Identifying and Managing Dental Impression Problems

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EDUCATIONAL OBJECTIVES
At the conclusion of this educational activity, participants will be able to:
1. Learn how to identify common impression problems
2. Learn how to correct impression problems
3. Learn how to avoid impression problems and improve impression quality
4. Learn what types of impression materials are best suited for particular restorative needs

ABSTRACT
Fixed restorative dentistry requires an impression of the teeth and area to be restored for the laboratory to fabricate the desired restorations. Traditional impressions are still utilized the majority of the time to capture the needed information. Selection of the correct viscosity will vary depending on what prosthesis is to be fabricated, which tray is being used and whether the preparations are on natural teeth or implants. Problems can arise during impression taking that can compromise the ability of the lab to fabricate the restoration or affect the accuracy and fit of the finished prosthesis. Identifying impression problems is part of the process, but how to manage these to improve the quality and accuracy of our impressions is critical to fixed prosthetics.
INTRODUCTION
Impression fabrication is a critical and technique-sensitive step in the fabrication of fixed prosthetics. It can also be a frustrating stage during treatment, both to the clinician and laboratory technician. Potential complications need to be identified and corrected prior to sending the impression to the lab for fabrication of the prosthetics. This article will address some common difficulties, what factors may cause impression errors, and present methods to correct and avoid complications related to impression capture.

INADEQUATE MARGINAL DETAIL
The primary complaint laboratory technicians voice with the impressions they receive daily is inadequate marginal detail and the majority of impressions they receive have issues. Marginal detail is the most critical aspect of the impression as it indicates where the restoration will terminate on the tooth. Failure to capture the true details of the margin of the preparation will result in open or overhanging margins and inadequate fit of the crown, onlay/inlay or bridge. Voids at the margins are the result of either insufficient retraction or fluid accumulation that prevented the impression material from flowing around the margin. (Figure 1) This can be avoided by using improved retraction methods such as syringeable hemostatics (e.g. Viscostat and Astringedent, Ultradent, UT; Retrac, Centrix, Shelton, CT; Expax-syl, Kerr Sybron, Orange, CA). The traditional approach to achieve sufficient retraction utilizes retraction cords with these syringeable hemostatics such as Ultrapak (Ultradent), Gingi-Plain (Gingi-Pak, Camarillo, CA), Knit-Pak (Premier Dental, Plymouth Meeting, PA), UniBRAID (Dux Dental, Oxnard, CA). Another approach are retraction pastes are placed into the gingival sulcus following preparation and held under pressure with a GingiCap (Centrix Dental, Shelton, CT) or Comprecaps (Coltene/Whaledent, Cuyahoga Falls, OH) creating hemostasis and dilation of the sulcus. When adequate retraction is achieved to allow the impression material to capture the prepared restorative margin the lab is able to visualize where the practitioner wants the restoration to terminate on the tooth. (Figure 2).

Alternatively, a diode laser (Gemini laser, Ultradent; Picasso, AMD LASERS, Indianapolis, IN; Epic, Biolase, Irvine, CA; Precise LTM, CAO Group, West Jordon, UT) can be used to trough the sulcus both widening it to better visualize the prepared margin and hemostasis is also achieved. The laser is kinder to the tissue without the potential for recession that was reported with electrosurgery.¹

INTERNAL BUBBLES
Vinyl polysiloxane (VPS) is the most widely used of impression materials available. These materials were introduced over 30 years ago and initially were hydrophobic (repealed by water)² in nature. Manufacturers have improved the chemistry of these impression material to make them more hydrophillic (adaptable to wet surfaces). But, moisture (water, saliva, blood) trapped at internal angles may lead to bubbles in the impression.

