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Who Gets to Whiten Teeth?

Washington columnist continues the controversy with attack on dental profession.

In an opinion piece that appeared recently in the Washington Post, columnist George F. Will took on the “teeth-whitening monopoly.” He cited a case in Connecticut in which teeth-whitening salons had sued the Connecticut State Dental Commission for what amounted to restraint of trade. The court disagreed, and the plaintiffs appealed. The 2nd Circuit Court of Appeals ruled in favor of the defendants. Now the plaintiffs have appealed to the U.S. Supreme Court, which has agreed to hear the case.

According to Mr. Will, this is just another case of the haves getting what they want from government to the detriment of the have-nots. He makes some pretty outlandish statements to prove his point, accusing the Connecticut State Dental Commission of trying to protect its own. It is true that the commission is made up entirely of dentists, so to an outsider, it might appear it’s a rigged game. The commission is empowered to write laws governing the practice of dentistry in Connecticut. It is Mr. Will’s contention that the commission writes only laws to protect dentists’ incomes, with no regard for what is good for the public. He sees this as a purely economic problem, where “big dentistry” is interfering with the rights of teeth-whitening salons—dentists charge $350 and up for teeth-whitening, while the salons charge $150 for the same treatment.

Mr. Will goes on to argue that teeth whitening is a simple, safe procedure that patients can administer to themselves with materials they can purchase without a prescription. While this is true for home whitening systems such as Crest White Strips, I don’t know of any system available to consumers that uses a light to activate the product. Most are simply 10% carbamide peroxide impregnated strips you leave on your teeth for approximately 20 minutes at a time. And, while most whitening products are safe to use, there can be serious side effects, tooth sensitivity being the most significant. People with many restorations in their mouths seem to be more prone to sensitivity reactions, particularly if there is recurrent decay under these restorations. The 10% concentration of carbamide peroxide is for home bleaching kits you can buy over the counter. The concentration in light or laser-activated products is much higher. Without proper supervision, this could lead to problems.

Mr. Will notes that in Connecticut, the commission can institute fines of up to $25,000 or up to five years in jail per incident for assisting a patron by placing the whitening products on the teeth and positioning the light. He maintains this
constitutes “a politically connected faction bending public power for its private benefit by crippling competitors.” I’m sure that is the motivation behind the Connecticut State Dental Commission and its regulation of the practice of dentistry in Connecticut. There is absolutely no thought on its part for public safety. Of course, I’m joking, as I am sure the sole motivation of the commission is to do exactly that, protect the public.

The whitening salons in Connecticut are represented by the Institute for Justice, which is arguing that “it is unconstitutional to require someone to have eight years of higher education before they can point a flashlight at someone’s teeth.” Where do I start with that statement? Mr. Will called this a “patent truth.” Does this mean there will be other areas of dentistry where our dental degrees will be meaningless? Is do-it-yourself orthodontics and endodontics on the horizon? There are already do-it-yourself clear aligner treatments available. All you have to do is send in maxillary and mandibular impressions and photos and a company will make a series of clear aligners to straighten your teeth. There are two companies in the United States providing this service. There are also YouTube videos describing how to close a maxillary midline diastema with rubber bands. Both of these are fraught with danger. When I was in dental school, one of the faculty members actually did an endodontic procedure on himself, or so it was reported. That took a lot of bravery, but at least he had the necessary training.

Mr. Will argues that if the Supreme Court finds in favor of the defendants and upholds the 2nd Circuit’s ruling, the rational basis test becomes meaningless, thereby ending judicial review of economic activity. Again, in Mr. Will’s own words: “This will become an unlimited license for government to impede access to professions, reward rent seekers and punish consumers, thereby validating Americans’ deepening disdain for government.”

I have to disagree with Mr. Will. Dental commissions are there for a purpose, and that purpose is not to protect the dentists they serve but rather the public. In my experience, dentists are among the most altruistic professionals around. Sure, there are dentists...
more concerned with their bottom line and maximum profits. Fortunately, they are the exception. Most dentists I know are caring, giving individuals who only have their patients’ best interests at heart.

If I could address Mr. Will, I would tell him that states have given dentists the right to oversee the practice of dentistry, not to aggrandize themselves but to guard the public from abuses that could occur if there were no oversight. In New York State, we have a State Board of Dentistry, but our rules and regulations originate from the Department of Education. The Board of Dentistry oversees licensed individuals providing dental services. Its goal is to protect the oral health, safety and welfare of the citizens of New York State. It does not exist to make sure there is no competition to licensed dentists but, rather, to make sure licensed dentists provide the best possible, ethical care to their patients.

It may be difficult for Mr. Will to comprehend, but sometimes the people who provide treatment and have been trained to provide treatment are also the ones who know best who can provide that treatment. It isn’t always about limited government, but what is best for the public. Sometimes the government appoints boards of experts to oversee various fields of endeavors, not because these boards want to control what goes on, but because they truly are the ones who know what is best. In the case of dentistry, that would be dentists. And when the whitening process goes wrong, who do they seek first to correct the problem? Not the teeth-whitening salons, but the dentist. And correcting the problem can be worse for the patient than the original desire for white teeth.

No, Mr. Will, this is not a David vs. Goliath situation, but what is best for the public. Sometimes what seems like an innocuous process can become problematic. If you don’t have the training necessary to handle complicated situations, you shouldn’t be doing the procedure. The public deserves this protection. That is why there are state boards of dentistry. Let’s hope the Supreme Court sees it this way as well. If it doesn’t, we are headed down a slippery slope indeed.

[Signature]
D.D.S.
Just who is running the show? I noted in a recent edition of the ADA News that United Concordia Insurance Co. will be denying claims for periodic dental X-rays taken in the absence of patient symptoms. Only X-rays taken with prior symptoms will be paid, according to FDA guidelines. Nice that our ADA has opposed this new policy, but a letter of disapproval will not stop these continual incursions into how we run our practices. We agree that it is in our patient’s best interest to limit radiation exposure, on any level, and both our profession and manufacturers have made outstanding progress in this area.

In my 52 years of practice, like all practitioners, I have found so much asymptomatic pathology simply by trying to be thorough and do radiographs periodically. And that frequency can vary with what we might be following. But the absence of symptoms is not our criteria for not being thorough. Our patients expect nothing less. Just think. Do you want your M.D. not to do diagnostic annual physicals, even though you feel O.K.? Does your M.D. do urine analysis, bloodwork, pupil dilation, bladder ultrasound, calcium scores, stool assay, cervical smears, nuclear stress tests, A1-C levels check, EKG and palpate the abdomen? It would be irresponsible and negligent to abdicate that responsibility to you because of an insurance company limitation. Certainly, one does not need to do every test known to man to feel that he or she has been thorough.

This whole business with insurance companies and X-rays is a smoke screen and has little to do with patient radiation exposure, albeit, that is the reason given. It really has to do with denying patients their rights to proper care and, thereby, increasing the profit bottom line. Does anyone really doubt that? The insurance companies are just looking to make us the “bad guys” by shifting costs.

To wit, in some states, insurers are denying claims for anterior restorations unless accompanied by postop radiographs. Why is it okay to have dentists prove care was rendered with an X-ray and, at the same time, deny diagnostic X-rays? So much for patient protection. The good news is that New York State law prohibits that practice, another feather in the cap for EDPAC and an enlightened Legislature.

I get it that insurance companies sign contracts with employers to provide coverage for defined services. It is always their decision as to what gets included in coverage, based on appropriate contractual agreements. But, entering into the field of medical/dental decision-making for patients, that is where the line must be drawn. We have the training and expertise; they do not.

As long as I have been practicing, this attitude of incursion and encroachment has been how insurance companies function. Their bottom line always takes precedence over patient and doctor care. So, when your patients ask, “How come this wasn’t covered?” Or want to know why the insurance company called the treatment unnecessary or said it exceeded reasonable and customary costs, your answer should simply be informative. Tell your patients that what is covered is mostly a reflection of an employer/insurance contract, based on what the employer wishes to spend. The insurance company then seeks to maximize its profits within that guideline.

By denying coverage, we are not allies. Our interest is proper care; theirs is profit. And, tell the insureds that they can register their dissatisfaction by contacting the appropriate management person. It is getting harder to run our own show.

Dr. Schwartz is corresponding secretary of the Dutchess County Dental Society.

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Efficacy of a Prenatal Oral Health Program
Follow-up with Mothers and their Children


ABSTRACT

Brookdale Hospital and Medical Center’s Prenatal Care Assistance Program (PCAP) provides oral health education and treatment to expectant mothers from a minority, impoverished, high-risk population. A chart review examined dental records for 42 children of mothers who took PCAP training versus 49 children of mothers who did not. At age 2, the children of PCAP mothers had fewer dental caries, less severe dental caries and fewer extractions. When combining children at ages 2 and 3, results were statistically significant and clinically important. Evidence strongly suggests the PCAP program can lead to vastly improved oral health of participants’ young children.

According to the Surgeon General, oral health education and treatment during pregnancy is an important strategy to potentially improve maternal and infant health. Maintaining good oral health has the potential to improve the overall health and well-being of reproductive-aged women during pregnancy and also later in life.

In August 2006, the New York State Department of Health (DOH) published guidelines for improved oral health of pregnant mothers to reduce complications of oral disease during pregnancy and childhood caries by limiting the transference of harmful bacteria that can cause dental caries from mother to child. Pregnant women in New York State have dental insurance and, thus, access to care.

The Prenatal Care Assistance Program (PCAP) at Brookdale Hospital and Medical Center Department of Dental Medicine and Oral Maxillofacial Surgery developed a program to provide such care. The PCAP appointments provide education and anticipatory guidance involving oral health care for both the mother and child, whereby significant lifestyle changes may be initiated. The DOH advocates for oral health to be an integral component of prenatal care and suggests that all prenatal care providers encourage oral health exams for all pregnant women who have not received dental care in the past six months. Access to oral care in this population has been inadequate and, therefore, it seems appropriate for all women enrolled in PCAP to be referred for oral examinations and education.

Acquiring harmful caries-causing bacteria earlier rather than at an older age predisposes a child to a greater risk of developing dental caries. Poor maternal oral health, poor oral hygiene behaviors and high sugar diets that promote high colonization with S. mutans may increase contamination of the child’s oral cavity and the presence of substrates for harmful bacteria growth. Maternal oral flora is one of the greatest predictors of the oral flora of infants and children. Behavioral interventions involved in PCAP dental appointments, such as smoking cessation, exercise, healthy diet and maintenance of optimal weight, are also useful tools for promoting overall systemic health for the mother.
A woman’s knowledge and action for her own health are critical to the oral health of her child and may be key to the prevention of childhood caries. Although nurses are concerned with numerous aspects of the health of pregnant women, the health of maternal and fetal dentition may be overlooked. As a result of recent studies and findings that periodontal disease may be a risk factor for preterm low birth weight, nurses and dentists are becoming more concerned with oral health during pregnancy.

