

Intrusion and Up-righting Teeth for Fixed Prosthesis with Temporary Anchorage Device

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Abstract: *Abstract: The mandibular first permanent molar is usually first to erupt around the age of six. Therefore, if the oral hygiene is not impeccable, it is usually also the first permanent tooth decayed in a child's mouth. A plethora of circumstances may lead to pulpal involvement, periapical pathosis, and endodontic treatment and in unfortunate situations, removal of this tooth. If this tooth is not replaced, or the extraction space is not retained for a considerable amount of time, the posterior occlusion will collapse. The most common occurrence is tipping of teeth in juxtaposition to the extraction site and extrusion of at least one opposing tooth. This article will describe efficient up-righting and intrusion of offending teeth prior to placement of fixed prosthesis. The author will explain the procedure step by step, first on acrylic models and then on the actual patient.*

Figure 1. Missing mandibular first molar is a very common occurrence. The collateral damage may be: mesially tipped mandibular second molar, over erupted maxillary first molar, occlusal disharmony, lack of coupling with the maxillary second molar, TM Dysfunction due to compression of the ipsilateral TMJ and periodontal distress.

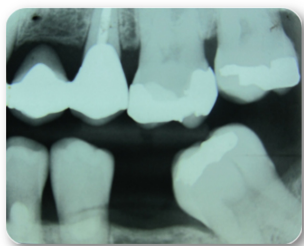


Figure 2 a, b. Temporary Anchorage Device (TAD) is inserted approximately 10 mm distally to the mandibular second molar to the posterior oblique ridge. TAD used by the author is Ancor Pro™ 1.6 x 10 mm (Ortho Organizers). Two buttons are bonded to the buccal and lingual surfaces of the mandibular second molar respectively. Alternatively an SS orthodontic band with attachments may be cemented on this tooth. Power chain of choice is attached to the buttons and to the TAD. Maximum 150 grams of bilateral combined force should be used for up-righting. This is verified by COREX force gage (Ortho Organizers).



Figure 3 a, b. After the up-righting is completed, the new position has to be crystallized for at least three months prior to placement of fixed prosthesis or an implant supported crown. If a fixed prosthesis is pre-planned the simplest way to maintain the acquired space is bonding a piece of .040 SS wire (sandblasted) into small DO and MO cavity preparation in juxtaposition to the developed space. The rest of the cavity is filled with a composite of the clinician's choice. It is paramount to bond this wire in infra-occlusion.



Figure 4 a, b. In case an implant supported crown is pre-planned, the temporary space maintainer has to facilitate the implant placement. The author suggests an SS band on the molar and bonded metal sandblasted pad on the second bicuspid. The connector is .032 SS, bent out buccally in the height of maximum coronal convexity. This design is conducive to raising the flap and an implant placement.

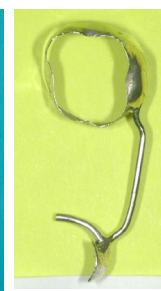


Figure 5 a, b. The intrusion of the contralateral first molar is done with the aid of two Ancor Pro™ 1.6 x 8.0 mm (Ortho Organizers) TADs. One is inserted mesio-buccally and the second one, disto-palatally. It is essential not to place both TADs mesially or distally, both forces would be only on one side of the vertical center of resistance of the molar, thus creating an undesirable moment (tipping), this would prevent smooth intrusion. In order to facilitate the intrusion the clinician must place separators mesially and distally to the first molar. Alternatively (providing there is a large restoration) the interproximal walls may be slenderized with a carbide bur of the clinician's choice. Buttons are bonded mesio-buccally and disto-palatally on the maxillary first molar and a power chain of the clinician's choice is attached. The cumulative force applied for intrusion of the molar should not exceed 100 grams.



Figure 6. After the maxillary molar reaches a harmonious plane of occlusion, it has to be retained at least until the contralateral arch is restored. Author's choice of retention is Hilgers Bond-a-braid (Ortho Organizers), flat passive multi-braded wire bonded with Tetric Flow (Henry Shine).



Case Study

Figure 7. Mrs. D. P., age 60 presented herself for replacement of missing mandibular left first molar. Her medical and dental history was noncontributory, except the slight reciprocal click on the left with no discomfort. Diagnosis was a left early opening click with reduction. I explained to her that her left side was in disharmony, mesially tipped mandibular second molar, over erupted maxillary first molar, occlusal problem, lack of coupling with the maxillary second molar, TM Dysfunction due to compression of the ipsilateral TMJ and a pseudo-pocket mesially to mandibular left second molar.