Internal bubbles occur as a result of either fluid accumulation (when larger and less sharp in definition) or air entrapment (when small and well defined) (Figure 3). Fluid in the sulcus, be it blood or saliva will interfere with accurate capture of the restorations margins in the impression. Achieving proper hemostasis solves these issues. Bubbles on the margins of the preparations can negatively affect the fit of the prosthetics. If the bubbles occur on the internal line angles of inlay and onlay preparations due to fluid accumulation, a substandard fit will be developed. If they occur due to air entrapment, the fit of the restoration will not be compromised. Bubbles occurring due to fluid accumulation may be large enough to affect the long-term success of the luting agent, which must now fill a wider space. The thicker the luting material the weaker the interface between the restoration and underlying tooth. The prosthetic material may also be thinner than recommended, weakening the restoration and material failure of the crown may result under function. This is more critical when using all-ceramic materials, as they require minimum thicknesses to perform as expected. Use of a wash impression is difficult in a completed impression (2-step impression), as complete seating can be hampered. Should a 2 step approach be considered, removal of impression material interproximally in the

[Figure 1: Illustration of marginal detail issues]
[Figure 2: Illustration of adequate retraction techniques]
[Figure 3: Illustration of internal bubbles]
set impression with scissors will prevent the interproximal material from preventing full reinsertion of the impression intraorally. Additionally, new wash material should be placed in all the tooth areas on the side of the impression before reseating the previously set impression. Placement of wash material only at the prepared teeth may result in a "stepped" impression and lead to a restoration that is not accurate related to the occlusion.

While the cause of large, internal, ill-defined areas in these preparations is usually fluid accumulation, air entrapment may also be a factor in narrow, deep inlay preparations. These errors may be avoided by thorough flushing and drying of the preparation prior to impression taking. Placing an intraoral impression tip into the deepest part of the preparation floor and extruding a light body VPS material to backfill the preparation, making sure to keep the tip in the material as its expressed, will force air out of the preparation decreasing entrapment potential.

If an air bubble remains on the cast after the impression is poured, a corresponding void will be created in the prosthetic material. This should not interfere with seating of the restoration and will be filled with the luting agent. These spots can often prevent complete seating when removed from the cast prior to restoration fabrication as alteration of the casts surface may not match what is present intraorally on the preparation. Identification of premature internal contacts can be performed with paint on occlusion indicator liquids (e.g., Accufilm IV, Parkell Inc, Farmingdale, NY; Arti-Spot Bausch, Nashua, NH). The laboratory can block out around these tiny internal bubbles prior to fabrication to decrease chairside time.

MARGINAL TEARS
Marginal tears usually occur when a wash (syringable) material with insufficient tear strength is used (Figure 4). Tear strength will vary from manufacturer to manufacturer and between viscosities. The lower the viscosity the more likely it may tear in the sulcus due to the thinness expressed subgingivally. The deeper the sulcus, the thinner the wash material and the higher the potential for it to tear when removed intraorally. Additionally, removal of the impression prior to complete setting of the wash material may also cause marginal tearing.3 Elastic recovery of the wash material is also critical to impression accuracy. The material may not tear upon removal intraorally, but if it does not return to its pre-removal shape, the resulting impression will not be accurate and the prosthesis will not fit the teeth.

Should an impression need to be retaken due to sulcular material tearing, any remnants of the original impression material must be removed from the sulcus. Additional tissue retraction may be indicated to widen the sulcus to facilitate thicker sulcular impression material. Switching to a more viscous wash material may further prevent development of another tear. Syringable hemostatic materials (ViscoStat® Clear, Ultradent, South Jordan, UT; Quick-Stat Free, Vista Dental Products, Racine, WI) can be used to limit the amount of fluid evident in the treatment area, and the patient can be instructed to occlude into a cotton cap for several minutes, thereby physically pushing the tissue away from the tooth and forcing the hemostatic deeper into the tissues.3, 6

DRAGS AND PULLS
A common complication encountered when using high viscosity impression materials (i.e., putty or heavy body materials) are drags and pulls. A drag results when long, rounded depressions that resemble the cuspal edges of the teeth are left in the impression material upon insertion of the tray (Figure 5). Whereas, a pull (also referred to as a fold) results when the material creates a fold in the material, usually at the gingival aspect (Figure 6). These deformities can both result from:

• Teeth rebounding off the tray and sliding into position.
• Impression material beyond its working time (no longer in its most fluid state)
• Failure of the impression material to adapt to the teeth.
• Exceeding working time of the material prior to intraoral insertion.
• Insertion of the tray in one motion.

