Dream Job

Now there's confirmation that dentistry is a compelling career choice.

Scanning the Internet recently, I came across an article from US News and World Report on the top 10 careers for 2014. The number-one career was software developer. This came as no surprise to me, as computers have just about taken over our lives. They are ubiquitous, performing innumerable functions, from cooking our dinner, to keeping our vehicles running properly and our homes warm. Someone has to program them to work correctly.

Career number two was computer systems analyst. Again, no surprise. With all the computers out there, specialists will be needed to keep them running properly so that all the computers can communicate with each other.

The real surprise came in the career listed at number three: dentistry. The article stated that, according to the Bureau of Labor Statistics, dentistry is expected to add over 23,000 jobs by the year 2022. That is a 16 percent increase in the number of dentists currently employed. Dentists, it seems, have a wonderful career because their incomes are excellent; job stress is relatively low; they have a great deal of independence; and job satisfaction is high. Physicians, by comparison, occupy the number-eight career.

I really shouldn’t be surprised by dentistry’s high standing. Dentistry is a unique career in that it lets you work at your own pace, do the things you like to do, refer out the things you don’t, work the hours you want and be your own boss most of the time. Pretty good work if you can get it.

I remember when I decided I wanted to be a dentist. I was a senior in high school and had to select the college I wanted to attend. But first, I had to decide what I actually wanted to do with my life after college. During my formative years, I had been exposed to many different occupations. Some appealed to me; others didn’t. For some reason, the dentists I met and became friends with impressed me the most. To a man—and at that time most dentists were men, particularly in Utica, NY—they seemed the most satisfied with their career choice.

So I selected my college with dental school in mind, one of the reasons why I went to the University at Buffalo for my undergraduate degree. Buffalo had a dental school, and it was a very good dental school. I thought I might have an added advantage getting into dental school as a UB alum. That thinking may have been wrong, but it worked for me. Eight years later, I graduated from UB School of Dental Medicine. Following a residency in orthodontics at the University of Connecticut School of Dental Medicine, I had attained my goal of being an orthodontist.

I have never been sorry for my career choice. It has been everything I had hoped for and then some. I have met some remarkable people during my career, both patients and other dentists. The patients I have treated have been, for the most part, wonderful. Sure, there are always those patients who, no matter how hard you try or what you do, are never pleased with the outcome. Thankfully, the dissatisfied have been few and far between. Most patients appreciate all you do for them and are truly thankful for the care you provide.

There is no better feeling in the world than to see a patient once treatment is completed beaming because you were able to give him or her a beautiful smile. It took a long time—usually two years—but these patients are truly pleased with the way they look. Since I work mostly with children and teens, being an orthodontist
has helped keep me young at heart. However, since 25 percent of my practice are adults, my older patients help keep me grounded in reality. The best of both worlds!

Since I have my own practice and am a solo practitioner, I am also my own boss. This is another reason why I chose a career in dentistry. My father had worked in corporate America, and, while he was treated well for most of his working life, his career ended on the whim of his boss. He had no control over the decision. I never wanted to be placed in that position. I will succeed or fail due to my own efforts and not because of some arbitrary reason from someone higher up.

Dentistry also allows me to pursue other activities and passions. Since you decide how much you want to work and you set your own hours, you have much more flexibility when it comes to pursuing other interests. Knowing many dentists, I have found that those interests are vast and varied. There are other careers that allow this, but I have to believe dentistry is at the top of that list.

Dentistry has, moreover, allowed me to expand my list of friends and acquaintances. Through my involvement in organized dentistry, I have met many wonderful dentists from all areas of our country and the world. This has helped me to understand that we all have similar problems and responsibilities. Even though we may practice alone, we are not alone; help can be only a phone call away. Being the caring individuals they are, dentists tend to respond positively to calls for assistance.

To me, dentistry is really the number-one career choice. It has been my career for over 35 years, and I have loved just about every minute of it. The people I have met, those I have treated over the years, those I have helped, have given me a wonderful sense of satisfaction and accomplishment. I wouldn’t trade it for any other career.

There is an old saying: Do what you love and you won’t work another day in your life. That is how I feel about dentistry. I haven’t worked all these years; I have just enjoyed myself.
Abstract

Invisalign is an increasingly popular technique for aligning teeth and correcting malocclusions orthodontically. This article analyzes the current professional literature published on Invisalign and the benefits and risks of using the technique for both patients and doctors. The steady increase in the number of cases treated with Invisalign and where the technique is going in the future is investigated. Ten guidelines for Invisalign treatment and patient selection are given, along with case examples.

Align Technology revolutionized orthodontic tooth movement with its invention and marketing of the Invisalign system. Although the idea of moving teeth naturally using clear thermoplastic aligners to apply pressure to the dentition has been around for many decades, Align’s engineers applied new CAD/CAM and mass customization technologies to greatly increase the use of aligners. According to Align’s website, Invisalign has been used to treat over 2.4 million patients worldwide, with over 80,000 dentists trained in the technique. Since its founding in 1997, Align has earned over 500 patents for its technologies and has another 200 patents pending. These are without debate impressive numbers, as are Align’s financial figures that show record revenue of $164.5 million in the third quarter of 2013 alone.

So, what has created such an upswing in demand? Certainly there are major advantages to using Invisalign over fixed appliances (braces). The aligners can be removed for eating, brushing and intimacy; patients experience less dental pain, have better oral hygiene and fewer dietary restrictions; and the treatment planning software (ClinCheck) is an excellent tool for visualizing and analyzing potential treatment outcomes, especially when preparing for future restorative work.

Of course, there is also the “invisibility” factor, but lingual braces are probably more undetectable to laypeople than Invisalign, and have been around for decades. They’re just not as comfortable and cannot be removed.

These are all valid and important points, but my inkling is that the more significant factors in these surging sales of Invisalign are Align’s massive advertising campaign, Internet group-discount companies like Groupon and Living Social driving down the cost to the patient, and Invisalign’s relative ease of use for the practitioner. A PVS impression or digital tooth scan is the major pretreatment step in the Invisalign technique. And the most laborious clinical step is bonding the composite attachments to teeth, which can usually be done in one step from a template. Both of these procedures can even be done by certified dental assistants, leaving the doctor only the treatment planning and interproximal reduction (IPR) to complete. Research presented at the AADR meeting found that Invisalign cases used significantly less chair time than conventional braces treatment, and had an overall shorter treatment time.

But if you step back and take a look at the big picture, this is a potentially precarious position for the treating doctor. He or she takes 100% of the responsibility for the outcome of each case; is confronted with a public perception (and hi-tech computer software) that Invisalign is a product that can place teeth virtually anywhere in the mouth with relative ease no matter who the doctor is; and is facing shrinking profit margins, forcing more production and, therefore, less clinical time with each patient.

A look at the published research on the Invisalign technique reveals mixed results. The last systematic review was in 2005, and it yielded inconclusive results—another published review is overdue. Invisalign has been proven to resolve moderate anterior tooth crowding predictably, but treatment outcome studies have highlighted Invisalign’s weaknesses compared to conventional braces in treating anterior-posterior discrepancies, large rotation-
al movements and the extrusion of teeth.\textsuperscript{8,9,10} More post-treatment relapse of anterior dental alignment has also been found in Invisalign cases.\textsuperscript{11} Two independent studies recommend leaving the aligners in the mouth for longer than the two-week intervals the company advocates, probably for better bone and periodontal ligament (PDL) formation.\textsuperscript{11,12}

Align has attempted to improve treatment outcomes with several generations of composite tooth attachments and softer, more resilient, aligner material.\textsuperscript{1} Even though the theory behind these improvements seems sound, Align does not publish its internal clinical findings and, thus, the data cannot be peer-reviewed. The time is now. We need blind, randomized, prospective studies comparing the outcomes of Invisalign to traditional braces. And if we really want a modern study, Invisalign treatment should be compared to fixed appliances using digital treatment planning software (Insignia or Suresmile). Surely, with thousands of practitioners all over the world using both techniques, such a study could be done.

There are several published Invisalign case studies that show impressive space closure, crowding alignment and moderate open bite correction.\textsuperscript{13,14} The Invisalign website and other case reports show patients who almost certainly feel they have a more attractive smile—and the improved quality of life that such changes bring should not be dismissed.\textsuperscript{1,15} But many of these published cases have occlusions that stand little chance of passing the American Board of Orthodontics (ABO) standards and could potentially make patients more prone to future dental problems.\textsuperscript{16,17,18}

This is the dilemma that all clinicians using Invisalign face: At what point, if ever, do the esthetic concerns trump the health issues? Is a beautiful smile worth an increased chance of certain dental problems later on in life? I’m sure many patients would say yes and many doctors would say no. But if we clinicians are not satisfying our patients’ demands, we’d all be out of business very soon.

I believe the solution is not only studying the literature and educating ourselves as to the capabilities of the Invisalign appliances, but also having an honest conversation with our patients about what these appliances can and cannot do; what has a high percentage chance of working; what is risky even with multiple refinements (ordering more aligners from a new scan or impression); and what the potential consequences can be. This conversation should be documented and signed by the patient.

To help dentists navigate this challenging terrain, I have provided basic guidelines below for case selection and general advice and troubleshooting tips. This list is certainly not comprehensive, but should, I hope, help the thousands of Invisalign clinicians in New York State.

