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Invited Paper

Revisiting Conservative Class II Gold Foils

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The purpose of this editorial is to reintroduce you to the American Academy of Gold Foil Operators (AAGFO). Our board selected this classic article by Bruce Smith, which was published in the AAGFO journal in 1967 to illustrate the similarities and differences in the approach to restoring teeth with direct gold today (Figures 1 and 2).

Although it should come as no surprise to any of us that there are more options for dental restorative materials today than ever before, it should also challenge us to be more disciplined in our selection of the most practical material for each clinical situation we encounter. In some situations, it may not yet be necessary, or the right time, to treat the patient with a restoration at all. With respect to material options, our obligation to our patients is to discuss the performance, aesthetics, and expense of each restoration, and to identify which one best aligns with our patients' goals and expectations. If we truly practice this, then direct compacted gold foil is still the premiere restorative material for appropriate niche lesions.

In his April 1967 article, "Conservative Class II Foils," Dr Bruce Smith describes with great detail the benefits of foil, case selection, preparation, compaction, and finishing of Class II Foils. For many years now, and for a myriad of reasons, foils, much less Class II foils, have not been taught in schools. In 1947, Dr Gerald Stibbs essentially predicted this would

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Conservative Class II Foils

Bruce B. Smith, d.m.d.

Seattle, Washington

Presented at the Annual Meeting of the American Academy of Gold Foil Operators in San Francisco, California on November 6, 1964.

THE CLASS II GOLD FOIL RESTORATION can be one of the most beautiful, delicate and functional restorations placed in a human tooth. Its replacement of diseased structure may be so fine as to withstand the damaging effects of decades of oral service. Usually it requires a little above average skill, but with training, restorations can be made within a reasonable length of time and with a minimum of discomfort for the patient. Many sleep while the operation is being done.

To use the term "Conservative" Class II foil is almost like repeating oneself. For this restoration is conservative above all other Class II types. However, there are some specific locations where the operation may be more easily accomplished and there are some conditions under which one may work more rapidly and easily. In addition to this, there are factors which make a Class II foil the operation of choice over an inlay from purely the standpoint of conserving tooth tissue for the patient.

As Ferrier[1] has said, "Consider only the tooth as an organ not capable of regenerative processes, such as bone, muscle, and mucous membrane, that once any part of it is lost, it can never he restored in kind; and that any restoration in any material falls far short of the original."

Dr Smith is in private practice in Seattle, Washington, and is on the Operative Dentistry staff at the University of Washington. He is Chairman of the Operative Section of the American Dental Association and Director of the John Kuratli Crown and Bridge Seminar. He has been a member of the University Ferrier Gold Foil Club for 17 years. In his spare time, Dr Smith enjoys sailboat racing.

Naturally, logic tells us that the first thing we can do is to save and conserve all possible dental tissue for the patient. And in considering incipient decay, gold foil is far superior than any inlay, for we can adapt the material to the needs of the case and not cut the tooth to suit a technique, which depends ultimately upon the withdrawal of a wax pattern from either a tooth or a die to establish the completed restoration.

So as prime indications we find (1) crowded or rotated teeth where an inlay would waste structure (Figs. 1 & 2); (2) bell crowned teeth for the same reason; (3) mesials of mandibular first bicuspids where no occlusal extension is required; and (4) generally speaking, mesial Class II cavities, as they are much easier for the average dentist who may not be familiar with the work.

A few general points are well to consider. On any mesial surface, a Class II foil has greater esthetic benefits. An inlay nearly always will show some gold. Often the operator has cut off the so-called "ears" of the bicuspid in preparing the inlay cavity, and amalgam used in these areas almost always shows through as a slight darkening. It is much easier to learn to condense the gold well on the mesial preparations. The angle of force is more nat-

Figure 1. Condensed cohesive and noncohesive foil in a rotated second bicuspid.

Figure 1. *Tooth restored with gold foil.*

happen, because even back then there was a certain disdain for the material.[2] He said poor case selection led to "a mistaken enthusiasm which engendered an era of sittings of many hours to insert huge fillings with the automatic mallet and which resulted in premature aging of the operator, premature death of the pulp, and a prayer for deliverance by the patient."[3] Because today's dentist heavily considers chair time when selecting filling materials, and because other more user-friendly and "forgiving" materials are now available, foil has taken a distant back seat, and there are very few doctors left who routinely, if ever, place gold foil in their practices.

Is There a Place for Gold Foil in Your Practice?

Gold foil has a place in the practice where the doctor believes in providing the best material for each specific case and is willing to dedicate the time necessary to learning and delivering each service they provide. Obtaining the necessary armamentarium is equally as

Figure 2. *Tooth restored with gold foil.*

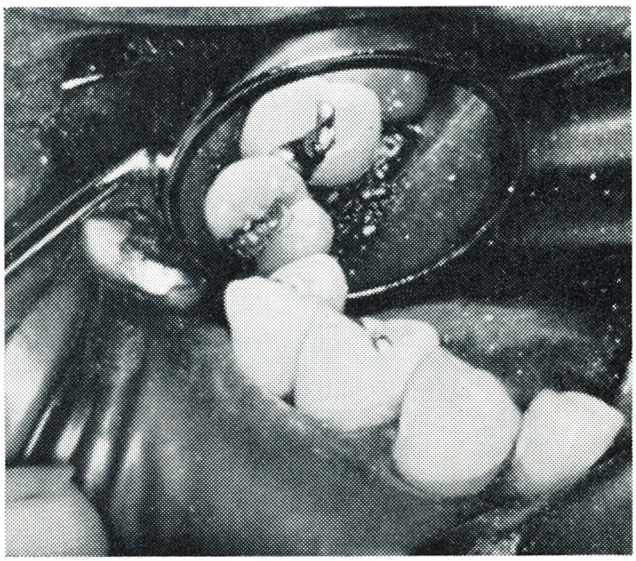

Figure 2. The completed restoration showing delicacy of form and minimal necessary extension.

ural and requires less use of highly offset bayonet condensers. In addition, when the work is done, it is more convenient to find any possible marginal or gingival angle deficiencies and to repair them with greater facility.

