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Vinyl Polysiloxane Impression Material in Removable Prosthodontics Part 1: Edentulous Impressions

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Importance of a Detailed Clinical Examination: Report of a Case of Fibrous Dysplasia
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In keeping with our vision for a “new ODA”, part of our strategic plan is to take all the steps necessary to be a major player in the health of Oklahoma’s citizens. But to be a major player requires getting people’s attention. And how do you do that? Presentation! This issue of your ODA Journal focuses on helping you realize the impact you can have on those who represent us (legislators and dental leaders) and those whom we represent (patients). How can we best get across our message, promote our programs, and solicit the resources we need? By effectively using those various avenues by which we all communicate. The Media.

Whether it’s the daily paper, the television networks, or the internet, the media play a critical role in shaping the public perception of issues, ideas, and individuals. How we perceive decisions made in the political arena is directly affected by how the media presents them. Good or bad, the media plays a major role from the top echelons of government and business down to the lowliest worker in how we communicate publicly with one another and even in what gets communicated.

It is our professional responsibility as dentists to utilize this complicated communication network as effectively as we can to publicize concern for human welfare, to put service above self, and to promote the art and science of dentistry for the benefit of all people everywhere. We chose this duty as soon as we chose dentistry for our career. And this responsibility requires our involvement in our communities and in the decisions made on behalf of our fellow citizens. How better to do that than to capitalize on the power of the media?

Dentistry has been very fortunate that its leaders over the years have taken strong public stances on moral and ethical values, on the importance of science to validate how we practice, and on issues of public welfare (like access to care, standards of care, etc.). We have also been fortunate that the coverage of dentistry in the media has been generally positive. We can thank not only our leaders but the many legislators and national decision-makers who have supported our endeavors and have used the media to spread the message of how critically important our concerns and issues are to us as dentists but, more importantly, to those who depend on us -- our patients.

This month marks another golden opportunity for our profession to foster those strong relations with our legislators and also with the public. Key programs like “Dentist Day at the Capitol” and “Children’s Dental Health Month” continue to provide dependable and reliable avenues to further support our goals. Your ODA needs your help in organizing these and other similar projects. We have played important roles in recent legislation focusing on access to care and promotion of community oral health, but can more local and statewide public relations initiatives to “spread the word” can improve these strides even more. And if we have dedicated legislators helping in this effort, you can bet the media are watching! And if the media are watching, to some degree or other everyone is watching!

February has in many ways become the month that kick-starts the efforts of Oklahoma dentistry for the rest of the year. It contains many opportunities for each of us to get involved and further promote the image of dentistry as a caring profession for all people. Many people have already answered the call. May we count on you as well?
February 2009

6th
– Give Kids a Smile® Day

11th
– Dentist Day at the Capitol Lunch/Visit: ODA, 1:00 PM
– Dentist Day at the Capitol Reception: ODA, 5:30 PM

12th
– OCDS General Assembly

13th
– OCDS Board Meeting: ODA, 6:00 PM

March 2009

6th
– ODA Council on Dental Care: ODA, 9:00 AM
– ODA Annual Meeting Planning Committee Meeting: ODA, 11:00 AM
– ODA Board of Trustees Meeting: ODA, 1:30 PM

11th
– Governor’s Task Force Meeting: ODA, 1:00 PM

16th
– Retired Dentists Lunch: ODA, 11:30 AM

We apologize for this omission.

The ODA mistakenly published the below-referenced article in the January 2009 issue of the ODA Journal, originally published by the ADA, without including the following statement:

The ODA now endorses Pitney Bowes small business postage meters. Pitney Bowes provides convenience, saves time, and reduces dental office costs. ODA members receive special members-only pricing and a free scale!

Receive a 90-day free trial of the Pitney Bowes mailstation™ 2 digital mailing system and $50 in free postage coupons. Save money with an integrated scale that automatically calculates and sets the exact amount of postage you need. Never overpay for postage again!

Visit www.pbmailstation.com/ada or Call 1-877-562-4500 and refer to order number 999991617.

*Any unused postage will be refunded by the U.S. Postal Service®. An initial $30 postage deposit is required, plus $9.99 shipping and handling. The shipping and handling fee will be refunded if you decide to return the meter during the trial period. Offer for new customers only. Cannot be combined with any other offer.

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Endodontic Treatment

What is endodontic treatment?
“Endo” is the Greek word for “inside” and “odont” is Greek for “tooth”. Endodontic treatment treats the inside of the tooth.
To understand endodontic treatment, it helps to know something about the anatomy of the tooth. Inside the tooth, under the white enamel and a hard layer called the dentin, is a soft tissue called the pulp. The pulp contains blood vessels, nerves and connective tissue, and creates the surrounding hard tissues of the tooth during development. The pulp extends from the crown of the tooth to the tip of the roots where it connects to the tissues surrounding the root. The pulp is important during a tooth’s growth and development. However, once a tooth is fully mature it can survive without the pulp, because the tooth continues to be nourished by the tissues surrounding it.

