this mock up is sent to the ceramist for the wax up. This new mock up will provide more solid information to the ceramist for his final wax up.

Another decision that we can make at this point is to prepare the deciduous canine #63 and tooth #24 for crowns and connect them to each other for better support and eventually end up with a small group function (instead of canine only) through the canine and first premolar which will also effect the design of the final wax up.

If nesessary during this period, the teeth can be bleached as well. (Fig. 11).

We can now actually realize that the incisal mesial corner of the tooth #11 has to be positioned and restored lingually. The best choice of treatment would be pulling it back with ortho first and then continue with our minimal invasive techniques. However time limitation for this specific case won't allow for such a treatment planning. But in any case, this situation has to be communicated to the lab so that he would know he has to trim that corner slightly inwards during his wax up.

What we do at that stage is that, we have to make two impressions out of the patient's dental arches. One is the original existing tooth structure with all these diastemas and unproperly aligned teeth and the second one is the impression with the mock up.

Now, the lab technician should relate those two together, using a silicone index and finalize his wax up with all the details as if he is building up the porcelain restorations. The technician is now free to do reduction on the facial surface of the protruding teeth (in this case tooth #11) and then finish his wax-up according to the guidelines of our mock-up (Fig. 12).

APR (aesthetic pre recontouring)

During the next appointment when the patient comes to the clinic for the tooth preparation, the dentist should be provided with a silicone index that is made from the wax up model which will indicate the final contours of the teeth. The index is then placed over the dental arch in order to visualize the existing positions of those teeth on the dental arch, relative to the final outcome of the wax up and veneers (Fig. 13). One problem that can be seen at this stage is that, one or few teeth may touch or push the silicone index bucally indicating that these teeth are either rotated or positioned labially than the expected final outcome. At this stage those teeth have to be trimmed down in order to place the silicone index passively on the dental arch. The process is named as APR (Aesthetic Pre Recontouring)[12] (Fig. 14).

APT (Aesthetic pre-evaluative temporaries)

We can now apply the wax up on the tooth structure as we are making the provisionals. The technique is that we make a transpar-

FIGURE 12—The final wax up.

FIGURE 13—A silicone index (SI) according to this wax up is built to be used during the preparation stage. This SI is tried on the teeth. Note that SI can not be seated on the arch passively, due to the protruded position of the mesio-incisal corner of tooth #11 (#8).

FIGURE 14—In such situations APR (Aesthetic Pre Recontouring) is done. The protruding surfaces of teeth that are positioned labially — relative to the final contours of the finished PLVs — are trimmed down until the silicone index can be passively seated ont he dental arch. Note the trimmed mesio-incisal edge of tooth #8 (#11) and how passively the index is seated on the arch after the APR. In order to test the final outcome of the proposed smile design the APT (Aesthetic Pre-evaluative Temporaries) has to be tested.

FIGURES 15A & B—An impression made out of the wax up is filled with a flowable composite (or any material of choice) and placed on the unprepared teeth.

ent silicone impression from the wax up and in the mouth, we fill this up with the flowable composite, then place it on the unprepared teeth; light cure it and take the translucent impression material out of the mouth (Figs. 15a & b). This would not have been possible had we rotated or buccally positioned the teeth and had they not been recontoured with APR, simply because the transparent impression wouldn't have fit on those teeth.

We then trim the gingival margins slightly and what we now created is the exact final outcome of the porcelain that is expected at the end but now made out of plastic. At this stage, because the patient is not being numbed, it is the best way to evaluate the aesthetic outcome (Fig. 16). The lip support of these restorations and the aesthetic length can be easily evaluated which should be approved by the patient. Also, we want to evaluate the functional movements of the patient to see whether it would create an anterior constriction or not. Also the phonetics that may be a problem in the future. And when this is approved by the patient, then we can step onto our second next stage.

FIGURE 16—Completed smile design, before any tooth preparation is done (APT). This should now mimic the exact final contours, texture and shape of the final PLVs.

FIGURE 17—Since the APT resembles the exact facial contours of the proposed smile design, now the tooth operation can be done through the APT. This will give the dentist and the ceramist the exact volume of reduction, hence being minimally invasive.

FIGURE 18—Incisal reduction finished through the APT.

FIGURE 19—The final preparation. Note how the mesio-incisal corner of the tooth #11 (#8) had to be reduced more than all the other teeth due to it's protrusive position... Hence all the other teeth are minimally preped with almost all the enamel left on their surfaces.

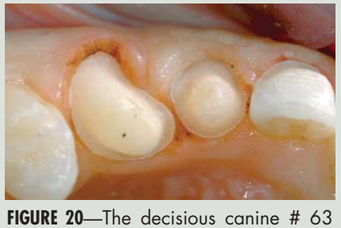

FIGURE 20—The decisious canine # 63 and the premolar #24 (#12) is preped to receive crowns connected to each other in order to support the functional loads especially during the excursions. Note the 360 degrees champher all around the gingival magrin.

FIGURE 21—The final check for preparation depth of the veneers as well as the crowns with the SI.