Drags and pulls can be avoided by using a less viscous material either syringed around the teeth or placed over the more viscous material in the tray prior to insertion. Correction of a pull in the impression can be accomplished by removal of the interproximal impression material so the impression can be reinserted without interference. A wash impression material (light or extra-light) should be placed over the entire
impression, and the depressions should be filled where the teeth are. The impression can then be reinserting intraorally. Drags, on the other hand often are not correctable by adding additional material, as they may have caused distortion of the tray. Avoiding contact between the tray and the teeth will help avoid these deformations.

TRAY SELECTION

Tray selection is important to capture the needed area without distortion and provide the needed details. The tray, either a dual arch tray (also known as a triple tray) or stock single arch tray, should be large enough encompass all the teeth without contacting the soft tissue (Figure 7). The completed impression should not demonstrate any show through of the tray. Full arch trays are available in small, medium and large and arch shape varies by manufacturer with some trays round in shape and others more square. When using stock full arch trays it is important to select a tray that is long enough to capture the entire arch from the hamular notches or retromolar pads to the most anterior aspect of the buccal vestibule. A tray that is too narrow may prevent adequate seating of the tray leading to missing of needed arch detail (Figure 8). Metal trays may be bent to widen them in the posterior, but modifications to the anterior of the tray can be difficult. Plastic stock trays are easier to modify. An alcohol torch may be used to heat the plastic tray and the flanges readapted to fit the specific patient.

Dual-arch trays also are available in different widths that can accommodate different width arch sections. It is best to have a variety of these trays to accommodate each patients arch size and shape. Show-through of the tray in the impression indicates that the tray used was either positioned improperly or the tray was too small. (Figure 9) With dual-arch trays contact with the tray by soft tissue may cause distortion of the resulting impression and a restoration that does not fit the prepared tooth. When using quadrant or dual arch trays, it is important to capture at least one full tooth (or the equivalent space) both mesial and distal to the tooth to be restored. Failure to provide this in the impression may make it difficult for the laboratory to properly mount the casts and achieve an accurate occlusion (Figure 10).

SEPARATION FROM THE TRAY

Separation of the impression material from the tray may not be obvious until the restoration is returned and tried in (Figure 11). This deformation may be overlooked when using trays with slots and holes to lock the impression material and can occur with VPS, polyethers and even alginate. The heavier the viscosity of the impression material the higher the potential for the material not to lock into the retention areas of the tray. Tray adhesive should be used with all impressions to help eliminate impression separation from the tray creating a chemical bond between the tray and impression material. Additional holes for mechanical retention may be placed with a lab bur in stock trays if needed. Each impression material's chemistry is different so it is advised that the clinician use the tray adhesive from the same manufacturer as their impression material to ensure chemical compatibility between the adhesive and impression material. Following application of the adhesive to the tray, allow the adhesive to dry prior to applying the impression material. The adhesive can be applied at the beginning of the appointment and will then be dry and ready when it is time to take the impression.

TRAY DISTORTION

Trays may distort when they come in contact with the teeth or tissue and this is more problematic with dual-arch trays then full arch trays due to their design. Distortion of the tray with dual arch trays is due to their more flexible nature as the patient occludes especially if soft tissue contacts the rigid part of the tray or posterior loop. This distortion may cause either a widened cast tooth when the impression material is stiff enough to resist spring back
(Figures 12a). Use of a medium body (monophase) VPS as the main tray material will allow the tray to distort when it contacts soft tissue or tooth and an elongated cast tooth results as the tray springs back. (Figure 12b) Proper selection of a tray that does not contact the teeth and is rigid enough to resist distortion is critical. When using dual-arch trays, it is advisable to use a rigid setting VPS material (e.g., a heavy body or tray material) as the bulk of the impression to provide a stable impression. Two-phase impressions can be used to create a custom format using the dual-arch tray. The preliminary impression creates a rigid base that will provide hydraulic pressure to force the wash material in and around the preparations. Trimming the interproximal material from the preliminary impression will aid in seating the wash impression fully when the wash phase is performed.

