The Periodontic/Orthodontic Connection: Maximizing Success with the Orthodontic Patient

A Peer-Reviewed Publication
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Abstract
Orthodontic therapies are no longer confined to the adolescent population and as such the role of the dental hygienist in patient education has grown significantly in recent years. This course will review the exciting science of bio-adaptive therapy; a process of working with nature and the body to move teeth while maximizing periodontal health and minimizing invasive procedures such as tooth extraction or palatal expansion, as well as the periodontic/orthodontic connection. A review of current tooth movement sciences will be included as well as methods to maximize oral health during therapy, including CAMBRA (Caries Management by Risk Assessment). Bio-adaptive research, results and adult options will be included as well as the role of the dental hygienist in orthodontic treatment planning and case success.

Learning Objectives:
The course participants at the conclusion of the course will be able to:
1. Understand the role of the dental hygienist in recognizing patients who would benefit from orthodontic therapy
2. Review the periodontic/orthodontic connection and current science regarding orthodontic treatment as a means to treat periodontal infection
3. List current options in orthodontic therapies
4. Define the dental hygiene process of care for the orthodontic patient and understand daily care options and opportunities to meet the unique oral health challenges of this patient population.

Author Profile
Kristy Menage Bernie, RDH, BS, RYT — As a national speaker and writer, on a variety of topics, Kristy gets to experience a vast array of philosophies and points of view. She has practiced in a variety of clinical settings and is the owner of Educational Designs, a 15+ year corporate consulting company. She is a member of the ADHA where she was a recipient of the 2005 Distinguished Service Award and she is a member of the AACD. In 2007 she was appointed as Dental Hygiene Editor of www.Dentalcompare.com and has contributed to various national publications for the past 15 years and has a chapter on oral malodor in the recently released 2nd edition of Murley’s Dental Hygiene text book. Her company offers resources and education in presentation skills and adult learning principles through “It’s Academic — Let’s Present It!” Finally, Kristy is a certified yoga teacher through the Yoga Alliance & offers yoga sessions throughout the country. She enjoys her cats, yoga, reading, music, travel, “reality” TV (just ask her anything about the latest show!), laughter, and is a world-class swimming pool rafting and water slide expert!

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Kristy Menage Bernie does not have a leadership position or a commercial interest with products and services discussed in this educational activity.

Supplement to PennWell Publications
This course was written for dentists, dental hygienists and assistants, from novice to skilled.

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Program Overview

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Educational Objectives

Following this presentation, the participant should be able to do the following:

- Understand the role of the dental hygienist in recognizing patients who would benefit from orthodontic therapy
- Review the periodontic/orthodontic connection and current science regarding orthodontic treatment as a means to treat periodontal infection
- List current options in orthodontic therapies
- Define the dental hygiene process of care for the orthodontic patient and understand daily care options and opportunities to meet the unique oral health challenges of this patient population.

Target Audience

The target audience for this course is Dentists, Dental Hygienists and Dental Assistants from novice to advanced professional.

Author Bio & Contact Information

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As a national speaker and writer, on a variety of topics, Kristy gets to experience a vast array of philosophies and points of view. She has practiced in a variety of clinical settings and is the owner of Educational Designs, a 15+ year corporate consulting company. She is a member of the ADHA where she was a recipient of the 2005 Distinguished Service Award and she is a member of the AACD. In 2007 she was appointed as Dental Hygiene Editor of www.Dentalcompare.com and has contributed to various national publications for the past 15 years and has a chapter on oral malodor in the recently released 2nd edition of Mosby’s Dental Hygiene textbook. Her company offers resources and education in presentation skills and adult learning principles through “It’s Academic – Let’s Present It!” Finally, Kristy is a certified yoga teacher through the Yoga Alliance & offers yoga sessions throughout the country. She enjoys her cats, yoga, reading, music, travel, “reality” TV (just ask her anything about the latest show!), laughter, and is a world-class swimming pool rafting and water slide expert!

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Hello, and welcome to the Periodontic/Orthodontic Connection: Maximizing Success with the Orthodontic Patient. My name is Kristy Menage Bernie.

Over the next hour we will have the opportunity to understand the role of the dental hygienist in recognizing patients who would benefit from orthodontic therapy, review the periodontic/orthodontic connection, and current science regarding orthodontic treatments as a means to treat periodontal disease, list current options in orthodontic therapies, and define the dental hygiene process of care for the orthodontic patient.
Beginning in the 1800s, tooth movement was in its infancy. While these devices may appear somewhat rudimentary, there are some from this period that look familiar.

From strange headgear-looking devices to palatal appliances, the science to correct malocclusion was born.
As we can appreciate, the science of tooth movement is complex and includes a delicate balance of compression and tension.