The presence of maternal periodontal disease and active infection has been associated with adverse pregnancy outcomes, such as preterm birth, preeclampsia, gestational diabetes, delivery of a small for gestational age infant and fetal loss. Evidence exists that periodontal treatment during pregnancy leads to a reduction in preterm birth risk.

Optimal nutrition during pregnancy has been shown to enhance dental health for both mother and fetus by providing important nutrients necessary for gingival health and mineralization of the teeth. Fetal tooth development begins by week six of gestation for the primary dentition and by week 10 for permanent teeth. Tooth development can be affected by severe maternal malnutrition.

The Surgeon General’s goal of improved access to oral health care for all individuals, including pregnant women, needs to include education of all health care providers. Barriers to care involving lack of education, socioeconomic factors, myths of safety of dental care in pregnant women and lack of public support for providing oral health care to pregnant mothers and their children needs to be addressed. It has been suggested that there is great difficulty overcoming urban myths regarding dentists providing, and patients seeking, oral health care during pregnancy.

Material and Methods
A Prenatal Care Assistance Program (PCAP) was developed in 2009-2010 at Brookdale Hospital and Medical Center, Brooklyn, NY. All expecting mothers were referred from obstetrician/gynecologists to the pediatric dentistry residency program. The PCAP offers comprehensive obstetric care and provides prenatal care, employing obstetricians, nurses, social workers, a nutritionist, oral and maxillofacial surgeons, general dentists and pediatric dentists, and a large constellation of support staff.

The PCAP gives dental education and care to a high-risk, impoverished, multicultural socioeconomic-challenged community. Brookdale’s primary service area has an average median income...
of $32,000. Approximately 42% of residents live below the federal poverty level, compared to 22% for the borough of Brooklyn and 19% for New York City overall. The community is designated as a “health professional shortage area” by the Department of Health and Human Services. The disease burden is high for early childhood caries. Maternal and newborn indicators are also poor. The service area is plagued by crime, especially gun violence. The New York City Police Department has designated our primary service area as an “Impact Zone,” due to the high crime rate.20

An application for a new investigation was completed and submitted to the Brookdale Hospital and Medical Center Research and Clinical Projects Committee (IRB). The retrospective chart review was approved to analyze whether patients returned for preventive and treatment visits, both for the mother and child, following the initial prenatal dental screening. The purpose of this data analysis was to determine the efficacy of a prenatal preventive and education program on the dental health of expectant mothers and subsequent oral health of their newborn children. This chart review would also determine the percent of mothers who returned for care for themselves and if and when they returned to a pediatric dentist with their child. The retrospective data from the prenatal preventive and education program would be reviewed and evaluated to determine the level to which the needs of both parent and child were met in this service project. All protected health information was removed, and no patient identifiers were accessible.

The aim of this study was to evaluate if prenatal counseling and care for pregnant mothers promotes oral health in children.

A total of 289 mothers attended Brookdale Hospital and Medical Center’s Prenatal Care Assistance Program (PCAP) and received dental evaluation and consultation from 2010 through 2013. A supplement to this article, available from the authors, describes the program. The number by year varies: 83 mothers in 2010; 74 in 2011; 47 in 2012; and 85 in 2013. Fifty-seven percent (167 of 289) of the mothers have not returned for dental care after the birth of their child. The percent not returning increases with year: 34 (41%) from 2010 have not returned; 36 (49%) from 2011; 31 (66%) from 2012; and 66 (78%) from 2013. It is likely that the mothers’ return rates will become more equal as the children born more recently grow older. Mothers who visited the clinic during pregnancy and after received prophylaxis, scaling, restorations, extractions, preventive care and education.

Of the 122 PCAP mothers who returned for dental care, 45% (55 of 122) have brought a child for dental examination and care. Forty-eight out of the 55 charts were located: 21 (43% of the returning mothers) from 2010; 17 (45%) from 2011; 7 (44%) from 2012; and 3 (16%) from 2013. Missing charts could be simply missing, or purged for storage limitations. Six of the children who were seen were older siblings rather than the recently born child. Children received prevention, fluoride, restorations and, as needed, extractions. Information from chart records on dental caries and extractions were recorded for the 42 available children. Because mothers of younger children have been less likely to return for dental care, the age of the children at their return visit is skewed: 23 (55% of the children) were 3 years old; 16 (38%) were 2 years old; and 3 (7%) were 1 year old.

A comparison group was created by randomly sampling charts of 55 children of mothers who did not participate in the PCAP appointment during 2010-2013. Six of the charts were missing or purged for storage limitations. Of the 49 children, five (10%) were 0-1 years old, 12 (24%) were 2 years old, 19 (39%) were 3 years old and 13 (27%) were 4 years old.

Statistical Methods
The numbers of children with and without caries and with and without extractions were tabulated by age of child at visit and mother’s PCAP participation status (yes/no). By age group, cross-classification by caries status (yes/no) and mother’s PCAP status (yes/no) produces 2 x 2 tables. Similar tables were made by cross-classifying extraction status (yes/no) and mother’s PCAP status. The statistical significance of the association between the two dimensions was assessed using Fisher’s exact test and a Chi-squared
test (one degree of freedom) with a continuity correction. One way to produce a p-value for the test of association using data from children of two or more ages can be computed by adding together cell by cell the tables for the various years and then performing Fisher’s exact or a Chi-squared test. Another way is to use the Cochran-Mantel-Haenszel (CMH) test for stratified 2 x 2 tables. The CMH test can be computed exactly using combinatorial computations or by using a large-sample approximation.

The number of teeth with caries by child was recorded. A two-sample t-test can be used to test the hypothesis of no difference in mean by mother’s PCAP participation status (yes/no) for children age 2 or 3. Tests can be performed for all the children by age group and then for those children with caries. The latter test omits children without caries and assesses the amount of caries among those with caries. One way to combine data from children of different ages is to simply ignore the ages and concentrate the data within groups defined by the mother’s PCAP status. Another way is to fit a linear regression model with effects for mother’s PCAP status and for age.

It is hypothesized that the group of children whose mothers participated in PCAP will be less likely to have caries and extractions and will have fewer caries than the group of children whose mothers did not participate in PCAP.

Results

Table 1 presents the number and percent of children with and without caries by age and by mother’s participation in PCAP dental evaluation and counseling. No children age 0-1 had caries. The rate of not having caries is higher in the children of PCAP mothers than in the children of non-PCAP mothers at age 2 (69% versus 50%, Fisher p-value 0.02, Chi-square p-value 0.03), at age 3 (75% versus 26%, Fisher p-value 0.02, Chi-square p-value 0.04), and overall (70% versus 39%, Fisher p-value 0.01, Chi-square p-value 0.02, CMH p-value 0.02 approximate and 0.016 exact). The rate of extractions in the age 4 non-PCAP children increased further. The analysis suggests that by age 3, the children of PCAP mothers are statistically significantly less likely to have dental caries.

Table 2 presents the number and percent of children with and without extractions of four teeth (DEFG) by age and by mother’s participation in PCAP dental evaluation and counseling. No children age 0-1 had extractions. The rate of not having extractions is higher in the children of PCAP mothers than in the children of non-PCAP mothers at age 2 (94% versus 67%, Fisher p-value 0.13, Chi-square p-value 0.18), at age 3 (91% versus 68%, Fisher p-value 0.11, Chi-square p-value 0.14), and overall (92% versus 68%, Fisher p-value 0.013 Chi-square p-value 0.02, CMH p-value 0.023 approximate and 0.01 exact). The rate of extractions in the age 4 non-PCAP children increased further (only 62% with-
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...question is that prenatal counseling and care for pregnant mothers appear to promote oral health in children.

One factor that made the intervention possible in the first place was convenient access to dental care and counseling of pregnant mothers due to the location of the OB/GYN unit and dental medicine and oral and maxillofacial surgery clinic within one institution and building.

A primary limitation of this research was that mothers self-selected for participation in PCAP. There are likely to be several confounding factors that affect results. For example, it is not possible to know if mothers had prior visits for dental care of children at this clinic or at other clinics. Information is not available on household structure or stability. The apparent advantageous impact of prenatal dental intervention with pregnant mothers supports further study of dental counseling in this and other populations. Previous work with school-age children has found a clear benefit in providing dental care to children in a convenient setting.21,22

One factor that can be partially examined is the age of the mothers. Age information is available on mothers who attended PCAP sessions and for some mothers who did not. Some of the PCAP mothers returned to receive dental care for themselves and their PCAP child (average age 26.75 years), whereas others came only for themselves (28.00 years) or did not return (26.52 years). Differences between PCAP groups are not statistically significant out extractions). The analysis suggests that by age 3, the children of PCAP mothers are statistically significantly less likely to need extractions of teeth DEFG.

Table 3 presents the average number of teeth with caries by age and by the mother’s participation in PCAP. Results are presented for all children and for children with some caries. Averages are higher for children whose mothers did not participate in PCAP. Results are highly statistically significant (p-value < 0.001) for children age 3 and for groups of children, including those who are age 3. Figures 1 and 2 illustrate differences by age and mother’s PCAP status. Figure 1 presents side-by-side box plots of children of PCAP mothers at ages 2 and 3 and children of non-PCAP mothers at ages 2, 3 and 4. Figure 2 is the same as Figure 1, but is restricted to children with some caries. The figures illustrate the substantial difference in distribution of the number of caries in children between PCAP and non-PCAP mothers.

Discussion

As children get older (age 3 or 4), if their parents do not instruct them in proper dental hygiene and diet behavior (e.g., not going to bed with a bottle with juice or milk), then they are at significant risk of multiple dental caries and of needing extractions of primary maxillary incisors. In the setting of this study, counseling and care of mothers seem to be effective in reducing the most egregious harmful effects. The answer to the primary research question is that prenatal counseling and care for pregnant mothers appear to promote oral health in children.

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(1-way ANOVA p-value 0.19). Non-PCAP mothers appear to be a little bit older on average (32.92 years), and the difference between them and the PCAP mothers who returned for child care was statistically significant (2-sample t-test p-value < 0.01). Ages were missing for non-PCAP mothers when a foster parent or a grandparent brought the child to the dental clinic.

Proper assessment, intervention and patient education focusing on dental and oral health problems during pregnancy can help enhance pregnancy outcomes. The PCAP can assume vital roles in screening and referral for dental problems during pregnancy and should also proactively teach patients about maintaining oral health during pregnancy.22

The relationship between maternal and child experience with dental caries is well established. Therefore, regardless of the potential for improved oral health to improve pregnancy outcomes, public policies that support comprehensive dental services for vulnerable women of childbearing age should be expanded.23 The PCAP promotes the mother’s own general health and, in addition, reduces the caries risk for their children. By embracing the concepts of the “dental home,” health care providers can implement preventative and treatment protocols. Partnerships with other health care professionals, with the aim of providing preventive care for our high-risk populations, are necessary to achieve improved oral health outcomes in the future.24

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REFERENCES


Goldenhar Syndrome and Pain-Related Temporomandibular Disorders

A Case Report


ABSTRACT

Goldenhar syndrome (GS) is a development syndrome, characterized by incomplete development of the craniofacial region. The involvement is mainly unilateral; it varies from being mild to severe; and it can range from malocclusion and facial asymmetry to a more complex phenotype with complete absence of the mandibular ramus and temporomandibular joint. However, orthopedic symptoms of orofacial pain and dysfunction have not generally been considered as part of the symptom complex in GS cases. The case presented here is of a 15-year-old Caucasian patient, who was referred for evaluation because of bilateral pain in the masticatory muscles and temporomandibular joints.