1. Until you decide to invest in a digital tooth scanner (only the iTero and 3M True Definition brands are currently compatible with Invisalign), try a two-phase PVS impression with putty to make a quick custom tray and then a light body wash (Genie or Henry Schein brand is fine). True, it’s an extra
2. Use Invisalign’s new G4 composite attachments, but note that the well on these attachments is usually much smaller, making the use of heavier filled composites challenging. Flowable composite (Kerr brand) is easier to place, but these resins tend to shrink more and abrade faster, preventing full expression of the aligner. Align claims to have unpublished studies on composite attachments as well, but it’s hard to see how the attachment/aligner interface will ever be as accurate as a wire/bracket interface. Theoretically, using a digital scanner, a clinician should be able to bond attachments first and then have the aligners manufactured. But, as of this publication, Align does not seem to be pursuing that avenue.

3. Make sure the patient is aware that Invisalign attachments are not “invisible” to other people (Figure 1). Currently, G4 attachments cannot be placed on the lingual side of teeth, so another outcome/esthetics decision needs to be made and documented.

4. Try Brasseler coarse strips in the mini-stripper handle for patient comfort and ease of use for IPR of .2 mm or less. If more reduction is indicated, break the contact with the strips and...
use the Brasseler double-sided mesh disk. Postpone all IPR as far into treatment as possible to get clear access through the contact point (expand and procline teeth first). This will ensure more accurate measuring with the IPR gauge. Tell the Invisalign tech the exact ClinCheck stage you wish to start your IPR and where. Attempt mostly posterior IPR unless you want to change the shape of the anterior teeth for esthetic reasons.

6. Do not attempt rotations over 30° unless you plan to use fixed appliances to align the rotated teeth first. If using Invisalign only and the tooth is not in an esthetic area, do not attempt to rotate the tooth at all, because the subsequent aligners will not fit and a new PVS impression or scan will be needed almost immediately. If a tooth is rotated 20° to 30° and is in an important esthetic area, you can attempt the correction with large buccal and lingual rectangular Ivoclar attachments, but educate the patient that several refinements may be needed and do not promise a 100% correction.

7. Overcorrect space closure with a “C-chain” aligner that will overcorrect all anterior spaces with three extra aligners at the end. You may not need all of these extra aligners, but you can sometimes avoid doing an entire refinement to close a small gap.

8. Ask the patient to leave the final three aligners in for three weeks each (unless using an accelerator like AcceleDent or Propel). This should allow for better bone and PDL formation toward the end of treatment and will, it is hoped, lead to better, more stable final results. Patients stop feeling the aligner forces after only a few days, but if they move to the next aligner too soon, they can potentially damage tissues. As always, compliance is a major factor with Invisalign and 22-hour/day wear is a must (Figure 2), as is nightly retainer wear after treatment or a fixed retainer.

9. Do not attempt the extrusion of teeth unless you plan and discuss with the patient the use of elastics or fixed appliances, or possible restorations (Figure 3). Due to the “watermelon seed” effect, every rotational force put on a tooth with Invisalign has an inherent intrusive vector. Anterior open bites are corrected with intrusion of posterior teeth and subsequent bite closure, not extrusion of anterior teeth.

10. Do not promise to correct skeletal Class II or Class III malocclusions, posterior crossbites, severe open bites (larger than 2 mm), or TMD symptoms with Invisalign (Figure 4). Advanced users have had some success correcting these conditions, but these techniques require full orthodontic records with a traced cephalometric radiograph and are beyond the scope of this article.

The bottom line to general practitioners is please use the Invisalign over ClearCorrect and other clear aligners due to the superior treatment planning software—but is most certainly not for every patient and is extremely case-sensitive. Seek the guidance of your trusted orthodontist to select the cases that have a high probability of success, and keep patients informed about issues that might not be completely corrected. Don’t forget that Align’s primary responsibility is to its shareholders. The patients are our responsibility.

Dr. Kuncio is an orthodontist in private practice on the upper west side of Manhattan who has treated or supervised the treatment of hundreds of Invisalign cases since 2006. He is a diplomat of the American Board of Orthodontics and a clinical attending and assistant professor of orthodontics at Montefiore Medical Center/Albert Einstein College of Medicine, New York, NY. Dr. Kuncio has no financial affiliation with Align Technology or any other dental company. Queries about this article can be sent to Dr. Kuncio at drkuncio@gmail.com.

REFERENCES

ABSTRACT

Demographically, dental caries remains the single most common disease of childhood. Various campaigns have been carried out to promote and to improve the oral health of children. However, the prevalence of dental caries was still more than 50% in many communities. This article reviews different approaches used in dental health programs in industrialized and developing countries. To build a comprehensive oral health preventive program, three elements are essential. They are oral health education/instruction, primary prevention measures and secondary prevention measures.

Elements in Oral Health Programs

Anty Lam, R.D.H., M.P.H.
tant in controlling the advancement of periodontal lesions. The 2001 Grant Makers in Health Issue Dialogue observed that “One proven strategy for reaching children at high-risk for dental disease is providing oral and dental health services in school-based health centers....”

The American Dental Association (ADA) also addresses the fact that tooth decay remains the single most common chronic disease of children. Resolution 38H-2010, passed by the ADA House of Delegates, recognizes the benefits of school-based oral health programs in preventing and controlling dental caries in children and adolescents. In fact, a number of community oral health programs for children have been conducted in school/kindergarten. Some examples are the ones in Milwaukee, WI, Brazil and Ecuador. To facilitate the operation of these community oral health programs, the involvement of school staff, community clinics, dental hygienists and health educators is feasible and appropriate.

Elements in Oral Health Programs
There are three main elements in most oral health programs. They are: oral health education/instruction; primary prevention measures, which can be chairside and non-chairside; and secondary prevention measures, which refer to early detection and treatment. Frazier and his co-workers surveyed prevention programs for children in Japan, Singapore, Sweden and the United Kingdom and concluded that it is essential to include these three program elements to build a comprehensive oral health preventive program.

Oral Health Education/Instruction
Oral health education/instruction usually refers to oral hygiene instruction and/or oral health education. These instructional activities aim to promote oral health practices and to improve awareness and attitudes toward dental health. They target not only children, but also their parents, teachers and health workers. Oral health education and instructional activities for children, parents, teachers and health workers are commonly carried out in schools and clinics. Reinforcing and teaching toothbrushing is generally accepted to be a main component in oral hygiene instruction. Oral health education is usually carried out through presentations, games or printed materials. Schools are often selected because they provide good access to children, parents, teachers and health workers. The WHO supports programs carried out in schools.

Arguments in favor of promoting dental health through schools include:
- Students can be accessed during their formative years, from childhood to adolescence. These are important stages in people’s lives, when lifelong oral health-related behaviors, as well as beliefs and attitudes, are being developed.
- School can provide a supportive environment for promoting oral health. Access to safe water, for example, may allow for general and oral hygiene programs. Also, a safe physical environment in school can help reduce the risk of accidents and concomitant dental trauma.
- The burden of oral disease in children is significant. Most established oral diseases are irreversible and will last a lifetime and have an impact on the quality of life and general health.
- School policies, the physical environment and education for health are essential for attainment of oral health and to control risky behaviors, such as the intake of sugary foods and drinks, use of tobacco and alcohol consumption.
- Schools can provide a platform for providing oral health care, that is, preventive and curative services.

Oral health education is considered important to preventing and treating oral diseases as evidenced in the Knowledge Attitude Behavior (KAB) model. The Health Belief Model (HBM) also posits that individuals must perceive themselves to be at risk before they will take actions to reduce risky behaviors or to engage in healthy alternative behaviors. Through education, people can acquire the knowledge to identify their risk and the impetus to practice healthy alternative behaviors.

Kay and Locker reviewed the effectiveness of dental health education and reported that very few definitive conclusions about the effectiveness of oral health promotion can be drawn from currently available evidence. Knowledge levels can almost always be improved by oral health promotion initiatives, but whether these shifts in knowledge and attitudes can be causally related to changes in behavior or clinical indices of disease has not been established. Although there are studies conducted in China and in England reporting that oral health education had an effect in improving the dental health of children, several other studies in different countries, such as the ones conducted in Zimbabwe, Belgium and Indonesia, concluded that the involvement of primary healthcare personnel and school teachers in providing school-based oral health education had little significant effect on caries prevention in children.

Primary Prevention Measures
Fluoride agents are commonly used as a primary prevention measure. It is generally agreed that the use of fluorides has led
to a significant decline in dental caries. Research has shown that fluoride is most effective in preventing dental caries when a low level of fluoride is constantly maintained in the mouth. The provision of fluoride can be through drinking water, salt, mouthrinse or toothpaste, and various forms of professionally applied fluorides, such as gels and varnishes. Of these modalities, water fluoridation is considered the most cost-effective way to prevent caries formation. It has been suggested that the most potent effect of water fluoridation is not so much preventing new lesions from appearing, but remineralizing existing carious lesions and, thus, slowing down or even arresting the caries process.

Although there is evidence of merits in water fluoridation, health authorities in many countries still have implementation problems. The lack of a safe networked water supply system and the absence of government willingness/support are difficulties in developing countries. In industrialized countries, worry from unjustified claims of harmful effects and freedom-of-choice and autonomy arguments from anti-fluoridationists may affect the decision to add fluoride to the water.

When water fluoridation is not feasible, WHO recommends considering the use of salt fluoridation techniques to prevent dental caries. Unlike water fluoridation, which requires a reliable water supply, salt fluoridation is less dependent on infrastructure and can achieve wide coverage. It is a less politically sensitive issue that allows for freedom of choice. And it has been reported to have an effect on preventing dental caries. In some areas of France and Germany, domestic fluoridation salt has a market share of more than 50%. In Jamaica, the reduction of caries in children has been noticed since implementation of salt fluoridation. Although there is increased use of fluoridated salt in Europe, Central and South America, the population coverage is still not large.

