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Transfer Trays Used in the Indirect Bonding Method and Their Application

Indirekt Yapıştırma Yönteminde Kullanılan Transfer Kaşıkları ve Uygulamaları

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ABSTRACT

Attaching brackets in the correct position is crucial for the success of fixed orthodontic treatment. Even though disadvantages existed in earlier stages of this technique, many of these have been eliminated over the years. The indirect bonding technique is preferred not only because it reduces clinicians' chair time but also because it provides a more accurate positioning of brackets. One of the most important steps of this technique is the selection of the transfer tray. Many types of transfer trays are being used, and new types are being tested.

Transfer trays used in the indirect bonding technique can be classified as single tooth trays or trays that cover the entire arch. Many different materials and techniques can be used in the production of these transfer trays.

The aim of this study is to examine transfer trays used in the indirect bonding technique.

Keywords: Orthodontics, orthodontic brackets, transfer trays

ÖZ

Sabit ortodontik tedavi başarısında braketlerin doğru konumda yapıştırılması oldukça önemlidir. İndirekt yapıştırma tekniğinin ilk kullanılmaya başlandığı dönemde, çeşitli dezavantajları olsa da zamanla tekniğin geliştirilmesi ile beraber bu dezavantajların çoğu ortadan kalkmış ve klinisyene birçok avantaj sunmuştur. İndirekt yapıştırma tekniği hem hekimin hasta başında geçirdiği süreyi azaltması hem de braket pozisyonlandırmasının daha doğru olması nedeniyle klinisyenler tarafından tercih edilmektedir. Bu tekniğin en önemli aşamalarından biri transfer kaşığı seçimidir. Birçok transfer kaşığı çeşidi kullanılmakta ve yeni transfer kaşıkları da denenmektedir.

İndirekt yapıştırma tekniğinde kullanılan transfer kaşıkları tek diş kaşıkları ya da tüm arkı kapsayan kaşıklar olarak sınıflandırılabilir. Transfer kaşıklarının üretimi için birçok farklı materyal ve teknik kullanılabilmektedir.

Bu derlemenin amacı; indirekt yapıştırma tekniğinde kullanılan transfer kaşıklarının incelenmesidir.

Anahtar Kelimeler: Ortodonti, ortodontik braketler, transfer kaşıkları.

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INTRODUCTION

The transition from removable appliances to fixed appliances used to position the teeth in their correct place has been a very important step in the history of orthodontics. Brackets and tubes were initially attached to the teeth by soldering them to bands. However, it is very difficult to attach these bands to the teeth in the correct position.[1] When we look at the history of orthodontics, two important developments have proven effective in making orthodontics what it is today. In 1955, Buonocore developed the acid etching technique and, in 1964, Newman attached orthodontic brackets to the enamel surface with the help of epoxy-resin.[2-4] With the direct bonding technique, in which fixed orthodontic elements are bonded directly to the teeth, the time spent bracketing in the clinic has decreased compared to the banded orthodontic treatment used in the past. This way, a more aesthetic and hygienic orthodontic treatment has been achieved.[1]

The most important point in the straight wire appliance is placing the brackets in their ideal position and correcting the tooth positions in all three planes.[5,6]

The direct bonding technique is a one-stage procedure in which the brackets are placed directly on the teeth, while the indirect bonding technique is a two-stage procedure. In the first stage of the indirect bonding technique, the brackets are placed on a plaster model obtained by taking impressions from the patient, and in the second stage, the brackets are transferred to the patient's teeth using special transfer trays.[7]

Silverman and Cohen developed the indirect bonding technique to produce a more accurate and faster bracket placement system.[8] Initially, this method was used infrequently because of its low bond strength, increased bracket rupture, and residual adhesives causing periodontal problems; however, these problems have been eliminated thanks to newly developed methods and adhesives produced specifically for the technique.[1] The indirect bonding technique has proven to be an effective method for proper bracket positioning in patients. [9–12]

The indirect bonding technique has clinical, technical, and ergonomic advantages. One advantage is that it reduces the dentist's chair time. One study showed that the average time required to complete the direct bonding technique was 42.18 minutes. For the indirect technique, the total time required was 53.73 minutes, including laboratory time, but the time spent in the clinic was found to be 23.91 minutes.[11] In another recently published study, the digital indirect bracketing time for the half jaw was determined to be 12 minutes, 52 seconds, and the direct bracketing time was 16 minutes, 47 seconds. When the digital bracket placement time was added, the total indirect bracketing time exceeded the direct bracketing time by 28 minutes and 14 seconds.[13] Shorter clinical time increases patient and dentist comfort levels.