Goldenhar syndrome (GS) is a development syndrome with heterogeneous etiology. The typical presentation of GS consists of craniofacial anomalies, such as epibulbar dermoids, microtia, auricular appendices, pretragal blind-ended-fistulas, mandibular hypoplasia and vertebral anomalies. However, its clinical manifestations may also include anomalies of other systems as well, such as skeletal, cardiac, renal and central nervous. The majority of cases are sporadic; however, familial occurrences have also been observed. The incidence of GS has been reported to be 1:3,500 to 1:26,550, with a male-female ratio of 3:2.1,2

The typical craniofacial presentation of GS is also referred to as hemifacial macrosomia. It is caused most likely by the developmental defect of the first and second brachial arches. The craniofacial involvement is mainly unilateral; it varies from being mild to severe, and can range from malocclusion and facial asymmetry to a more complex phenotype with complete absence of the mandibular ramus and temporomandibular joint.1,3 Craniofacial involvement of GS has been classified by Mulliken and Kaban3 into three types. Type I includes mild hypoplasia of the ramus, with the body of the mandible minimally or slightly affected. Type II includes a flattened condyle while the glenoid fossa and coronoid are absent. Type III includes a ramus that is reduced to thin lamina or is completely absent, with no evidence of the temporomandibular joint (TMJ).

Temporomandibular disorders (TMD) encompass a group of musculoskeletal and neuromuscular conditions that involve the TMJs, the masticatory muscles and associated tissues.4 The pain-related TMD consists of myalgia, arthralgia and headaches attributed to TMD.5 The prime manifestations of pain-related TMD are pain of a persistent, recurring or chronic nature in the masticatory muscles, TMJ or adjacent structures, or limitation or other alterations in the range of mandibular motion due to pain. The prevalence of pain-related TMD is about 10% in the general population.6,7

The etiology of pain-related TMD is considered multifactorial, resulting from a complex interaction among biological, psychological, social and environmental variables.8 Risk factors identified with pain-related TMD include the presence of psychological symptoms, oral parafunctional behaviors, non-specific orofacial symptoms and various comorbid pre-existing pain conditions.8-11
The case presented here is intended to illustrate an example of compensatory behaviors developed because of facial asymmetry associated with Type I Goldenhar syndrome and their possible association in triggering the masticatory muscle and joint pain.

Case Report
A 15-year-old Caucasian patient was referred for evaluation because of bilateral pain in the masticatory muscles and temporomandibular joints. Her medical history was significant for Goldenhar syndrome. Associated anomalies consisted of left anotia, bilateral vesicoureteral reflux disease and facial asymmetry. She had previously undergone surgery for left cochlear and external ear implants. She was not allergic to any known medications; and there was no relevant family history or other medical concerns.

During the interview, she reported intermittent bilateral pain localized to the masseter and temporalis muscles and the temporomandibular joints. She had been experiencing this pain for the last six years. The pain was described as dull and achy in nature, taking place multiple times during the day, with each episode lasting from a few minutes to a few hours. In addition, the patient said her pain was aggravated with opening and closing jaw movements and mastication; application of heat or ice alleviated her symptoms.
Bio-behavioral assessment using standardized self-reported instruments indicated that she was involved in multiple parafunctional behaviors that included the following: unilateral chewing; clenching or pressing her teeth together when awake; clenching or grinding her teeth when asleep; holding her lower jaw forward to improve her appearance; holding her jaw in a rigid position; leaning with her hand on the jaw; biting her finger nails; biting on her tongue, cheeks, or lips; and pressing her tongue against the teeth.

Clinical examination indicated that the patient had bilateral facial asymmetry and functional overloading. A panoramic radiograph (Figure 1) showed no structural abnormality in the anatomy of the right and left TMJs; however, the height of the left ramus was shorter than the height of the right ramus. According to the classification of mandibular deficiency, proposed by Mulliken and Kaban, this patient had a Type I discrepancy. Based on the patient’s history, standardized clinical examination and radiographic report, she was diagnosed as having myalgia and arthralgia (pain-related TMD diagnoses), according to the Diagnostic Criteria for TMD (DC-TMD).

A treatment plan focused on symptomatic care was designed for her. She was given a comprehensive home care program, in which she was educated about pain-related TMD, given dietary instructions, asked to modify parafunctional habits, perform thermal compressions, and do isometric and isotonic exercises of the masticatory muscles. In addition, a soft maxillary 2 mm splint was delivered for nocturnal wear, and physical therapy techniques were performed on the masticatory muscles and TMJ.

After a month of engagement and compliance with the home care program, physical therapy and nocturnal splint use, the patient said her symptoms had significantly reduced in frequency and intensity. Such outcomes were still maintained at a two-year follow up; however, she had stopped physical therapy and nocturnal use of the splint. She now only occasionally engages in the home care program. Furthermore, a panoramic radiograph showed the patient still had the Type I discrepancy on the left side. No structural changes consistent with degenerative joint disease were observed.

Discussion
In the current literature, structural malformations such as those associated with GS have not been considered a risk factor for pain-related TMD. Furthermore, orthopedic symptoms of orofacial pain and dysfunction are generally not considered part of the symptom complex in Type I GS cases. However, pain and tenderness have been reported in severe types (III) of GS. In this particular case, the patient reported moderate-to-severe pain, attributed to pain-related TMD.

A possible common association between these two conditions in this particular case may be the presence of parafunctional activity. The patient reported having developed waking-state behavioral activities, such as protruding the mandible to compensate for the facial asymmetry. Parafunctional oral behaviors have been hypothesized to result in an abnormal, sustained contraction of the masticatory muscles, which could exert non-physiological forces on both the muscles themselves and the temporomandibular joints. In theory, this could result in damage, inflammation and nociceptor sensitization. These changes can subsequently act as initiating, aggravating and perpetuating factors in subgroups of TMD patients. Based on current literature, it appears that the presence of parafunctional activity may be associated with the cause as well as the consequence of the pain experienced in TMD. Another proposed mechanism of association suggests that the contralateral articular disc of the normal TMJ may become anteriorly displaced due to the abnormal condylar rotation caused by the mandibular asymmetry and functional overloading. However, limited evidence is available in the literature to support this association.

Goldenhar syndrome has a clinically heterogeneous presentation; there is no agreement in the literature regarding the diagnostic criteria. The spectrum of mandibular malformations range from a small but normally shaped ramus and TMJ to complete absence of these structures. The treatment of facial anomalies associated with GS mainly consists of orthodontic treatment, surgical procedures (distraction osteogenesis, temporomandibular joint replacement), and cosmetic and orthognathic surgeries. However, in Type I GS, a nonsurgical, conservative approach, such as orthodontic treatment, may be preferred by the patients. Since pain is generally not a symptom, no specific recommendations for pain management are included in GS treatment protocols.

For pain-related TMD, it is recommended that the diagnosis be based on information obtained from the patient’s history, clinical examination and, when indicated, TMJ imaging. The treatment of such patients should be based on the use of conservative, reversible and evidence-based therapeutic modalities. Furthermore, it is recommended that professional treatment be augmented with a home care program, in which patients are taught about their disorder and how to manage their symptoms.

Conclusion
In the current literature, structural malformations such as those associated with Type I GS have not been associated as a risk factor for pain-related TMD. A comprehensive history and examination during patient assessment, including pain characterization, associated signs and symptoms, bio-behavioral characteristics and a standardized clinical exam, can help clinicians identify and characterize pain-related TMD. The treatment of pain-related TMD in the aforementioned patient should be based on the use of conservative, reversible and evidence-based therapeutic modalities.

The authors declare that there is no conflict of interests regarding the publication of this paper. Queries about this article can be sent to Dr. Khawaja at khawajashehryar@gmail.com.
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Minimally Invasive Treatment of Temporomandibular Joint Ankylosis and Fibrosis of Temporalis Muscle


ABSTRACT
A case of severe mandibular hypomobility due to fibrosis of the left temporalis tendon, combined with ankylosis of the temporomandibular joint, is presented. This case emphasizes the importance of reconstructing the historical timeline to establish a correct diagnosis, ultimately leading to appropriate treatment. The use of minimally invasive surgical techniques and the importance of postoperative rehabilitation are emphasized.

Temporomandibular joint ankylosis is a condition in which there is extensive pathology of the articular tissues, which partially or completely reduces mandibular mobility, affecting mastication, speech and oral health.4 The inability to open the mouth normally is a significant disability that affects quality of life, nutrition and the overall health of the affected individual. Additionally, the severe limitation of mandibular mobility predisposes individuals to oral infections due to reduced access to dental structures, with decreased visualization of oral diseases impairing treatment of dental and oral pathology.

Ankylosis of temporomandibular joint can be classified into true ankylosis (intracapsular) or pseudoankylosis (extracapsular). The most common causes of true ankylosis of the temporomandibular joint are trauma, infection and systemic diseases that cause damage to the intracapsular tissues.2-4 Systemic conditions such as rheumatoid arthritis and psoriatic arthritis are associated with severe inflammation, which damages the intra-articular tissues, often resulting in fibrosis and bone formation.

Pseudoankylosis causes limitation of mandibular mobility due to extracapsular pathology. Common causes of pseudoankylosis are masticatory muscle disorders (muscle spasm, myositis ossificans), osseous disorders (coronoid hyperplasia), neurological disorders, psychiatric disease, radiation therapy, neoplastic disorders affecting the muscles of mastication and postoperative fibrosis from surgical procedures involving the head, neck and intracranial structures.5

At times, it is difficult to categorize the type of ankylosis; and there are circumstances in which both pseudoankylosis and true ankylosis exist simultaneously. The following case report demonstrates how both of these conditions can contribute to severe mandibular hypomobility. It also provides insight into how such patients can be treated using minimally invasive techniques.

Case Report
An 85-year-old female presented to the private office of an oral and maxillofacial surgeon, an attending in the Division of Oral and Maxillofacial Surgery, New York-Presbyterian/Weill Cornell, in June 2014 with a chief complaint of severe limitation of jaw opening. The patient reported that her problem began one year ago and that prior to this, she never had problems opening her
jaw. In July 2013, she underwent a routine dental procedure involving preparation for a crown on the lower left second molar. She reported that the procedure was relatively short (20 minutes) and that nothing unusual occurred immediately following the procedure. When the effect of the local anesthetic wore off, she was able to open her mouth widely.