Tension and compression areas occur when force is placed upon the tooth at the crown. If force is applied for approximately 2 weeks, bone will begin to remodel. And of course, throughout tooth movement, our goal is to minimize pain and maximize gain.
Bones contain cells that make new bone called osteoblasts, and cells that resorb bone, called osteoclasts. Cells continually migrate and cells within the periodontal ligament, in response to pressure signal osteoclasts/osteoblasts in the bone to remove and remodel bone adjacent to the PDL. To return to a state of equilibrium, PDL signals the osteoclast to remove bone in the area of compression. And osteoblasts to deposit bone in the area of tension. As a result, alveolar bone around the root will have remodeled and the tooth will have moved within the bone.
Tooth movement has often included extractions and when the use of force to move the anterior teeth posterior, we get the desired results. Due to differences in facial type this one-size-fits-all approach has been replaced by tooth movement sciences which accomplish optimal alignment without extractions. This lends to a more natural appearance for the many facial types who would benefit by maintaining a complete dentition.

According to the American Association of Orthodontists, 50-75% of the population would benefit from orthodontic therapy and 50% of US children are currently undergoing some type of orthodontic therapy. Most interestingly is the fact that there are a growing number of adults seeking care. Average treatment time is estimated between 12 and 36 months.
Where we’ve seen the greatest shift is the growing number of adults seeking orthodontic therapies. In addition to a desire for straight teeth, the AAO also cites periodontal infection as a key rationale for adult orthodontic therapy. The AAO states that this type of treatment can prevent or improve periodontal problems as well as prevent or reduce further bone loss. Additionally, adult treatment rationale includes improving the ability to restore missing teeth, improving aesthetics and function, improving self-confidence, and improving overall oral health.

Regardless of age, the goals of tooth movement according to the 2nd Edition of Mosby’s Dental Hygiene Textbook include light, consistent, controlled forces over time; maintenance of appropriate forces to avoid necrosis, which can lead to undermining resorption; remodeling without tissue destruction; and minimal discomfort.
Periodontal Orthodontic Connection: Biological & Synergistic Tooth Movement

- **Successful tooth movement relies upon healthy tissue**
- **Controlled forces allow the movement through alveolar bone**
- **Regeneration of periodontal supporting tissues**

Ong & Wang, AJODO, October, 2002

Clearly, the periodontal status is a central factor in successful tooth movement and relies upon healthy tissues. This combined with controlled orthodontic forces upon the teeth allow the teeth to relocate through the alveolar bone. This gradual movement is aided by the regeneration of supporting periodontal tissues and requires careful calculation on the part of the orthodontist. Light, consistent, controlled forces over time results in regeneration of the bone in the direction of movement. Maintenance of the appropriate forces is essential to avoid necrosis which can lead to undermining resorption. Periodontal health will benefit greatly through orthodontic treatment as a result, and of course, correction of crowding will lend to better plaque biofilm control and furthermore, research has indicated that orthodontic tooth movement may be able to actually reverse the damage from past periodontal infections.
Periodontal Infection = Contraindication?

- Re et al, in a 12-year report, showed orthodontic treatment is no longer a contraindication in the therapy of severe adult periodontitis. In such cases, orthodontic treatment might enhance the possibilities of saving and restoring a deteriorated dentition.

Parameter on Occlusal Traumatism in Patients w/ Chronic Periodontitis

- Occlusal therapy is an integral part of periodontal therapy
- Failure to treat OT may result in:
  - Progressive loss of bone
  - Adverse change in prognosis
  - Could result in tooth loss

Research has also demonstrated that periodontal infection is no longer a contraindication. Many of us learned in hygiene school that this was a contraindication and yet this 12-year report looks at numerous studies that actually suggest that orthodontic therapy might enhance the possibility of saving and restoring deteriorated dentition.

And in fact, the American Academy of Periodontology issued their parameters on occlusal traumatism in patients with chronic periodontitis and recommends the following. They state that occlusal therapy is an integral part of periodontal therapy and failure to treat occlusal traumatism may result in progressive bone loss, adverse change in prognosis and could result in tooth loss. This shift in thinking has provided even more rationale in discussing orthodontic treatment options with our adult patients. And the dental hygienists, of course, can play a significant role.
As dental hygienists, we have a unique opportunity to increase success with the orthodontic patient and can play a significant role in candidate identification, patient education and referral to an orthodontist. In addition, the dental hygienist will play a key and collaborative role in pre-, during- and post-orthodontic therapy. And finally, the dental hygienist should be prepared to provide appropriate treatment and make recommendations that will assure a successful outcome.

Let’s take a look at each of these categories.

Identifying patients who would benefit from orthodontic therapy should be included during the dental hygiene assessment phase. A suggestive protocol comes from the 2nd Edition of Mosby’s Dental Hygiene Textbook and is called the “Orthodontic Six-Point Check System.” This starts with an examination of each arch separately and includes evaluation of arch width, transpalatal from molar-to-molar. The average width is 36mm. Next, we’ll look for excessive spacing or crowding and that should be noted, as well as any missing or ankylosed teeth.
The assessment continues by evaluating the relationship between the upper and lower teeth in occlusion, at which time the Angle’s Classification can be determined. In addition, you’ll want to note any overbite or overjet and if an openbite or crossbite exists. Facial aesthetics is also an important consideration for treatment goals, function, and success. Correcting disproportions will be important as growth continues for adolescents and for adult aesthetics. Frontal evaluation would include symmetry, size proportions of the midline to lateral structures and vertical proportionality. Profile evaluation would include a determination of jaw positioning, lip protrusion, vertical facial proportions, and mandibular angle.
Let’s take a look at the Angle Classification. Here we see a Class I malocclusion. The maxillary cuspids and the first molars are distal to the mandibular cuspids and molars, which is considered a normal relationship. With respect to overbite and overjet, this would be normal but we may have malpositioned teeth.