The most common products for self-application are fluoride toothpastes and mouthrinses. A review of fluoride toothpaste by Cochrane Collaboration, using random effects meta-analyses, found that fluoride toothpaste is efficacious in preventing caries in children. The review also found that the effect of fluoride toothpaste increased with higher baseline levels of D(M)FS, higher fluoride concentration, higher frequency of use and supervised brushing. Fluoride toothpaste can be used in community-based preventive programs. A study in China found that brushing with fluoride toothpaste for three years arrested 45% of the proximal and 23% of the buccal and palatal carious lesions in primary anterior teeth. It demonstrated that daily toothbrushing with fluoride toothpaste could be an effective program to control the caries problem in children. Since the use of fluoride toothpaste in developing countries like China, especially in rural areas, can be inhibited by its relatively high cost and poor distribution, the development of the fluoride toothpaste market in these countries presents a challenge to manufacturers and to dental public health workers.

Although fluoride mouthrinse is not as popular as fluoride toothpaste for self-application, there are studies that report that mouthrinse is effective in caries prevention in children. A meta-analysis conducted by Cochrane Collaboration suggested that the supervised regular use of fluoride mouthrinse reduced caries incrementally in children. However, fluoride rinses may not be suitable for young children, because they are likely to swallow the solution posing a risk for fluorosis. On the other hand, rinsing appears to have a greater effect in older children aged 10 or above.

Fissure sealant application is another procedure that has been demonstrated to be effective in preventing caries in children. Although the prevalence among U.S. children and adolescents of one or more sealed permanent tooth surfaces increased about 13% during the period 1988-1994 to 1999-2002, it is still well below the objective set by the Healthy People 2010 document, which is 50% of sealant use among this population.

Many states have used government money to initiate sealant utilization programs to meet the objective delineated in the Healthy People 2010 document. Examples of community-based sealant promotion programs targeted to high-risk school children include Sealant Saturdays in Salt Lake City, UT, and the Dental Initiatives of the Academic Health Center at the University of Minnesota; Dental Sealant Program of the Department of State Health Services, Texas; Seal a Smile Program of Wisconsin Oral Health Program; Dental Sealant Grant Program of Illinois Department of Public Health; and the Rural School-Based Oral Health Program for South Texas. School-based dental sealant programs also have significant accomplishments. Those programs in Arizona, Illinois, New Mexico, Michigan and Ohio have been named as successful practices in the Association of State & Territorial Dental Directors May 2011 Report.

**Secondary Prevention Measures**

Dental screening is the usual strategy used in early detection and treatment service. A study in Sweden pointed out the importance of early detection and prevention of caries in the primary dentition. In industrialized countries, dental treatments are often carried out in either standing dental clinics or provided through a “mobile dental clinic” housed in a van that travels to various places. These methods are neither available nor affordable in developing countries, where the cost of basic sets of instruments, dental materials and infection control products is too high and training for primary health workers to undertake basic oral care is inadequate. In these situations, a new approach to oral healthcare is needed.

The Commonwealth Dental Association (CDA) and the WHO held a workshop in 1996 on equity in oral health. One of the many challenges addressed at the workshop was how to provide funding to treat the massive amount of caries in children in developing countries. Managing caries through minimal
invasions and low-cost methods is imperative. Caries-arresting treatment that aims to halt or slow down disease progression is a practical solution to minimize children’s discomfort and other problems due to dental caries.

Studies on xylitol chewing gum showed the effect of the gum on arresting caries in children.42,43 Other studies showed similar results from using chlorhexidine varnish.44,45 Moreover, a minimal intervention treatment using professionally applied topical silver fluoride, followed by stannous fluoride solution, was found to be effective in arresting caries in primary molars.46 The School Dental Service in Western Australia has used a 40% silver fluoride solution as the standard treatment for deep carious lesions in primary teeth with good results.47 In China and Japan, silver ammonia fluoride or silver diamine fluoride (SDF) has been used successfully for arresting caries in children for many years.48,49 A recent review found that SDF is a simple and cost-effective agent that has significant and substantial benefit in arresting and preventing caries.50

Another systemic review by Rosenblatt concluded that SDF appears to meet the criteria of both the WHO Millennium Goals and the U.S. Institute of Medicine’s criteria for 21st century medical care.51

The use of glass ionomer in atraumatic restorative treatment (ART) is another useful method for treating dental caries in pre-school children in developing countries. The short treatment time and simple and minimal armamentarium of ART makes it affordable for treating children. An evaluation of ART restorations placed in children in China showed promising results.52 Another study in Tanzania reported a good success rate with ART over six years.53 The WHO Collaborating Centre performed a meta-analysis and found it appears there is no difference in survival results between single-surface ART restorations and amalgam restorations in permanent teeth over the first three years.54

The advantages of ART sealants and restorations then are: it requires simple instruments and materials; the cost is low; it is flexible; and it is user friendly, especially for children. Dr. R.G. deAmorim commented in a journal article that the accumulating evidence of ART has suggested that it can be as good as or even better than conventional treatment.55

**Conclusion**

In summary, most articles on prevention describe how the programs were run; few studies have proper evaluations. Evidence-based studies are essential to evaluate the outcome of these programs. It is difficult to have appropriate study design for evaluation; and a randomized clinical trial model may not be applicable because of ethical issues. However, as there are a number of effective prevention methods available, we can provide feasible

---

**NEW YORK STATE MISSION OF MERCY**

**Volunteer Registration is now open**

The New York State Dental Association (NYSDA) and New York State Dental Foundation (NYSDF), together with national partner Mission of Mercy, are launching the New York State Mission of Mercy (NYSMOM), a free two-day dental clinic to provide oral health services and education to people who, for many reasons, lack access to dental care.

Go to www.nysmom.org for information and to volunteer.

**SAVE THE DATE**

**Date: June 13 & 14, 2014**

Edward F. McDonough Sports Complex
Hudson Valley Community College
Troy, New York
prevention care to children after careful consideration of the cultural, social, economic and healthcare settings in which they live.

Queries about this article can be sent to Ms. Lam at alam@citytech.cuny.edu.

REFERENCES

Riga-Fede Disease
Case Report

Abstract
Riga-Fede disease results when an infant’s instinctive tongue thrusting and raking motion over recently erupted primary mandibular incisors causes a traumatic ulceration of the tongue and/or mouth floor. The symptoms and therapeutic approach to the condition are highlighted in this case report.

Riga-Fede disease (RFD) is a reactive traumatic mucosal disease in infants, characterized by an uncommon self-limiting persistent ulceration of the oral mucosa. It was first described clinically by Riga in 1881. In 1890, Fede added a histologic description.

The ulceration is a result of repetitive trauma to the oral mucosa by teeth and usually involves the ventral surface of the tongue. An instinctive infantile reflex tongue thrust leads to a raking motion of the tongue over the incisal edges of recently erupted primary mandibular incisors. Inevitably, an ulceration of the tongue’s ventral surface results. However, the lingual frenum, mucosa of the lips, buccal mucosa, mouth floor, and even the dorsum of the tongue if contact with maxillary teeth occurs, all can become involved.

Natal teeth, those that are present at birth, and neonatal teeth that erupt in the first 30 days after birth are the causes of RFD. Although RFD is usually seen soon after birth, coinciding with deciduous tooth eruption at 6 to 8 months, it is also observed in infants up to 2 years of age. Traumatic ulcerative granuloma with stromal eosinophilia is the diagnostic term used to describe the identical condition in children older than 2 and in adults. The incidence of RFD in the presence of natal/neonatal teeth has been reported to be 6% to 10%. Because of the oral discomfort that is present, feeding problems with nutritional deficiencies, retarded growth, dehydration and infection can result. Prompt care is necessary to avoid these sequelae. Furthermore, an early accurate diagnosis is mandatory in order to differentiate RFD from serious neurologic and hereditary disorders that present similar oral ulcerations.

The authors present a case of RFD that was previously undiagnosed by the infant’s pediatrician and dentist. The purpose of the report is to highlight the etiology, symptomatology and therapeutic approach to RFD. The profession’s familiarity with the entity will avoid known complications, the patient’s chronic discomfort and needless parental concern.

Case Report
A 9-month-old female was seen in the oral surgery clinic of Columbia University College of Dental Medicine. The infant’s mother was concerned about an ulceration that was present in the anterior mouth floor. The mother said she first noticed the lesion three weeks previously and had sought professional advice, but no diagnosis had been made. The mother believes a feeding problem has developed and this has heightened her concern.

A previous examination by the infant’s pediatrician indicated that the baby was thriving normally and was in excellent health. The intraoral examination revealed a non-suppurating ulcerative
lesion, measuring about 1.3 cm in diameter, that involved the anterior mouth floor, lingual frenum and the ventral surface of the tongue (Figure 1). The ulcer had a gray-white surface, reflecting the presence of a necrotic slough. Mandibular deciduous central incisors, with distinctive mammelons, were noted to be in their normal eruptive position.

The source of the problem became quite evident during the examination. The infant constantly thrust her tongue anteriorly out of the mouth and over the incisal edges of the deciduous anterior teeth. In so doing, the tongue carried forward the lingual frenum and the mouth floor. The involuntary repetitive action brought these anatomic mucosal structures into continuous contact with the mammelons of the erupted teeth. The ulcer’s location corresponded perfectly with those mucosal areas that rubbed against the mandibular primary anterior teeth.

A diagnosis of RFD was made. Conservative therapeutic treatment involved referring the infant to the pediatric dentist, with the recommendation that the sharp incisal edges of the deciduous anterior teeth be smoothed by disking. Our follow-up phone call, five weeks later, revealed that the ulcer had disappeared three weeks after the teeth were disked.