Approximately one week following the dental procedure, the patient complained of swelling and redness of her left face, as well as limited jaw opening. When she returned to her dentist, she was placed on a course of antibiotics. The patient reported that the face and jaw swelling improved, but the limited jaw opening persisted. Approximately 14 days following the initial dental procedure, she presented to the emergency room of a local hospital. A CT scan (August 2013) was performed, and the patient was told she had a temporomandibular joint disorder.

The patient was referred to a dental practitioner, reportedly with expertise in the diagnosis and treatment of temporomandibular joint disorders. At that time, the patient’s interincisal opening distance was reported to be 6 mm. The dental practitioner concluded that the diagnosis was “temporomandibular joint dysfunction” and recommended a three- to six-month treatment with a “neuromuscular orthopedic mandibular repositioning” appliance.

An MRI of the temporomandibular joints was obtained in September 2013. The radiology report indicated that the right joint had anterior disc displacement without reduction and the left joint had decreased translation and normal disc position. The patient underwent three months of physical therapy; however, the severe limitation in mandibular range of motion persisted. She was seen by another oral and maxillofacial surgeon, who performed arthrocentesis of the right temporomandibular joint in May 2014. There was no improvement in the interincisal opening distance following this and the patient was referred to the oral & maxillofacial surgeon affiliated with New York-Presbyterian/Weill Cornell.

In June 2014, at her initial presentation, the patient’s only complaint was severe limitation in jaw opening. Clinical examination revealed the maximum interincisal opening distance to be only 3 mm, with 4 mm left lateral excursion and 0 mm right lateral excursion. Careful palpation of the mandibular condyles revealed that the right condyle did have some ability to translate, but the left condyle had no mobility. A cone beam CT scan of the
temporomandibular joints revealed a bony/fibrous ankylosis of the left temporomandibular joint (Figure 1).

Although the diagnosis of left temporomandibular joint ankylosis was established, the history of acute limitation of jaw opening associated with an acute extracapsular infection did not support ankylosis as the sole cause of this patient’s severe limitation of mandibular mobility. Review of the August 2013 CT scan clearly demonstrated that the left temporomandibular joint was unremarkable, with no evidence of ankylosis (Figure 2). The September 2013 TMJ MRI was carefully reviewed for both the articular and extra-articular structures. With a history consistent with a left masticator space infection causing acute trismus, particular attention was focused on the muscles of mastication. When comparing the right and left temporalis tendon, it was clear there was significant thickening on the left side compared to the right, as well as a decrease in signal uptake, consistent with fibrosis (Figure 3).

A thorough review of the clinical findings, chronologic history of the progression of symptoms, along with the current and previous diagnostic images, helped establish the following diagnoses:

1. Fibrosis of the left temporalis tendon and surrounding soft tissues of the masticator space.
2. Bony and fibrous ankylosis of the left temporomandibular joint.

It was unclear as to how much of the restriction in mandibular range of motion was due to pathology of the right temporomandibular joint, as this joint also had the persistent lack of mobility and, potentially, could have had fibrous adhesions.

Because of the patient’s age and severity of symptoms, it was determined that the least invasive procedure possible to improve her mandibular range of motion was indicated. Therefore, the proposed surgical treatment plan was the following:

1. Examination under general anesthesia.
2. Left mandibular coronoidectomy via an intraoral approach.
3. Left temporomandibular joint operative arthroscopy designed to remove any intra-articular bony/fibrous adhesions.

Figure 1. Cone beam CT coronal (A) and sagittal (B) images showing bony/fibrous ankylosis of left temporomandibular joint nine months after onset of infection-related trismus.

Figure 2. Sagittal view of CT scan (August 2013), two weeks after onset of infection-related trismus. No evidence of ankylosis of left temporomandibular joint.

Figure 3. MRIs of right and left mandible obtained two months following onset of infection-induced trismus. (A) Sagittal section of right temporalis tendon and muscle compared to (B) Sagittal section of left temporalis and muscle demonstrating thickening and fibrosis on left with presence of dark signal.
4. Re-examination to determine mandibular range of motion, with the possibility of performing right temporomandibular joint arthroscopy if required.

The patient was taken to the operating room and underwent fiber-optic nasotracheal intubation. Examination under general anesthesia revealed the maximum interincisal opening distance to be extremely limited to only 3 mm (Figure 4). The right condyle was capable of translation, but the left condyle could not be manipulated into any translation movement. The left coronoidectomy was performed through an intraoral approach.

Following the coronoidectomy, the mandibular opening distance increased to approximately 7 mm, but there was still significant restriction. Inspection of the soft tissues medial to the mandible revealed significant fibrosis of the temporalis tendon and muscle, as well as the medial pterygoid muscle. Temporalis tendon and muscle attachments were further stripped from the medial ramus of the mandible. Using controlled digital pressure between the mandible and the maxilla to open the jaw, there was a sudden release in resistance, and increased opening was achieved with a maximum interincisal opening distance of 38 mm (Figure 5).

Left temporomandibular joint operative arthroscopy was performed. Following routine superior joint space entry with a trocar and cannula, initial examination revealed a specific area of osteoarthritis and fibrosis in the anterior portion of the superior joint space. It was assumed that this was the main location of fibrous ankylosis, which had been released during the intraoral procedure. Osteoarthritis with fibrillation of the articular cartilage was present throughout the superior joint space. A moderate synovitis was present in the posterior recess of the superior joint space. Operative arthroscopy was performed, with placement of a second portal into the superior joint space. Using a triangulation technique, adhesions were removed, along with debridement of fibrillation tissue using a motorized shaver, particularly in the region of the anterior joint space (Figure 6). Inflamed synovial tissues of the posterior recess were localized. Under direct vision, a #25 gauge spinal needle was inserted into the inflamed synovium and 3 mg of Celestone Soluspan suspension (6 mg/ml betamethasone) was injected (Figure 7).

The patient’s postoperative course was uneventful. There was particular emphasis on passive motion exercises 15 minutes four times daily. The patient was seen 10 days postoperatively, at which time, her maximum interincisal opening distance was 20 mm. However, she had not been compliant with the passive motion exercises and the necessity of this was emphasized again. Following this, the patient did demonstrate compliance with passive motion exercises and at the two months postoperative appointment, her maximum interincisal opening distance was 25 mm. She reported having no pain, excellent function and a normal diet.
Discussion
This paper describes a case of an oral infection inducing fibrosis of the temporalis muscle causing pseudoankylosis and eventually leading to a bony and fibrous ankylosis of the temporomandibular joint. There is a paucity of information on the concomitant presence of true ankylosis and pseudoankylosis of the temporomandibular joint. Furthermore, the use of minimally invasive surgical techniques has not routinely been described in the treatment of these conditions.

Traditional treatment of temporomandibular joint ankylosis generally involves surgical therapy to remove the pathology that is preventing mandibular mobility. A major challenge for the treating surgeon is to identify the main source of the pathology, as well as any other additional anatomic barriers preventing mandibular mobility. Another challenge is to perform the least invasive surgical procedure possible to treat the source of restriction, whether intra-articular or extra-articular or both. The more invasive the surgical procedure, the greater the amount of swelling and tissue damage, ultimately leading to fibrosis, which will impede the postoperative rehabilitation and mobility. Mandibular mobilization in the immediate postoperative period is necessary to reduce the formation of intra-articular adhesions and extra-articular fibrosis. Therefore, the least invasive surgical procedure that effectively releases the obstruction to mandibular movement will tend to facilitate the postoperative rehabilitation designed to maximize mobility.

There is a wide range of surgical treatment options available, depending on the etiology, diagnosis and experience of the surgeon. Treatment for intracapsular ankylosis includes: gap arthroplasty; interpositional arthroplasty with autogenous or allogenic materials; and total joint replacement with autogenous tissues or alloplastic materials (Karamese). Each surgical intervention has advantages and disadvantages. The major challenge for the oral and maxillofacial surgeon is to prevent a recurrence of the ankylosis.

An interpositional arthroplasty is designed to prevent recurrence of ankylosis by placing a tissue graft or an autogenous material between the surfaces of the surgically created gap. A total joint replacement is designed to completely remove the pathologic joint with either autogenous or alloplastic materials and offers the advantage of enabling the surgeon to improve the occlusion if the pathology has resulted in altered significant condylar resorption. Regardless of the surgical technique chosen, healing can be impeded by complications, such as infection, foreign body reaction and displacement of the prosthesis or graft. Additional potential complications of arthroplasty and total joint replacement include facial nerve injury, malocclusion, recurrence of ankylosis and persistent neuropathic pain.

The use of minimally invasive techniques has not routinely been described in the treatment of ankylosis and pseudoankylosis. Coronoid hyperplasia, one potential cause of pseudoankylosis, is routinely treated surgically with coronoidectomy or coronoidotomy, via an intraoral approach. Robiony et al. have reported on the technique of endoscopically assisted intraoral coronoidectomy to provide a less invasive approach to this procedure. The authors indicate that the advantage of this minimally invasive technique using the endoscope is that it allows the surgeon to create the coronoid osteotomy, avoiding a large incision and wide dissection. Consistent with the trend for minimally invasive surgery, McCain et al. have demonstrated arthroscopic temporomandibular joint surgery as a highly effective technique for treatment of a variety of intra-articular pathologies. The major advantage to arthroscopic surgery is that there are no incisions or significant dissection, limiting the amount of tissue trauma and secondary fibrosis created to treat the intra-articular pathology.

Although arthroscopic surgery is not considered a mainstay in the treatment of ankylosis, Moses et al. reported on a case of arthroscopic laser treatment of fibrous and bony ankylosis of the temporomandibular joint. The postoperative course following arthroscopy is associated with decreased swelling and pain and a more rapid recovery, facilitating rehabilitation, which is essential for restoration of mandibular mobility. Obviously, when there is a full bony ankylosis, arthroscopic surgery is not possible and, thus, there is a paucity of information on the use of arthroscopic surgery for the treatment of bony ankylosis. However, when the intra-articular fibrosis and bone formation is at an early stage and/or in an isolated location, as demonstrated in this case report, using a minimally invasive approach with arthroscopic surgery is possible and offers great advantages.

The orthopedic literature has demonstrated the deleterious effects of lack of mobility on synovial joints, resulting in muscle atrophy, cartilage breakdown and intra-articular adhesions. Thus, it is likely that the lack of the physical stimulus of motion itself can lead to further pathology in both intra-articular and extra-articular locations. The case presented here represents a perfect example of how lack of mobility from an extra-articular site can lead to intra-articular pathology. This patient initially developed trismus from an infection of the masticator space. Although the acute infection eventually resolved with a course of antibiotics, the trismus persisted, most likely due to persistence of a chronic infection and/or inflammation involving the masticator space, which resulted in fibrosis of the temporalis tendon.

Unfortunately, this patient was misdiagnosed and treated for a temporomandibular joint disorder because of a multiple series of incidences that confounded its original source.