Who performs endodontic treatment?
All dentists, including your general dentist, received training in endodontic treatment in dental school. General dentists can perform endodontic procedures along with other dental procedures, but they often refer patients needing endodontic treatment to endodontists. Endodontists are dentists with special training in endodontic procedures. They provide only endodontic services in their practices because they are specialists who have completed an additional two or more years of advanced training in endodontics after graduating from dental school.

Why would I need an endodontic procedure?
Endodontic treatment is necessary when the pulp becomes inflamed or infected. The inflammation or infection can have a variety of causes: deep decay, repeated dental procedures on the tooth, or a crack or chip in the tooth. In addition, a blow to a tooth may cause pulp damage even if the tooth has no visible chips or cracks. The pulp can become inflamed or infection can occur if such an injury is left untreated. This can cause pain or lead to an abscess. Signs of pulp damage include pain, prolonged sensitivity to heat or cold, discoloration of the tooth, and swelling and tenderness in the nearby gums. Sometimes, there are no symptoms.

How does endodontic treatment save the tooth?
The endodontist removes the inflamed or infected pulp, carefully cleans and shapes the inside of the tooth, then fills and seals the space. Afterwards, you will return to your regular dentist, who will place a crown or other restoration on the tooth to protect and restore it to full function. After restoration, the tooth continues to function like any other tooth.

More than 14 million teeth receive endodontic treatment each year. By choosing endodontic treatment, you are choosing to keep your natural teeth as a healthy foundation for chewing and biting for years to come.
Update on Mid-Level Provider

Minnesota - Just when one believes the world can’t get any more unusual, something else inevitably comes along to dispel that belief. So it is with the world of alternative dental workforce proposals. The last few weeks have brought about significant actions concerning this issue from across the nation.

Most recently, the Oral Health Practitioner (OHP) Work Group under the auspices of the Minnesota Department of Health, charged with developing the scope, education and supervision requirements of this new position created by the legislature last spring, released its final recommendations. The thirteen member work group wrangled with these difficult issues and ultimately found it impossible to reach a consensus. The deeply divided group ultimately issued the report on a majority vote and included several alternate opinions to the final document.

Despite the efforts of the representatives of the Minnesota Dental Association (MDA) and others on the Work Group, the final report frames an OHP that leaves far too many questions and ultimately leaves a more confusing environment that before this issue arose. Among the major recommendations the Work Group will forward to the legislature for consideration in 2009:

OHPs can treat patients in the Minnesota Health Care Programs (currently 175% of Federal Poverty Level or below); the uninsured who are low income and without coverage; individuals with significant barriers to receiving dental care and those who reside in Dental Health Professional Shortage areas as designated by the US Department of Health & Human Services.

OHPs may work in the following settings – the office of Critical Care Dental Providers (those dentist who treat a large share of public program patients in Minnesota); dental hygiene collaborative practice settings (these include hospitals, nursing homes, home health agencies, group homes, government operated facilities, schools, Head Start programs and nonprofit agencies treating the uninsured of public program enrollees); patient homes when the patient is homebound; low income clinics and provider offices; and educational institutions which provide oral health training.

The Work Group found that both the University of Minnesota Dental School and Metro State of the Minnesota State Colleges & Universities system (currently a dental hygiene program) have sufficient abilities to provide the OHP program.

Scope of practice will include restorations and extractions of primary and permanent teeth, most procedures (including restorations and extractions) will be “supervised” under a “collaborative management agreement. This language can be misleading and is more accurately portrayed as a standing orders situation. No prior examination, diagnosis or development of a treatment plan by the “supervising” dentist is required for any particular patient.

December/January 2009

State Legislative Report

While this report will go to the legislature with accompanying legislation it will not necessarily encounter smooth sailing. The MDA recently endorsed a concept being developed by the University of Minnesota Dental School to develop a dental therapist which would be a fully integrated member of the dental team. Conceptually a four year bachelor’s degree (with the possibility a Master’s alternative pathway), the therapist program would teach a similar scope of practice as the OHP but with the understanding that a supervising dentist would be on site when more involved procedures are performed. The MDA is considering offering a bill to create that program within the University of Minnesota Dental School.

During the last meeting of the Work Group yet another legislative proposal became a possibility when the representative of the Safety Net Coalition (a group of safety net clinic that was a primary proponent of the Advanced Dental Hygiene Practitioner during the 2008 legislative session and then the OHP) announced it believed the OHP had been too limited and that they may consider bringing an Alaskan DHAT type of bill to the legislature.