Distal Class II preparations, though slower and more awkward to fill, have one advantage in that the finishing strips and disks tend to lay in such a manner as to expedite finishing procedures. The use of the pneumatic or electromatic condensers render many of these areas highly accessible.

Condensation or compaction is the heart of all foil work - especially so in the Class II. The proximal gold should be layered and wedged toward each proximal wall. The vertical condensation should step out slightly beyond the cavosurface angle to give good wall adaptation, and the contact point should be well formed and condensed against the adjacent tooth using cohesive foil and not soft foil. A matrix has no place in this technique as lateral condensation later uses the excess gold for density and good coverage in finishing proximal and gingival margins. Minimum proximal extension often avoids great time waste. Over extension allows non-cohesive cylinders to slip out and makes it easier to add excessive amounts of foil

important as having practiced with it and the material prior to treating a live patient. Study clubs or, at the very least, dusting off the old dentoform, are probably the most reasonable places to gain proficiency with handling the delicate material prior to appointing one's first gold foil patient for a foil. Pursuing and receiving adequate mentorship early on will prove the smoothest road for learning the discipline and technique, and for avoiding pitfalls. Successfully identifying appropriate lesions and patients is essential. Selecting suitable first patients, such as relatives, friends, or employees, is an important consideration, as management of the operator's frustrations or procedural complications will be more easily navigated if the operator must veer from the original course of treatment. Having an experienced mentor present is also advantageous.

Case Selection and Case Presentation

If we are truly going to continue to offer all the best options in our practices, and if we are going to maintain vitality in dentistry, Class II foils are perhaps not the most appropriate place to begin. Therefore, consider straightforward Class I lesions with easy access, ie, buccal and occlusal pits on 1st molars and occlusal pits on premolars. In dental school, most of us first practiced on the dentoform with these teeth and surfaces. Suitable lesions need to be small because foil takes longer to handle, compact, and finish than the more modern options. Such "small lesions" include those where the enamel is slightly cavitated and chalky, an explorer barely sticks, transillumination reveals an underlying stain, our experience tells us a sealant or other nonrestorative approach will be inadequate, and the damaged tooth structure needs to be cut (Figure 3A). As operators, we should consider the caries management by risk assessment lesion classification, the patient, and all nonrestorative options prior to recommending a restoration. Other important considerations include: Can the patient tolerate a rubber dam and lengthy procedure? Will the patient accept a non-tooth-colored restoration? Is there presence of periodontal disease? Does the patient fear certain components of amalgam and composite, where the inertness of gold would be welcomed with more appeal? How old is the patient? How long does our patient expect to live? Does the patient value a slightly more expensive restoration to achieve better longevity?

Isolation and Preparation

With one valence electron, gold atoms adhere to one another very well, but any amount of any type of contaminant is catastrophic to the phenomenon of gold cohesion. Rubber dam isolation, therefore, is a must.[1] Furthermore, "superior results are obtained with less

on the lingual. Time is not only wasted in adding the excess gold, but often to a much greater extent in finishing it off.

Perhaps it is well to mention a few of the most common cause of difficulties or failures. One of the more frequent is inadequate condensation in the proximal gingival angles. This must be avoided in the placement and condensation of the three non-cohesive cylinders These are usually two 1/8 cylinders and one ¼ cylinder of No. 4 gold. They are swept powerfully into position with the No. 13, No. 14 parallelogram condensers in both a lateral and gingival direction, then condensed vertically with the large square bayonet condenser of the Ferrier study club set. Their final height when condensed should be about 2/3 rds of the height of the axial wall. This allows room for the following cohesive foil to aid in the retention of the proximal and to form the contact point.

Another common error is the use of an incorrect angle of force along the buccal occlusal walls of the preparations. To correct this tendency, a bayonet condenser or a right angle head in the pneumatic or electromatic condenser must be used. This is also frequently necessary on the mesial walls of distal cavities.

Proper layering of the gold bucco-lingually as described by Black[2] can be of great assistance in these situations. Yet from a biological standpoint, care should be exercised not to produce excessive wedging effects and pressures, as these can create hypersensitivity or even crack teeth.