Class II is defined as having the mesiobuccal cusp of the maxillary first molar and the maxillary cuspid mesial to the mandibular landmarks.
This division is subdivided into Class II Division 1, in which the anterior teeth are flared.

And Class II Division 2, in which anterior teeth are inverted or inclined lingually. These patients can often have prominent chins and a flat or concave profile.
In Class III malocclusion, we see the mesiobuccal cusp of the maxillary first molar and the maxillary cuspid distal to the mandibular landmarks.

Next, an assessment of facial types should take place. Most individuals have a mesocephalic type, where the jaw is in harmony with the face and teeth. And yet, they may be malopposed.
Brachycephalic facial type is represented by jaw bones in large proportion to the face. This is usually seen with the mandible and these individuals have a tendency to brux or grind their teeth. In addition, very little tooth structure will show when smiling. And those with a brachycephalic facial type often appear older than their true age.

The third facial type, dolichocephalic, the jawbones again – and usually the mandible – are smaller in proportion to the face. These individuals will have a long or gummy smile and may also have thumb or digit sucking habits. They also have a tendency to be mouth breathers and they will appear younger than their actual age.
Additional assessments will include the periodontal assessment and hard tissue assessment. The periodontal assessment will include 6-point full mouth probing, clinical attachment evaluation and radiographs. Complete assessment of the hard tissues may include use of caries detection technologies, as well as saliva tests to determine the caries risk. Chair-side tests today can assay for decay-associated bacteria while new fluorescence technologies can assist in early detection of insipient lesions. Evidence confirms the amount of mutans streptococcus, MS, increases significantly after bracket bonding. So it will be important for the clinician to know the potential risks and for the patient to implement preventive strategies. In addition, nutritional counseling is also warranted and should include education regarding caries-associated diets and nutrient-dense soft foods. Avoidance of sugar or acid beverages, sticky, fermentable carbohydrates, and known cariogenic foods will be important in preventing decalcification during orthodontic therapies.

Another part of our hard tissue assessment should also include CAMBRA.
CAMBRA, Caries Management By Risk Assessment, is a process of care that assesses risk for caries and based on that risk will dictate particular treatment and preventive strategies. The overall goal of CAMBRA is to prevent disease with emphasis on non-surgical means for repairing or remineralizing the tooth structure. In 2007, Featherstone and Colleagues authored papers in two issues of the California Dental Association Journal. These journal articles are open to the public and are located at www.cda.org. Once you’re on the site, you can type CAMBRA into the search engine and then click on the CDA journal links for the October and November 2007 issues.
Overall, CAMBRA is a methodology of identification of the cause of disease by assessment of risk factors for each individual patient. Risk factors are then managed through behavioral, chemical and minimally invasive procedures. And of course, the evaluation is segmented into 0-5, and then of course, 6-adult, based on permanent and deciduous dentition.

CAMBRA takes into account the protective factors, risk factors and the disease indicators for each individual patient. The more risk factors and/or disease activity lead to a higher chance of developing caries and thus a strategic approach to disease prevention.
Here we see an example of the CAMBRA risk assessment form. This form is available at the website previously mentioned and provides a logical approach to assessing risk. Of interest with respect to our topic today, you’ll see that those wearing orthodontic appliances place them at a higher than normal risk for caries. Combining this with past disease history and protective factors will provide clinicians a clear picture for overall risk.

Now once your risk has been determined this chart, again available at cda.org, gives suggested treatment and preventive protocols. You’ll see from frequency of radiographs to frequency of recall visits, to use of fluoride, calcium and phosphate products, to use of antibacterials, this chart provides key suggestions based on risk.
Once assessment has taken place and the patient has been identified for a candidate for orthodontic therapy, the orthodontist will decide the best method for occlusal therapy. To review, One-Phase fixed orthodontic appliances are used to move teeth successfully and generally require 24-36 months of active therapy. Systematic approaches move teeth sequentially and may include extraction. This treatment is generally initiated when the permanent teeth have erupted, thus providing a clear and concise understanding of growth and treatment predictability. This method often involves extraction therapy and may not address facial or profile concerns. A combination of brackets, bands, arch wires, and ligation make up this treatment regime.
We also have the option of Two-Phase treatment which incorporates early intervention for those with moderate to severe malocclusion and is initiated in the mixed dentition phase. The second phase includes active ligated brackets and the first phase generally lasts 6-14 months utilizing any variety of appliances designed to correct skeletal imbalances or neuromuscular problems, crowding, or to treat the effects of oral habits such as digit sucking.

Rapid maxillary expansion appliances to headgear, to lip bumpers to functional orthopedic appliances may all be used during this phase. These treatment approaches take advantage of growth and pave the way for traditional fixed appliances.
Appliances typically utilized in Two-Phase therapy include rapid palatal expanders to gain maxillary arch width, headgear to restrict the downward and forward growth of the maxilla, lip bumpers to provide expansion and upright posterior teeth while preventing the forces of the orbicularis oris structures and functional orthopedic appliances which position the mandible forward and include appliances such as the Herbst and Frankel. There is a thought that these Two-Phase appliances are invasive and have a high potential for non-compliance.