**Discussion**

The classic ulcer associated with RFD can also herald the existence of underlying developmental or neurologic disorders. Familial dysautonomia (Riley-Day syndrome) is an inherited disorder that affects the autonomic nervous system with a variable symptom complex that includes insensitivity to pain, loss of tears, poor growth, a labile blood pressure and frequent emetic episodes. Lesch-Nyhan syndrome, an X-linked recessive disorder of purine metabolism, is best known for its classic diagnostic characteristic, a severe compulsive self-injurious patient behavioral pattern. Additionally, the persistent motor disorder associated with cerebral palsy can include involuntary tongue thrusting activity that may lead to tongue ulceration.6

Histologic analysis of the ulcer will reveal a chronic ulceration surrounded by a dense mixed inflammatory granulation tissue infiltrate consisting largely of lymphocytes, macrophages, mast cells and numerous eosinophils.2,3,6 Due to the large number of eosinophils, it is often classified as a subtype of the traumatic ulcerative granuloma with stromal eosinophilia (TUGSE).4,10 However, TUGSE differs clinically from RFD in that the ulcers are seen in adults and involve oral regions other than the tongue. Biopsy is rarely indicated in cases of RFD, because a diagnosis can be made on the basis of the history and clinical features of the lesion. When the clinical symptoms do not resolve within two weeks after standard treatment, biopsy can be performed to rule out an infectious or neoplastic etiology.1,2,6

![Figure 1. Ulceration involving anterior mouth floor and ventral surface of tongue (arrow).](Image)

**Treatment**

The aim of therapy for RFD is to minimize trauma. Standard treatment options for RFD begin and typically end with conservative therapies such as disking down the sharp incisal edges of teeth and/or placing composite resins on the edges of the teeth. Both techniques are usually combined with a topical corticosteroid because of its anti-inflammatory action.1,4,7-9,12 Extraction of the culpable teeth is an option, but its effect on the eruption of the permanent teeth must be considered.7,9,12 Recurrence of the ulcerative lesion is not expected once healing has occurred following therapy.6

Queries about this article can be sent to Dr. Mandel at LM7@columbia.edu.
Use of Oral Healthcare and Need to Expand Population That is Served

A Commentary


ABSTRACT

General population demographics are undergoing dramatic changes. Long-term customary populations that provided the bulwark for successful dental practices are being replaced by the many minority populations. Despite these significant general population developments, the demographic profile of the dental profession has experienced (and, apparently, based on dental student populations, will continue to experience) limited changes. The economic strength of the profession may well be predicated upon its responses to these developments. The question remains, “Is the profession preparing for them?”

In mid-April 2013, the lead headline of the ADA News announced, “Baby Boomers Boost Utilization: Older Patients Show Raise in Dental Expenditures.”1 However, the information contained in paragraphs of the column that followed emphasized a different story. It included:

- Americans aren’t spending any more on dental care than they were five years ago.
- After decades of steady growth, national dental expenditures began to slow in the 2000s, years before the economy soured.
- Once the great recession hit in 2008, national dental expenditures leveled off and have remained flat ever since.
- The rising proportion of those over 65 years old (projected to increase from 48 million in 2015 to 92 million in 2060) could significantly increase dental expenditures, “…buoying up the dental economy for years to come.”1

Unfortunately, waiting decades for the number of seniors to almost double and boost the economics of dentistry is not a viable option for current practitioners. Similarly, relying solely on emphasizing efforts to increase the use of services by the traditional consumers of oral healthcare may have its limitations. Maybe by “accentuating the negative” component of the 2012 report on dental expenditures from the federal Agency for Health Care Research and Quality, we can tell the story that could direct the profession as it seeks to expand its services to the general population.2

Non-use of Services

Percent with No Expenses

Almost half of youngsters and teenagers (ages 5 to 17 years) were reported to have had no expenditures for dental services in 2010, followed by two-thirds of younger adults (18 to 44 years) and more than half of the population 45 years and older. Among other demographic cohorts, dental expenditures were reported by a smaller percent of:

- Men than women.
- Minority groups, in particular Hispanics, than white non-Hispanics.
- Middle income and poor populations than higher income populations.
“More than 4 million children aged 17 and younger had unmet dental need in 2011 because their families could not afford dental care....”6

- Residents in non-metropolitan statistical areas (MSA) than those in MSA.
- Uninsured individuals than privately insured and government covered program groups.
- Residents of the Southern region than in all other census regions (Table 1).

### Mean and Median per Person Expenses

It is estimated that almost 60% of the population (183.9 million individuals) reported no expenditures for dental services. Among those who spent money for services, the average individual expended $666 in 2010, with a median expenditure of $236—which would indicate that of those who spent money for care, half expended a relatively small amount of money (that is, less than $236) and half (or possibly a small component) expended a much greater amount of money to raise the overall national mean level to $666 (Table 1).

### Payment for Dental Services

Out-of-pocket spending represented 44% of all dental service costs. By contrast, out-of-pocket spending represented 14% for all healthcare expenditures for the total population—including 17% of the costs for youngsters < 18 years; 15% for the 18- to 64-year population; and 12% for the 65+ year population.3 In essence, spending for dental services “is felt” to a greater extent than for total health services.

- Private insurance does not cover 54% of dental expenses.3
- Medicaid provided 6% of all expenditures for dental services. However, it represented 42% of costs for children less than 5 years, 21% for the Hispanic population, 38% for the poor population and 73% for the 65+ population with public insurance (Table 2). At the same time, studies suggest that fewer than 25% of all dentists accept Medicaid patients and fewer than 10% have at least 30% of their practice represented by Medicaid beneficiaries.4

Yes, there are explanations, including inadequate fee schedules and Byzantine bureaucratic impediments. However, from the prospective of the public, the results are limitations in the availability of dentists to provide access to care. For example, the death of Deamonte Driver in 2007 was headlined as, “For the Want of a Dentist.” And follow-up statements in the Washington Post made the case that “Twelve-year-old Deamonte Driver died of a toothache Sunday. A routine, $80 tooth extraction might have saved him... If Medicaid dentists weren’t so hard to find.”5

### Ongoing Crisis in Dental Care

The Centers for Disease Control and Prevention reported that in the second half of the last decade, almost one-quarter (23.7%) of adults 20 to 64 years had untreated dental caries.7

### Table 1

**Dental Services—Median and Mean Expenses per Person with Expenses: 2010**

<table>
<thead>
<tr>
<th>Population characteristics</th>
<th>Population (in millions)</th>
<th>Percent with Expenses</th>
<th>Median Expenses</th>
<th>Mean Expenses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>308.6</td>
<td>40.4%</td>
<td>$236</td>
<td>$666</td>
</tr>
<tr>
<td>Age in years</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Under 65</td>
<td>267.4</td>
<td>40.1%</td>
<td>228</td>
<td>642</td>
</tr>
<tr>
<td>Under 5</td>
<td>21.3</td>
<td>18.9%</td>
<td>125</td>
<td>234</td>
</tr>
<tr>
<td>5-17</td>
<td>53.6</td>
<td>54.1%</td>
<td>188</td>
<td>678</td>
</tr>
<tr>
<td>18-44</td>
<td>111.1</td>
<td>34.2%</td>
<td>240</td>
<td>547</td>
</tr>
<tr>
<td>45-64</td>
<td>81.5</td>
<td>44.5%</td>
<td>273</td>
<td>759</td>
</tr>
<tr>
<td>65 &amp; over</td>
<td>41.2</td>
<td>42.4%</td>
<td>296</td>
<td>814</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>151.6</td>
<td>37.2%</td>
<td>230</td>
<td>644</td>
</tr>
<tr>
<td>Female</td>
<td>157.0</td>
<td>43.5%</td>
<td>242</td>
<td>684</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White, non-Hispanic</td>
<td>198.7</td>
<td>45.8%</td>
<td>252</td>
<td>710</td>
</tr>
<tr>
<td>Black, non-Hispanic</td>
<td>37.4</td>
<td>30.5%</td>
<td>166</td>
<td>466</td>
</tr>
<tr>
<td>Native American</td>
<td>6.6</td>
<td>38.1%</td>
<td>235</td>
<td>560</td>
</tr>
<tr>
<td>Asian</td>
<td>15.5</td>
<td>36.3%</td>
<td>247</td>
<td>668</td>
</tr>
<tr>
<td>Hispanic</td>
<td>50.3</td>
<td>28.0%</td>
<td>177</td>
<td>566</td>
</tr>
<tr>
<td>Health insurance status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 65 yrs, private</td>
<td>179.4</td>
<td>48.1%</td>
<td>250</td>
<td>687</td>
</tr>
<tr>
<td>&lt; 65 yrs, public</td>
<td>47.8</td>
<td>30.7%</td>
<td>129</td>
<td>410</td>
</tr>
<tr>
<td>&lt; 65 yrs, uninsured</td>
<td>40.2</td>
<td>15.6%</td>
<td>210</td>
<td>574</td>
</tr>
<tr>
<td>65+ yrs, Medicare only</td>
<td>15.7</td>
<td>32.0%</td>
<td>294</td>
<td>758</td>
</tr>
<tr>
<td>65+ yrs, Medicare &amp; private</td>
<td>20.8</td>
<td>55.1%</td>
<td>308</td>
<td>860</td>
</tr>
<tr>
<td>Poverty status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor</td>
<td>46.8</td>
<td>25.9%</td>
<td>151</td>
<td>447</td>
</tr>
<tr>
<td>Middle income</td>
<td>93.0</td>
<td>37.9%</td>
<td>227</td>
<td>672</td>
</tr>
<tr>
<td>High income</td>
<td>111.7</td>
<td>53.9%</td>
<td>268</td>
<td>735</td>
</tr>
<tr>
<td>Metropolitan statistical areas (MSA)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSA</td>
<td>260.1</td>
<td>41.1%</td>
<td>240</td>
<td>674</td>
</tr>
<tr>
<td>NonMSA</td>
<td>48.4</td>
<td>37.1%</td>
<td>222</td>
<td>620</td>
</tr>
<tr>
<td>Census region</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northeast</td>
<td>55.5</td>
<td>41.9%</td>
<td>226</td>
<td>689</td>
</tr>
<tr>
<td>Midwest</td>
<td>66.9</td>
<td>45.6%</td>
<td>240</td>
<td>642</td>
</tr>
<tr>
<td>South</td>
<td>114.0</td>
<td>35.8%</td>
<td>215</td>
<td>589</td>
</tr>
<tr>
<td>West</td>
<td>72.2</td>
<td>41.9%</td>
<td>280</td>
<td>776</td>
</tr>
</tbody>
</table>
The 2012 report “Dental Care Crisis in America” by the Subcommittee on Primary Health and Aging of the U.S. Senate Committee on Health, Education, Labor & Pensions goes further in describing the need for dental health services. It found that:

- More than 47 million people live in places where it is difficult to access dental care.
- About 17 million low-income children received no dental care in 2009.
- One fourth of adults in the U.S. ages 65 and older have lost all of their teeth.
- Low-income adults are almost twice as likely as higher-income adults to have gone without a dental checkup in the previous year.
- Bad dental health impacts overall health and increases the risk for diabetes, heart disease and poor birth outcomes.
- There were over 830,000 visits to emergency rooms across the country for preventable dental conditions in 2009—a 16% increase since 2006.
- Almost 60% of kids ages 5 to 17 have cavities—making tooth decay five-times more common than asthma among children of this age.

![Table 2](image)

<table>
<thead>
<tr>
<th>Total Expenses (in billions)</th>
<th>$59.7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Out of Pocket</td>
<td>44.3%</td>
</tr>
<tr>
<td>Private Insurance</td>
<td>46.1%</td>
</tr>
<tr>
<td>Medicare</td>
<td>0.7%</td>
</tr>
<tr>
<td>Medicaid</td>
<td>5.7%</td>
</tr>
<tr>
<td>Other</td>
<td>3.2%</td>
</tr>
</tbody>
</table>

**Age in Years**
- Under 65: 47.8
- Under 5: 9
- 5-17: 8.2
- 18-44: 15.8
- 45-64: 22.9
- 65 & over: 11.9

**Gender**
- Male: 27.0
- Female: 32.7

**Race/ethnicity**
- White, non-Hispanic: 46.8
- Black, non-Hispanic: 4.0
- Native American: 1.1
- Asian: 2.4
- Hispanic: 5.3

**Health insurance status**
- < 65 yrs, private: 41.3
- < 65 yrs, public: 4.0
- < 65 yrs, uninsured: 2.5
- 65+ yrs, Medicare only: 3.3
- 65+ yrs, Medicare & private: 8.2

**Poverty status**
- Poor: 4.2
- Middle income: 17.3
- High income: 

**Metropolitan statistical areas (MSA)**
- MSA: 51.3
- Non-MSA: 8.4

**Census region**
- Northeast: 10.6
- Midwest: 14.4
- South: 17.6
- West: 17.1

* Relative standard error equal to or greater than 30%.
whites, who made up 67% of the population in 2005, will be 47% in 2050. Hispanics will rise from 14% of the population in 2005 to 29% in 2050. Blacks were 13% of the population in 2005 and will be roughly the same proportion in 2050. Asians, who were 5% of the population in 2005, will be 9% in 2050.10

Minorities, classified as those of any race other than non-Hispanic, single-race whites, currently constitute about a third of the U.S. population, according to Census figures. In 2042, minorities are projected to become the majority, making up more than half the population. Minority children are projected to reach that milestone even sooner. By 2023, the Census Bureau reports “…more than half of all children will be minorities.”11

Dental Profession Demographic Changes

Dental School Graduates
Between 2001 and 2010, the continuing increase in the proportion of female representation among graduates, from 37.5% to 45.3%, was the major demographic change. During the same period, the proportion representations among graduates included:

- Non-Hispanic white—decreased from 62% to 58.4%.
- Asian—decreased from 26.5% to 25.0%.
- Hispanic—increased from 4.9% to 6.1%.
- Black—increased from 4.9% to 5.5%.
- Native American—increased from 0.6% to 0.7%.12

Compared to the general population, Asian students were over-represented among graduates, and other minorities continued to be under-represented among dental school graduates during the past decade.

Dentists
In 2010, 80.3% of the 175,000 dentists were non-Hispanic whites; 19.7% were members of minority groups (13.7% Asian, 5.7% Hispanic and 0.3% black).13 The shortage of Hispanic dentists has been emphasized previously by the National Hispanic Medical Association.14

Overview
Decades of studies and reports based on race/ethnicity, income, residency locations and insurance have emphasized the disparities in the delivery of dental care to the general population. The layout of most tables in these reports (e.g., Tables 1 & 2) “accentuated the positive” use of services by non-Hispanic white middle- and higher-income populations with insurance. The tables usually compare and recognize the inadequacies for minority populations. But general population demographics are undergoing dramatic changes with the result that the long-term customary populations that provided the bulwark for successful dental practices are being replaced by the many minority populations.

Despite these dramatic general population developments, the demographic profile of the dental profession has experienced (and, apparently, based on dental student populations, will con-
tain dental services because of cost. Also, Medicaid dentists are “...so hard to find.”

The reality is that changes are coming. The question remains, “Is the profession preparing for them?”

Queries about this article can be sent to Dr. Waldman at h.waldman@stonybrook.edu.

REFERENCES

Histologic Findings within Peri-implant Soft Tissue in Failed Implants Secondary to Excess Cement
Report of Two Cases and Review of Literature


A B S T R A C T

A link has been established between peri-implant disease and excess cement extrusion in cement-retained implant restorations. The histologic findings of two patients with failed implants secondary to residual excess cement are reported here. If excess cement is detected early and adequately removed, resolution can occur in the majority of situations. Simple recommendations are proposed, with the intention of preventing further implant failures from residual excess cement.

Cementation of an implant prosthesis is an accepted protocol. Advantages include less demanding surgical placement of the implant, simpler laboratory techniques, passive fit, esthetics and control of the occlusion.1,2 Disadvantages are unpredictable retention and resistance, and the detrimental effect of cement flow into the soft tissues that can be difficult to remove.2

The soft tissue attachment onto the implant surface is more delicate than that seen at the natural tooth surface due to the lack of Sharpey’s fiber insertion, the reduced number of collagen fibers and the direction in which these fibers run.2,3 Cement extrusion into the sulcular area may result in soft tissue swelling, soreness and bleeding, or exudation on probing.2,4 In some instances, the excess cement has been considered the cause of implant failure.2,5

We report here on two cases of failed implants with histologic evidence of excess cement within the soft tissue surrounding these implants and foreign body inflammation. The intent of this publication is to increase awareness of the detrimental effects of incomplete cement removal or residual excess cement, and to provide clinicians with simple recommendations to minimize further implant failures.

Case Reports
Case One
In June 2009, a 44-year-old female in good general health was referred by her general dentist to an oral and maxillofacial surgeon for extraction of the mandibular left first molar (#19) (Figure 1A). The treatment plan was to extract tooth #19 and immediately place a dental implant. After local anesthesia was obtained, the tooth was atraumatically extracted. The surgical site revealed an inadequate amount of alveolar bone for the planned procedure and, thus, the decision was made to place freeze-dried human bone graft material (Oragraft; Life Net Health) in the extraction socket and postpone placement of a dental implant for several months.

The patient returned to the office in March 2010 for evaluation of the previously placed graft in the edentulous area of tooth #19 and implant consultation (Figure 1B). The patient was ad-
vised to wait an additional six months. On August 26, 2010, the patient returned to the oral and maxillofacial surgeon for implant placement. A Nobel Biocare replace select implant (Nobel Biocare; Yorba Linda, CA) was inserted (Figure 1C) in the edentulous space #19. The implant was allowed to heal for four months. In December 2010, the patient returned to her general dentist for restoration of the implant. A ceramo-metal crown was subsequently fabricated and cemented.

On October 14, 2011, the patient returned to the practice of the now-deceased oral and maxillofacial surgeon with excessive bone loss and granulation tissue around #19 implant. The implant was removed, along with the friable surrounding soft tissue and ostectomy contents, which were placed in a bottle of 10% formalin and sent to the oral and maxillofacial pathology laboratory for histopathologic evaluation.

Hematoxylin and eosin-stained sections of the specimen (Figure 1D) revealed foci of black amorphous exogenous cement scattered throughout the fibrous stroma. These foci were accompanied by an acute and chronic inflammatory cell infiltrate and multinucleated foreign body giant cells (Figure 1E). Surface mucosa overlying inflamed fibrous tissue containing a spicule of residual necrotic bone (Figure 1F) was also noted. The final pathology report included a diagnosis of acute and chronic inflammatory reaction with foci of exogenous matter consistent with cement. The ICD-9 code for foreign body granuloma accompanied the diagnosis.

**Case Two**

In January 2006, a 57-year-old male presented to an oral and maxillofacial surgeon. He had been referred by his general dentist for placement of dental implants in the edentulous right mandible. Two implants (Nobel Biocare replace select) were placed in the edentulous right mandible in the area of the second premolar and second molar sites (Figure 2A).

Four months after the implants were placed they were evaluated for clinical integration (Figure 2B). The patient returned to the general dentist for fabrication of abutment crown restorations. Individual ceramo-metal crowns were fabricated and cemented onto the implants.