Although a direct reading of diagnostic images is routinely required by all oral and maxillofacial surgeons at our institution, in this particular case, it was essential to establish the correct diagnosis and course of treatment. The CT scan taken within two weeks of the onset of the masticator space infection clearly shows...
the left temporomandibular joint to be normal, without any evidence of ankylosis (Figure 2). The MRI of the temporomandibular joints and surrounding structures, taken two months after the onset of symptoms, demonstrates reduced signal uptake of the left temporalis muscle and tendon compared to the right, highly suggestive of fibrosis (Figure 3). Most importantly, the cone beam scan of the left temporomandibular joint taken over one year after the initial CT scan, clearly demonstrates formation of a bony ankylosis in the left temporomandibular joint (Figure 1).

Thus, the hypomobility caused by the fibrosis of the temporalis tendon ultimately caused intra-articular fibrosis, cartilage breakdown and, eventually, bony ankylosis of the left temporomandibular joint. The combination of pseudoankylosis from fibrosis of the left temporalis tendon and muscle (caused by the masticator space infection) and the secondary progression of an intra-articular bony ankylosis of the left temporomandibular joint ultimately led to a severe limitation in interincisal opening distance of 3 mm when the patient presented to our institution for treatment.

This case demonstrates the importance of carefully putting together a timeline of the patient’s history, including retrieval and review of prior records and diagnostic imaging. The chronologic review of the initial CT scan, the MRI and the cone beam scan in this case, along with correlation of the patient’s clinical course, permitted the correct diagnosis leading to treatment.

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Endodontic retreatment often involves remaking restorations. The total cost may steer the treatment towards surgery. The aim of this study was to retrospectively record the reasons for performing apical surgery in an economically deprived patient population. The clinical reasons (59%) for apical surgery were most common, but the nonclinical (financial) reasons (41%) emerged as a major cause. The finding that 41% of the apicoectomies were performed because of nonclinical constraints is a high figure and may not reflect the situation generally. Still, economic factors potentially play a major role in the selection of surgical versus nonsurgical endodontic retreatment.

Endodontic treatment has a good outcome, but, like all clinical treatment modalities, occasionally it may fail. A revision, or orthograde retreatment, will mostly take care of the problem. However, in some cases, an orthograde retreatment may not be possible, or is not likely to have a good prognosis. In these cases, apical surgery, including placement of a retrograde filling, is performed to save the tooth.

There are many reasons for choosing a surgical approach instead of retreatment of the root canal filling. They are, among others: canal blockage in the form of large posts or separated endodontic instruments; damage to the apical canal portion during the first treatment; perforation of the root; non-healing periapical lesion after seemingly good endodontic treatment; or lingering clinical symptoms after treatment. In other words, the common reasons for surgical retreatment are clinical.

Orthograde endodontic retreatment often involves the removal of posts, cores and crowns to obtain access to the root canal and make the retreatment possible. In addition, when the retreatment is completed, it is necessary to place a new post with core and a new crown to restore the function of the tooth. This markedly increases the costs of the endodontic retreatment, and many patients hesitate for economic reasons. A surgical approach may be chosen to leave coronal restorations intact to make the overall therapy less costly. This adds a nonclinical factor to the reasons for apical surgery treatment, and this may be accentuated in a patient population with no or few financial means.

Our dental school patient population mainly comes from the Washington Heights and Inwood areas in the northern part of Manhattan in New York City. Compared to other communities in New York City, the Washington Heights and Inwood areas are characterized by high rates of poverty and families receiving public assistance, old and poorly-maintained housing stock and a relatively high proportion of undocumented immigrants not eligible for government benefits. Low levels of English proficiency, low educational levels and lack of job skills combine to make a large proportion of the members of this community ill-equipped
to compete for higher-paying jobs. Influenced by such factors as restricted access to health insurance among recent immigrants, residents of the Washington Heights and Inwood areas have been found to have a low level of health care. The community faces numerous socio-environmental risk factors that make it a particularly opportune location from which to examine the issues associated with oral health disparities.6,7

The aim of this study was to carry out a retrospective chart review to record the reasons for performing apical surgery in a northern Manhattan dental patient population attending a dental school clinic.

**Material and Methods**

Charts from a 10-month period at a postdoctoral endodontics clinic were screened and the cases involving apicoectomy treatment were selected. The total number of charts was 1,502, out of which, the number of surgical patients was 98, involving 108 teeth. The study was approved by the Columbia University Medical Center Institutional Review Board.

The 98 charts with digital radiographs were simultaneously read by two examiners. The tooth/root and clinical reasons for the treatments were recorded, together with the patients’ gender, age and ethnicity. The examiners also evaluated and recorded for each case whether orthograde (nonsurgical) or retrograde (surgical) retreatment would in their minds have been the preferred therapy from a clinical standpoint. Cross-tabular analyses and Fisher’s exact test were used to examine associations between the two treatment categories and demographic variables available in the patient record. Pearson independent samples t-test was used to assess mean differences between the two treatment groups. Logistic regression was used, regressing the presence of a nonclinical reason for apical surgery on the variables available on the patient record. The statistical analysis program SPSSS 21.0 was used for conducting all statistical analyses.8 We have used the p<=.1 statistical significance level when considering the role of multiple teeth; the study was regarded as exploratory. The study is likely to be under-powered to discover statistically significant relations.

**Results**

The clinical reasons for apical surgery were most common, but the nonclinical (financial) reasons emerged as a major reason category of treatment choice in this study. The two groups, clinical and nonclinical, did not differ in terms of their basic demographic and health status characteristics. Having multiple teeth involved made it 76% less likely that the patient would have a nonclinical reason for apical surgery.

The results are summarized in Tables 1-3.
Discussion
The restorative status of a tooth in need of retreatment appears to be a major deciding factor when it comes to the choice between an orthograde or a retrograde approach. An immaculate restoration will steer the clinician towards surgery, whereas a restoration that needs to be remade will often justify the nonsurgical endodontic retreatment. Today’s apical surgery treatment has a good prognosis.9 And the treatments performed, even if an orthograde approach was preferred, saved the teeth from extraction. Still, in many instances, it left the patients with solved endodontic problems, but with various restorative needs.

Authors have called attention to the substantial variation among clinicians’ management of treatment planning. A number of factors, clinical and nonclinical, potentially contribute to the variation noted. Among the clinical, oral health factors considered have been diagnosis, risk assessment, clinical environment, cognitive factors and dental treatment planning.9-14 Nonclinical sources of variation considered have included patient preferences, time availability and monetary interests; provider capability, equipment accessibility, practice busyness15,16 and cost considerations.17,18

That cost and financial factors at times play a major role reflects the influence of economic factors in dentistry, often regarded as an optional, market-sensitive health care service.19 A dental school clinic may be chosen by patients, as the fees are lower than in private practice. However, basing treatment preferences largely on cost considerations raises quality-of-care issues19 and has the potential to lead to divergent clinician-patient interests.17 In the private sector, nonclinical considerations, e.g., resource constraints (i.e., the patient’s ability to pay) may be more balanced with clinical considerations such as oral health status.

In this study “nonclinical” emerged as a major reason category of treatment choice. A large part of the clinic’s patient population depends upon Medicaid/state-financed assistance for dental care. Also, those who pay for their own treatment may have selected the dental school clinic because of its relatively low fees. The patient pool from the northern Manhattan communities of Washington Heights and Inwood is predominantly Hispanic (73%), and 73% of these are of Dominican origin,7 with the majority of them being first- or second-generation Dominican immigrants.6 Income is lower, and the need for social services higher here than in New York City as a whole.7 As of 2006, 31% of Washington Heights and Inwood residents were living below the federal poverty level.6 These numbers exceed the 21% poverty rate for all of New York City,6 a city known for its high cost of living. Median income in this community is among the lowest in the city, with 48% receiving income support in 2005.7 The patients describing themselves as white were four-times more likely to have a nonclinical reason for apical surgery. This appears consistent with the fact that patients who described themselves as Hispanic, among whom many may have described themselves as white, also were 3.3-times more likely to have a nonclinical reason for apical surgery. Since the study is likely to be under-powered to discover statistically significant relations, again, we have used the p<=.1 statistical significance level in the case of race because we regard the study as exploratory.

The finding that 41% of the apicoectomies were performed because of nonclinical constraints is a high figure and may not reflect the situation in private practice. Still, it suggests that economic factors potentially play a major role in the selection of surgical versus nonsurgical endodontic retreatment and will be the topic of another study of reasons for apicoectomies in private practice. A

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Influence of Root Canal Tapering on Smear Layer Removal


ABSTRACT

The purpose of the study presented here was to compare the influence of root canal taper on the efficacy of irrigants and chelating agents in smear layer removal. Eighty mesial roots of molar teeth were selected and prepared with rotary instruments. In group A, file 30/0.02 and in group B, file 30/0.4 were placed at working length and the smear layer was removed. In groups C and D, root canal preparation was the same as in groups A and B, respectively, except that the smear layer was not removed. The amount of the smear layer was quantified using a scanning electron microscope. Greater smear layer was detected in the apical portion of each group, whereas no significant difference was detected between groups in other portions. No statistical difference was found between canals with different tapers.

The goal of root canal therapy is to clean and disinfect the root canal system. Many studies demonstrate that regardless of the mechanical instruments and techniques, irrigation solutions are required to improve lubrication and canal cleaning.

Mechanical instrumentation of root canals produces a smear layer that covers root canal walls and consists of inorganic debris and organic constituents. This layer may prevent penetration of intracanal disinfectants into root canal irregularities or dentinal tubules. Flushing the canal with 17% EDTA and 5.25% NaOCl is known to be the most effective way to remove the smear layer in clinical practice. Various factors, such as activation of irrigants with ultrasonic instruments, use of delivery systems or syringes, the size and position of the syringe, and the volume of irrigation may affect cleaning efficacy of the irrigant. It has been shown that the irrigant exchange is limited to 1 mm from the needle tip apically. On the other hand, many studies have concluded that canal size and taper significantly increase the volume and exchange of irrigants at the apical part of the canal. Brunson et al. found that an increase in the preparation size or taper of the root canal resulted in an increase in the irrigant volume.

Previous SEM studies have evaluated smear layer scores after canal preparation using two different rotary systems, as well as rotary files and hand instruments. However, to our knowledge, no study in the literature has directly evaluated the influence of different taper of the rotary system on smear layer removal. This study sought to assess the effect of canal taper on the efficacy of irrigants and chelators on smear layer removal.

Materials and Methods

Preparation of Specimens

In this in-vitro study, 80 mesial roots of freshly extracted mandibular molars or the mesiobuccal root of maxillary molar teeth with mature apices and 15- to 30-degree curvature (according to Schneider et al.) were selected.

Before preparation, a radiograph was taken for each tooth (in order to ensure they had two separate canals in each root).
The teeth were stored in 5.25% NaOCl for one hour and then were cut perpendicularly to their long axis using a diamond disk 14 mm from the root tip. A #10 K-file (Dentsply Maillefer, Ballaigues, Switzerland) was advanced into the canal until the file tip was visualized within the apical foramen; then 1 mm of its length was subtracted to provide the working length.