Here we see a case that used rapid palatal technology. Unfortunately, we also see recession that appears to be directly related to where the bands were placed in the RPE.
The Impact of Using Heavy Forces

You can see that she has visible recession in specific areas: the cuspid, the first bicuspid, and the molar. Coincidentally, this is where the RPE was exerting force during treatment.

Research has begun to look into the question of the periodontal effects of rapid palatal expanders. This particular study showed that RPE use resulted in unwanted periodontal compression, root resorption, reduction in buccal bone thickness, which is what we viewed in the past two slides, as well as induced dehiscence on the buccal aspects. As research continues, we have seen an emergence in new technologies designed to provide a minimally invasive approach to tooth movement that also do not involve extraction or the use of rapid palatal expanders.

Expansion vs. Adaptation Literature Review

- AJO Study shows that in addition to creating unwanted periodontal compression and root resorption, RPEs reduced the buccal bone thickness and induced dehiscences on the buccal aspect.
Here we see a great example of an ad from the orthodontic community touting non-extraction and non-headgear methods.

So both One-Phase and Two-Phase methods use fixed bracketed appliances and by the very nature of orthodontic brackets, bands and archwire ligation, plaque control will be increasingly challenging. And as such, professional and daily care strategies should be modified accordingly. In addition, active ligation has recently been looked into in terms of force applied on the teeth as well as unnecessary friction. Research is also looking into different approaches that will result in predictable outcomes and provide a minimally invasive approach.
This makes sense. Not only are consumers seeking less invasive approaches, they are also looking for quicker treatment times and systems that are easier to maintain. Conventional ligative braces pose challenges which include: a failure to provide and maintain full archwire engagement, high friction, elastic ligature that loses its elasticity over time. I mean, you think about it and you put on any kind of rubber band material and automatically you start to lose or have an idea of the force exerted by that elastic material. We see a potential impediment to oral hygiene and we also understand that wire ligation is slower.

There is no doubt that tooth movement sciences have evolved. Today, we now have technologies that are aesthetically pleasing, that reduce forces on the dentition providing a minimally invasive approach, and even those that involve surgical intervention. These technologies include aligner technology, passive self-ligation systems or bi-adaptive therapy and accelerated osteogenic orthodontics.
Let’s take a look at aligner technology which was introduced in 1999. This technology includes a series of removable aligners worn throughout the treatment phase. This invisible therapy option has been popular with those patients who would not consider fixed orthodontic traditional appliances. Those who would benefit include adults and teens with mild occlusion, mild to moderate crowding and mild to moderate spacing issues. They would also require non-skeletal, constricted arches and those who have experienced relapse from previous treatment are all candidates for this type of technology. A certification course is required to be completed for both orthodontists and general dentists to be able to offer this technology to their patients in order to assure optimal success.
Aligners are worn 24 hours a day and they must be removed for eating, drinking and oral hygiene. They’re distributed in 4-6 week intervals with 2-3 aligner sets per appointment. Patients are instructed to change their aligners every 2 weeks, returning for monitoring appointments that include an evaluation of attachments, spacing, oral hygiene, periodontal status, and the need for interproximal reduction.

This technology has given rise to some controversy over the clinical research as many of the published papers are case reports. Concerns over final outcome to correct malocclusion and the potential for relapse have been reported. In addition, because of the ease of removal, patient compliance with the aligners must be carefully monitored. Commercially available aligner systems include Invisalign, New Brace, and ClearCorrect. The popularity of this technology has confirmed that adult patients are not only interested, but are willing to pursue orthodontic treatment.
While fixed appliances have been readily available for decades, the use of appliances with lighter forces that work in natural harmony with the body, or bio-adaptive therapy, is growing in popularity. It has been well understood and accepted that light forces will be effective and quickly move teeth. The challenge has been to develop a fixed appliance that will allow light-force action with minimal friction and moderate force, as seen when archwires are ligated to fixed appliances.

Bio-adaptive therapy utilizes 100x less than traditional mechanics, while maximizing availability for oxygen and periodontal remodeling. The presence of oxygen is the trigger on the periodontium and thus, tooth movement. A review article on the effects of orthodontic therapy on periodontal health in adults confirms that when forces are kept within biologic limits, gingival inflammation is avoided and further, that light forces are recommended to avoid root resorption for the periodontally healthy adult patient. Uniquely designed self-ligating brackets have also been said to serve as mini-lip bumpers and as a result, the forces of the lips and cheeks help move the teeth into their physiologic position. Additionally, passive ligated brackets lend to better patient comfort, improve the ability to minimize plaque biofilm accumulations around the brackets because there are no O-rings for elastic or wire ligatures and the archwires can be easily removed for hygiene appointments. Both adolescent and adult populations are appropriate for bio-adaptive orthodontic therapy.