On October 26, 2011, the patient presented with excessive bone loss around a failing implant at the mandibular second molar site. This implant was removed, along with the hyperplastic soft tissue surrounding the failed implant, which was placed in a bottle of 10% formalin and sent to the oral and maxillofacial pathology laboratory for histopathologic examination. A bone graft using a mineralized allograft material (Puros; Zimmer Dental, Warsaw, IN) was placed in the surgical defect (Figure 2C) for a future implant.

Hematoxylin and eosin-stained sections of the tissue (Figure 2D) showed scattered foci of black particulate exogenous cement material throughout the inflamed fibrous tissue stroma. The final pathology report included a diagnosis of acute and chronic inflammatory reaction, with foci of exogenous matter, consistent with cement, and ICD-9 coded for foreign body granuloma.
Discussion

The cemented crown was introduced for esthetic reasons and to compensate for loosening problems encountered with screw-retained restorations\(^4,6\). The initial disadvantage associated with cemented restorations was lack of retrievability when problems occurred that required crown removal. Another problem is the difficulty associated with visualization and with removing excess cement at the crown margins.\(^4\) Residual excess cement (REC) is a common complication of cement-retained prosthesis and has been linked to peri-implant disease,\(^2,8\) which can result in a local inflammatory process and has been documented as a cause of peri-implant disease.\(^2,5\)

In a published study by Wilson,\(^9\) peri-implant disease was first diagnosed in test implants loaded from four months to more than nine years after cementation of single-unit fixed partial dentures. Case Two in our series occurred five and a half years after final cementation. Wilson\(^9\) noted that if the REC is identified and adequately removed, resolution of peri-implant disease can occur in the majority of situations. The proposed etiology for the peri-implant disease in the Wilson study was bacterial colonization of the cement; however, in the two examples cited in our case report, it may well be due to a foreign body reaction.

Prevention of cement extrusion during the restoration process beyond the restorative cement margins cannot be underestimated; however this may be more difficult than it appears.\(^10\) In vitro model systems have demonstrated the difficulty in controlling and removing REC by visual and tactile means,\(^11\) even when supra-gingival crown/abutment margins were placed.\(^12\)

Radiographic evaluation allows for a non-invasive evaluation of the site, with the potential to locate REC. Detection is influenced by factors such as composition of the cement, amount and site.\(^13-14\) Other disciplines within dentistry have required radiopacity specifications for cements.\(^15\) No mandatory minimal standard specifications exist for implant cements.\(^16\)

The radiopacity of some commonly used cements has been documented, and a large variability in radiographic detection ability was reported.\(^13\) Some cements have high radiographic density, which allows for easy radiographic detection; others cannot be detected even at 2 mm thickness.\(^10\) The radiographic material varies directly with the third power of the atomic number of the absorber elements.\(^14\) For this reason, the zinc found in zinc phosphate and zinc oxide eugenol cements is highly detectable. This is in contrast to the low atomic number elements found in acrylic urethane cements, which are difficult to detect radiographically unless the manufacturer purposefully adds agents containing higher atomic numbers to increase the radiopacity.

The failure of complete seating of the crown during cementation has also been reported.\(^9\) In this situation, excess cement is allowed to be extruded during placement. This can occur for several reasons, including too much cement placed within the crown, tight proximal contact, tight fit of the crown, inadequate

---

**Figure 2A.** Case Two radiograph taken January 2006 following insertion of screw dental implants #29 and #31.

**Figure 2B.** Radiograph taken before prosthetics; April 2006.

**Figure 2C.** Radiograph taken October 2011 following removal of failed implant #31 and replacement bone graft for future implant.

**Figure 2D.** Hematoxylin and eosin-stained section (20x magnification) depicts highly vascularized fibrous tissue containing several foci of black exogenous cement particles and scattered acute and chronic inflammatory cells in stroma.
cement space, not following cement manufacturer’s recommenda-
tions regarding working and setting time and inadequate pres-
sure application while seating the crown. Some of these issues are
readily highlighted with a pre-cementation radiograph, allowing
for corrective adjustment and complete seating.

Comparison of a post-cementation radiograph with a pre-
cementation film can be useful for visualizing incomplete seating
of the crown and for providing a means of determining if residual
excess cement is present, given that the cement is radiopaque
enough and at a site that allows for detection.

The importance of postoperative appointments for implant
patients following cementation of the restoration cannot be over-
emphasized.4 A recommendation of one week, followed by one-
month, three-month and six-month postoperative appointments
following cementation of prosthesis has been proposed.4 Should
peri-implant complications suggest the possibility of residual ex-
cess cement, treatment would include conservative exploratory
surgery to confirm initial diagnosis and to evaluate the extent of
the problem; removal of the excess cement; and replacement of
the existing restoration, if indicated, to restore the health of the
surrounding tissues.4

Summary
This article describes two patients with failed implants secondary
to REC and the histologic findings of foreign body inflammation
and foci of exogenous cement within the tissues surrounding the
failed dental implants. By understanding the issues, the clinician
may be able to more readily diagnose problems early and gain
clearer understanding of an important factor when selecting a ce-
ment for implant restorations, that is, the ability to readily detect
excess cement with intraoral radiography. If detected early and
adequately removed, resolution of peri-implant disease can occur
in most cases. "

Queries about this article can be sent to Dr. Ramer at Naomi.ramer@mountsinai.org.

REFERENCES
1. Hebel KS, Gajjar RC. Cement-retained versus screw-retained implant restorations: achiev-
2. Wadiwani C, Pineyro A. Technique for controlling the cement for an implant crown. J
4. Pauletto N, Lahiffe BJ, Walton N. Complications associated with excess cement around
1999;14:865-868.
5. Gapski R, Neugeboren N, Pomerantz AZ, Reisner MW. Endosseous implant failure in-
6. Arvi-Aker L, Zarb GA. Clinical effectiveness of implant-supported single-tooth replace-
7. Quirynen M, DeSoete M, Van Steenberghe. Infectious risks for oral implants: a review of the
9. Wilson TG. The positive relationship between excess cement and peri-implant disease: a
10. Wadiwani C, Rapoport D, LaRosa S, Hess T, Kretschmar S. Radiographic detection and
characteristic patterns of residual excess cement-retained implant restorations: a clinical
11. Agar JR, Cameron JM, Hughbanks JC, Parker MH. Cement removal from restorations luted
12. Linkervaat C, Vindsdiute E, Puisys A, Peciuliene V. The influence of margin location on the
amount of undetected cement excess after delivery of cement-retained implant restorations.
Clin Oral Impl Res 2011; 000-000 (Epub ahead of print).
13. Wadiwani C, Hess T, Faber T, Pineyro A, Chen CSK. A descriptive study of the radiographic
tore/store.html
Myositis Ossificans of Infraorbital Musculature in Uncontrolled Diabetic

Mohan Baliga, M.D.S.; Joanna Baptist, M.D.S.

A B S T R A C T

Myositis ossificans traumatica is a form of dystrophic calcification that leads to heterotopic ossification of intramuscular connective tissue. It is rare in the orofacial region. A history of trauma, conventional radiography and computed tomography, along with histopathological examination, can be used effectively to diagnose this condition. We present a unique case of infected myositis ossificans traumatica in the infraorbital region in an uncontrolled diabetic.

Myositis ossificans is a non-neoplastic, heterotropic bone formation within muscle or fascia broadly classified into myositis ossificans progressiva (MOP) and myositis ossificans traumatica (MOT). MOT is a rare sequelae of acute trauma, burns, surgical manipulation, repeated injury or inflammation, with the first evidence of a calcified mass appearing from between 3 weeks to more than 20 years. Thighs, arms, shoulders and hands are the commonly affected sites. MOT in the head and neck region is unusual. Within the maxillofacial region, involvement of the medial pterygoid, temporalis, masseter, buccinator, platysma and sternocleidomastoid muscles have been reported. To the best of our knowledge, this may be the first case of myositis ossificans traumatica in the infraorbital region in an uncontrolled diabetic.

Case Report

A 34-year-old uncontrolled diabetic male patient was referred to the department with a bony, hard swelling in the infraorbital region that had been present for the past year. The patient was involved in a traffic accident one and half years ago, during which he reportedly injured the right infraorbital region. This area subsequently healed without surgical intervention. Three months after the first injury, the patient sustained a blunt trauma in the same region, following which he noticed a swelling that gradually increased in size. Initially the swelling was asymptomatic, but later, it became painful. Associated with the swelling was a pus discharge, for which he underwent wound exploration. As the swelling and discharge persisted, he was referred to our department for opinion and further management.

On physical examination, the patient was afebrile with a diffuse, tender, firm-to-hard swelling in the right infraorbital region. The overlying skin was erythematous with a solitary draining sinus (Figure 1). There was no associated paraesthesia or epiphora. Orbital examination was within normal limits. Foci of infection from intraoral and paranasal sinuses were ruled out.

A paranasal sinus view revealed a diffuse radiopacity in the right infraorbital region (Figure 2). A CT scan showed normal paranasal sinuses and a radiodense region superficial to the right zygomatic bone (Figure 3), suggestive of MOT.

Prior to surgical intervention, detailed hematological and biochemical investigations showed altered levels of plasma glu-
cose (376mg/dl), glycosylated hemoglobin (11.1%), total cholesterol (229 mg/dl) and triglycerides (749mg/dl).

After obtaining glycemic control, an infraorbital incision was placed along the existing scar. The pathologic mass was excised, along with the sinus tract, and sent for histopathological examination. Primary closure was achieved after thorough debridement of the infected area, and scar revision was done. There were no immediate postoperative complications.

Histopathological examination revealed a moderately collagenous connective tissue stroma with a dense mixed inflammatory cell infiltrate, skeletal muscle degeneration, perineural and perivascular inflammation with focal areas of heterotopic calcification scattered in the tissue specimen. The patient is on constant follow-up with strict advice on lifestyle modifications. At the six-month follow-up, there was evidence of a residual, inconspicuous mass.