The roots were randomly divided into four experimental groups (n=20 each). The teeth were prepared by one operator with RaCe rotary files (FKG; Dentaire, La-Chaux-de-Fonds, Switzerland) in a crown down manner using an Endo IT motor (VDW, Munich, Germany). Rotational speed was set at 600 rpm and torque was adjusted according to the manufacturer’s instruction. The coronal part of the canals was flared using Gates-Glidden drills #2 and #3 (Dentsply, Maillefer, Ballaigues, Switzerland). In group A, the canals were prepared in the following sequence: Pre-RaCe 40/0.1, 35/0.08; then 30/0.06, 30/0.04 were placed 10 mm or 12 mm inside the canal, respectively; and, finally, 30/0.02 at the working length. Irrigation with 30 ml of 5.25% NaOCl (Pakshoma, Tehran, Iran) was used throughout the instrumentation, and RC- Prep (Vericom, France) was used as a lubricant with each file.

After completion of root canal preparation, the smear layer was removed via 1 ml of EDTA (Ariadent, Asia Shimiteb, Tehran, Iran) with a 27-gauge needle for two minutes and a final irrigation using 5 ml 5.25% NaOCl. In group B, preparations were made as described for group A, except a 30/0.4 instrument reached working length.

In groups C and D, root canal preparation was as described for groups A and B, respectively, except the smear layer was not removed and the final irrigation was 5.25% NaOCl. All root canal preparations were done by one operator.

**SEM Evaluation**

The teeth were split longitudinally with a diamond disk (D&Z, Diamont, Germany) in a mesio-distal direction, dried for 24 hours, then sputter coated for SEM analysis. SEM was performed using Leo SEM Microscope (Leo-5360-S.E.M-England) at 1250× magnification. For each specimen, the photomicrographs were exposed from the center of the middle and apical thirds. The images (Figure 1) were scored according to Zand et al. using the following criteria:

- Score 0: presence of smear layer that covers 0% - 25% of the canal wall.
- Score 1: presence of smear layer that covers 25%- 50% of the canal wall.
- Score 2: presence of smear layer that covers 50%- 75% of the canal wall.
- Score 3: presence of smear layer that covers 75%- 100% of the canal wall.

![Figure 1. Representative images (1250× magnification). (A) Smear layer score 0. (B) Smear layer score 1. (C) Smear layer score 2. (D) Smear layer score 3.](image-url)
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Complete elimination of debris from the root canal is very difficult because of canal complexity. The smear layer contains inorganic and organic substances and acts as a reservoir for microorganisms; thus, its removal enhances disinfection of the root canal. Crumpton et al. found that chelator volume greater than 1 ml did not improve smear layer removal; therefore, in our study, 1 ml of EDTA and finally 5 ml NaOCl was used.

Albrecht et al. showed that larger preparation of the apical portion resulted in less residual debris. Also, Usman et al. found that instrument size had a predictable influence on apical third cleanliness. Thus, in this study, all experimental groups were instrumented to the same master apical file (MAF) size.

Two taper sizes (0.02 and 0.04) were used for comparison. As in curved root canals, achieving a great taper may involve procedural errors. Therefore, in the study presented here, the maximum apical taper was 0.04.

The result of this study showed that in all groups, the difference between apical and middle thirds was significant, but the different canal tapers had no effect on smear layer removal. This finding is in contrast with Vander Sluis et al., who concluded that canal taper was positively correlated with canal debridement. The possible explanation of this effect may be based on root selection. The selected roots in this study were molar roots, but they used maxillary and mandibular canines with less curvature, so the penetration of chelator may be less affected by canal tapering in the present study. Another reason could be the difference between the sizes of MAF used in these studies. Our result is in agreement with Arvaniti et al., who showed that root canal preparation with tapers 0.04, 0.06 or 0.08 did not affect canal cleanliness.

The result of this study demonstrated that the remaining smear layer with or without a flush of EDTA was not significantly different. This finding is not in agreement with Peters et al., who found that the combination of NaOCl and EDTA was more effective in smear layer removal. This effect may be based upon the curvature of the roots, which may reduce the volume of irrigants reaching the apical part of the canal. In each group, mean smear layer scores were significantly different at the apical and middle levels. This is in accordance with most studies on smear layer removal.

As the largest amount of smear layer was found in the apical portion of the canal regardless of the taper or application of EDTA, it seems that the volume of irrigant and chelator was not sufficient to effectively remove the smear layer. Needle penetration may differ according to the root canal taper, but we did not measure this in our study. Smear layer removal relationship with penetration of chelator could also be assessed by measuring the penetration of the needle tip in different canal tapers. A study could be designed to assess the relationship between the canal tapering and the volume of irrigants in the apical portion and its effect on bacterial reduction.

The scoring was performed by three examiners who were blinded to the preparation, and irrigation regimens were employed for each group. Two splits of each root were evaluated and the mean score was recorded. The final record was agreed on by the examiners.

Statistical analysis with the non-parametric Kruskal-Wallis test was performed to detect statistical differences in the presence of smear layer between experimental groups; the Wilcoxon test was used to assess the differences between the apical and the middle thirds of each group. The significance for statistical tests was P<0.05.

Results
A statistically significant difference between the apical and the middle thirds was detected, as the middle thirds were significantly cleaner in all groups (P<0.05). However, there was no significant difference in the remaining smear layer in the apical (P=0.98) or middle (P=0.72) thirds between the four groups (Table 1).

Wilcoxon’s test showed a significant difference between apical and middle thirds in groups treated with EDTA and the groups not irrigated with EDTA (Table 2).

The difference between the apical and middle thirds was significant in the groups prepared using 0.02 taper or 0.04 taper instruments (Table 3), but no statistically significant differences could be found between the groups prepared with different tapers in the apical (P=0.948) or middle thirds (P=0.970).

TABLE 1
Mean Scores for Presence of Smear Layer

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean ±SD</th>
<th>Apical third</th>
<th>Middle third</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>2.25 ± 1.21</td>
<td>1.0 ± 0.95</td>
<td>1.26 ± 1.03</td>
</tr>
<tr>
<td>B</td>
<td>2.40 ± 0.82</td>
<td>1.21 ± 1.31</td>
<td>1.21 ± 1.31</td>
</tr>
<tr>
<td>C</td>
<td>2.28 ± 1.26</td>
<td>1.21 ± 1.31</td>
<td>0.83 ± 1.028</td>
</tr>
<tr>
<td>D</td>
<td>2.33 ± 1.23</td>
<td>1.21 ± 1.31</td>
<td>0.83 ± 1.028</td>
</tr>
</tbody>
</table>

TABLE 2
Mean Scores for Presence of Smear Layer According to EDTA Application

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean ±SD</th>
<th>Apical</th>
<th>Middle</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>With EDTA</td>
<td>1.14 ± 0.98</td>
<td>2.33 ± 1</td>
<td>0.000 &lt; 0.05</td>
<td></td>
</tr>
<tr>
<td>Without EDTA</td>
<td>1.03 ± 1.18</td>
<td>2.30 ± 1.22</td>
<td>0.001 &lt; 0.05</td>
<td></td>
</tr>
</tbody>
</table>

TABLE 3
Mean Scores for Presence of Smear Layer According to Canal Taper

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean ±SD</th>
<th>Apical</th>
<th>Middle</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taper 0.02</td>
<td>1.11 ± 1.14</td>
<td>2.26 ± 1.21</td>
<td>0.002 &lt; 0.05</td>
<td></td>
</tr>
<tr>
<td>Taper 0.04</td>
<td>1.07 ± 1.03</td>
<td>2.37 ± 1.00</td>
<td>0.00 &lt; 0.05</td>
<td></td>
</tr>
</tbody>
</table>
Conclusion
According to the results of this study, different tapers of canal preparation had no effect on the efficacy of irrigants for smear layer removal.

This study was supported by a grant from the vice chancellor of the Research Council of Mashhad University of Medical Sciences, Iran. Queries about this article can be sent to Dr. Javidi at javidim@mums.ac.ir.

REFERENCES

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ABSTRACT

Last May, the New York State Dental Association and the New York State Dental Foundation convened the first “Oral Health Stakeholders’ Summit on the Future of Special Needs Dentistry, Hospital Dentistry and Dental Education.” The summit was chaired by David J. Miller, then NYSDA President Elect, and Carl H. Tegtmeier, then chair of the NYSDA Council on Dental Health Planning and Hospital Dentistry. It brought together experts, called to frame the issues and provide information necessary for a reasoned response. And it sought input from attendees to develop recommendations to ensure that patients with intellectual and developmental disabilities, as well as an aging population with Alzheimer’s disease and dementia, have access to appropriate oral health care in the years ahead.

Over 100 participants, representing dentistry, hospital training programs, third-party payers, state government offices and related patient support associations, attended the two-day event in Albany. They focused on the impact of reductions in funding, the transition of Medicaid services into a managed care model, a loss of service providers and the need for expanded training programs. They heard from speakers representing a broad spectrum of those involved in the oral health care of patients with intellectual and developmental disabilities, the Alzheimer’s Association, dental educators and researchers, hospital dentistry and the benefits industry, whose presentations focused on a looming oral health crisis threatening access to dental care for patients with disabilities.

The dental profession, advocacy groups and public health agencies have long focused on the issue of access to care and the factors that prevent patients from engaging in effective preventive oral health strategies and taking advantage of dental treatment services. The access issue is all the more vital when considering the needs of patient populations with concurrent health issues, physical limitations and more complex preventive and treatment concerns. Existing obstacles to oral health are compounded by an increasing emphasis on reducing health care costs.

What is the impending crisis? It is uncertainty about the continued viability of hospital-based dental programs and residencies, the lack of new dentists providing care to patients with special needs, the decreasing number of special needs facilities, long waiting times to access operating rooms for dental cases and the increasing number of patients requiring the services of dentists with special skills.

The Impending Oral Health Crisis

Ensuring Quality Dental Care and Access for New York’s Most Vulnerable Patients

Carl H. Tegtmeier, D.M.D.; David J. Miller, D.D.S.; Judith L. Shub, Ph.D.
There are an estimated 300,000 people with an intellectual or developmental disability (ID/DD) in New York State. Fortunately, most practicing dentists can treat many of these patients with minimal advanced training and with few treatment modifications in patient management. However, approximately 60,000 people with ID/DD have resistive behaviors that require treatment from dentists with expertise in behavioral intervention techniques. The New York State Office for People with Developmental Disabilities (OPWDD) estimates that there now are only 300 dentists with expertise in treating patients with resistive behaviors. The challenges are to change the emphasis in public policy and to evaluate the efficacy of cost-neutral changes to health care spending.