**DUAL ARCH TRAYS**

Dual arch trays work well for fixed prosthetic applications as long as the patient has holding occlusal contacts in the section of the arch to be restored. As previously indicated, it’s important that at least one tooth mesial and distal to the prepared tooth be captured in the impression. Dual arch trays are available as posterior quadrant, anterior arch, ¾ arch, and full arch versions.

When the tray is inserted and the patient occludes, it is important that maximum intercuspation be observed on the adjacent side (Figure 14). When using anterior dual arch trays it is often difficult to determine if the patient has occluded fully, so a separate bite should be provided to the laboratory in a very rigid VPS material designed for occlusal records. It is recommended that the lab be instructed to use the separate bite record provided to mount the case and avoid hand articulating the casts or using the dual-arch impression to determine occlusion. Wax bites should not be used as they are unstable in transport to the lab due to changes in temperature during shipping. Posterior and ¾ quadrant trays have a plastic distal loop on the tray to stabilize the tray at insertion. It is critical that the patient not occlude on this loop as this will lead to distortion of the tray and resulting spring back when the tray is removed (Figure 15).

**INADEQUATE SYRINGE MATERIAL**

A “stepped” impression may result when using a two-phase impression technique and insufficient wash material has been placed (Figure 13). The result will be restorations that require excessive occlusal adjustments. This can be avoided by filling the entire set tray material where the teeth depressions are with wash material, to provide a uniform impression.

Upon dual arch tray impression removal, the clinician should be able to see contacts through the material to the trays mesh where the teeth are intercuspated (Figure 16). Holding the tray up to the light should reveal illumination at these contact points. An impression that was improperly occluded will show lack of occlusal shine through and thicker material between the arches. If there is any chance that the laboratory cannot verify the occlusion, a separate bite should be taken with an appropriate VPS material and included with the case.
SURFACE CONTAMINATION
A less common problem, unset impression material on the surface of the set tray material may present. This typically presents as an unset tacky layer (Figure 17). Exposure to air inhibited methacrylates (e.g., composites, adhesives, core build-up materials, bis-acryl temporary crown and bridge materials) may leave a greasy coat on the prepared tooth that inhibits the material’s ability to set correctly. When using two-step impressions, failure of the wash material to adhere to the tray material may occur when the preliminary impression is utilized to fabricate the temporary prosthesis. Wiping down both the tooth and preliminary impression with alcohol to remove the greasy air-inhibited layer can prevent these issues.

Hemostatic agents may transfer sulfur to critical areas of the impression and cause inhibition of the setting reaction of the marginal VPS material. These include retraction cords and solutions containing ferric sulfate or aluminum chloride; glove contact of the prepared teeth or surrounding tissues; rolling retraction cord in gloved fingers; or the use of a rubber dam. Rinsing the area with mouthwash or water after rubber dam removal and thoroughly drying can avoid this problem. Latex contamination of the putty can occur when mixing by hand. This may be avoided by washing gloved hands to remove any residual powder and surface sulfides. Powder-free, nitrile or vinyl gloves are alternatives to prevent putty contamination. It is advised that following use of a hemostatic agent to control gingival hemorrhage, the preparation be vigorously washed with the air/water syringe to clean any residual hemostatic and debris from the tooth. Should any gingival oozing begin, additional hemostatic is burnished into the gingiva to arrest the hemorrhaging. If no bleeding is noted the prep is air dried and impressioning can begin. This will avoid sulcular bleeding that will lead to having to retake the impression and the impression is only begun when your assured all hemorrhage in the sulcus has been controlled.

When a small area of unset material is noted in the final impression, but the remainder of the material has set properly. This may be the result of a failure to bleed the cartridge prior to expressing material from the auto mix tip. All new cartridges should be “bled” prior to use. It is a wise practice to express a small amount of base and catalyst prior to placement of an automix tip each time to ensure that both materials are flowing from the cartridge and have not set at the end of the cartridge.