Figure 8 a, b. After the final preoperative conference and evaluation of the Medical History the Informed Consent was signed, the patient was ready for the insertion of a TAD. Xylocaine Gel (Henry Shine) was applied topically for three minutes. Mandibular left retro-molar area was infiltrated with 0.5 ml of Ultracaine 4% 1:200 000 Epinephrine. After approximately five minutes one Ancor Pro™, 1.6 x 10.0 mm TAD was inserted, by means of a hand driver, approximately 10.0 mm distally and slightly buccally to the mandibular second molar. Small 3.0 mm eyelet was created on .012 SS ligature tie then it was laced through the opening of the head of the implant. The eyelet was positioned mesially in reference to the TAD. An SS band was cemented with Ketac Cem (Patterson Dental) on the mandibular left second molar. The mesial aspect on the lingual cleat of the SS band was opened as well as the buccal hook was bent anteriorly. Power chain was attached to the buccal hook then laced through the eyelet on the TAD and finished on the mesial aspect of the lingual cleat. The combined forces did not exceed 150 grams.



Figure 9 a, b. Due to the fact that an implant supported crown was preplanned, a temporary retainer was cemented as described previously (Figure 4 a, b.). Twelve mm of space became available after the up-righting of the second molar. The duration of treatment was 8 months. The molar band was cemented with Ketac Cem (Patterson Dental) and the bicuspid pad was bonded with Tetric Flow (Henry Schein).

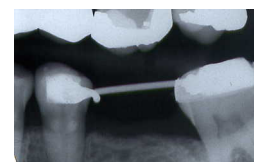


Figure 10 a, b, c. After the mandibular left sextant was resolved, an intrusion of the maxillary left first molar was contemplated. Two pieces of .018 x .025 SS wire were bent and bonded temporarily with Tetric Flow (Henry Schein) on the inter-radicular area buccally and interdental area mesio-palatally. These indicator wires are essential for TAD placement, when the amount of available space is critical. Periapical radiogram was taken in 90 degrees to the buccal surface of the molar using paralleling technique. If the positions of the indicator wires are not acceptable, then they may be bent into different positions and the radiogram must be retaken.



Figure 11 a, b, c. Two Ancor Pro™, 1.6 x 8.0 mm (Ortho Organizers) TADs were inserted following the same exact protocol as described on Figure 8 a, b. The buccal TAD was placed between the mesial and distal root of the first molar, while the palatal one was placed between the palatal root of the first molar and the root of the second bicuspid. Bondable metal buttons were placed on the disto-buccal and mesio-palatal aspect of the first molar. It is paramount to bond the buttons far apart to prevent undesirable moments on the coronal aspect of the tooth. It is essential to open contacts between the teeth in juxtaposition of the first molar slated for intrusion. Otherwise minimal or no intrusion may take place. This may be rendered by placing and continuously replacing separators on both sides of the molar if the tooth is virgin. Alternatively, the clinician may perform Air-rotor Slenderizing of the MOD restoration, if it is present. The power chain is attached from the TAD to the button on both sides respectively. The cumulative force should not exceed 100.0 grams.

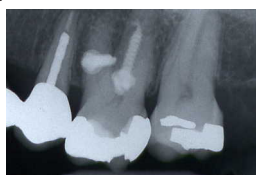


Figure 12 a, b. In four months the maxillary left first molar was intruded to satisfaction. Mandibular left first molar space was replaced with Nobel Biocare Sterioselect implant 4.5 x 7.0 mm. Screw retained porcelain fused to the metal crown was inserted and the screw was tightened to 35 Ncm. There was no need for an interim retention of the maxillary molar as the implant supported crown prevents relapse.



Figure 13 a, b. After the defective amalgam restoration was replaced, porcelain fused to the metal crown was cemented on the maxillary left first molar. Final radiogram and photographs revealed good inter-digitation and occlusal harmony. The early reciprocal click disappeared and the patient remained asymptomatic.



Discussion

Long standing missing mandibular first molar causes tipping of the adjacent teeth and extrusion of the maxillary first molar. It is a common occurrence, which is dealt with most often by placement of a bridge in this pathological position. There may not be enough space for insertion of the implant. Aggressive reduction of the occlusal coronal aspect of the contralateral first molar is a treatment of choice, occasionally leading to hyperemia/pulpitis with subsequent root canal treatment followed by post/core build up and a PFM crown.

Conclusion

The author consulted a large dental laboratory that he has collaborated with for last 35 years. In numerous conversations they alluded that the cardinal problems in the process of constructing posterior bridges are: tipped ipsilateral and extruded contralateral teeth. Number of fixed prosthesis had to be constructed in this disharmonious environment. The author described in his

article a simple protocol in resolving this problem. The treatment takes approximately 12 months, including the reconstruction. The author feels that this protocol is an efficacious and elegant adjunct in the armamentarium of every orthodontic practitioner.



Dr. Adrian J. Palencar graduated from Komensky University with a degree of Doctor of Universal Medicine in Bratislava Slovakia. He recertified at the UWO in Canada in 1970. Dr. Palencar is Master of AGD, Diplomate of the IBO, Fellow of the Academy of Dentistry International, Fellow of the Pierre Fouchard Academy and Fellow of the Academy of Dentistry International. Dr. Palencar received his IAO Pinsker Award in 2003. He is also a Secretary/Examiner for the IBO and an Assistant Instructor to Dr. Rondeau for past eight years.