At the same time, it is possible to position the brackets more accurately using the direct technique, especially since the posterior teeth are more easily seen in the model. Although different studies have shown that it is possible to position the brackets correctly with the indirect and direct techniques, factors such as the workload and fatigue level of the dentist may affect the correct bonding of the brackets in bracketing with the direct method.[14,15]

Although some studies have concluded that bracket rupture is higher in the indirect bonding technique, many have found similar amounts of rupture.[11,16,17]

However, the indirect bonding technique has disadvantages. Bracketing cannot be done during the first visit, so an additional session is required.[18] It also requires additional laboratory steps compared to the direct technique, resulting in extra costs and laboratory time. Several studies have demonstrated that although the indirect technique reduces the time spent in the chair, it does not affect the total duration of treatment and often necessitates longer procedure times.[12] When the technique is not applied correctly and adhesive resins specifically developed for this technique are not used, the amount of bracket rupture may increase compared to the direct technique.[19] All bracket positions may be inaccurate if the transfer trays are not correctly adapted to the patient's mouth and the technique is not applied with precision. If the resin applied to the bracket bases is excessive or not cleaned adequately, the patient's oral hygiene may be affected, and periodontal problems may occur. The indirect bonding technique is difficult to apply to teeth with rotated and/or short crowns.

In this technique, reference lines are marked on the plaster models obtained from the patient so that the brackets can be placed correctly. Lacquer is then applied to the model. After the lacquer has dried, the brackets are placed on the plaster model in the laboratory (Figure 1). The transfer trays are then prepared (Figure 2). To dissolve the lacquer and separate the brackets from the plaster, the plaster model is soaked in water, and the bracket bases are sandblasted. The resin bases are wiped with pure alcohol. The bases are washed with air and water spray and dried.

The patient's teeth are first cleaned with pumice or paste, and the enamel surfaces are etched with 37% orthophosphoric acid. A primer suitable for the adhesive resin is applied to the tooth surface, and adhesive resin is applied to the bracket bases; following this, the transfer tray is placed in the correct position (Figure 3). The teeth are pressed sufficiently, polymerization is performed that is suitable for the adhesive resin, and the transfer tray is removed from the mouth. The residual adhesives around the brackets are cleaned.[20]

Figure 1. Placement of brackets in the laboratory.

Figure 2. Transfer tray made in the laboratory.

Figure 3. Transferring brackets to patient teeth with transfer trays

Different types of adhesive resins are used in the indirect bonding technique. Previously, soft caramel was preferred for attaching the brackets to the model, and chemically polymerized resins were preferred as clinical adhesives. However, this technique left excessive resin residue. For this reason, the 'Custom Base Technique' was developed, creating a personalized bracket base.[7] In this technique, during the laboratory stage, the brackets are attached to the model with adhesive resins, and the residual resins are cleaned. In the clinical stage, after etching the teeth with acid and applying a primer, the brackets are attached using a small amount of suitable adhesive resin. In this technique, both chemical and light polymerized adhesive resins can be used.[21,22]

In the indirect bonding technique, one of the most critical issues for correctly transferring the bracket position is the selection of the appropriate transfer tray. Different methods and materials are used to manufacture transfer trays.[23] This study aims to present the transfer trays utilized in the indirect bonding technique and their usage areas in light of the literature.

Transfer trays used in the indirect bonding technique can be made to cover a single tooth or the entire arch.

Trays containing a single tooth

Trays containing a single tooth are more advantageous because practitioners can attach the brackets in a more accurate position, and the brackets can be positioned more accurately on the tooth.[24] It is also easier to remove the transfer tray from the tooth, and these trays can also be used to reattach brackets that have dropped. Single tooth trays are frequently used, especially in lingual orthodontics.