Disinfection of the completed impression can be performed either prior to sending the impression to the laboratory or at the laboratory. Immersion of the impression in common disinfecting solutions (i.e. phenols and gluteraldehydes) used for periods of time up to 60 minutes have not shown clinically significant distortion or surface alteration of the impression material. Although, overnight immersion is not recommended as this may result in a decrease in accuracy of the final cast.

INADEQUATE IMPRESSION MATERIAL MIXING
Once the impression material is combined, it should be uniform in color with no streaking. Streaking is more common with hand mixed putty materials than with cartridge materials (Figure 18). When hand mixing putty, the material should be kneaded quickly to keep within the working time and yield a uniform color when completed. But, may also occur if the automix cartridge is not bled prior to attaching the mixing syringe, allowing one component to extrude out of the cartridge first. Standard operating procedure should be to bleed the cartridge right before a new automix tip is placed to ensure both base and catalyst are equally flowing to avoid mixing issues. It is also recommended that the practitioner use the wash and tray material from the same manufacturer to ensure that chemically the two materials are designed to work together. Mixing materials from different companies may lead to separation of the wash material from the tray VPS decreasing the impressions accuracy when the lab pours the model.

CAST DISCREPANCIES
Large bubbles on the cast will correspond to a defect in the impression material and should be identified before dismissing the patient so that a new impression or a wash in the defective impression can be taken to correct the problem (Figure 19). These bubbles invariably are caused
by insufficient impression material in the tray or air trapped between the impression material and the arch at tray insertion. These defects can be avoided by syringing material around the teeth and into the vestibule prior to tray insertion. Patients with deep palates, it is also advisable to place some impression material into the depth of the palatal vault. Additionally, as these large bubbles are more frequent in maxillary impressions, how the filled tray is inserted also plays a factor. Inserting the tray posteriorly first will not only limit impression material extruding out the back which may cause gagging in some patients, but also pushes impression material anteriorly as the tray is rotated into position and with it the air that might become trapped.

Should a void in the impression be present upon tray removal due to air entrapment, a wash impression can be used to fill the void. It is advisable that the interproximal material be removed from the impression to allow full seating and the entire tray be covered in the wash material to ensure a continuous impression with no "step" appearance. Large bubbles in the impression in non critical areas of the opposing arch may not require a wash in the impression to fill the void, but that is up to the practitioner to decide what the laboratory ideally needs to create the prosthetics being requested.

A cast that is covered with multiple tiny voids (bubbles) when the impression does not have corresponding defects may be the result of hydrogen gas release from the impression (Figure 20). Hydrogen is a by-product of VPS polymerization. Should the cast present with this defect, if the impression is still intact it can be re-poured. This type of defect can be avoided by following the manufacturer’s recommendation with regard to the duration that should be observed prior to pouring the cast. Typically, waiting 30 minutes or longer before pouring the impression is sufficient to allow the impression to “de-gas”. This is not a concern if the impressions will be sent to the lab where they will pour them.

**IMPLANT IMPRESSIONS**

Impressions for implants involving impression materials are divided into two categories; open tray and closed tray impressions and the impression copings for these differ in geometry. (Figure 21) Open tray impressions require that the impression coping is retained in the impression and they are removed together and have a long pin that will protrude through the impression and tray. (Figure 22) Whereas when a closed tray impression is taken the impression is removed intraorally leaving the impression coping attached to the implant. The impression coping is then removed intraorally, an analog attached and it is reinserted back into the impression extraorally. (Figure 23) What impression material is selected is dependent on which type of impression will be taken. A stiffer tray material (heavy body or tray VPS) is required when taking an open tray impression to lock the impression copings into position so that they are oriented both to each other and the connector rotation is captured so the resulting master soft tissue model is accurate to fabricate the prosthetics. Closed tray impressions, as the coping must be reseated into the impression extraorally need a more resilient viscosity of impression material. If a stiff VPS such as a heavy body were used, it may tear around the copings when it is removed intraorally and would hamper full seating of the coping back into the impression. Thus, a medium body (monophase) VPS is ideally suited for this application allowing the impression to spring off the coping as it is removed intraorally and allow the coping to be reinserted back into the impression to fabricate the master soft tissue model. It is advised with both approaches that a wash material be syringed around the gingival aspect only, to capture the gingival position better then may be achieved with the material in the tray alone. Implant impressions differ from impressions of natural teeth, as implants do not have a PDL rigidity of the impression material is more important for the precision of the prosthetics that will be fabricated when adjacent implants are to be restored.