Given the multiple competing proposals for change to the dental workforce that may appear during the 2009 legislative session it is virtually impossible to predict the outcome at this time. Ultimately, the ADA will continue to assist MDA through the State Public Affairs program to craft the best possible solution within the existing political environment of Minnesota.

New Hampshire – The 2008 legislative session created a joint committee to study and report on whether the state should create a mid-level dental provider such as an Advanced Dental Hygiene Practitioner (ADHP). The ADA, working with the New Hampshire Dental Society and a local public affairs firm, served as a resource for the committee, providing information as needed. The joint legislative report was released in November and found no need to create such a position at this time and instead encouraged further study and attempts to improve access to dental care for the underserved.

While this positive finding and recommendation does not prevent any legislator from introducing a new bill in 2009 to create an ADHP it does deny supporters the credibility and momentum that a positive finding from the joint committee may have generated.

Editor: Paul O’Connor
Copyright 2009 American Dental Association. All rights reserved. Republication in whole or part is permitted with credit to State Legislative Report.
Your registration must be postmarked on or before April 1, 2009, to qualify for the pre-registration prices. ONLY ONE REGISTRANT PER REGISTRATION FORM – DO NOT REGISTER MORE THAN ONE PERSON ON THIS FORM. Please make copies of this form as needed. REGISTER ONLINE at www.okda.org or mail completed form with payment to: Oklahoma Dental Association c/o Event 1, 1601 South 129th West Avenue, Sand Springs, OK, 74063. Forms may also be faxed with completed credit card information to 918-245-8007.

The ODA will refund registration fees, less a $30 administration fee, if a written request is delivered to the Executive Director or postmarked no later than April 10, 2009. The ODA Annual Meeting schedule is subject to change and the ODA is not responsible for any changes to the schedule.

All persons who register for this meeting acknowledge reading and agreeing to this statement: “This function’s planners claim and assume no liability for the acts of meeting suppliers, nor for the safety of any attendee, or spouse, child or guest of an attendee, while in transit to or from this event. Attendees and participants in any event, including but not limited to those which may require or feature physical activity, assume all risk and liability associated with such activity.”

I. REGISTRATION INFORMATION

Last Name:_______________________________________________
First Name:____________________________ Middle Initial:_______
Name for Badge:___________________________________________
ADA Number (if applicable):_________________________________
ODA Members, please indicate District:_______________________
Address:_________________________________________________
City:___________________________ State:_________ Zip:________
Phone:__________________________________________________
Fax:_____________________________________________________
Email Address:_____________________________________________

III. REGISTRATION FEES

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You can also register online at www.okda.org
### IV. PURCHASE / RESERVE EVENT TICKETS

Please check each event and CE scientific session you plan to attend.

#### Friday, April 24

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#### CE COURSE TICKETS

- **The Business of Dental Hygiene** (Dobson-Hartley)
  - 8:00-11:00 & 2:00-5:00
  - **FREE**

- **Precision & Semi-Precision Attachments** (Bambara)
  - 8:00-11:00 & 2:00-5:00
  - **FREE**

- **Finally! A Sensible Approach to Perio** (Donley)
  - 8:00-11:00 & 2:00-5:00
  - **FREE**

- **The Virtues of Profitable Dentistry** (Farran)
  - 8:00-11:00 & 2:00-5:00
  - **FREE**

- **Oklahoma Twister: A Cornucopia of Dental Topics Part I**
  - 8:00-11:00
  - **FREE**

- **CPR Course: Basic Life support for Healthcare Providers**
  - Limited to 30 Attendees
  - 8:00-11:00
  - 75.00  85.00

- **Dental Assistants: Roundtable Discussion**
  - 9:00-11:00
  - 15.00  25.00

- **ODA Lunch & Learn Ethics for the Dental Team**
  - 12:30-1:45
  - 40.00  50.00

- **Oklahoma Twister: A Cornucopia of Dental Topics Part III**
  - 2:00-5:00
  - **FREE**

- **CPR Course: Basic Life support for Healthcare Providers**
  - Limited to 30 Attendees
  - 2:00-5:00
  - 75.00  85.00

- **Dental Assistants: Infectious Disease Preview** (Brown)
  - 2:00-5:00
  - 15.00  25.00

#### SPECIAL EVENT TICKETS

- **ODA Alliance/Dental Spouse/Guest Luncheon - Southern Hills Golf Club**
  - Transportation Provided
  - 11:00-2:00
  - 50.00  55.00

- **President's Dinner**
  - Saturday
  - 6:30 pm
  - 65.00  75.00

#### REGISTRATION FEE + TICKETS

- **= TOTAL AMOUNT DUE**
  - **$_________**

#### V: PAYMENT INFORMATION

REGISTER ONLINE AT [www.okda.org](http://www.okda.org) or mail completed form with payment to: Oklahoma Dental Association, c/o Event 1, 1601 South 129th West Avenue, Sand Springs, OK, 74063. Forms may also be faxed with completed credit card information to 918-245-8007.