The Hiro system, the Hybrid Core system, and the Convertible Resin Core system developed by Kim are primarily used to construct single tooth trays.[24–26]

The Hiro system is easy to use and inexpensive and was later developed by Takemoto and Scuzzo. In the model, each tooth is divided into separate parts, and a new model is created by placing the teeth in the correct position. The brackets are placed on the teeth so that a 0.018 x 0.025-inch angled archwire can pass through the teeth. A separate transfer tray is created for each tooth and transferred directly from the model to the teeth. The time in the clinic is longer compared to transferring brackets to each tooth with a single transfer tray.[26,27]

The Hybrid Core system was designed by Matsuno for lingual orthodontics. In this system, the inner part is silicone, and the outer part is made of resin. This way, the transfer tray remains stable in the mouth and can be easily separated from the transfer tray after the bracket attaches to the tooth. Since the transfer tray is not damaged much after the bracket attaches to the tooth, the transfer tray can be reused to attach broken brackets.[24]

In the Convertible Resin Core system developed by Kim, the transfer tray is prepared from Duralay (Reliance, IL, USA), a hard resin. In this technique, the brackets are placed on the set-up model. An elastomeric ligature is used to hold the bracket and transfer tray together, which ensures that the bracket remains in the correct position in the resin core, and the tray can be reused when the bracket needs to be reattached. In this system, a separate transfer tray is prepared for each tooth, so the time spent in the dentist's chair is longer.[26]

Another hybrid tray system is the combined tray system developed by Kim and Encharri. In this system, a separate transfer tray is prepared from acryl for each tooth. In order to transfer the brackets to the teeth more quickly during the procedure, a transfer tray made of opaque impression material covering all teeth is made. This reduces the time spent in the chair but increases the time spent in the laboratory.[28]

Whole arc trays

Whole arch trays are trays that cover all the teeth in an arch. These transfer trays can be made of silicone-based materials, such as opaque (Xantoprene Optosil (Heraeus Kulzer, Germany) or transparent (Memosil 2 vinyl polysiloxane, Heraeus Kulzer GmbH&Co. KG,Dormagen, Germany) impression materials and thermoplastic (Copyplast, Bioplast (Scheu-Dental Germany) thermoformable materials.[29]

Chemically cured adhesive resin should be used for transfer trays made of opaque silicone impression material. Light-curing composites cannot be used because the transfer tray is opaque.

Whole arch trays shorten the clinical time considerably compared to single tooth trays, but when the opaque impression material is placed under the bracket wings, it is difficult to remove it from the brackets during removal because they are very tightly attached to the brackets so that it can be used in two or three pieces. Alternatively, it can be cut from the occlusal surface after bonding and divided into two parts, buccal and lingual, to facilitate its removal from the mouth.[28]

As transparent silicone impression material, Memosil 2 (Heraeus Kulzer GmbH & Co. KG, Dormagen, Germany) and Emiluma (Shofu Co., Tokyo, Japan) are generally used to make transfer trays. Since these impression materials are more flexible than opaque impression materials, removing them from the teeth is easier after bonding. These materials are sprayed first on the brackets, then on the occlusal surface of the teeth, and finally on the lingual surface of the teeth in the bracketed model with its own gun—and a transfer tray is prepared. The material hardens in approximately five minutes. Afterward, the model is easily removed from the model by leaving it in warm water for about 20 minutes.[30]

Thermoplastic/thermoformable materials can be used as single or double layers. Block out is applied on the plaster model on which the bracketing is made, and the part where the hooks are located is sealed with silicone. The first tray material (Bioplast (Scheu-Dental Germany)) is then printed using a Biostar machine. After the edges of the first tray have been shaped, applying sprayed oil (PAM) on top of this material is recommended. Subsequently, the top layer material (Biocryl (Scheu-Dental Germany)) is printed, and the edges are shaped. The inner layer is soft, making it easier to separate the spoon from the brackets, while the outer layer provides stability due to its hardness. It was found that 1.5 mm for the inner tray and 0.75 mm for the outer tray was the most stable tray combination, providing the most accurate bracket transfer. After the transfer tray is ready, the model is soaked in warm water for 20 minutes, and the plaster is easily separated from the model; the bracket bases are then sandblasted and ready to be placed into the patient's mouth.[29]