**WHAT TO LOOK FOR IN AN IMPRESSION MATERIAL?**

Not all impression materials are equal and what to look for when selecting an impression material is important to achieve accurate predictable impressions. Setting time is important for patient comfort and the shorter the impression is in the mouth the happier the patient is typically. Faster setting VPS are available...
but it is important to know the working time for that material. The impression needs to be dispensed into the tray and inserted within that working time. If this is exceeded the impression material has started the setting process and may not fully seat, plus will not accurately capture the needed details intraorally. As discussed high tear strength for the wash material with good elastic recovery will allow accurate capture of the marginal details. Hydrophilicity, is also an important feature in quality VPS impression materials. Materials that have high hydrophilicity will adapt to the prepared tooth better especially subgingivally where fluid may be present. Those that have low hydrophilicity or are hydrophobic will not adapt to wet surfaces and lead to lower impression quality as a result. Some of the materials that fulfill those qualities include; Thermo Clone VPS (Ultradent), Imprint (3M/ESPE) and Take One (Kerr Dental).

**CONCLUSION**

Complications during the impression process can be perplexing to both the dentist and laboratory technician. Some of the more common concerns include tearing, voids, bubbles, and tray contact. Identifying the problem is only half the solution and understanding why it occurred helps guide the practitioner to correct the issue and prevent future occurrences. This article addressed solutions for correction of some of the most prevalent impression issues that are experienced in clinical practice. By taking the necessary precautions, clinicians can ensure improved accuracy in communication of critical parameters as well as an overall improvement in restorative fit related to their impressions. Key to these goals are achieving sufficient hemostasis (retraction cord, retraction pastes or laser) and using a quality impression material so that treatment success is maximized for the doctor, lab and most importantly the patient.

**REFERENCES:**


**AUTHOR PROFILE**

Gregori M. Kurtzman, DDS, MAGD, FPFA, FACD, FADI, DICOI, DADIA. Dr. Kurtzman has completed over 4,500 hours of continuing education in the areas of IMPLANT DENTISTRY, COSMETIC DENTISTRY AND OTHER DENTAL TOPICS. A graduate of The AAD / Howard University College of Dentistry IMPLANT MAXI COURSE, he has been trained in all aspects of Implant Dentistry. He has achieved FELLOWSHIP in the Academy of General Dentistry (AGD), Pierre Fauchard Academy (FPA), International Congress of oral Implantologists (ICOI), the American College of Dentists (ACD) and the Academy of Dentistry International (ADI). Holds MASTERSHIP in the AGD and the Implant Prosthetic Section of the ICOI. He also has achieved DIPLOMATE status in the ICOI and the American Dental Implant Association (ADIA). He is a former Assistant Program Director for a university based IMPLANT MAXI-COURSE and a former Assistant Clinical Professor at University of Maryland, Baltimore School of Dental Surgery in the department of Endodontics, Prosthetics and Operative Dentistry. An international lecturer, he has been recognized annually since 2006 as one of the “TOP DENTAL LECTURERS” by Dentistry Today. Dr. Kurtzman has published over 180 dental articles in national and international dental journals and is a consultant to multiple dental manufacturers.