### Passive Self-Ligation Advantages

- Utilizes forces 100x less than traditional mechanics (low force/low friction)
- Minimally invasive, synergistic approach
- Shorter treatment time, fewer appointments
- Higher patient acceptance...
There are three pillars to bio-adaptive therapy. Passive self-ligating brackets, which eliminate the need for the elastic or the O-ring ligature and result in low friction, improved comfort, and better hygiene. The second pillar is new wire technology which maintains lighter forces with fewer adjustments; and the third pillar is a minimally invasive mechanic which will result in fewer extractions and near-elimination of headgear and/or rapid palatal expansion appliances. In essence, bio-adaptive therapy utilizes passive ligation and light wires that create light forces and low friction which do not cut off the blood flow to the alveolar bone. This technique holds particular promise for patients at high risk for periodontal disease as gentle movement that repositions the teeth in the arch will minimize inflammation and encourage growth of new alveolar bone.
Note the periodontal health pre- and post-treatments. Aside from the posterior region it’s also interesting to note the regeneration of interdental papilla between 8 and 9. This passive self-ligation case took only 12 months and 12 appointments.

One other relatively new option in the field of tooth movement sciences is that of Accelerated Osteogenic Orthodontics™. This protocol includes a surgical phase after the placement of brackets where alveolar decortication and placement of grafting material takes place. In essence, the action of osteoclasts and osteoblasts are accelerated through surgical intervention. Clearly, an invasive procedure and process but one that will speed up treatment time.
Regardless of the tooth movement system or science used, the role of the dental hygienist in referral for correction of malocclusion is obvious. And working with the practitioner providing orthodontic treatment is crucial in developing the dental hygiene process of care. We will look at the dental hygiene process of care for pre-orthodontic therapy, active orthodontic therapy, and post-orthodontic treatment.

The Pre-Orthodontic Dental Hygiene Care Plan should include careful evaluation of the periodontal and hard tissues and be treated appropriately. Pre-therapy dental hygiene intervention will include full mouth instrumentation, evaluation of daily care strategies, planning for dental hygiene care during therapy and post therapy considerations. Patient’s health, risk factors and current oral hygiene practices will further dictate the care plan. For periodontal cases clinicians should consider implementing full mouth disinfection or accelerated instrumentation-phased appointments. This is a process of accelerated treatment that is based on research in which the protocol included full mouth instrumentation within 24 hours, use of chlorhexidine and professional and daily tongue cleaning.
Full mouth disinfection research has shown this protocol to be more effective than traditional quadrant scaling and root planing over time. Think of it this way: our partial mouth disinfection over time requires 4 appointments 2 weeks apart, and if the patient meets those appointments, it’s 6 weeks of treatment.

When we follow the full mouth disinfection protocol, research has shown that there is a gain in clinical attachment, greater reduction in probing depths, eradication of p. gingivalis, greater reduction of spirochetes and modal organisms subgingivally, and greater reduction in oral malodor. These results were maintained for 8 months post-instrumentation. Researchers questioned that partial mouth approach; 4 appointments 2 weeks apart over 6 weeks and their concern being the translocation of biofilm and bacteria from infected, non-instrumented sites to newly instrumented areas of the mouth and the ability of the immune system and healing response to kick in as far as success with instrumentation protocols.
Since the 1990s, full mouth disinfection research has continued and interestingly, they have combined that accelerated protocol with adjunctive therapies. These studies clearly demonstrated the importance of an accelerated instrumentation phase prior to the application of locally applied medicaments.

And furthermore, the good news is that just about all periodontal research today starts with an accelerated instrumentation phase that lasts no more than a few days to 2 weeks. From locally applied antimicrobials to the use of lasers to automatic toothbrushes, this accelerated instrumentation protocol is important for establishing baseline data. So as far as an evidence-based approach, when we combine periodontal research with full mouth disinfection research, we clearly have the rationale to implement this type of periodontal care.
And I like to look at it this way: imagine seeking medical treatment for an open wound only to be told that, “We’re going to take care of one quarter of that wound, send you out and you’re going to return in 2 weeks, and over the course of 6 weeks we’ll take care of that active infection.” Certainly doesn’t make sense and with this in mind, looking at the full mouth disinfection research we have the opportunity to consider some treatment modalities that were not used in the original research to increase the success of this approach.

Suggested modifications to this protocol include the use of powered instruments, as only hand instruments were used in the original data. We can simultaneously administer antimicrobial agents such as chlorhexidine and there are now a number of different powered options on the market today, both in the piezo and magnetostrictive categories. From wireless foot controls to inserts that light, powered scaling has evolved into an important part of the clinician’s armamentarium.

Another consideration, especially for the orthodontic patient, is air polishing. This quick and effective means to de-plaque appliances is utilized quite frequently within the orthodontic community.
Another modification is the use of locally delivered antimicrobials. Here we see the chlorhexidine chip at 35%, 10% doxycycline gel, 1mg minocycline microsphere, and for generalized periodontal conditions, we might consider sub-dose doxycycline. This can be used in conjunction with accelerated instrumentation and may help fast-track the healing process for the orthodontic patient.