- **REGISTRATION TOTAL:**
  - **$_________**

- VISA
- American Express
- MasterCard
- Discover

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- Expiration Date: ________________________

- PRINT name as it appears on card: ____________________________

- Signature: ____________________________

ODA Office Use Only

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- Date Charged: __________ CK #: __________ Total Fees: __________
- Name on CC or CK if different from reg: ____________________________
2009 OKLAHOMA DENTAL ASSOCIATION ANNUAL MEETING

Mark Your Calendar!
April 23 – 25, 2009
Tulsa Convention Center – Downtown Tulsa

The ODA Annual Meeting is by far the largest dental meeting in the state!
Join over 1,500 dentists and other dental team members as they participate in continuing education, networking, and social events throughout the meeting!

Over 68 hours of CE available for you and your staff!

Hotel Reservation Information:
DoubleTree Hotel – 1.800.838.7914 and use code OKD
Special ODA rate: *$87/ king    *$87/ double
*You must use the 3-letter code OKD to indicate that you are booking in conjunction with the ODA for the special rate. The cut-off for the special rate is April 1, 2009!
Dale West is one of America’s top asset protection experts, having helped thousands of dentists achieve financial peace of mind by teaching them how to properly structure their assets for tax reduction, lawsuit protection, and estate planning. For more than two decades his seminars have trained dentists in all 50 states. His career has been credited with helping thousands of people save millions of dollars.

Dale West is a nationally recognized speaker and has shared the stage with Donald Trump, Zig Ziglar, Brian Tracy, Margaret Thatcher, Colin Powell, and former U.S. Presidents Reagan, Ford, Clinton and Bush. He has lectured at hundreds of conventions and seminars across the country with rave reviews. His clients have included Hollywood celebrities, professional athletes, CEOs of large corporations, and renowned dentists. He is a contributing author to the best-selling books, *America’s Greatest Tax Secrets Revealed*, *The Asset Protection Bible*, and *Cover Your Assets: Lawsuit Protection*.

Does Your Bag Have Holes? Advanced Lawsuit Protection and Tax Reduction Strategies
Three (3) Hours of CE Available
Saturday, April 25, 2009
9:00 am – 12:00 pm AND REPEATED 2:00 pm – 5:00 pm
Lecture and Q&A format
Recommended for dentists and specialists

From this presentation, dentists will learn the lawsuit protection, tax reduction, and estate planning strategies most advisors are unaware of including: sources of lawsuits dentists are exposed to and how to protect against them (failure/delay to diagnose, failure/delay to refer, employee liability, premise liability, failure to receive informed consent, etc.) Dentists will also learn how they can protect 100% of their professional and personal assets from a lawsuit, how they can legally save up to 50% in income taxes each year, how they can eliminate 100% of the capital gains tax on the sale of their practice, real estate, or other assets, and how they should structure their practices (C-Corporations, S-Corporations, LLCs, Trusts, Limited Partnerships) to avoid the serious legal and tax consequences of operating as a sole proprietor. Attendees will learn how to pass assets to their heirs tax-free, how to protect practice, property, and personal assets in the event of a judgment in excess of liability insurance or an exclusion in a policy, and how to avoid the most common asset protection mistakes, such as putting assets into a spouse’s name. Dentists will also be shown how to minimize vicarious liability for the acts of other professionals and staff. After completing this course, the participant should be able to:

- Maintain focus of practice on improved patient care rather than lawsuit defense.
- Structure practice for lawsuit protection and prevention.
- Reduce liability insurance costs.
Is your practice protected from vicarious liability?

Does your practice operate under a corporate entity?

Does this corporation employ or contract a dentist?

You need a separate Organizational Policy to fill the gap.

In many malpractice law suits the organization’s name is included. Although this entity may not have been negligent, it can cost thousands to defend.

The Organization Policy is designed to protect your corporation for negligent acts from an employed or contracted dentist working under that entity. Your organization is already protected with your Individual Professional Liability (must be named on the policy for coverage to exist,) but dentists working under your organization can create a gap in coverage. This gap is referred to as vicarious liability and is excluded under the Individual Professional Liability Policy.

Protect against Vicarious Liability with the Organization Policy. Why risk the costs of thousands to defend when you can protect for hundreds? Give us a call today!

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The fabrication of conventional complete dentures is an indirect dental prosthetic process. Early in the treatment sequence, an analogue of oral conditions must be developed to proceed with denture construction. The degree to which this analogue accurately represents a detailed simulation of oral conditions, both anatomically and mechanically, determines in large part the quality of the therapeutic outcome. One important aspect of this oral simulation involves making impressions of the denture-bearing and peripheral structures and fabricating the dental casts.