These biological considerations are usually the normal ones we face in most operative procedures. There should be adequate pulpal protection from thermal shock during preparation procedures as well as suitable use of bases or medicaments to prevent post-operative complications. This may include prednisolone, calcium hydroxide and zinc oxide bases, or simply gum copal varnish. However, if sizable bases are necessary, the condensing pressures on the base should be considered. Sometimes a stronger base of zinc phosphate cement with alloy filings added is indicated. But the larger the cavity

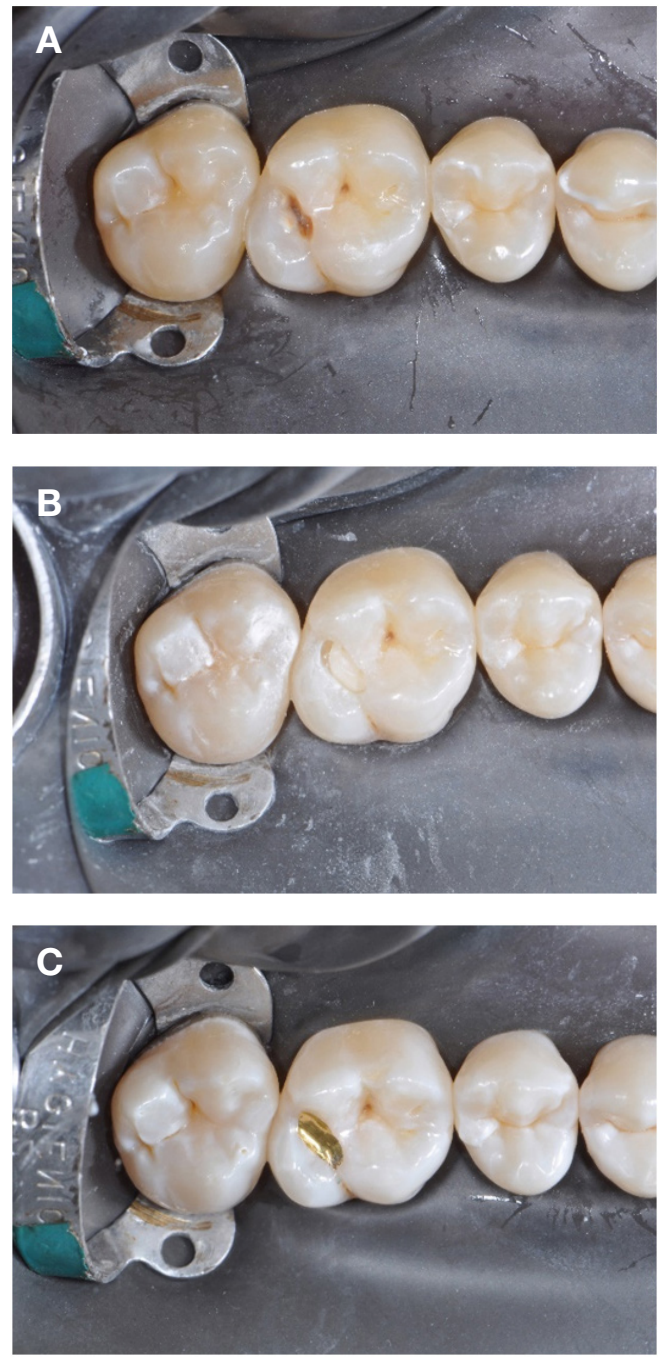

Figure 3. *(A): Preoperative #14-O caries detected visually and with slight explorer stick. (B): Completed preparation. (Note: Ionoseal light cured glass ionomer in pulpal floor to block out large void from caries removal, allow ideal conservative preparation, and minimize the amount of time placing and compacting the foil.) (C): Completed restoration with anatomic contours and grooves restored.*

effort," in less time, regardless of the material. Dr Smith reminds us that final outline form (convenience form) is ideal if it is just large enough for the operator to reach all areas of the preparation for adequate compaction

area the less the case is indicated for a foil restoration and the more an inlay or alternate procedure should be considered.

The separator can be a vicious instrument if care is not employed in its use. It should first be selected carefully to fit the case so that torsion effects are not incorporated. The jaws should be delicate and not impinge on the tissue. The screws should be free with a little "play" to avoid forceful wrench action and give more accurate control. Finally, the separator should be well stabilized with compound to avoid tissue damage and distribute pressures over four or five teeth.

CAVITY PREPARATION

With high speed a preparation can be cut very rapidly and efficiently, but the operator must have a clear picture of the preparation in mind to avoid overcutting or loss of detail. Fine cavity detail is of great importance in ensuring convenience of insertion of the gold and durability of the finished restoration.

The occlusal (Fig. 3) should be cut with a 700 series bur which has been broken and squared off to about 1/3 of its normal length. This automatically will set the proper depth and inclination of the walls. The walls must be slightly divergent in the isthmus area and at the occlusal wall distal to the proximal. This strengthens the marginal ridge. The only occlusal retention used should be gained at the expense of the buccal and lingual walls where they reach the distal. Proximal extension should be minimal to aid in supporting the non-cohesive foil and aids in a better esthetics. No bevels should be on any walls where non-cohesive foil is employed and only the fine finish of sharp cutting instruments is necessary to plane all walls to proper outline and completion.

FINISHING

One of the greatest aids to finishing procedures is a set routine. It is more than a convenience, it is a necessity. This is the one area where many men repeat and duplicate actions, wasting time, until they and finishing, yet small enough to minimize the amount of material to be compacted in a reasonable appointment. He goes on to describe the ideal characteristics of the Class II preparation (a textbook amalgam preparation). An occlusal Class I is simply a Class II without a proximal box, of course, but all of Dr Smith's recommendations of wall convergence or divergence should be followed to provide the strongest, full length, and dentin-supported enamel rod walls as possible. Sharp and crisp margins are obtained with sharp new burs and enamel hatchets (Figure 4A and 4B).