Changing Reimbursement Models
Current trends in funding and delivery models penalize people who face obstacles in their ability to access oral health care, including patients with complex medical diagnoses, physical or developmental disabilities, and dementia. The barriers to access for these patient populations are economic and systemic, exacerbated by a growing population with even greater service needs. The existing provider network has been underfunded through a “one size fits all” reimbursement methodology despite years of inflationary cost increases. In the national dialogue about health care, patients with physical and developmental disabilities generally are marginalized or overlooked altogether in emerging delivery models. There is a homogenization in the funding models for public health care programs that allocate reimbursement for a fixed set of services at a defined frequency for all patients, regardless of individual treatment needs.

Decreasing reimbursement already has resulted in a reduction in both facilities and providers available to meet the treatment needs of patients with dementia and ID/DD. The decline in available facilities and qualified dentists correlates directly with reductions in Medicaid payment rates. It has resulted in less access to training for dentists in the skills necessary to meet the needs of patients in the Medicaid program, as well as the most challenging and vulnerable patients in the general population. History has shown that reductions in funding for hospital dental programs result in fewer available services, less operating room (OR) availability for dental cases, and fewer training opportunities to ensure an adequate professional workforce.

The Centers for Medicare and Medicaid Services (CMS) has approved waivers enabling New York State to transition its Medicaid program into a managed care model. The transition has achieved its main goal of cutting costs. In coming years, New York will transition its Medicaid long-term care, dentistry and, ultimately, medicine into the new managed care entities known as FIDA IDD and DISCOs. Individuals with ID/DD who are eligible for both Medicaid and Medicare may join a fully integrated duals advantage (FIDA IDD) organization. Those who are eligible for Medicaid only will join a developmental disabilities individual services care coordination organization (DISCO). These managed care entities will receive a per-member/per-month capitalization payment to provide long-term care, as well as dental and medical care. Like health maintenance organizations (HMO), the FIDA IDD and DISCOs will subcontract with other long-term care agencies and dental managed care organizations to provide dental services.

This plan has raised concern among patients with intellectual and developmental disabilities and their families, dentists with expertise in treating this population, dental educators and OPWDD. Patients, caregivers and dental professionals already face obstacles in accessing timely, appropriate dental treatment and are uncertain about the impact of the new model on their continued ability to access oral health care services.

OPWDD, the primary agency responsible for overseeing supports and services provided for people with ID/DD, formed the Task Force on Special Dentistry in 2002. The goal of the task force is to improve the equity, effectiveness and efficiency of dental services for New Yorkers with ID/DD. The task force’s initial concern was to assure that the transition for those with ID/DD to managed care for long-term supports and dental care maintain, at a minimum, the present network of dental providers and their facilities. Its members emphasized the need to consider the complexity of the health care system, including financial and other levers that support the training and financial viability of dentists with expertise in treating patients with special needs and the facilities in which they work.¹

The task force considered how the provision of dental care is different from that of medical care. It underscored that the behavioral component for dental treatment is intensified for people with ID/DD and many dementia patients, resulting in the need for added time for behavior management and treatment. With these understandings, the task force produced specific recommendations to be incorporated into the DISCO model contract, including:

- The establishment of reimbursement rates relative to the needs of patients.
- The establishment of reimbursement levels sufficient to compensate for the time necessary for behavior management and treatment and to assure instruction of dental residents in special needs dentistry.
- Credentialing dentists with expertise in serving special needs populations and developing criteria for designated “centers of excellence.”
- Requiring that dental networks:
  a. Include a sufficient ratio of dentists with expertise in treating special needs patients.
b. Ensure sufficient operating room block time availability.
c. Ensure dental networks include sufficient anesthesiologists and other dental specialists.
d. Guarantee timely access to care and geographic accessibility.

Modify allowable services to include pre-approved reimbursement for:
  a. Four appointments (exam and cleaning) per year.
  b. Oral sedation.
  c. Behavior management for patients with ID/DD.
  e. Fluoride varnish application up to four times a year.
  f. Six desensitization visits.

An Escalating Patient Population with Greater Needs
Another variable contributing to the growing crisis is that the patient population is increasing as resources diminish. The demand for services by patients requiring behavioral management, anesthesia, OR services and other special skills is expected to grow as life expectancies increase and more people maintain their own natural teeth. In addition, the aging population with Alzheimer’s disease and dementia that will require an enhanced range of special patient and disease management skills is growing. Alzheimer’s disease is a progressive, neurodegenerative disease that currently affects an estimated 5.2 million Americans, 380,000 of whom live in New York State. In 2015, total payments for persons with Alzheimer’s disease and dementia are estimated at $214 billion, with Medicare and Medicaid covering 70% of that cost.

One in six individuals age 65 and older now has Alzheimer’s disease. Among those 85 and older, there is an increase in incidence to 49%. Currently, there are 142,500 New York residents in the moderate stage of the disease. In the moderate stage, 70% of Alzheimer’s patients present with challenging behaviors. Most of these patients, as well as those with late stage Alzheimer’s disease, should be seen by a dentist with expertise in treating special needs patients. The number of Alzheimer’s patients who are difficult to treat far exceeds the 60,000 patients with ID/DD with resistive behaviors that currently are cared for by the 300 dentists statewide with expertise in treating this population.

Beginning in 2020, baby boomers will dominate the elderly population, with a massive increase in those aged 65 and older increasing from 35 million in year 2000 to 86.7 million by 2050. The numbers of elders will double substantially, increasing the health care needs of those confined to home and institutions. By the year 2050, the number of patients with the moderate stage of the disease, i.e., with resistive behaviors, is estimated to grow from 100,000 patients to 280,000 patients. This is a looming crisis the profession and the current safety net system of care are not prepared to handle.

The Challenges of Behavioral Management
This patient population presents unique behavior management challenges that require increased treatment time, supplemental resources and greater costs beyond those necessary for the provision of routine preventative, diagnostic and treatment services. Those providing treatment to patients with highly resistive behaviors in hospital settings employ a range of services necessary to safely and effectively provide oral health care to patients with complex medical and behavioral issues. Patients presenting to the hospital may have extreme anxiety and/or irrational fear of oral health care as well.

Ultimately, the most effective way to reduce Medicaid expenditures for medical and dental care is prevention. One study cited shows that patients who are seen regularly in the OR, those with the most resistive behaviors, actually have the lowest cavities incidence because of proactive preventive measures. Further, when programs provide multidisciplinary treatment to patients in the OR, costs can be significantly reduced, and patients can receive more comprehensive care with less potential trauma and disruption to their daily routine.

Hospital dentistry is a critical piece of the dental care mosaic for people with ID/DD. It falls under the umbrella of special care dentistry, in that it is the referral site for patients whose health issues exceed the level of expertise of the community dentist. Hospital dental programs also play a critical role in the education of future dentists. About one-quarter of these 60,000 patients require that their dental treatment be performed in a hospital operating room under general anesthesia. There now are 30 programs across New York State that offer access to hospital operating rooms for comprehensive dental treatment. The 300 dentists with this expertise practice in 48 offices or facilities. Twenty six of these are hospital outpatient dental programs, according to an OPWDD internal report. The 48 offices and facilities, along with the 30 hospital operating room programs, are located in the cities and suburbs of Buffalo, Rochester, Binghamton, Utica/Syracuse and Albany; the counties of Rockland, Westchester, Suffolk and Nassau; and the five boroughs of New York City.

There are 40 hospital outpatient dental programs that provide ongoing dental care to almost 20% of the 126,000 individuals with ID/DD who receive supports and services from OPWDD. These hospital dental programs, along with other freestanding diagnostic and treatment centers, are an integral component of the safety net for people with ID/DD. These institutions have been under increasing financial pressure for years because of a “one size fits all” reimbursement mechanism that has perpetuated flat funding to these facilities for 20 years, based on information from the New York State Department of Health (DOH).

For the 15,000 patients requiring operating room services, only about 3,000 visit an operating room for their dental care an-
nually. Waiting times to access care in an operating room can be between one and two years in much of the state, as it is becoming increasingly difficult for dentists to access operating room time.

The Threat to Hospital Dental Programs
Hospital dental programs are pivotal sites that ensure access to safe, effective dental treatment and training for dentists in the specialized skills necessary to handle resistive behaviors and complex health issues. Changes in health care delivery and funding offer opportunities for hospital dentistry but also pose a threat to their continued existence. Hospital dentistry is locked in a health care system that is expanding and merging in an environment where public and commercial third-party payers are focused on the bottom line of profit and loss.4

The services provided by dentists in the hospital setting extend to all areas of care beyond the dental clinic itself, including in-patient services, emergency departments, surgery and oncology. Nonetheless, hospitals fail to reimburse dentists for services rendered outside of those traditionally thought of as dental in nature. Medical insurance does not pay for dental procedures, and dental insurance does not pay for medical services. This puts hospital dental programs at risk, because if there is not a dollar number assigned to the service, from the hospital administrators’ perspective, the service never happened.

Hospitals have replaced doctors who understand the inner workings and relationships of different hospital services with MBAs. The metrics used are based on the system of payments. There is a move toward value-based payments and capitation, where a whole segment of a population is given a “global payment.” It is not known whether there are accurate enough cost-to-resource data to properly provide quality medical/dental care for specific patient cohorts. The problem evolves from the fact that, while dentists in the hospital serve patient needs by supporting medical care in a wide range of settings, most services are not counted because they are not reimbursable in the current accounting systems.

Without hospital dentistry, some segments of the patient population would not have access to ongoing dental care, including, primarily, the most vulnerable, i.e., those with special needs, the medically fragile and the financially vulnerable. Without hospital dentistry, the entire community would not have access to a unique “medical subspecialty” that other medical specialties and community dentists sometimes require for the proper care of their patients. A method must be found to demonstrate in a measurable way what dentists do outside of the hospital dental clinic.

Training Dentists to Care for Patients with ID/DD
Delivery models, funding and policy changes cannot improve access to oral health care or the health of patients with ID/DD or dementia without a well-trained professional workforce with the skills necessary to meet the unique demands of these patient populations. Reductions in reimbursement and the resulting loss of hospital-based allocated operating room and anesthesiology services and dental training programs are resulting in fewer dentists willing and able to meet the oral health demands of these growing patient populations. How effective are the Commission on Dental Accreditation (CODA) mandates for training dental students in special needs dentistry?

CODA implemented Special Needs Standard 2-24 in 2006: “Graduates must be competent in assessing the treatment needs of patients with special needs.” The standard was intended to expand the range of assessment and care options for patients presenting with various medical, physical, psychological and social situations. It was to include people with ID/DD, cognitive impairment, complex medical problems, physical limitations and vulnerable elderly. While dental school curricula nationally include training in related skills, fewer than three-quarters of the schools actually treat patients with ID/DD. “Special needs” is a broad definition encompassing a wide range of disabilities. There are marked differences between care for a patient with diabetes and quite another for patients with profound ID/DD who will not open their mouths, thrash about in the dental chair and cannot understand the doctor’s requests.5

The CODA mandate requires “assessing treatment needs” but not “treating.” This sets the standard of care that applies to all practitioners who, by virtue of the Americans with Disabilities Act, must see patients with ID/DD in their practices because they are places of public accommodation, but do not necessarily have to treat them in their practices. CODA lacks a standard definition for “competence.” Surveys of dental students report that they receive little preparation in treating difficult patients. Dental schools struggle to obtain knowledgeable and experienced faculty with expertise in treating these patients. With only 300 such safety net dentists in New York State, it is a difficult challenge to tap this very limited re-
source. Further, dental schools find it hard to fit training in “special needs” care into their existing curricula, and the cost to run such programs is high. As a result, students continue to graduate who are unprepared to care for these populations.