In addition to these trays, transfer trays produced with computerized systems have been developed in recent years. There are two different methods for producing these trays: full-digital and semi-digital. In the semi-digital method, bracket positions are determined with software, the bracket model is printed with 3D printers, and the transfer tray is prepared using one of the classical methods. In the full-digital method, the transfer tray is also prepared digitally. In 2006, rapid prototyped transfer trays (RPT) were introduced.[31] Computer-aided design and computer-aided manufacturing (CAD-CAM) is used to prepare these trays. Direct intraoral or intraoral plaster models are scanned with a scanner. Brackets selected from the available brackets in the computer library are virtually placed on the teeth in the models transferred to the computer system. The computer system makes a virtual set-up, and the brackets are placed accordingly (Figure 4). The dentist can see the teeth and bracket positions at the end of treatment and can intervene in the bracket positions. The tray material can also be adjusted according to the dentist's preference. Transfer trays can be produced to cover a single tooth or all teeth. Although the margin of error decreases with these transfer trays, the cost increases.[32,33]

In a study conducted in 2016, brackets were placed on models overlaid with cone beam computed tomography (CBCT), and position accuracy was examined with a silicone (polyvinyl siloxane) transfer tray. Values were generally within the acceptable range. Transfer accuracy was lowest for torque and highest for mesiodistal and buccolingual bracket positions.[34]

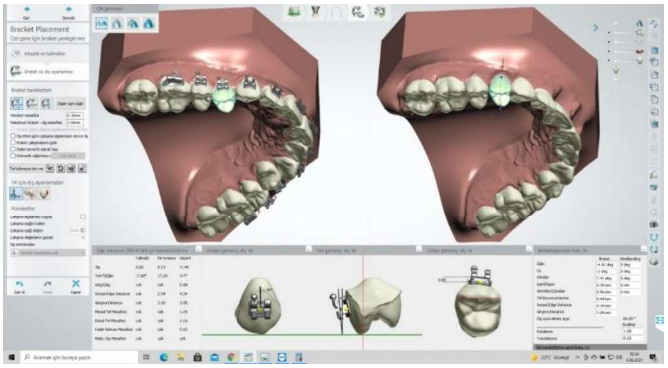

Figure 4. Bracketing in a virtual environment.

In another study comparing double vacuum form and silicone transfer trays, both had acceptable results, but the silicone transfer trays showed less position inconsistency. In that study, registration was performed on 3D-scanned models.[23]

In another study examining five different transfer trays: double polyvinyl siloxane (double-PVS), double vacuum form (double-VF), polyvinyl siloxane vacuum form (PVS-VF), polyvinyl siloxane putty (PVS-putty), and single vacuum form (single-VF), no differences in transfer accuracy were found for double-PVS, PVS-putty, and PVS-VF, while double-VF and single-VF were significantly less accurate in the occlusal gingival direction. In that study, registration was performed on photographs.[9]

A study published in 2021 comparing two digital indirect transfer trays (double vacuum form-3D-printed transfer tray) showed that although both trays led to adequate results in terms of position accuracy, the 3D-printed transfer tray had more successful results overall.[35]

In a study conducted by Duarte et al.[36], digital bracketing was performed on digital models overlaid with tomography using the OrthoAnalyzer (3Shape) program, and 3D transfer trays were produced. A total of thirty-three orthodontists with more than 15 years and less than 15 years of clinical experience, with and without indirect bracketing experience, performed indirect bracketing on models with the same malocclusion for two different bracket types (MiniSprint Roth and BioQuick self-ligating). These models were scanned using an intraoral scanner. The digital models and the initial virtual models were overlaid. Differences between bracket positions were statistically insignificant, except for mesiodistal differences in the BioQuick group. The orthodontists' past experiences did not significantly affect bracket positioning, and it was shown that previous experience with indirect bracketing did not affect the success of indirect bracketing. 3D transfer trays were found to be successful in terms of bracket position accuracy.