In the absence of occlusal caries extension, many Class II preparations can be completed as slot preparations with adequate approximal retention and resistance form (Figure 4). The use of a 169L to create opposing slots, entirely in the dentin of the buccoaxial and linguoaxial line angles to maximize retention. The slots can be shaped and internally sharpened with appropriate and sharp gingival margin trimmers to further improve retention of the initial increments of gold (Figure 4B).

Liners and Bases

Dr Smith recommended suitable bases that were available at the time, including calcium hydroxide and zinc oxide bases, to be utilized in cases where postoperative sensitivity was expected. Dentin desensitization with GLUMA (Kulzer, South Bend, IN, USA), followed by dentin block-outs with newer fluoride-releasing resin-modified glass-ionomers might prove more readily available, easier to place, sufficient to withstand condensing forces, and more effective in preventing postoperative sensitivity (Figure 3B). The operator should consider other restorative materials like cast gold, composite, or amalgam in larger preparations where excessive dentin substitution is necessary and the area is too large to apply foil in a timely manner. Although Dr Smith claims many patients sleep through the operation, encouraging the patient to begin 400 mg ibuprofen, four times a day, starting the day before and continuing for a few days after placing a gold foil is worth its weight in gold for both patient comfort and the operator not being bothered with follow-up visits for pulpitis. Taking ibuprofen preoperatively can significantly decrease the initial and total amount of inflammatory proteins that cascade, leading to a happier patient and doctor.

Gold Placement and Compaction

Conventional noncohesive sheets of foil (Jensen Dental, North Haven, CT, USA) and powdered gold (EZ Gold; courtesy of Dr Clyde Roggenkamp) are still available

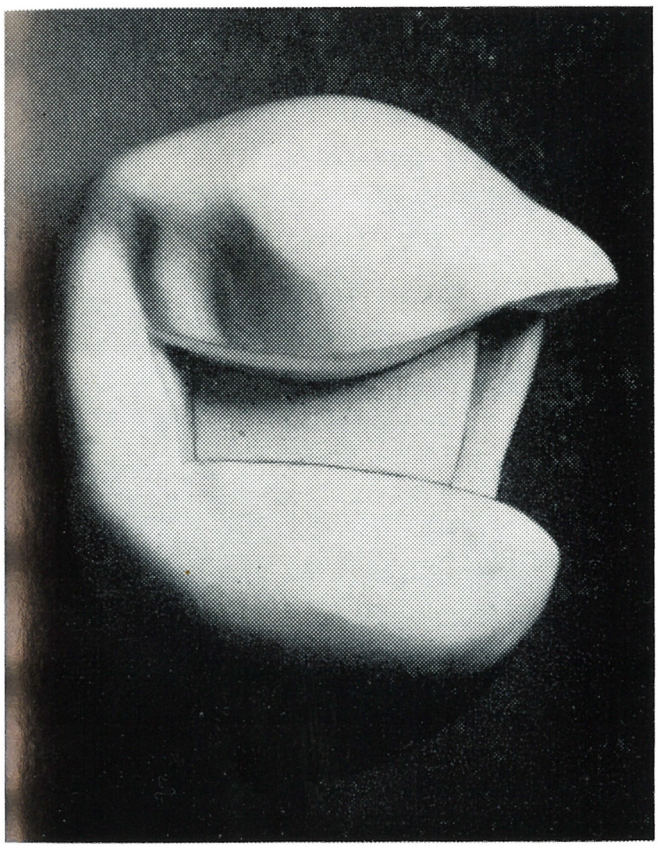

Figure 3. Occlusal view of normal Class II foil preparation. Note reverse curve on buccal to allow proper proximal boxing. Isthmus area and marginal ridge walls are slightly divergent. Retention areas are at the expense of the buccal and lingual walls toward the distal.