**AUTHOR DISCLOSURE**

The author has no affiliations with any company who would have a gained interest in the material published in this course. The author is not employed by a company that would stand to profit off the publication of this course. All research is presented in an unbiased manner.
1. Primary complaint from labs is?
   a. Inadequate marginal detail
   b. Torn sulcular material
   c. Voids on the marginal material
   d. All of the above
2. Failure to capture the marginal details will result in?
   a. Overhanging restoration margins
   b. Overextended restorative margins
   c. Open restorative margins
   d. A and C
3. Methods to better visualize the restorative marginal to capture with an impression?
   a. Retraction cord
   b. Retraction pastes
   c. Laser
   d. All of the above
4. Internal bubbles on the impression may be due to?
   a. Trapped moisture
   b. Trapped food
   c. Unset impression material
   d. Poor tooth preparation
5. Which is problematic in the impression?
   a. Bubbles on teeth not being restored that do not align to the预备
   b. Bubbles on the opposing arch
   c. Bubbles at internal line angles
   d. Bubbles at the margins
6. If a bleb is noted related to a bubble on the internal line angle of the prep on the cast it is recommended to?
   a. Ignore the bleb as it won’t affect fabrication of the restoration
   b. Scrap off the bleb on the cast
   c. Block out the area on the cast around the bleb if it is small
   d. Block out the area on the cast around any size bleb
7. Large bubbles in the impression at internal line angles may?
   a. Compromise the strength of metal restorations fabricated on the cast
   b. Compromise the strength of ceramic restorations fabricated on the cast
   c. Not affect the integrity of the restoration fabricated
   d. May be altered on the cast to remove before restoration fabrication
8. When using a 2-step impression technique?
   a. Trim interproximal material with scissor in set tray material before step 2
   b. Avoid drying the set material in the tray
   c. Place wash material over all tooth areas in the set tray material before reinserting
   d. A and C
9. When capturing an occlusal or proximal preparation it is advised to?
   a. A. Use a wash material placed into the tray over the unset tray material
   b. Place an intraoral tip to the bottom of the preparation and backfill it to prevent air entrapment
   c. Utilize a 2-step technique
   d. Avoid use of a heavy body VPS
10. Identification of internal premature contacts on an inlay/onlay restoration can be aided by?
    a. Liquid occlusal indicator
    b. Use of articulating film instead of articulating paper
    c. Relief of the entire internal area of the restoration with a bur/diamond
    d. Relief of the entire preparation with a bur/diamond
11. Marginal tears of the impression material are related to?
    a. Low wash material tear strength
    b. Deep margin with narrow sulcus
    c. Premature removal of the impression intraorally
    d. All of the above
12. Regarding marginal tearing, which viscosity will be stronger in a deeper sulcus to capture needed detail?
    a. Very light body VPS
    b. Light body VPS
    c. Medium body VPS
    d. Universal body VPS
13. When using a heavier body VPS in the tray you may notice?
    a. Longer setting time
    b. Drags may be noted due to air entrapment
    c. Drags may be noted due to the cusps when inserted
    d. Lack of adhesion to the wash material when doing a 1-step technique
14. Exceeding the working time of the impression material can result in?
    a. Drags and folds
    b. Failure of the wash material and tray material to adhere to each other
    c. No effect on the final impression
    d. Make removal of the impression intraorally more difficult
15. To avoid drags and pulls when using heavier body tray materials you can?
    a. Use a 1-step technique
    b. Use a 2-step technique
    c. Syringe wash material around all of the teeth before inserting the previously set tray material
    d. Syringe wash material around all of the teeth before inserting the unset tray material
16. When using a dual-arch tray?
    a. Use a heavy body VPS in the tray
    b. Use a medium body VPS in the tray
    c. Viscosity of the tray material is not important
    d. All trays are the same
17. Tray selection is important because?
    a. Patient arches vary and one manufacturers tray will not fit all arches of that same size
    b. Prevent show through of the tray in the completed impression
    c. Not contact soft tissue when inserted that may lead to distortion
    d. All of the above
18. When using full arch trays it is important to select a tray that is?
    a. Long enough to capture the entire arch
    b. Long enough to capture the teeth being treated
    c. Tray contact with soft tissue is not important
    d. Not wider than the arch
19. When using a dual-arch posterior tray it is important that?
    a. Contact with the posterior loop helps stabilize the occlusion of the impression
    b. Upon biting not have contact with the posterior loop
    c. Show through on the occlusal surface not be present
    d. Contact with the tray be evident to ensure an accurate impression
20. Separation of the impression material from the tray can be avoided by?
   a. Application of a compatible adhesive to the tray
   b. Selection of a tray with adequate retentive elements
   c. Addition of holes or slots to the stock tray before taking the impression
   d. All of the above