Techniques used to make dental impressions of edentulous patients have been known to the profession for many decades. Although improvements in available materials have subtly influenced the process, dentistry’s approach to impression making has remained remarkably consistent over the years. Conventional wisdom, as taught in most US dental schools, includes: (1) primary irreversible hydrocolloid impressions; (2) construction of custom impression trays; (3) intraoral modification of custom impression tray border dimensions; and (4) definitive impressions made using a suitable impression material.14

Since their introduction to the profession, zinc oxide-eugenol paste5-7 and polysulfide8-9 impression materials have been standards for definitive edentulous impressions. Because of their material proprieties and handling characteristics, these materials require the use of custom impression trays. Custom impression trays may be
formed using chemical-activated resins or light-activated resins. Clinical modification of tray borders is typically accomplished using modeling plastic impression compound, a technique that dates to the early 1900s. More recently, the use of polyether or vinyl polysiloxane (VPS) impression material for custom-tray border correction has been described.

Without question, these standard edentulous impression procedures have served the dental profession well and will continue to serve the profession for many years. However, it is important that the profession continuously strives to develop new procedures aimed at improved accuracy, convenience, and patient acceptance. The area of impressions in complete-denture prosthodontics is no exception. In this 3-part article, a fresh look at a variety of impression procedures associated with complete-denture prosthodontics will be provided. New concepts, modern materials, and innovative techniques will be highlighted for those interested in modifying standard approaches to complete-denture therapy while reducing appointment times.

The Basics

As thoroughly discussed in a number of textbooks on the subject, dentists should appreciate basic principles and objectives of impression making if successful edentulous impressions are to be achieved. The basic objectives of edentulous impressions are to facilitate denture retention, denture stability, denture support, optimal esthetics, and the maintenance of health of the oral tissue. To consistently accomplish these objectives, dentists should be knowledgeable about the anatomy and function of the relevant oral structures, the materials involved in impression making, basic impression techniques, and the clinical management of patients.

Impressions of edentulous arches must accommodate the anatomy and function of the oral tissue. The following basic principles should be considered:

- Impressions should extend to include the entire denture foundation within the health and function of the supporting and limiting tissue.
- Impression borders should be in harmony with anatomic and functional limits of the denture foundation and adjacent tissue; therefore, impression borders should be identified using functional movements.
- Adequate space for impression material within the impression tray should be available.
- A guiding mechanism should be available to accommodate correct positioning of the impression tray relative to the edentulous ridge and associated tissue.
The impression tray and impression material should be made of dimensionally accurate and stable materials.

Impression contours and dimensions should correspond to the intended contours and dimensions of the planned complete dentures. Physical properties of the impression tray and its manipulation constitute important considerations in the impression process. Historically, the use of custom impression trays to make definitive edentulous impressions has been considered essential for accurate results. Today, stock edentulous impression trays are available that conform to the dimensions and anatomical contours suitable for edentulous patients. If stock edentulous trays are selected to make definitive edentulous impressions, several important aspects of the trays and the associated impression techniques should be considered:

- Trays should be sufficiently rigid to withstand the physical manipulations of the impression process and support dimensionally accurate definitive impressions.
- Trays should be sized appropriately for the variety of edentulous arches that may be encountered.
- Trays should permit both additive and subtractive border and flange modifications. Trays constructed from thermoplastically formable materials are ideal in this regard. Although metal stock trays are easy to additively adjust, the grinding of overextensions or bending of tray flanges may be problematic.
- Tray handles should be fashioned to extend from the tray and exit the mouth without disturbing the relaxed posture of the lips.
- The tray or impression system should provide a means of adequate retention of impression material within the tray.

Historically, much attention has been given to the wide variety of materials available for making edentulous impressions including plaster, modeling plastic impression compound, zinc oxide-eugenol paste, irreversible hydrocolloid, polysulfide, polyether, and VPS. Consideration of material handling properties, working time, setting time, viscosity and flow, 3-dimensional accuracy, surface detail accuracy, hardness, elasticity, tear strength, biocompatibility, mixing requirements, cost, repeat pourability, time to pour, dental–stone interactions, disinfection properties and consequences, dimensional stability, shelf life, color, odor, taste, availability, and clean-up characteristics may contribute to material selection. Most currently available impression materials perform satisfactorily for edentulous impressions when applied under appropriate clinical conditions and in the hands of skilled operators.

Ultimately, the choice of impression material may depend more on the dentist's familiarity with a material rather than specific handling characteristics or material properties. The concept of the “correctable impression” is a convenience worth consideration (e.g., modeling plastic impression compound is thermoplastic and repeatedly molded to refinement, while VPS can be cut back and laminated to improve contours). With the recent popularity of VPS and polyether for fixed prosthodontic impressions and the convenient availability of these materials in most dental offices, their use for edentulous impression making may be based on convenience and dual use in the dental environment.