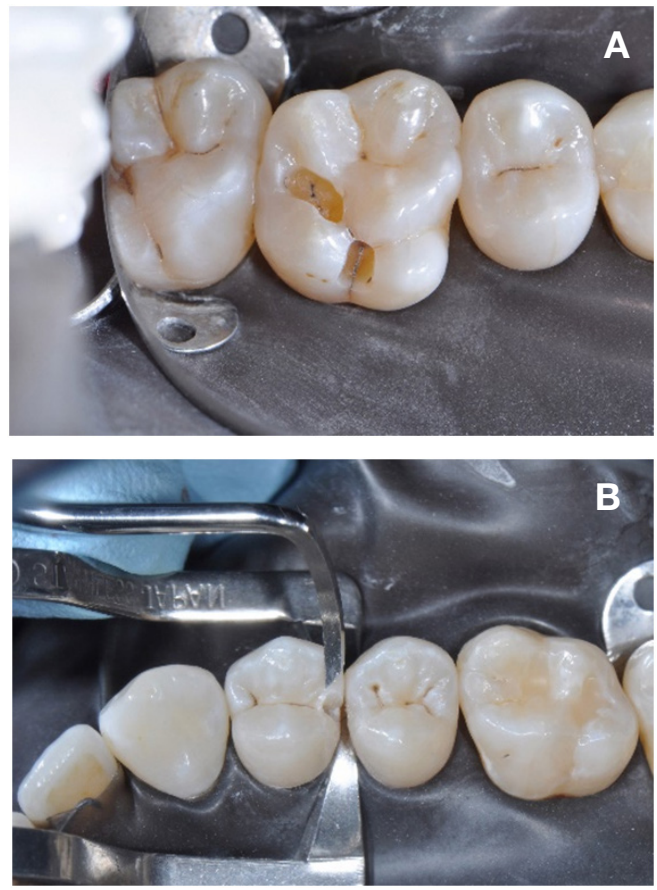

Figure 4. *Dry field established with rubber dam isolation in both images. Permanent orthodontic retainers and bridges are more challenging to perfectly isolate, but otherwise, dam margins should be inverted for optimal isolation. (A): Completed occlusal and palatal preparations, flat pulpal floor, and diverging distal wall to allow full length enamel rods supported by dentin, and smooth cavosurface margins and outline form. Internal line angles are sharpened with sharp explorer tine, and additional retention is cut with 33.5 inverse cone bur. (B): Completed Class II preparation with sharpened Tucker gingival margin trimmers #232 and #233, used to sharpen gingivoaxial, axiolingual, and axiobuccal internal line angles for retention (Tucker Institute Manual).*

eventually end up with a completed operation. The use of burs, files, gold knives and the Searl swagger (Suter Dental Instrument Co., Chico, California) should preceed [sic] the use of graded disks. An interesting miniature burnisher is of great convenience in finishing occlusals. The small instrument has short extensions which permit the operator to exert greater burnishing force with less tendency for the instrument to twist within his grasp. Also, the small burnishing surfaces are more suited to our present delicate cavity extensions. (Fig. 4)

Finishing burs may be moistened with water to prevent "leading." They usually consist of two types: one, a squared off 700 series bur, is very fast for use in dentistry today. Noncohesive foil becomes cohesive when degassed, or annealed, as the pellet is passed through a flame to remove the ammonia gas. At this point, the degassed pellets will readily stick to each other and compact more easily. Dr Smith recommends initially placing noncohesive gold cylinders into the proximal box of a Class II, reasoning that the gold will slip more easily into the sharp and retentive internal line and point angles, and to bulk up two-thirds of the box more quickly. Because cylinders and pellets are commercially unavailable, a member of the team must use sheets of noncohesive foil to roll their own cylinders and pellets, certainly a drawback for today's operator and team.[4]

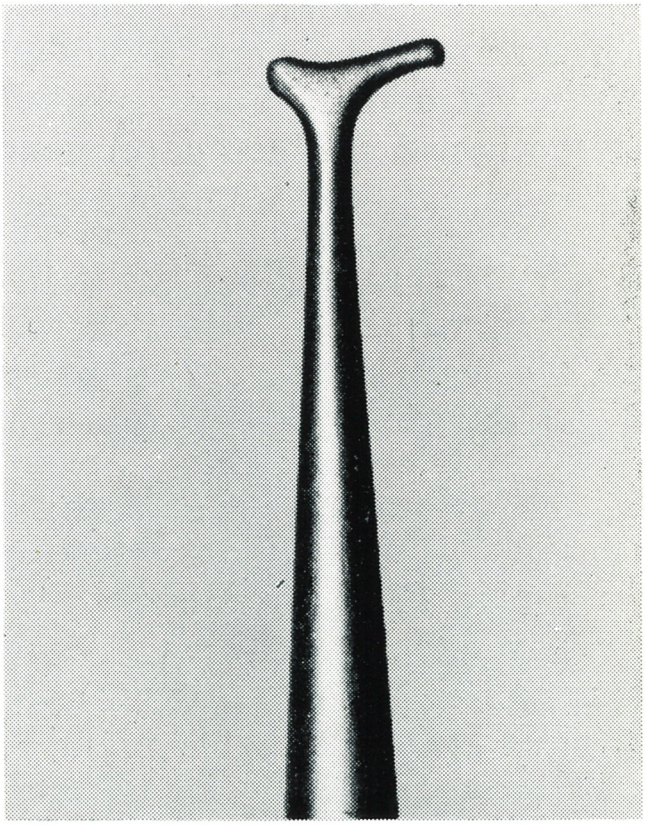

Figure 4. Extra-small burnisher with short leverage to prevent turning in the band.

and convenient in setting the inclined planes and central groove; the other - a round bur - may be right or left cutting, and is very helpful in trimming gold to margin, especially in the extensions. Finally, a dull number ½ round bur is excellent to accentuate and define previously established grooves.

The separator should be known by number; usually the Ferrier No. 4 is indicated for Class II foils. Occasionally, the No. 3 will be better on the angle of the arch for mesial restorations in first bicuspids. This depends upon the narrowness of the arch and the conformity of the teeth.

After all gross finishing is done, i.e., the gingival and all occlusal anatomy with the exception of the occlusal embrasure, the separator should be placed momentarily and a Gordon White saw passed through the contact area. A lightning strip and subsequent finer extra long finishing strips (Moyco) should be used with copious amounts of EZ Gold has also been shown to be a suitable material for bulking-up quickly, having ease of compaction (5 lbs), and doing so to a suitable denseness to survive the oral cavity, especially if veneered with cohesive (degassed) conventional foil. After bulking up the preparation to within 0.5–1.0 mm of the occlusal portions of the cavosurface margins, veneering with cohesive foil to finish out the anatomically correct contours of the restoration is preferred because it condenses more completely than powdered gold, leads to better marginal adaptation, and holds a better polish for hygienicity and aesthetics.