It is evident that the current CODA standards fall short in preparing graduates by failing to require that they be competent to treat patients with ID/DD and failing to define competency. There is no standardization of the types of patient populations to which dental trainees are exposed. Dentists can graduate with little or no experience with patients with ID/DD or Alzheimer’s disease.

Beyond what is received in dental school, what training do general practice and pediatric dentistry residents in New York State receive in the care of patients with ID/DD? Based on a survey of New York State residency directors, currently, there are 45 general practice residencies (GPR) offering 452 positions, 18 pediatric dental residencies offering 89 positions, 9 advanced education in general dentistry (AEGD) programs offering 59 positions and 1 postgraduate fellowship in the care of special needs patients that offer opportunities to care for underserved patient populations. Twenty-five percent of AEGD and pediatric residents spend fewer than five hours in didactic instruction on special needs dentistry; 38% spend 6 to 10 hours in didactic instruction; and 38% spend more than 10 hours. Ninety-four percent of the GPR programs have access to an OR; 100% of the pediatric programs have access to an OR but report waiting times extending into months.

Looking Forward: Policy Changes

How Oral Health Care Can Help Reduce Medical Costs

Chronic disease accounts for three of every four dollars spent on health care in the United States. Are there cost-neutral ways to increase funding for oral health care? Increasing evidence from the medical insurance industry suggests that expenditures on oral health reduce the medical costs associated with chronic diseases. Major health insurers, including Blue Cross Blue Shield of Massachusetts, are looking at the impact of oral health care on the costs associated with treatment of major chronic illnesses. The summit’s keynote speaker, Robert Lewando, looked at medical and dental claims information, comparing medical costs for members with certain conditions against whether the member was using his or her dental insurance for services that may help to control oral infection or inflammation. His contention is oral health is a risk factor in chronic disease management. The connections are critical both from the perspectives of public health and health care financing. The major health care insurers have documented that access to dental care and better oral health saves medical dollars. This suggests that cost-neutral funding for expanded oral health care could be derived from some of the monies saved.

Reinvesting saved Medicaid dollars in dental care should result in even greater cost-savings over the long term.

Blue Cross Blue Shield of Massachusetts 2014 claims data demonstrate that BCBS members with coronary artery disease who received a dental cleaning and/or periodontal treatment had $530 per member/per month lower medical costs than members who did not receive dental treatment. There were similar savings of medical dollars for members who had diabetes, chronic heart failure, chronic renal disease and dementia, with a total dollar savings for these policyholders with good periodontal health of $3,676 per year.

Over six million New Yorkers now receive Medicaid benefits. While not all have chronic diseases, the state could gauge the potential savings through improved oral health using existing data. The link between oral health and overall health has become more definitive. An article in the September 2015 Journal of Infection and Immunity brought it down to the cellular/biochemical level explaining the results of a litany of studies showing this relationship. That oral health has an effect on overall health given all the recent studies has to be accepted in looking at overall patient care.

Controlling Health Care Costs through Prevention

The prevalence of dental disease in this population far exceeds the Healthy People 2020 goals for the general population of 20% untreated cavity experience for people 35 to 74 years old. Prevention has continually proven to be among the most effective strategies to reduce the need for—and cost of—dental treatment. Recent research demonstrates a link between social determinants and oral disease prevention interventions that lead to better oral health outcomes for this vulnerable population. Evidenced-based oral disease management strategies have been identified that have the potential for long-term improvement in oral health outcomes. Researchers have found that the living arrangement of patients with ID/DD correlates with their oral health and preventive behaviors. In a recent study by Drs. Morgan and Minihan at Tufts, people living independently had the highest percentage of cavities (52.3%), while those living in a supervised facility had the lowest percentage of cavities (18.8%). Those living with family had the second highest percentage of cavities, double the amount of those living in a supervised facility.

Drs. Morgan and Minihan’s research found correlations between oral health status and the type of residence, cooperation level, level of disability and age. They recommend a shift in policy aimed at improving oral health through interventions of prevention and disease management. Such efforts would begin at home with paid and family caregivers and would include programs to provide structured training and oversight for family caregivers as a priority to make meaningful changes in the oral health of a majority of people with ID/DD.
Changing Public Policy
It is evident that the present system of dental care for vulnerable populations and educational requirements both need to be changed to meet the growing access crisis. Caswell A. Evans Jr. maintains that changing public policy requires a definition of terms, a clear statement of need and rationale, and a compelling articulation of the value proposition. Policy change invariably entails collaboration in the context of a broad coalition that includes inter-professional partnerships and community interest groups.

Changing public policy first needs to garner the interest of policymakers. This requires that advocates make the issue compelling by framing it in the context of “social justice.” Advocating for “dental care” and advocating for “oral health” are different. Advocating simply for dental care could appear to be self-serving. The issue of underserved and unserved is powerful in making change. Dr. Evans views issues of access to care and health disparities as issues of social injustice and social discrimination. “Equality” is “even balance,” i.e., everyone gets the same. “Equity” involves making up for shortcomings that prevent everyone from getting the same opportunity. People in underserved groups will require more resources to achieve the same access to care and outcomes.

Advocacy involves engagement by the dental profession with communities with a common vision. One obstacle to engagement is the absence of a model. There is a marked “silo” approach to patient care. In most discussions, dentistry is simply not invited to the table. Through its presence, dentistry can establish alliances with other professional and lay communities, which can be a source of support for issues prioritized by dentistry.

A Collaborative Model to Reduce Health Care Costs
Once there is agreement that policy needs to change to ensure everyone’s overall health and well-being, achieving major policy change will require collaboration by all parties involved. Fred Ferguson considered solutions to the escalating costs of health care, health disparities and poor utilization. He cited a lack of collaboration among patients, payers, providers and policymakers as the cause. He considers patient behavior to be the primary obstacle to collaboration. His solution is to develop a health care system based on an online “oral health home.” Using this tool, patients, payers, health providers and policymakers could collaborate to manage oral health to promote long-term health and reduce health care costs. Providing an online interface that can track patients’ health and health behaviors facilitates correlation between this information and the patient’s dental examination outcomes, providing continuous health guidance to the patient. This is a logical approach to improve collaboration between patients and their dentists.

Poor oral health is the most common chronic health concern nationally. The risk factors for poor oral health include habits, lifestyle choices, diet, self-care, dependent-care and childcare. These are well understood and are linked to overall health and wellness. Dr. Ferguson utilizes “smart data” derived directly from patients and their dental exams.

While patients and caregivers often complain about a lack of dental care, access problems begin with a lack of health literacy, healthy lifestyles, primary prevention and timely dental care. With data, payers could improve access and utilization because they will be better able to hold patients accountable. Most importantly, the data will facilitate patients, providers and payers working together to protect long-term health and cost reduction.

When patients, payers, providers and policymakers collaborate with the transparency available through an interactive, health management record, we will get a handle on increasing costs through preventive measures specific for each individual’s lifestyle, health and dental issues to achieve the goals of effective managed care.

Conclusions
The information and wide range of perspectives presented during the summit conveyed the consistent theme that the barriers to access for these patient populations are both economic and systemic. Further, these existing barriers will be exacerbated by the growing patient population of older adults with more intensive service needs. Assuring that appropriate services are available to patients with ID/DD and dementia will require trained professional personnel and facilities equipped to address intensive medical and behavioral conditions. These facilities fulfill the role of service provision and serve as the source of training to ensure an adequate professional workforce prepared to meet patients’ oral health needs.

With the transition into a managed care model, there is a risk that the emphasis on cost-containment will result in the continued attrition of services and a disenfranchisement of both patients and providers. Attention to detail, focus on goals, cooperation between all stakeholders and committed leaders at the highest levels of government are required to ensure access to quality care and improved health.
Each presentation at the Stakeholders’ Summit underscored concerns with the potential impact of the managed care transition on the vulnerable ID/DD and aging populations exhibiting symptoms of dementia. Hospital dentistry, special care dentistry and dental education are all interconnected, and meaningful change to meet this crisis in care must be accomplished within each individual area, otherwise we will fail to meet the dental needs of New York State’s most vulnerable citizens, as well as the general population.

The presentations made at the summit support two noteworthy conclusions. These conclusions must be the basis for changes in the health care system moving forward if the goals truly are better health, increased access to care and fiscal prudence.

First, there is increasing recognition outside of the dental profession that good oral health has an impact on overall health. Data, like that included in the report presented by Dr. Lewando of BCBS, demonstrates that utilizing dental treatment results in improved general health and lowers health care costs for people with serious chronic conditions. Taxpayers and policyholders face a huge financial burden when oral health is ignored. Policymakers must recognize and consider this relationship in order to bring about effective changes in the health care system. The value to individuals and society is enormous and offers the potential to bring dental care to the underserved and unserved through savings in medical expenses. The savings realized can be reinvested in dental health care systems that ensure all have access to dental care—and equality in improved overall health.

Second, dentistry has been undervalued for too long. As a result, hospital dental programs and existing special care dentistry “centers of excellence” are in financial difficulty and in danger of closing. This will continue the further disenfranchising of these underserved and unserved populations, especially those with ID/DD. This erosion of resources comes at a time when an aging population with more disabilities and patients with Alzheimer’s disease and other dementias are in need of these facilities and providers. More facilities and providers with expertise in treating special needs patients are required to meet the growing need as shown in demographic projections. There is no mechanism in place—or under consideration—to shift saved medical dollars to fund oral health services. New York’s Medicaid managed care program lacks protocols to facilitate the reinvestment in effective prevention, oral health literacy, school-based programs, hospital programs and special care dentistry centers of excellence needed to improve overall health and meet the treatment needs of people in New York State. With the growing dialogue about “outcomes-based” health care, such protocols should be a fundamental part of any planned shift in reimbursement models.

The relationship of oral health to overall health is a game changer that turns all previous reimbursement systems for dental care upside down. It is both fiscally and medically prudent to rethink the medical/dental provision of care to better assure the best possible outcomes for all concerned.

Copies of a white paper containing reports on each of the presentations included in the Summit are available from NYSFDA.

REFERENCES


Carl H. Tegtmeier, D.M.D., is representative to and former chairman of the NYSFDA Council on Dental Health Planning and Hospital Dentistry and co-chair of the New York State Office for People with Developmental Disabilities’ Task Force on Special Dentistry.

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