Discussion

Myositis ossificans is categorized clinically into four variants: myositis ossificans traumatica (MOT; associated with a history of trauma);\(^1,9\) myositis ossificans progressiva (MOP; autosomal dominant disease characterized by symmetric congenital malformations of the hands and feet with progressive heterotopic ossification of soft connective tissue);\(^10\) myositis ossificans associated with paraplegia (a disease process where tissue atrophy and degeneration may promote metaplastic ossification); and pseudo-malignant myositis ossificans (where a history of trauma is absent).\(^3\)

MOT is the most common extra-skeletal bone-forming lesion.\(^1\) Although it may occur at any age and without any sex predilection, it is generally reported in young adult males. This may be because young males are more prone to accidents and are actively involved in contact sports.\(^11\)

The clinical features include pain, tenderness, soft-to-firm tissue swelling with decreased range of function. A history of trauma to the region may or may not be elicited.\(^12\)

Many theories have been proposed to explain the etiopathogenesis for MOT. The three most widely accepted are: implantation of osteogenic cells from active periosteum into muscle;\(^13,14\) bone formed from mesenchymal stem cells that retain their ability to differentiate along bone-forming lines; and over production of bone morphogenic protein\(^4\) (BMP 4) in response to injury.\(^15\)

Our literature review showed only one reported case of MOT in the periorbital region. This was an intraorbital mass that presented with diplopia due to restricted movements of the involved eye. This was attributed to the change in configuration of the orbit and change in orientation of muscle fibers.\(^11\) Our case had no functional deficit, as the calcific mass was in the infraorbital region superficial to the zygomatic bone and did not involve any of the extraocular musculature.

Early lesions appear as amorphous calcification within soft tissue on a conventional radiograph. As they mature, they appear

Figure 1. Preoperative photograph showing swelling in right infraorbital region with solitary draining sinus.

Figure 2. Paranasal sinus view showing diffuse radiopacity in right infraorbital region over zygomatic bone.

Figure 3. CT scan showing radiodense region superficial to right zygomatic bone.
more well-circumscribed, with a ring of calcification around a relatively radiolucent central portion. A longstanding lesion will appear diffusely calcified. A similar appearance can be seen on a computed tomogram. The biochemical findings are almost always within normal limits, but there are some reported cases of elevated alkaline phosphatase levels due to disease progression.

The conventional treatment for MOT is surgical excision of the ossified mass. However, recurrences are common, especially when the mass is removed at an early stage. The recurrences are presumed to occur as a result of surgical hemorrhage and inadequate physical therapy. Nonsurgical therapy and prevention of postsurgical recurrence have been suggested. A low dose of radiation is believed to have anti-inflammatory actions. This is thought to inhibit mesenchymal cell differentiation in osteoblasts. Disodium etidronate (a bisphosphonate) is generally used for MOT to decrease bone mineralization and is known to cause osteomalacia in long-term use. Many authors recommend its use as a supplement to surgical treatment to prevent recurrence.

Intra-lesional steroid injections have had anecdotal success. NSAIDs like endomethacin decrease the synthesis of prostaglandins E and F and also inhibit differentiation of pre-osteoblasts. Retinoids have also been studied for prophylaxis against MOT, as they inhibit mesenchymal differentiation into cartilage and bone. A more recent treatment strategy includes bone morphogenic protein type I receptor inhibition to reduce heterotopic ossification. Spontaneous regression of MOT has also been reported.

Conclusion
A detailed history and thorough clinical examination, along with conventional radiography and computed tomography, is most often adequate to diagnose MOT. This can be supplemented by histopathology to confirm the diagnosis. We suggest surgery as an option in rapidly growing, symptomatic, painful lesions, and in cases where the surgery will not create additional functional deficits. Alternative nonsurgical treatment modalities may be considered alone or in combination with surgical intervention, depending on the individual patient need. Whatever the mode of treatment employed, periodic and long-term follow-up is absolutely essential.

Queries about this article can be sent to Dr. Baptist at Joanna.omfs@gmail.com.

REFERENCES
Oral Osteosarcoma
A Case Report and Analysis of Previously Reported Cases

ABSTRACT
Osteosarcoma is the most common malignancy of mesenchymal cells after hematopoietic neoplasms. Most originate within bones, but the occurrence of this malignancy in the jaw bones is rare. There is controversy about the characteristics of this tumor in the literature. The aim of this paper was to collect the previous reported data and provide a statistical analysis of them. Additionally, we have reported a case of mandibular osteosarcoma.

Osteosarcoma (OS) is a malignant bone tumor that most frequently affects long bones.\(^1,2\) It accounts for approximately 40% to 60\(^{3,4}\) of primary malignant bone tumors. Its annual incidence is relatively rare, about 2 per 1 million people,\(^5\) or 0.07 in 100000.\(^6\) About 10% of osteosarcoma occurs in the head and neck region,\(^2,5\) with jaws affected most frequently.\(^2,4,5\) It rarely occurs in the ethmoid and sphenoid bones.\(^4\) The prevalence in the jaws is about 4%.\(^7\)

The etiology of the tumor is unknown, but major risk factors include previous radiotherapy,\(^2,4,8,9\) Paget’s disease,\(^2,4\) fibrous dysplasia,\(^4,7\) chronic osteomyelitis, myositis ossificans, trauma\(^4\) and Li-Fraumeni syndrome.\(^5\) OS is categorized primarily as osteoblastic, chondroblastic and fibroblastic.\(^2,7\) In addition, it can be classified as telangiectatic, fibrohistiocytic or juxtacortical tumors (parosteal and periosteal), according to the histologic appearance.\(^10\) The few case reports published during the last 50 years result in scattered, and even controversial, demographic characteristics of OS. We have tried to find the previous case reports and analyze their data to attain more complete information about jaw OS. In addition, we report on a case of mandibular OS.

Methods and Materials
To find all accessible data about OS, we searched Medline and Scholar Google using the key words osteosarcoma (bone or jaw), malignancy (head and neck or jaw or oral), and chondroblastic osteosarcoma. We searched these data bases until September 2009; no language was restricted. We found 21 oral chondroblastic osteosarcoma articles. Extracted data consist of age, sex, involved jaw, location of lesion, chief complaint of patients, treatment plan, histological type and survival recorded and analyzed with Mann-Whitney, chi-square and survival analysis.

Case Report
A 50-year-old man, presenting with a right mandibular extensive swelling, was referred to the Department of Oral Medicine, Faculty of Dentistry, Tehran University of Medical Sciences. His chief complaint was pain and limited mouth opening. The swelling had begun two months previously and had grown rapidly. During this
time, his lesion was diagnosed as a tooth abscess and was treated with antibiotics by his dentist.

Intraoral examination showed an approximately 3 cm diameter, painful, hard, dome-shaped buccolingual mass on the right retromolar and molar areas of the mandible. Ulcerative mucosa covered the lesion on the buccal side (Figure 1). There was no paresthesia over the inferior alveolar nerve and no evidence of lymph node involvement.

A panoramic radiograph showed a radiopaque lesion with poorly circumscribed borders and no evidence of bone destruction (Figure 2). An incisional biopsy was performed. Microscopic examination demonstrated a neoplastic tissue consisting of areas of osteoid and chondroid formation, surrounded by a cellular stroma and fibroblastic bundles. The diagnosis of chondroblastic osteosarcoma was established. The patient was referred to the Department of Oncology, where he underwent surgical resection of the lesion.

Discussion

Mesenchymal malignant cells of OS are able to produce osteoid or immature bone.3 OS is the most common malignant bone tumor, but its occurrence in the jaw is rare,7 and most published literature comprises a small series or case report (Table 1). Despite some case series, there is no comprehensive information about this disease and controversy exists about the demographic characteristics of it among authors. To achieve our goal, we searched Medline and Scholar Google databases and found the full text of 21 articles. After data extraction of each case from all reports, we analyzed them.

The results showed patients’ ages range from 8 to 81 years (mean: 35.43± 15.52). The disease was more prevalent in males than in females (59.7% vs. 40.3%). There was no significant difference between males and females with respect to age (Mann-Whitney: P=0.136). Although the mandible was a common location of JOS in some reports,2-4 11 others reported that the maxilla can be involved more frequently.6,7 Our analysis showed that OS occurred 49.6% of the time in the mandible and 45.4% in the maxilla. In 5.0% of the cases it occurred in other areas, such as the orbit, nasal cavity and ethmoid sinus. Males and females showed no significant difference with regard to the location of disease ($\chi^2=1.44; P=0.487$).