The original FMD research also included tongue brushing for 60 seconds after the instrumentation phase. This not only seems uncomfortable, but unrealistic for clinicians and patients alike. Instead we can replace this procedure with tongue cleaning via a tongue scraper as we see here. Professional tongue de-plaquing not only removes instrumentation debris, but is also an excellent opportunity to educate patients on the importance of daily removal of this large intraoral biofilm which can contribute to disease processes and is the main culprit in oral malodor.
For the adult and/or periodontal patient headed for orthodontic treatments this process of care accounts for our client- and clinician-centered approach to periodontal therapy that will maximize clinical outcomes while providing immediate benefits. And completing periodontal instrumentation within 1-2 weeks is an easy factor to control that will lend to fast-tracking orthodontic treatment plans, healing, and referral.
So we’ve finished up with our Pre-Orthodontic Phase, let’s take a look at the Active Orthodontic Dental Hygiene Care Treatment Plan. This should include more frequent re-care visits based on caries risk and periodontal status. Instrumentation during the orthodontic phase of therapy is very important to treatment success and should include the use of powered scalers and/or air polishing devices to de-plaque all areas around the appliances and soft tissue. Research has demonstrated an increase in AA as well as strep. mutans when orthodontic appliances are present.

Thorough instrumentation will assist in maintaining the periodontal health. Working with the case orthodontist will allow the clinician to coordinate archwire removal and/or receive prior approval to remove the archwires for optimal access. Regardless of the periodontal status all orthodontic cases should receive in-office fluoride treatments and this is confirmed and verified through CAMBRA as well.

The most effective and recognized in-office method is 5% sodium fluoride varnish. And fortunately, and currently, the Food and Drug Administration has approved varnish for the treatment of hypersensitivity. However, clinicians have been utilizing varnishes in the treatment and management of dental caries in public health and other arenas for years. And interestingly, the American Dental Association adopted policy encouraging the FDA to approve varnishes for the prevention and the treatment of caries.
Clearly, the use of fluoride is important in reversing demineralization and the orthodontic patient is at particular risk. As such, professionally applied fluorides will jump-start their remineralization therapy.

Professionals have justified using 5% neutral sodium fluoride varnishes under an off-labeled use via professional judgment based on sound research and the current American Dental Association professionally applied, topical fluoride, evidence-based clinical recommendations document. This document advocates the use of varnish for caries prevention as a professional treatment. Fluoride varnishes have been utilized successfully outside the United States for the treatment of caries for more than 25 years. A 40% or more caries reduction has been demonstrated with varnishes which is comparable to acidulated or APF tray treatments. Fluoride varnish
offers distinct advantages over tray systems such as the ease of application to a multitude of individuals in a variety of settings. In addition, APF has been known to affect the frictional forces of titanium brackets that are used by some orthodontists. Dental hygienists need to know what type of brackets the patient’s orthodontist is using. Varnish application does not require trays or expectoration and thus very little is needed with respect to materials or equipment and is ideal for the orthodontic patient.

Fluoride varnish has been shown to be a viable strategy to prevent enamel demineralization particularly around orthodontic brackets. Additionally, varnishes provide a time-release method to deliver fluoride directly to the areas needed and new formulations now also include amorphous calcium phosphate, or ACP, to enhance remineralization and decrease sensitivity.

Opinions differ with respect to frequency of application of varnishes from every few months to twice a year. Rochans* reports that applications every 3-6 months will reduce decay rates and research has indicated this is an important interval for those at high risk or disease activity as we see with the orthodontic patients. Most manufacturers now offer unit dose for convenience and optimal product usage. Varnishes should not be applied immediately prior to bonding of orthodontic brackets because research has indicated that the bond strength may be compromised. It’s important, therefore, to allow 2-3 weeks time before bonding takes place.

Here we see a new product to the market that incorporates a slow time-release of fluoride along with tricalcium phosphate. This product differs from fluoride varnish in that it requires light activation to cure the ionomer. The result is sustained release of both fluoride and calcium.
And here we see the product being placed which produces an aesthetically pleasing result around the brackets and bonding that cannot be seen.

New to the category of professionally applied varnishes is one that contains chlorhexidine and thymol. This method of delivery of chlorhexidine provides for longer retention, eliminates the side effects seen with daily rinsing, prevents bacteria from adhering to the tooth surface, affects bacterium metabolism and destroys the cell walls of flora. The thymol is a component of essential oil gained from thyme. It belongs to the family of phenols and displays an antimicrobial effect when combined with pronounced spongistatic properties similar to those seen with chlorhexidine. Thymol has a denaturing effect on proteins and destroys
cell membranes. Therefore, thymol inhibits growth of a large number of microorganisms. Although the package concentration is 1% for both chlorhexidine and thymol, when the solvent evaporates the resulting concentration is 10%. Keep in mind that daily rinse is 0.12%. This product can be applied 4 times a year when using it in conjunction with a professional fluoride treatment, be it a tray or varnish. It should be placed prior to the fluoride treatment.