Dr Smith does not recommend the utilization of a matrix in Class II's, but it has been shown, particularly in deeper or wider boxes, or lesions not in contact with an adjacent tooth, that by better containment of the material, less gold is extruded (Figure 5). Thus, the benefits are 2-fold: less time is spent unnecessarily compacting excess gold, and less time is spent removing excess gold during finishing. A matrix can save precious time and material, and prevent frustration for both the patient and the operator.

Although one can conceivably place small Class I and Class II gold foils with hand condensation alone, malleting provides better density and polish. Obtaining an electromallet (Figure 6) or a pneumatic condenser will save considerable time in achieving adequate compaction. Because time is the real elephant in the room regarding the disappearance of gold foil and its operators, today's operator should treatment plan for ideally sized cases, utilize automated condensers for the bulk of the condensation, and consider high-speed finishing after final condensation.

Figure 5. *EZ Gold quickly bulk filled to within 0.5 mm from the cavosurface margin, prior to cohesive foil veneer. Because the lesion was palatal to contact, the adjacent tooth could not act as the matrix; therefore, the operator utilized a Tofflemire matrix to better contain the gold and save time.*

air. This will leave a beautifully finished and polished interproximal surface.

The strips should be manipulated with care and relieved at either buccal or lingual surface to maintain proper contact point relationship and correct embrasures at this time. The occlusal embrasure should receive special consideration. A sharp gold knife or small cleoid swept across the marginal ridge while the separator is in place will set up the proper angulation for the embrasure and the escape gate. It is often convenient to mount a large but extra fine cuttle fish disk in the straight screwhead (small-size) mandrel. This will by-pass the separator frame and nicely round out and highly finish the embrasure.

A step by step logical finishing routine will reward the operator with consistently excellent results with a happy, rested patient.

An ideal Class II from the standpoint of ease of operation is the mesial of the lower first bicuspid. (Fig. 5) Because it occludes with the upper cuspid only, there is no stress on the occlusal surface and no occlusal extension is necessary. Both buccal and lingual proximal walls make acute angles with the gingival due to the shape of the adjacent mandibular cuspid. The interior has accentuated axial line angles to help retention. An excellent instrument for this delicate feature is the special gingival margin trimmer No. 28˚ and No. 29˚ (Suter Dental Instrument Co., Chico, California). These were designed by C. T. Fleetwood and are also of great convenience in lingual approach Class III foils. (Fig. 6)

Usually only three 1/16th non-cohesive gold cylinders are placed at the gingival. The cohesive gold placement is delicate and wedging should be carefully accomplished to ensure good wall adaptation. Finishing procedures are minimal and the operator can easily see and check his work.

The result is a delicate, beautiful and inconspicuous Class II restoration.

To cut across the large and solid transverse ridge would be a waste, both of time and tooth structure, for this tooth is much like an overgrown

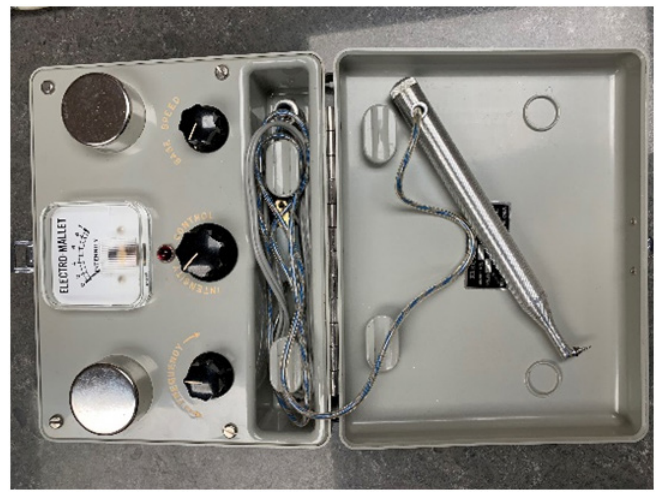

Figure 6. *Although locating one might prove challenging, an electromallet is a much more efficient instrument for condensing gold foil than a conventional mallet and foot condenser, and it frees the assistant of the burden of malleting (Roberson TM, Heymann H, Sturdevant CM, & Swift EJ (2002) Sturdevant's Art and Science of Operative Dentistry Mosby, Maryland Heights, MA).*

Finishing

The remaining tooth structure should dictate the final level, shape, and contours of the gold. Again, care should be taken not to overfill to save time. Once adequate contours have been achieved, Dr Smith recommends a system for finishing to save time. Finishing with hand instruments should still ideally be completed to trim flash, and burnishing should be completed prior to rotary finishing. Hand burnishing and carving the gold work hardens it, and it will polish more completely with less air porosity.

In Class II's the proximal contact should be adjusted first. Releasing the separator, the operator can gauge the weight of the contact prior to selecting interproximal saws, or which grit of finishing strips are necessary to avoid over- or underfinishing the contact area. The use of a swedge, either in the electromallet or by hand, helps to create the convex marginal ridge, forming proper embrasures on the occlusal, buccal, and lingual surfaces (Figure 7). Appropriate embrasures facilitate easier passage of floss into the proximal contact and for food to sluice off the occlusal table and around the proximal contact, appropriately stimulating the soft tissues. The interproximal contact weight is evaluated and adjusted to the appropriate contact weight with abrasive strips (Figure 8). Further finishing of the buccal and lingual margins is done with paper backed E. C. Moore's Discs (E. C. Moore, Dearborn, MI, USA).