The chief complaints of patients were swelling alone (60.8%), swelling and pain (15.7%), swelling and tooth mobility (9.8%), swelling and loss of sensation (7.8%), previous fibrous dysplasia (3.9%), and tooth mobility and loss of sensation (2.0%). This is consistent with other reports that concluded that the most
<table>
<thead>
<tr>
<th>No.</th>
<th>Author</th>
<th>Year</th>
<th>Age</th>
<th>Sex</th>
<th>Location</th>
<th>Chief Complaint</th>
<th>Treatment</th>
<th>Histologic Type</th>
<th>Survival (M)</th>
<th>Experience</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>McGuff</td>
<td>2008</td>
<td>38</td>
<td>F</td>
<td>Max</td>
<td>P &amp; Sw</td>
<td>Ch</td>
<td></td>
<td>47</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Amaral</td>
<td>2008</td>
<td>38</td>
<td>F</td>
<td>Max</td>
<td>F &amp; P</td>
<td>palliative C</td>
<td>Ch</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Fernandes</td>
<td>2007</td>
<td>41</td>
<td>M</td>
<td>10 F</td>
<td>9 Max</td>
<td>Sw14/14, LT3/14, P2/14</td>
<td>S 14, C 4</td>
<td>8 Ch</td>
<td>4 Os</td>
<td>10</td>
</tr>
<tr>
<td>4</td>
<td>Geevensen</td>
<td>2006</td>
<td>60</td>
<td>M</td>
<td>Max</td>
<td>?</td>
<td>S + C</td>
<td>Ch, Died</td>
<td></td>
<td></td>
<td>18</td>
</tr>
<tr>
<td>5</td>
<td>Ogunlewe</td>
<td>2006</td>
<td>29</td>
<td>F</td>
<td>13.6 M</td>
<td>12 M</td>
<td>Sw12/17, P/Sw3/17, T/Sw1/17</td>
<td>S + postop. R</td>
<td>8 Ch, 6 F, 3 Os</td>
<td>39</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Ghavami</td>
<td>2006</td>
<td>33</td>
<td>F</td>
<td>Max</td>
<td>?</td>
<td>?</td>
<td>Ch</td>
<td></td>
<td></td>
<td>21</td>
</tr>
<tr>
<td>7</td>
<td>De Biase</td>
<td>2005</td>
<td>54</td>
<td>M</td>
<td>Man</td>
<td>P &amp; Sw + Pa</td>
<td>S + C + S + R</td>
<td>Ch</td>
<td>18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Silva</td>
<td>2005</td>
<td>32</td>
<td>M</td>
<td>Man</td>
<td>Sw</td>
<td>S + C</td>
<td>Ch</td>
<td></td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>9</td>
<td>Nakayama</td>
<td>2005</td>
<td>33.6</td>
<td>M</td>
<td>10 F</td>
<td>5 Max</td>
<td>2 preop C, 3 postop C, 5 unknown</td>
<td>2 Ch, 8 Os</td>
<td>2.7-93.0</td>
<td>14(1983-2001)</td>
<td>10</td>
</tr>
<tr>
<td>10</td>
<td>Frei</td>
<td>2004</td>
<td>9</td>
<td>M</td>
<td>Max</td>
<td>?</td>
<td>?</td>
<td>Os</td>
<td></td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>11</td>
<td>Yamaguchi</td>
<td>2004</td>
<td>25-67</td>
<td>6 M</td>
<td>3 F</td>
<td>3 Man</td>
<td>S, S + R + C, S + C, S + C</td>
<td>16.4 Ch, 55.7Os, 21.3 F</td>
<td>39.1% recurrence, 8.7% metastasis to lung</td>
<td>Shanghai, China</td>
<td>9</td>
</tr>
<tr>
<td>12</td>
<td>Li</td>
<td>2003</td>
<td>39.8</td>
<td>1.26 M</td>
<td>1 F</td>
<td>57.4% Man</td>
<td>32.8% Max</td>
<td>?</td>
<td>?</td>
<td>38</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Yousefi</td>
<td>2003</td>
<td>81</td>
<td>M</td>
<td>Max</td>
<td>Sw</td>
<td>S</td>
<td>Ch</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Junior</td>
<td>2003</td>
<td>29</td>
<td>12 M</td>
<td>13 F</td>
<td>10 Man</td>
<td>15 Max</td>
<td>?</td>
<td>S, 32%, S + C 36%, S + R + S + C R112%, C43%, C + R4%, without information 4%</td>
<td>72% Ch, 28% Os</td>
<td>72</td>
</tr>
<tr>
<td>15</td>
<td>Kawasaki</td>
<td>2002</td>
<td>18</td>
<td>M</td>
<td>Max &amp; Man</td>
<td>Sw(F.D)</td>
<td>S + C + R</td>
<td>Ch</td>
<td>48</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Mutafoglu</td>
<td>2001</td>
<td>17</td>
<td>M</td>
<td>Max</td>
<td>?</td>
<td>?</td>
<td>S + postop. R</td>
<td>Ch</td>
<td>46</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Altuwairgi</td>
<td>1996</td>
<td>41</td>
<td>37</td>
<td>F</td>
<td>Max. Max</td>
<td>Sw, T.M</td>
<td>Preop C, S + R</td>
<td>Ch</td>
<td>48</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Kawasaki</td>
<td>1996</td>
<td>50</td>
<td>F</td>
<td>Man</td>
<td>P, Sw</td>
<td>S</td>
<td>Ch</td>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Regez</td>
<td>1987</td>
<td>31</td>
<td>10 M</td>
<td>7 F</td>
<td>10 Man</td>
<td>Sw, P, Pa</td>
<td>16 S, 1 S + C</td>
<td>S, 3 Os, 5F, 2 Par, 1 Tel, 1 Ch, xarc</td>
<td>Michigan, USA</td>
<td>17</td>
</tr>
</tbody>
</table>

TABLE 2
Frequency of Different Treatment Plans in Various Sites

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Maxilla</th>
<th>Mandible</th>
<th>Other</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preoperative chemotherapy &amp; surgery</td>
<td>2 (66.7%)</td>
<td>1 (33.3%)</td>
<td>0 (0%)</td>
<td>3 (100.0%)</td>
</tr>
<tr>
<td>Palliative chemotherapy</td>
<td>1 (33.3%)</td>
<td>2 (66.7%)</td>
<td>1 (33.3%)</td>
<td>3 (100.0%)</td>
</tr>
<tr>
<td>Primary surgery &amp; chemotherapy</td>
<td>10 (45.5%)</td>
<td>11 (50.0%)</td>
<td>1 (33.3%)</td>
<td>22 (100.0%)</td>
</tr>
<tr>
<td>Surgery</td>
<td>12 (36.4%)</td>
<td>19 (57.6%)</td>
<td>2 (6.1%)</td>
<td>33 (100.0%)</td>
</tr>
<tr>
<td>Surgery &amp; chemotherapy &amp; radiotherapy</td>
<td>7 (70.0%)</td>
<td>3 (30.0%)</td>
<td>0 (0%)</td>
<td>10 (100.0%)</td>
</tr>
<tr>
<td>Surgery &amp; radiotherapy</td>
<td>8 (88.9%)</td>
<td>1 (11.1%)</td>
<td>1 (25.0%)</td>
<td>10 (100.0%)</td>
</tr>
<tr>
<td>Preoperative chemotherapy &amp; surgery &amp; radiotherapy</td>
<td>2 (50.0%)</td>
<td>1 (25.0%)</td>
<td>0 (0%)</td>
<td>3 (100.0%)</td>
</tr>
<tr>
<td>Chemistry</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Radiotherapy</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>1 (100.0%)</td>
<td>1 (100.0%)</td>
</tr>
</tbody>
</table>

common clinical appearance of jaw OS can be painless swelling as the first sign, in 85% to 95.5% cases.1,3,6 Frequencies of chief complaint were similar statistically among males and females ($\chi^2=6.49$; $P=0.261$). The chief complaint of patients had no correlation with the involvement of sites—maxilla, mandible or other areas ($\chi^2=10.94$; $P=0.054$). Although there are different treatment plans for this lesion, the most common treatment in previous case reports was surgery alone, in 36.7% of cases (Chart 1). There was significant difference between the location of lesions and various treatment plans ($\chi^2=36.87$; $P=0.005$).

The survival rate among patients may depend on different factors, like age, CT pattern of osteogenesis, treatment plan, early diagnosis and adequate surgical resection.3,7 Our finding is in agreement with Fernandes et al., who divided their patients into younger or older than 40 years. Despite a higher mean survival rate in young patients than in old ones, there was no significant difference between them. Fernandes et al.3 explained that survival was increased among patients younger than 40 years, but this was not statistically significant.3 We found no correlation between age and the survival rate of patients ($P=0.154$). But August and colleagues reported that prognosis may be influenced by the patient’s age.12

Prognostic factors include the size of tumor, the histologic grade at the time of diagnosis and tumor necrosis after preoperative chemotherapy. The latter is the most reliable and statistically significant factor.13 Different treatment regimens, like chemotherapy or radiotherapy, for OS do not change the prognosis,2,4,14 but radical surgery may provide a better prognosis.6 The expression of P53 protein is associated with high grade and aggressive tumors, but the author could not find any relation between the positivity of P53 and prognosis or detect a worse survival rate in patients with tumors positive for this protein.2 Some poor prognostic factors are age over 60 years, non-mandibular location, tumor size >6 cm and positive resection margins.15

In our analysis, the range of survival was 2.7 to 180 months, with a mean of 51.13±38.74 months. But there was no significant difference between various treatment protocols and survival rates ($P=0.49$). The survival rate was similar between males and females statistically ($P=0.79$). Histological types were chondroblastic (54%), osteoblastic (35%) and fibroblastic (11%), and had no significant differences in maxilla, mandible or other areas ($\chi^2=4.82$; $P=0.31$). Histological types were similar between males and females statistically ($\chi^2=0.25$; $P=0.88$). The mandible may be involved more frequently, but the difference in survival among patients with jaw OS of the mandible versus maxilla was not statistically significant.3
In our investigation, the survival rate had no correlation with location of lesion \((P=0.87)\) and histological type \((x^2=58.69; P=0.45)\). But some authors believed chondroblastic OS comprises about half of the jaw OS and has a slightly better survival rate. The differential diagnosis of jaw OS includes the following: chondrosarcoma; Ewing sarcoma; bone metastasis; fibrous dysplasia; osteomyelitis; and, even, lesions that do not usually affect the jaw bones, such as fibrosarcoma, leiomyosarcoma or rhabdomyosarcoma.

Queries about this article can be sent to Dr. Shirazian at Shiraziansh@gmail.com.

REFERENCES