Additional considerations for the orthodontic patient include: management of aligners—how can we keep those clean and fresh; arch wire removal by collaborating with the referring orthodontic practice—can we have that archwire removed for easier access during instrumentation? Of course, reinforcement of the orthodontic treatment plan; review of oral hygiene instruction and special tools designed for orthodontic appliances; and of course, we want to remember that healthy tissue lends to quicker tooth movement results. Let’s take a look at daily care strategies to consider for the orthodontic patient.
The orthodontic patient represents unique challenges due to the fixed nature of the appliances or maintaining even those that can be removed. Pretreatment education should include mechanical and chemotherapeutic means to control oral plaque biofilm from around the appliances, the surface of the tongue, at the gingival margin, and interproximally. Of course, the goal is to prevent caries or decalcification, oral malodor, and periodontal infection. Let’s take a look at various mechanical options for this patient population.

Mechanical methods for plaque biofilm control include the use of power toothbrushes, and in particular, sonic frequency devices have been researched in the orthodontic population and shown to be effective while not compromising bracket bond strength. Ideally, manual toothbrushes should be replaced with power devices as research has proven that these are not only safe for fixed appliances, but they are more effective at removing bracket retentive plaque and stain. In addition, powered brushes offer a highly effective means for applying fluoride or other agents throughout the oral cavity.
As we know, the majority of the patient population do not perform flossing on a regular basis and it is so important for the orthodontic population. While floss threaders have long been available, many clinicians report they pose a huge problem with the respect to ease of use and thus compliance can be lacking. Alternatives for interdental hygiene include oral irrigators, and you want to use them on a slightly higher setting; toothpicks, interdental brushes, or even mechanical flossers.

One such device has demonstrated equal effectiveness to traditional floss and is extremely easy for those with fixed appliances to use. Unique tools now available include flossers that slide up and underneath the brackets and irrigation devices with small brushes at the tip to de-plaque areas around the brackets while flushing away collective biofilm.
Other products to consider might include these pictured here, and ArchWired.com, a site designed for those individuals undergoing orthodontic care. The site includes discussion groups, tips and comments regarding various orthodontic systems and provides the opportunity for those looking for resources relating to their specific treatment to connect.

Daily tongue coating removal is the single most effective means to maintain fresh breath while removing a significant plaque biofilm containing periodontal and caries-related flora. Patients should be instructed to use the tongue cleaner at least once a day and they can combine it with volatile sulfur compound neutralizing sprays, such as those containing chlorhexidine or cetylpyridinium chloride to maximize fresh breath results. Daily tongue cleaning may also be key in preventing staining chromogens from depositing on the teeth and/or around the orthodontic brackets and bands. Here we also see some additional products addressing the unique concerns for the orthodontic patient.
Additional daily care strategies should also include the use of chemotherapeutics. Chemotherapeutics will go a long way in maintaining both hard and soft tissue health during the orthodontic treatment. And it is well documented and accepted, of course, that fluoride is an important part of preventing decalcification and sensitivity in this patient population.

There are two types of fluoride options, neutral sodium and stannous. The 5,000 PPM prescription strength neutral sodium fluoride product will provide 5 times the concentration of fluoride over the over-the-counter available toothpaste. Twice-a-day application is recommended either via toothbrush or in a custom tray. And 5,000 part-per-million neutral sodium fluoride is safe to use on aesthetic restoration and has minimal to no side effects such as staining or tissue irritation. In addition to daily fluoride, calcium phosphate, Xylitol, and chlorhexidine can be of benefit to the orthodontic patient.
Relatively new to the caries control armamentarium are the calcium and phosphate delivery systems, which enhance remineralization while providing desensitization. Four delivery systems are currently available. The first is casein phosphopeptide-amorphous calcium phosphate, or Recaldent. This is a time-release formulation that will activate when the pH drops to an acidic level and it is found in professionally dispensed take-home products. The next system is calcium sodium phosphosilicate or Novamin, which is a bioactive glass silicate. It will elevate the pH and then release the calcium and phosphate. CSP is found in numerous professionally applied products as well as professionally dispensed take-home products. The next calcium phosphate system we see is tricalcium phosphate, which is released when it comes in contact with saliva and is found in both professionally applied and professionally dispensed products. And the final category is amorphous calcium phosphate or ACP, which is an immediate release agent found in numerous professionally applied and professionally dispensed daily care products. All of these systems work best when combined with fluoride, and as a result many of the formulations include fluoride. In addition, the ACP product also contains potassium nitrate for extra sensitivity control. Here we see the categories of available systems for daily care. All of these are available only and exclusively through the dental practice.
Xylitol containing products will also benefit the orthodontic patient. Xylitol is naturally occurring, diabetic safe, low calorie sugar that is not metabolized by mutans streptococcus, or MS. It will inhibit MS attachment and thus decrease bacterial load. And Xylitol starves MS in a manner similar to removing sucrose from the diet completely. Xylitol can also be found in professionally applied 5% neutral sodium fluoride varnishes as well.