**VPS Impressions**

VPS, an addition reaction silicone impression material, offers a number of distinct advantages for making definitive impressions during complete denture therapy, including:

- Manufacturers provide a series of materials from which to choose that possess different viscosities and working times. Material viscosity can be varied throughout the impression surface based on tissue consistency and impression philosophy.
- The material delivery system typically involves automix cartridges, manual dispensing guns or automatic mixing machines, and spiral mixing tips. The mixing tips that introduce the material into the impression tray are sized for this task.
• Sequential additions of new impression material to existing, cured material in the tray will effectively adhere when polymerized. This permits a layering or build-up approach to impression making.
• Although working and polymerization times vary for different products on the market, VPS materials permit ample working time for the applications described in the present article. For example, the impression material system depicted here (Aquasil Ultra Smart Wetting Impression Materials - Fast Set) permits the operator approximately 30 seconds to disperse the material into the impression tray, 1 minute to insert the tray into the patient’s mouth and perform border molding manipulations, and then 1 minute to final polymerization. Caution should be taken when extending the border molding process beyond 1 minute. This may result in surface folding or rippling of the material.
• The material is sufficiently elastic. When soft- and hard-tissue undercuts are encountered during impression making, the impression can be retrieved from the mouth and clinically acceptable elastic recovery achieved.
• The material has clinically acceptable tear strength. When making impressions for immediate complete dentures, the material will tear and release from interproximal tooth areas when the impression is removed from the mouth. This is particularly true when low-viscosity materials are selected.
• Newer products in this class of impression materials have been chemically manipulated by manufacturers to improve their wettability or hydrophilicity. The addition of nonionic surfactants produces hydrophilized addition silicone. These more hydrophilic materials wet soft and hard tissue better, facilitate the gypsum casting process, and result in improved dental-cast surface properties.28-31
• The material does not generally induce sensitivity reactions in patients or operators.
• The material does not possess an offensive taste or odor.

The impression material preferred by the authors is Aquasil Ultra Smart Wetting Impression Materials - Fast Set. This system of VPS impression materials includes 5 viscosities (extra-low, low, medium, medium-high, and high). Other similar VPS impression systems are available in today’s dental marketplace (eg, Imprint 3® and Extrude®) and are applicable to the techniques discussed in the current article series.

Clinical Conditions and Impression Philosophies

Careful examination of the residual tissue that prise the edentulous ridges and denture-bearing areas reveals a wide range of soft- and hard-tissue conditions, contours, consistencies, and attachments. The capacity of the residual tissue to provide support, stability, and retention to the planned complete dentures varies across the denture-bearing area in each patient and can substantially differ among patients in general. Management of the tissue before and during definitive impression making will dramatically influence the fit, function, and comfort of the final prostheses.

With regard to impression making and the delivery of force to the denture-bearing tissue, 3 dominant theories have been put forward: (1) definitive-pressure impressions; (2) minimal-pressure impressions; and (3) selective-pressure impressions.32 Regardless of the preferred impression philosophy, no definitive impression should be accomplished before achieving reasonably healthy soft-tissue conditions.33-34 Additionally, dentists should consider procedural alterations for impressing unsupported, flabby tissue35-37 along the edentulous ridge crest.25,38-40 The placement or displacement of mobile soft tissue during impression procedures may significantly impact the overall success of therapy.

It is important that the profession continuously strives to develop new procedures aimed at improved accuracy, convenience, and patient acceptance.

Definitive-Pressure Impressions

Although not commonly considered today, the definitive-pressure impression concept41 attempts to capture denture-bearing tissue in a loaded state. Proponents rationalized that denture dislodgement is most likely during masticatory loading. To maximize the potential for denture support, stability, and retention during masticatory loading, capturing the denture-bearing tissue in a loaded state is theoretically essential to this philosophy.

Minimal-Pressure Impressions

The philosophy of the minimal-pressure impression is historically based on the mucostatic principles42 of denture fabrication. Accordingly, an attempt is made to record the denture-bearing tissue in its undistorted, undisplaced condition using low-viscosity impression materials in specialized impression trays. Subsequent denture fabrication will theoretically result in optimally supported and retained prostheses. Although the theoretical biophysics of the mucostatic approach are not clinically practical, the concept provided dentistry with an understanding of the value of the minimal impression force application using highly flowable impression materials to avoid mucosal distortion. The use of minimal-pressure impression in complete-denture therapy is well accepted today.
**Selective-Pressure Impressions**

The concept of selective-pressure impression making considers the anatomy of the denture-bearing tissue and attempts to distribute functional loads to those areas most capable of tolerating loading. In the edentulous maxilla, the primary stress-bearing area is the residual ridge, and the secondary stress-bearing area is the rugae area. For the edentulous mandible, the primary stress-bearing areas are the buccal shelves, and the secondary stress-bearing area is the residual ridge. The aspects of the definitive-impression procedure that can be manipulated to differentially distribute force to tissue most capable of functional loading include impression tray perforations, space between the tray and tissue, and the viscosity of the impression material. This impression philosophy is highlighted in several popular textbooks and taught in most dental schools in the United States.