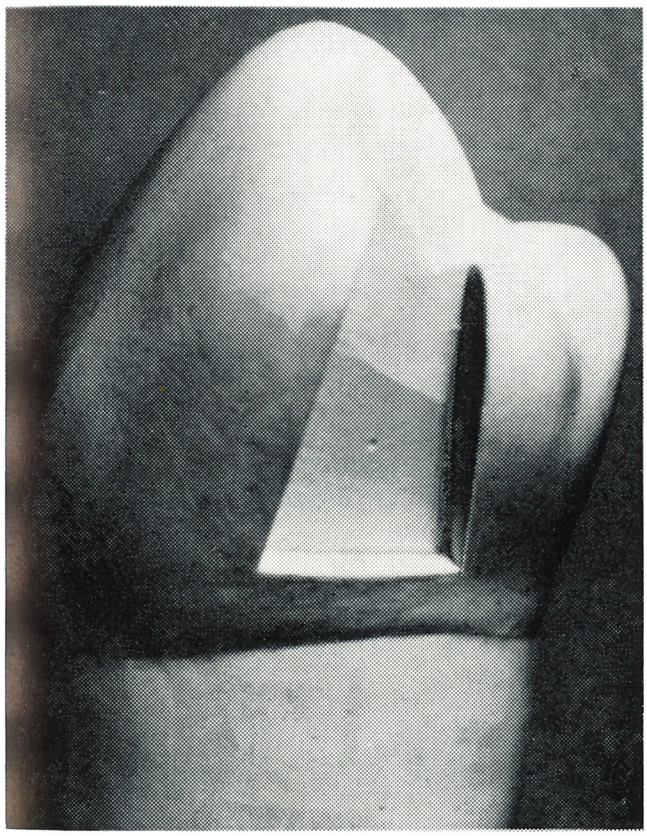

Figure 5. Cavity preparation for the mesial of the mandibular first bicuspid. No occlusal step.

cuspid. A central groove is almost never present. If a groove is present, it is nearly always in the distal portion of the occlusal. (Fig. 7) In addition, if an occlusal extension were made, the great size of the buccal cusp would tend to augment thermal shock because of gold being closer to the extension of the pulp.

One of the first questions asked by men tempted to try Class II foil work is, "How much time should this operation take?" Naturally, the correct answer is, "Enough time to do the case at hand properly." However, to quote averages which may be helpful, two to two and a half hours should be allowed in the beginning. Later, an hour and a half to two hours should be adequate. Ideal cases have been done in an hour or even 45 minutes by highly skilled men, and the most remarkable time of 40 minutes, including anaesthetic administration, has been witnessed.

Figure 7. *After cohesive foil veneer is built up to properly restore contours, a swedge is used in an electromallet to properly create the embrasure form.*

With the better availability of burs and finishing materials today, many Class I's can be finished with high and slow speed rotary burs very quickly. Copious water spray should be used at lower speeds with the high-speed handpieces and with light pressure, and the assistant should keep air moving over the tooth while finishing dry with any handpiece. Shaping grooves and following ridges with dull, small, round- and football-shaped carbide burs is efficient and can be retraced with green and white stones, and with brownie, greenie, and super greenie points and cups, in both high- and slow-speed handpieces. Beginning in the grooves and working one's way outward, the higher spots seem to

Figure 8. *After swedging, the separator is released, contact weight is evaluated with floss, and the proximal saw and the appropriate interproximal abrasive strip is selected to finish and smooth interproximally. Here, the operator felt the contact weight was slightly heavy and chose to begin with a medium grit strip (coarse = blue, medium = yellow, fine = red) to begin interproximal finishing.*

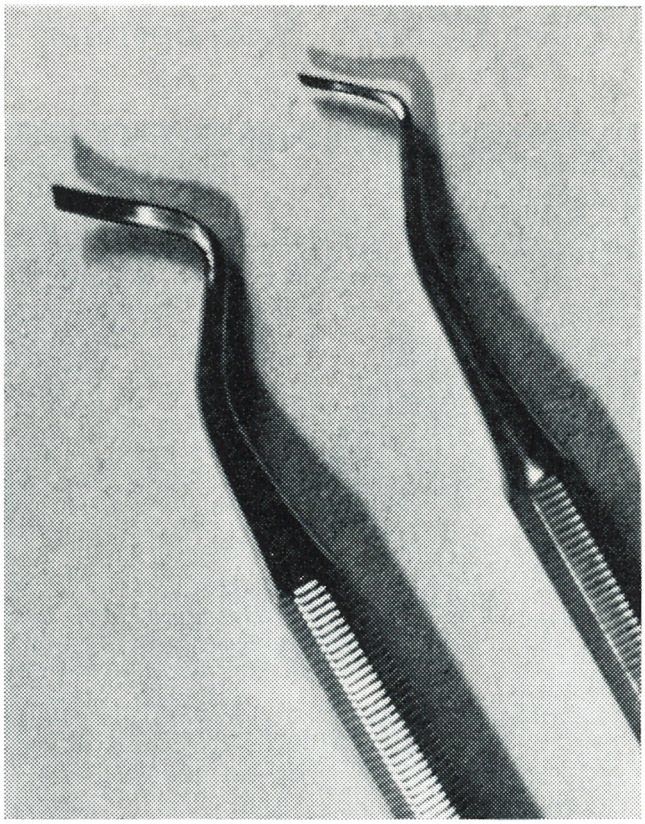

Figure 6. Instrument No. 28°, the extra- small gingival margin trimmer, compared with a normal size instrument.