In a study conducted by Xue et al.[37] in 2020, intraoral models were obtained from 10 patients with an intraoral scanner, and bracketing was performed on the virtual models. These brackets were transferred to the patients' mouths with a guided bonding apparatus. This apparatus was designed on a computer and produced from a 3D printer. The three-part appliance consists of an L-shaped guide that fits the occlusal and distal edge of the brackets, a splint that completely or partially covers the occlusal surface, and tie bars. Based on a computer-aided design, computer-aided manufacture of the guided bonding appliance and precise control, this protocol transferred the planned bracket position from a digital model to the patient's tooth, usually with high positional accuracy.

In a study investigating the effect of crowding and transfer tray stiffness on bracket position accuracy, two groups of 10 mandible models, each with less than 3 mm of crowding and more than 7 mm of crowding, were created according to Little's irregularity index. Hard transfer trays were printed with polyjet, and soft transfer trays were produced with Digital Light Processing. The brackets and tubes were transferred to 3D models and fully digitalized using intraoral scanning (IOS) and micro-computed tomography (micro-CT) to assess linear and angular deviations. In that study, soft transfer trays were found to be more advantageous in terms of transfer position accuracy in patients with more severe crowding. In terms of bracket position accuracy, most of the linear and angular deviations were within acceptable limits, and bonding errors were mostly observed in the anterior teeth. The authors also stated that bracket position accuracy could be determined more accurately with micro-CT than with IOS.[38]

CONCLUSION

The indirect bonding technique has developed considerably since its inception, and many techniques and materials have been used. In recent years, indirect transfer trays prepared with digital methods have also started to be used more frequently. However, compared to conventional trays, the number of studies on digital transfer trays is relatively small. Nevertheless, each additional study on transfer trays will guide the clinician in choosing the right transfer tray.

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REFERENCES

1. Yildirim K, Aydinatay BS. Ortodontide indirekt yapistirma teknigi. *Acta Odontol Turc.* 2016;33:153.
2 Ezgi A, Ciğer S. Ortodontik Bonding İşleminde Self-Etch Primer Ve Konvansiyonel Asit-Etch Tekniklerinin Karşılaştırılması. *Atatürk Üniv Diş Hek Fak Derg*. 2014;24:452–457.
3 Buonocore MG. A simple method of increasing the adhesion of acrylic filling materials to enamel surfaces. *J Dent Res.* 1955;34:849–853.

4 Mewman G V. Bonding plastic orthodontic attachments to tooth enamel. *J NJ Dent Soc.* 1964;35:346–358.

5 Andrews LF. Straight-wire appliance origin, contoroversy, commentary. *J Clin Orthod.* 1976;10:99–114.

6 McLaughlin RP. Finishing and detailing with a preadjusted appliance system. *JCO.* 1991;4:251–264.

7 Thomas RG. Indirect bonding: simplicity in action. *J Clin Orthod JCO.* 1979;13:93.

8 Silverman E, Cohen M. A report on a major improvement in the indirect bonding technique. *J Clin Orthod JCO.* 1975;9:270.

9 Suganya S. Measurement and Comparision of Bracket Transfer Accuracy of Five Indirect Bonding Techniques: An In Vitro study. 2017.

10 Dindaroğlu F, Doğan E, Doğan S. Direkt ve İndirekt Yapıştırmada Klinik Çalışma Zamanı ve Braket Kopma Miktarının Karşılaştırmalı Olarak Değerlendirilmesi. *Ege Üniversitesi Dişhek Fak Derg.* 2016; 37:120–125.

11 Aguirre MJ, King GJ, Waldron JM. Assessment of bracket placement and bond strength when comparing direct bonding to indirect bonding techniques. *Am J Orthod.* 1982;82:269–276.

12 Deahl ST, Salome N, Hatch JP, Rugh JD. Practice-based comparison of direct and indirect bonding. *Am J Orthod Dentofac Orthop.* 2007;132:738–742.

13 Czolgosz I, Cattaneo PM, Cornelis MA. Computer-aided indirect bonding versus traditional direct bonding of orthodontic brackets: bonding time, immediate bonding failures, and cost-minimization. A randomized controlled trial. *Eur J Orthod.* 2021;43:144–151.

14 Collins J. A precise and predictable laboratory procedure for indirect bonding. *J Clin Orthod JCO* 2000;34:702.

15 Higgins DW. Indirect bonding with light-cured adhesive and a hybrid transfer tray. In: Seminars in Orthodontics. Elsevier, 2007:64–68.