The impression procedures described in this series of articles may be classified as selective-pressure impressions. VPS will be demonstrated as the impression material of choice. The procedures take advantage of the available range of VPS viscosities including extra-low viscosity, low viscosity, medium viscosity, medium-high viscosity, and high viscosity. The convenience of the automix delivery systems greatly facilitates border molding and definitive impression procedures on edentulous patients.

Management of the tissue before and during definitive impression making will dramatically influence the fit, function, and comfort of the final prostheses.

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**VPS Edentulous Impression Technique**

**Tray Selection**

After the patient interview, initial diagnosis, and tissue-conditioning procedures, dimensions of the edentulous arches are determined and appropriate stock edentulous impression trays are selected (Figure 1). The impression trays illustrated here (Massad Edentulous Trays) are constructed of a polystyrene-based polymer and are provided in 5 maxillary sizes and 5 mandibular sizes. Anatomically appropriate tray handles and ergonomic finger rests facilitate the impression-making procedure. Retention slots perforate the trays to maximize mechanical retention of the material. It is strongly recommended that VPS adhesive not be used in the trays. Rather, it is preferred that the impression material is wiped clean from the tray in areas where the tray impinges on border and peripheral tissue. This clean elimination of impression material from tray borders clearly signifies the need to accomplish subtractive adjustments of the tray before making the definitive impression.

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**Tray Adaptation**

Tray adaptations to existing anatomic contours are possible. The polystyrene-based polymer trays are thermoplastic. To affect subtle alteration of flange trajectory, pass the appropriate portion of the tray quickly through a microflame until the resin softens, being careful not to overheat the tray. Once the resin is softened, carefully manipulate the tray flange into the appropriate orientation. Cool the tray with water. The border extension of the tray may also be subtractively adjusted by grinding with a conventional acrylic resin rotary instrument.

**Tray Stops**

The definitive impression requires multiple placements of the impression tray in the patient’s mouth. To achieve consistently repeatable tray placements, tray stops are developed. Using high-viscosity VPS, dispense 4 nick-size circles of material into the maxillary impression tray at the incisor, molar, and midpalatal regions (Figure 2). Seat the tray on the edentulous maxilla and center the tray over the ridge. The objective is to develop a consistent space between the tray and the denture-bearing tissue surface. When polymerized, remove the tray and inspect the stops to assure even thickness and that the ridge crest is centered within the tray. Repeat this procedure with the mandibular impression tray developing 3 stops (Figure 2). Trim the stops with a sharp knife to minimize the area of tissue contact (Figure 3).

Once correctly established, the tray stops permit: (1) adequate and even space between the tray and denture-bearing tissue for the impression material; (2) adequate and even space between the tray and vestibular reflections for the impression material; and (3) consistently repeatable positioning on tray placement without overseating.

**Border Molding**

Border molding is a process defined as, “the shaping of the border areas of an impression material by functional or manual manipulation of the soft tissue adjacent to the borders to duplicate the contour and size of the vestibule.” VPS impression materials provide a distinct advantage as border-molding materials. The dentist can select from a number of viscosities based on the clinical conditions at hand. For example, in the typical edentulous maxilla characterized as having average ridge dimensions, high-viscosity VPS works well as a border molding material. However, when impressing a severely resorbed edentulous mandible, the authors prefer to use medium-viscosity VPS to increase material flow against the less substantial tissue.

To accomplish border molding of the maxillary tray, dispense a rope of medium-viscosity VPS along the peripheral tray borders including the postpalatal seal area. Place and center the tray on the maxilla using the tray stops as guides. Use the following tissue manipulations to define peripheral borders:

---

4 Global Dental Impression Trays, Tulsa, OK; http://gdit.us/
• To define the labial notch, grasp the philtrum close to the vermilion border and pull downward.
• To form the labial vestibular borders, ask the patient to purse the lips using a sucking action and then to smile widely.
• To define the buccal notches and buccal vestibular borders, grasp the cheek with the forefinger and thumb at the corner of the mouth and pull downward and forward. Repeat this process on the opposite side.
• To define the coronomaxillary vestibular border and hamular frenum area, ask the patient to open the mouth wide. This will cause the coronoid processes to translate through the coronomaxillary spaces, bringing the associated muscles to their terminal positions. If the mandibular opening is restricted, instruct the patient to move the mandible from side to side.
• To functionally form the posterior border of the tray, instruct the patient in Valsalva’s maneuver.44–46 Manually occlude the patient's nostrils and ask the patient to forcibly exhale through the nose only. This causes the soft palate to valve downward, forming the VPS along the postpalatal seal aspect of the impression tray.