To return to normal considerations however, it's safe to say that the time consumed to create a beautiful Class II foil is nearly always less than the time and effort required to produce and cement a Class II inlay. The operator should not think in terms of speed, but in terms of excellence, efficiency and service.

Lastly, let us consider contra-indications. It is proper here to quote the Latin legal phrase, *res ipsa loquitur*, the thing speaks for itself. For professional experience, training and judgment are almost perfect guides to the average man. A tooth without proper gingival support would certainly not be a likely candidate to receive condenser blows or even give good gold condensation. Large cavities imposing undue stress on the patient or the tooth are questionable to use. Devital teeth, or those with impaired circulatory protection, should be avoided if possible. Then, once in a great while, the unusual

Figure 9. *A completed Class II gold foil.*

finish down without demanding much attention of their own.

Placing gold foils routinely in private practice, in a study club environment, or even on a dentoform will challenge even an experienced operator to improve their overall skillset as an operative dentist. As a material, gold foil arguably demands more patience and skill from the operator than any other restorative material. It continues to teach discipline in many of the principles we committed to memory in school and strive to practice today, including case selection, isolation, resistance and retention form, convenience form, material manipulation and condensation, and exquisite finishing. The acuity and attention to detail that direct gold restorations require are contagious and will likely spill over to positively impact every aspect of our clinical ability to provide better care and dentistry for our patients.

The AAGFO is perhaps the only source available today to obtain all the information regarding everything gold foil, in one place. Proficient mentors, courses, study clubs, instructional manuals, and lists of materials, instruments (AAGFO hand instrument kit; courtesy of G Hartzell Denmat), and supplies can all be found there. Our annual meeting is open to anyone interested in attending, and all the information needed to register for the meeting or to begin placing gold foil is available on our website, www.aagfo.org.

Conflict of Interest

The authors of this article certify that they have no proprietary, financial, or other personal interest of any nature or kind in any product, service, and/or company that is presented in this article.

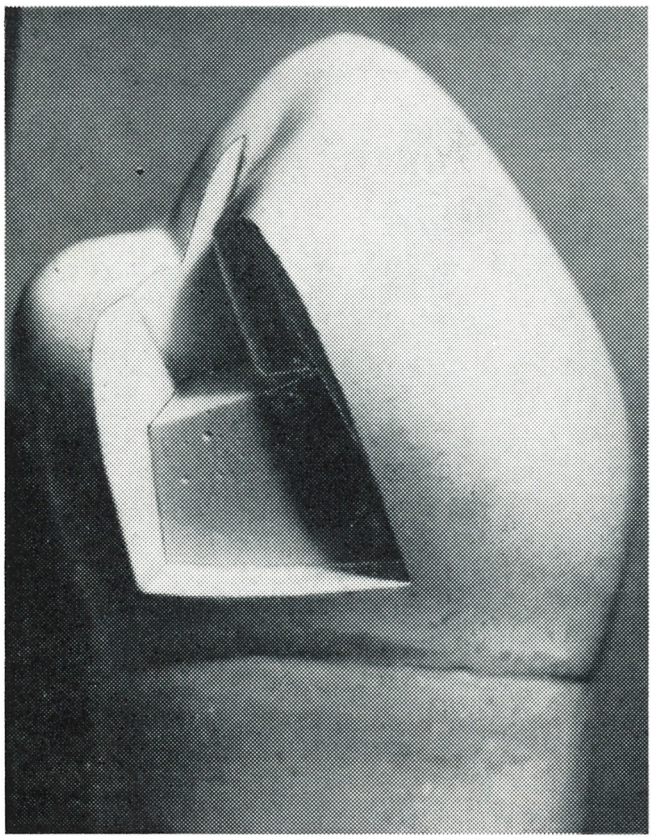

Figure 7. Cavity preparation for the distal of the mandibular first bicuspid. Occlusal step is sloped to avoid the large pulp horn.

patient will appear who is psychologically unsuited to stand the malleting or condensing blows. Fortunately, the usual patient, on the other hand, seems to actually enjoy his brief period of relaxation while the foil is placed.

In conclusion, it is hoped that some ideas and aids toward operational procedures will have been found here. If so, the author may have partially repaid his debt for some of the help and assistance gained from predecessors.

References

1. Ferrier, W. I.: *Gold Foil Operations*, University of vVashington Press, Seattle, 1959.
2. Black, G. V.: *Operative Dentistry*, Volume II, Medico Dental Publishing Co., Chicago, Illinois, 1908, Pgs. 271-2.

REFERENCES:

1. Thoen E (1941) Gold foil: its selection, characteristics, manipulation, and insertion. (Read before the section on Operative Dentistry at the 77th Annual Midwinter Meeting of the Chicago Dental Society, February 19, 1941.)
2. Stibbs G (1947) *The Journal of the Canadian Dental Association* April 1947.
3. Stibbs G (2017) *Gold Foil Seminar Manual* (Revision).
4. Ingraham R & Koser JR (1961) *An Atlas of Gold Foil and Rubber Dam Procedures* Uni-Tro College Press, Buena Park, CA.