16 Zachrisson BU, Brobakken BO. Clinical comparison of direct versus indirect bonding with different bracket types and adhesives. *Am J Orthod.* 1978;74:62–78.

17 Pamukcu H, Özsoy ÖP, Dağalp R. In vitro and in vivo comparison of orthodontic indirect bonding resins: A prospective study. *Niger J Clin Pract.* 2018;21:614–623.

18 White LW. A new and improved indirect bonding technique. *J Clin Orthod JCO.* 1999;33:17–23.

19 Klocke A, Shi J, Kahl-Nieke B, Bismayer U. In vitro investigation of indirect bonding with a hydrophilic primer. *Angle Orthod.* 2003;73:445–450.

20 Kalange JT. Prescription-based precision full arch indirect bonding. In: Seminars in Orthodontics. Elsevier, 2007:19–42.

21 Miles PG. Indirect bonding with a flowable light-cured adhesive. *J Clin Orthod.* 2002;36:646–647.

22 Hickham JH. Predictable indirect bonding. *J Clin Orthod JCO.* 1993;27:215.

23 Schmid J, Brenner D, Recheis W, Hofer-Picout P, Brenner M, Crismani AG. Transfer accuracy of two indirect bonding techniques—an in vitro study with 3D scanned models. *Eur J Orthod.* 2018;40:549–555.

24 Matsuno I, Okuda S, Nodera Y. The hybrid core system for indirect bonding. *J Clin Orthod JCO.* 2003;37:160–161.

25 Kyung H-M, Park H-S, Sung J-H. The mushroom bracket positioner for lingual orthodontics. *J Clin Orthod JCO.* 2002;36:320–328.

26 Buso-Frost L, Fillion D. An overall view of the different laboratory procedures used in conjunction with lingual orthodontics. In: Seminars in Orthodontics. Elsevier, 2006:203–210.

27 Cunningham SJ. Invisible Orthodontics: Current Concepts and Solutions in Lingual Orthodontics. By G Scuzzo and Kyoto Takemoto. Pp. 173; 642 illustrations;£ 65. Chicago & London: Quintessence 2003. ISBN 3876521815. 2004.

28 Echarri P, Kim T-W. Double transfer trays for indirect bonding. *J Clin Orthod JCO.* 2004;38:38.

29 Sondhi A. Efficient and effective indirect bonding. *Am J Orthod Dentofac Orthop.* 1999;115:352–359.

30 Daub J, Berzins DW, Linn BJ, Bradley TG. Bond strength of direct and indirect bonded brackets after thermocycling. *Angle Orthod.* 2006;76:295–300.

31 Ciuffolo F, Epifania E, Duranti G, et al. Rapid prototyping: a new method of preparing trays for indirect bonding. *Am J Orthod Dentofac Orthop.* 2006;129:75–77.

32 Gracco A, Tracey S. The insignia system of customized orthodontics. *J Clin Orthod.* 2011;45:442–451.

33 Sachdeva RCL. SureSmile technology in a patient-centered orthodontic practice. *J Clin Orthod.* 2001;35:245–253.

34 Grünheid T, Lee MS, Larson BE. Transfer accuracy of vinyl polysiloxane trays for indirect bonding. *Angle Orthod.* 2016;86:468–474.

35 Niu Y, Zeng Y, Zhang Z, Xu W, Xiao L. Comparison of the transfer accuracy of two digital indirect bonding trays for labial bracket bonding. *Angle Orthod.* 2020;91:67–73.

36 Duarte MEA, Gribel BF, Spitz A, Artese F, Miguel JAM. Reproducibility of digital indirect bonding technique using three-dimensional (3D) models and 3D-printed transfer trays. *Angle Orthod.* 2020;90:92–99.

37 Xue C, Xu H, Guo Y, et al. Accurate bracket placement using a computer-aided design and computer-aided manufacturing–guided bonding device: An in vivo study. *Am J Orthod Dentofac Orthop.* 2020;157:269–277.

38 Jungbauer R, Breunig J, Schmid A, et al. Transfer Accuracy of Two 3D Printed Trays for Indirect Bracket Bonding—An In Vitro Pilot Study. *Appl Sci.* 2021;11:6013.