These plastic teeth have been named as APT (Aesthetic Preevaluative Temporaries) which is nothing different than making a provisional on the tooth structure but before the teeth has been touched.[13] These provisionals can then be double checked with silicone index to make sure that they are placed in the mouth correctly.

TOOTH PREPARATION IN COMPLICATED CASES

The second problem at this stage is what if we can not use the standard preparation technique? In other words, when the teeth are not aligned properly on the dental arch which means the teeth may have rotations, may be placed lingually or buccally, how can we assess the final success of that case and prepare the teeth precisely and predictably every other time?

TOOTH PREPARATION THROUGH APT

The beauty of these Aesthetic Provisional Temporaries, besides the evaluation of aesthetic functions and phonetic aspects, is that we have a great tool in our hands now to prepare the teeth. We can simply use these APTs as a guideline to prepare out tooth structure.

Since this APT resembles the

exact final contours of the final outcome such as the incisal edge position, such as the facial volume (contours) of the the teeth, now we can start preparing the teeth through the APT as if we are dealing with a very simple case in which the teeth are aligned properly, since everything is already set in advance. And at this point we wouldn't really mind how the teeth underneath is aligned[14] (Figs. 17 & 18). In some situations we may not end up preparing the tooth surface. If for example, the tooth is too palately placed (ie. More than 0.6 mm away from the facial contours of the APT). Once we make our major reduction with the depth cutters followed by the round ended fissure burs, our major facial volume reduction will be finished.

Then we can proceed and finish the gingival margins and interproximal lines.

In rare occasions like in this case, if we did an substractive correction on the wax-up stage, that means that we should be removing much more tooth structure than a standard preparation depth. And tooth # 11 gets a substractive correction. So, the mesial incisal corner is prepared aggresively in order to align it properly while the facial contours of the expected dental arch form we want to create after the veneers are finished. As mentioned previously the best way of handling such a case is to prealign the positionof such teeth orthodonticaly before our preparations.

The same reduction will be done in the incisal edge and most of the time, which is very surprising that, we really don't need to prepare too much incisal healthy tooth structure[15] (Fig. 19).

In PLV preparation we tend to finish the gingival champher supra gingival unless we are dealing with a severe discoloration or with spaced dentition.

After finishing the tooth preparation for the veneers, deciduous canine (#63) and first premolar tooth #12 (#24) can be prepared for the all ceramic crowns. They will then be connected to each other for the functional support and a small group function for the lateral excursions (Fig. 20).

Once the preparation is finished, the same silicone index is used once again to check and verify the correct preparation depths, (Fig. 21) then the impression is made and the provisionals are fabricated. The provisionals will be exactly the same as the APT. This will be a second chance for the patient to evaluate the final outcome during the fabrication (Fig. 22).

FIGURE 22—Provisional temporarily bonded in the mouth, replicating exactly the final result.

FIGURES 23A & B—Smile from different angles.

FIGURES 24 & 25—Full face before and after.

THE LAB PROCEDURES

Basically the veneers can be fabricated with feldspathic porcelain on a refractory die, or on platinum foil. The other ways are either using pressable ceramics with external staining or layering techniques.

In this case the pressable porcelain will be used with the layering technique. Whichever technique is used, the most important issue is that the ceramist uses the same silicone index that we used in the mouth that fits perfectly on the APT, which was the approval of the final outcome. The rest is his/her knowledge, ability and talent of integrating the colours, form, shape and texture.

TRY IN

When the veneers are received from the lab, they should be first tried out in the mouth. Preferably the provisionals should be taken out and PLV's are tried in without anesthesia. That way it will be a lot easier to check the lip support and the incisal edge position relative to the upper lip.

The veneers should be tried out one by one in order to check the margin fit accurately, and then together, to see their overall integration with each other, with the lips and finally, the face.

BONDING

The author prefers a sectional rubber dam placed in the mouth. Once the teeth and the inside of the veneers are surface treated they can now be bonded two by two. Preferably, the bonding should start with the centrals, proceeding with the lateral, canine on one side and the other lateral, canine on the other side. The soft tissues should be handled very gently. The easier way to do that is to place the veneer on the tooth and once it is completely seated, spot tack it from the 1/3 middle with a 2mm turbo tip. This will hold the veneer intact in place and then switch the tip of the light source to a larger diameter such as 13mm. Light cure the excess flesh around the gingiva for only 1 or 2 seconds. This will not fully polimerize the luting resin but bring it to a jelly consistency. That will be very easily cleaned with an explorer which was dipped into an adhesive liquid. Then, go in between the veneers with a dental floss to cleanse the interproximal contacts.

Once everything is finished, now you can fully polimerize the luting resin.

In order to finalize the bonding procedure a #12 blade will help a lot to cleanse the undetected left over composite on the margins. And if needed, the margins can be polished with a rubber cup, but never, ever with a diamond bur which will totally ruin the glaze and the polish of the porcelain on the margins.

Final PLVs' position, form, phonetics, lip support etc. will never be a guess work. The same aesthetic, functional and phonetic results that are established during the APT and provisionalization will be the same after the PLVs are bonded (Figs. 23a & b).