21. A “stepped” impression may result when?
   a. Inadequate wash material is used in a 1-step technique
   b. Inadequate wash material is used in a 2-step technique
   c. Working time of the materials has been exceeded
   d. Different brands of VPS used together

22. Unset VPS on the impression surface may be a result of?
   a. Contact with oxygen inhibited methacrylates
   b. Contact with blood
   c. Contact with powder-free latex gloves
   d. All of the above

23. Bleeding the automix cartridge is important to?
   a. Ensure flow of base and catalyst from the cartridge
   b. Ensure the material has not expired
   c. Ensure complete mixing from the automix tip
   d. A and C

24. When disinfecting an impression you can?
   a. Spray with disinfectant and immediately rinse off
   b. Immerse in approved disinfecting solution for up to 30 minutes
   c. Immerse in approved disinfecting solution for up to 60 minutes
   d. Immerse in approved disinfecting solution overnight

25. When taking a VPS impression one should?
   a. Pour the impression immediately
   b. Wait at least 30 minutes before pouring
   c. Wait at least 60 minutes before pouring
   d. Pour the impression before sending to the lab for maximum accuracy of the cast

26. Multiple tiny bubbles on the cast that are not in the impression is an indication of?
   a. Impression did not have adequate time to de-gas
   b. Moisture was present on the impression before it was poured
   c. Impression was dry before it was poured
   d. The impression material is not compatible with the stone used to fabricate the cast

27. When taking an open tray implant impression?
   a. A medium body VPS is recommended
   b. A heavy body VPS is recommended
   c. Any viscosity VPS may be used
   d. VPS should not be used as the impression material

28. When taking an closed tray implant impression?
   a. A medium body VPS is recommended
   b. A heavy body VPS is recommended
   c. Any viscosity VPS may be used
   d. VPS should not be used as the impression material

29. If a tray material VPS is used to capture a closed tray impression what potential problems can occur?
   a. Impression may tear upon removal of the impression intraorally
   b. No problems will result using a tray material
   c. Reinsertion of the coping back into the impression extraorally may not be accurate
   d. A and C

30. Use of a heavy body VPS as the tray material when taking an open tray impression
   a. Locks the impression copings accurately in relation to other adjacent implants
   b. Accurately captures the implants rotational orientation
   c. Is more accurate then taking a closed tray impression
   d. All of the above
Identifying and Managing Dental Impression Problems

EDUCATIONAL OBJECTIVES

1. Learn how to identify common impression problems
2. Learn how to correct impression problems
3. Learn how to avoid impression problems and improve impression quality
4. Learn what types of impression materials are best suited for particular restorative needs

COURSE EVALUATION

1. Were the individual course objectives met?
   Objective #1: Yes No  Objective #2: Yes No
   Objective #3: Yes No  Objective #4: Yes No

Please evaluate this course by responding to the following statements, using a scale of Excellent = 5 to Poor = 0.

2. To what extent were the course objectives accomplished overall?  5 4 3 2 1 0
3. Please rate your personal mastery of the course objectives.  5 4 3 2 1 0
4. How would you rate the objectives and educational methods?  5 4 3 2 1 0
5. How do you rate the author’s grasp of the topic?  5 4 3 2 1 0
6. Please rate the instructor’s effectiveness.  5 4 3 2 1 0
7. Was the overall administration of the course effective?  5 4 3 2 1 0
8. Please rate the usefulness and clinical applicability of this course.  5 4 3 2 1 0
9. Please rate the usefulness of the supplemental webliography.  5 4 3 2 1 0
10. Do you feel that the references were adequate? Yes No
11. Would you participate in a similar program on a different topic? Yes No
12. If any of the continuing education questions were unclear or ambiguous, please list them.

13. Was there any subject matter you found confusing? Please describe.
14. How long did it take you to complete this course?
15. What additional continuing dental education topics would you like to see?

PLEASE PHOTOCOPY ANSWER SHEET FOR ADDITIONAL PARTICIPANTS.