Finally, chlorhexidine may also be considered for the orthodontic patient, especially if both periodontal and hard tissues concerns exist. Chlorhexidine gluconate will certainly prevent gingivitis and is being used to treat moderate to advanced caries. However, the staining and taste make this a last choice. If recommending as a daily rinse, powered toothbrushes should be used in conjunction to minimize the staining. These agents can also be placed into oral irrigators to enhance access throughout the oral cavity, including the niches around brackets and bands. Research now also indicates that a spray delivery may be as effective as rinsing regimes. Sprays are
also ideal to use in combination with tongue cleaning practices. Alcohol-free rinses containing cetylpyridinium chloride have also gained in popularity especially with adolescent population. And one such rinse also contains zinc, a known VSC or oral malodor neutralizing agent. We see here an alcohol-free option for chlorhexidine and for those who will not comply with recommended daily routines, we also now have, as we previously discussed, the chlorhexidine varnish which will last for 3 months per application and does not have any of the side effects related to rinse products. The role of the dental hygienist in collaboration with the referring orthodontist is important in monitoring the health during active therapy and includes coordinating professional and daily care strategies. The outcome of corrected occlusion is equally important to that of the health of both hard and periodontal tissues. And clearly, dental hygiene protocols will be key in the overall success.

The Post-Orthodontic Dental Hygiene Care Plan should include a periodontal and caries activity evaluation with the indicated dental hygiene instrumentation. Although the orthodontic office strives to remove excess bonding used to secure brackets and bands, the dental hygienist needs to evaluate for residual bonding following the debanding process. To determine whether residual bonding is present, the dental hygienist will need to use air to dry the tooth surface. In some cases, ultrasonic instrumentation or high-speed hand pieces will be needed to remove excess bonding. Also at this time, areas of decalcification can be addressed and many clients opt for tooth whitening to complete their smile enhancing process. Finally, a review of retention devices and how to maintain them should be addressed.
Retention...is...Life Long!

- Removable retainers
- Fixed retainers
- Aligner style retainers

For many of these patients, retention will be a life-long reality. They may include devices that may be fixed or removable. Methods to maintain both fixed and removable appliances should be offered and can include cleaning removable appliance with powered toothbrushes, daily use of power toothbrushes for fixed retention appliances, as well as use of products designed to clean and freshen. These recommendations can also be made to patients using the aligner technology for tooth movement or retention. The dental hygienist will need to motivate the patient to follow the orthodontist’s recommendations for retention therapy and life-long success of their orthodontic treatment.

Action Items?!

- What products will you order?
- What additional information/resources?
- How will your protocols change?
- How will you implement collaborative practice?

In this program, we discussed the role of the dental hygienist in recognizing patients who would benefit from orthodontic therapy. We reviewed the periodontic/orthodontic connection and current science regarding orthodontic treatment as a viable means to treat periodontal disease, and we also looked at current options in orthodontic therapies as well as defined the dental hygiene process of care as it relates to the orthodontic patient. As a result of this program, how will you change your process of care? What products will you need to order? What additional information or resources will you need? Will your hygiene protocols change? And
finally, how will you implement collaborative practice that benefits the patient, the referring orthodontic prac-
tice, and your own practice? Clearly, tooth movement sciences have evolved to be an option that can be
offered throughout life. The dental hygienist is in a particularly unique position to identify candidates for
orthodontic treatment, be an active part of therapy and assist in maintaining life-long results.
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Examination Review

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1. The American Association of Orthodontists estimates that:
   A) 25% - 40% of Americans would benefit from orthodontic therapy
   B) Over 90% of Americans would benefit from orthodontic therapy
   C) 50% - 75% of Americans would benefit from orthodontic therapy
   D) None of the above

2. The American Association of Orthodontists rational for adult orthodontic therapy includes:
   A) Prevent or improve periodontal problems
   B) Prevent or reduce further bone loss
   C) Improve ability to restore missing teeth
   D) Improved aesthetics & function
   E) All of the above

3. According to the American Academy of Periodontology:
   A) Occlusal therapy is an integral part of periodontal therapy
   B) Occlusal therapy is contraindicated for those with chronic periodontal disease
   C) Occlusal therapy will result in tooth loss
   D) Occlusal therapy will result in bone loss

4. Patients with this facial type often appear younger:
   A) Mesocephalic
   B) Brachycephalic
   C) Dolichocephalic

5. The role of the dental hygienist in orthodontic therapy include all but:
   A) Candidate identification
   B) CAMBRA
   C) Bonding brackets
   D) Pre-bonding deplaquing/instrumentation
   E) Clinical application of fluoride

6. All of the following statements are true, except for:
A) Fluoride varnish is not a replacement for tray fluoride treatments
B) Calcium and phosphate containing products will assist in preventing caries
C) The orthodontic patient is considered a moderate to high risk for caries according to CAMBRA
D) Accelerated periodontal instrumentation protocols will fast track orthodontic banding/bracketing
E) Chlorhexidine varnish will affect bacteria associated with caries

7. Advantages of passive self-ligation systems include:
   A) Utilizes forces 100x less than traditional mechanics (low force/low friction)
   B) Minimally invasive, synergistic approach
   C) Shorter treatment time, fewer appointments
   D) Higher patient acceptance…
   E) All of the above

8. All of the following statements are true, except for:
   A) The dental hygienist has a key role in orthodontic success
   B) Adults with periodontal infection and occlusal traumatism may benefit from orthodontic therapy
   C) Calcium and phosphate containing products should not be used with fluoride containing products
   D) Daily care strategies for the orthodontic patient include use of automated plaque control technologies and appropriate chemotherapeutics such as fluoride, chlorhexidine, calcium/phosphates & xylitol