SUMMARY

PLVs have been one of the most used restoration for aesthetics. Even though it is one of the most conservative of the treatment options, some rules have to be followed. Aesthetics is a subject that is very objective and necessitates excellent communication between the dentist, patient and ceramist. The case has to be carefully selected and treatment planned. The use of the mock ups, followed by a wax up, APT and silicone index will not only let us to get the best aesthetic, phonetic and functional outcome, but to communicate this with the patient and more importantly, end up with minimum invasion on the recipient tooth.

Further to all the techniques explained above which will help this communication to get more reliable, solid and helpful to get the best aesthetic results with minimal tooth reduction, the use of PDP (Permanent Diagnostic Provisionals) will have a further impact on this solid communication. That way, the patient will have a chance to evaluate the aesthetics, function and phonetics not only by him/herself but with their immediate circles as well if he/she wishes to do so (Figs. 24 & 25). OH

Acknowledgements

Special thanks to, Ulrich Werder, MDT for the first case and Shigeo Kataoka, RDT for the second case.

Dr. Galip's bio will go here.

Oral Health welcomes this original article.

REFERENCES

1. Horn HR. Porcelain laminate veneers bonded to etched enamel. Dent Clin North Am 1983;27:67-684.
2. Lin CP, Douglas WH, Erlandsen SL. Scanning electron microscopy of type I colagen at the dentin-enamel junction of human teeth. J Histochem Cytochem 1993;41:381-388.
3. Magne P. Douglas WH. Porcelain veneers: Dentin bonding optimization and biomimetic recovery of the crown. Int J Prosthodont 1999;12:111-121.
4. Noack MJ, Roulet J-F. Rasterelelektronenmikroskopische Beurteilung der Atzwirkung verschiedener Atzgele auf Schmelz. Dtsch Zahnarztl Z 1987; 42:953-959) (Van Meerbeek B, Peumans M, Gladys S, et al. Three-year clinical effectiveness of four total-etch dentinal adhesive systems in cervical lesions. Quint Int 1996;27:775-784)(Van Meerbeek B, Perdigao J, Lambrechts P, et al. The clinical performance of adhesives. J Dent 1998;26:1-20.
5. Besler UC, Magne P, Magne M. Ceramic laminate veneers: Continious evolution of indications. J Esthet Dent 1997;9:197-207.
6. Strub JR, T, rp JC. Esthetics in dental prosthetics. In: Fischer J, Esthetics and Prosthetics. Chicago: Quintessence, 1999:11.
7. Garber DA, Goldstein RE, Feinman RA, Porcelain Laminate Veneers. Chicago: Quintessence, 1988) (Nixon RL. Porcelain Veneers. An esthetic therapeutic alternative. In: Rufenacht CR. Fundamentals of Esthetics. Chicago: Quintessence, 1990:329-68) (Garber DA. Porcelain laminate veneers: Ten years later. Part 1. Tooth preparation. J Esthet Dent 1993; 5:56-62.
8. Morley J. The role of cosmetic dentistry in restoring a youthful appearance. J Am Dent Assoc 1999; 130: 1166-1172.
9. Dietschi D. Free-hand composite resin restorations: A key to anterior aesthetics. Pract Periodont Aesthet Dent 1995;7:15-25) (Vanini L. Light and color in anterior composite restorations. Pract Periodont Aesthet Dent 1996;8:673-682) (Baratieri LN et al (eds). Direct Adhesive Restorations on Fractured Anterior Teeth. Sao Paulo: Quintessence, 1998: 135-205.
10. Peumans M, Van Meerbeek B, Lambrechts P, Vanherle G, Quirynen M. The influence of direct composite additions for the correction of tooth form and/or position on periodontal health: A retrospective study. J Periodontal 1998;69:422-427)(Chiche GJ, Pinault A. Esthetics of Anterior Fixed Prosthodontics. Carol Stream, IL: Quintessence Publishing, 1994;33-52) (Romano R, Bichacho N, Touati B, eds. The Art of the Smile. Carol Stream, IL: Quintessence Publishing Publishing; 2005: 7-24.
11. Dawson PE. Evaluation, Diagnosis and Treatment of Occlusal Problems, ed 2. St Louis: Mosby, 1989:274-297.
12. Gurel G, The Science and Art of Porcelain Laminate Veneers. Quintessence 2003;7:246.
13. Gurel G, The Science and Art of Porcelain Laminate Veneers. Quintessence 2003;7:246) (Gurel G. Predictable, precise and repeatable preparation for porcelain laminate veneers. Pract Proced Aesthet Dent 2003; 15(1):17-24) (Gurel G. Predictable tooth preparation for porcelain laminate veneers in complicated cases. Quint Dent Tech 2003;26:99-111.
14. Gurel G, The Science and Art of Porcelain Laminate Veneers. Quintessence 2003;7:246)(Gurel.G. QDT + PPAD.
15. Castelnuovo J, Tjan AH, Phillips K, Nicholls JI, Kois JC. Fracture load and mode of failure of ceramic veneers with different preparations. J Prosthet Dent 2000;83:171-180.

@ARTICLECATEGORY:587;