After the VPS polymerizes, remove the maxillary impression tray and inspect all peripheral borders to assure appropriate anatomic and functional detail is represented (Figure 4). If the resin tray is apparent through the border-molding material, adjust the tray by grinding. Finally, relieve all borders approximately 1 mm to 2 mm using a scalpel blade or rotary instrumentation in preparation for the definitive impression (Figure 5).

To accomplish border molding of the mandibular tray, dispense a rope of medium-viscosity VPS along the peripheral tray borders. Center the tray on the mandibular edentulous ridge using the tray stops as guides. Use the following tissue manipulations to define peripheral borders:
• To functionally form the lingual and retromylohyoid flange borders, have the patient place the tip of the tongue forward out of the mouth and have the patient move the tongue side to side. Next, have the patient retract the tip of the tongue to touch the posterior palate.
• To form the labial notch, grasp the lower lip at the vermilion and pull outward and upward.
• To functionally form the labial and buccal borders, stabilize the tray with the index and middle fingers on the finger rest and the thumb under the chin. Ask the patient to purse the lips using a sucking action and then to smile widely.
• To form the buccal notches, grasp the cheek with the forefinger and thumb at the corner of the mouth and pull upward and forward. Repeat this process on the opposite side.

The placement or displacement of mobile soft tissue during impression procedures may significantly impact the overall success of therapy.

Definitive Impression

Before making definitive impressions, closely examine the soft-tissue conditions across the denture-bearing surface of the maxilla and mandible. Keep in mind the location of the primary denture-bearing areas. Dispense VPS impression materials into the maxillary impression tray, distributing different materials to correspond with relative tissue conditions such as low viscosity along ridge areas with firmly attached tissue and throughout the palate and extra-low viscosity in areas of flabby or mobile tissue. Place and center the tray on the maxilla using the tray stops as guides. Repeat all border molding manipulations. When the VPS has polymerized, remove and inspect the impression for appropriate anatomic, functional, and surface details (Figure 6).

Dispense VPS impression materials into the mandibular impression tray, distributing different materials to correspond with relative tissue conditions. Again, dispense low-viscosity material along the ridge areas with firmly attached tissue. Use extra-low viscosity in the areas of flabby or mobile tissue. Place and center the tray on the mandible using the tray stops as guides. Repeat all border-molding manipulations. When the VPS has polymerized, remove and inspect the impression for appropriate anatomic, functional, and surface details (Figure 6).

CAUTION: If excessively mobile soft tissue is present at the edentulous ridge crest, special precautions must be taken before making the definitive impression with extra-low viscosity VPS impression material. To avoid displacing the mobile soft tissue, remove the associated tray stop (Figure 5). Once the tray stop has been removed, care must be taken to avoid over-seating the tray during definitive impression procedures.

Once satisfied with the quality of the definitive impressions, bead, box, and cast the impression using a suitable, vacuum-mixed dental stone.57

Conclusion

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This article describes the recent advances in defini-
tive impression-making techniques for use in complete-denture therapy. Improved impression materials and new stock edentulous impression trays permit the application of modern procedures aimed at single impression master cast development. VPS impression material performs well in this application because of the favorable range of available viscosities and working times, delivery system, sequential layering ability, elasticity, tear strength, hydrophilicity, biocompatibility, taste, and smell. The clinical techniques described can be readily and successfully incorporated into any dental practice involved with complete-denture patients.

Subsequent articles in this series will address additional applications for VPS in removable prostodontic procedures including immediate complete dentures, denture reline procedures, implant overdenture treatment, and external impressions used to assess prosthesis fit.

Disclosure
Dr Massad is the inventor of the Massad Edentulous Tray for which he holds the US patent and has a financial interest. He has also received research grants and consulting fees from Procter & Gamble, and Dentsply.

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1. Conventional wisdom, as taught in most US dental schools, includes which of the following:
   a. primary irreversible hydrocolloid impressions.
   b. construction of custom impression trays.
   c. intraoral modification of custom impression tray border dimensions.
   d. all of the above

2. The basic objective of edentulous impressions is to facilitate:
   a. denture retention.
   b. denture stability.
   c. denture support and optimal esthetics.
   d. all of the above

3. Which of the following basic principles should be considered for impressions of edentulous arches?
   a. Impression borders should be slightly overextended to maximize retention.
   b. Adequate space within the tray isn't needed.
   c. Impressions should extend to include the entire denture foundation.
   d. Physiology movement of border tissue is not a consideration in the final impression.

4. Distinct advantages of VPS impression materials for making definitive impressions include:
   a. a series of materials that possess different viscosities and working times.
   b. material delivery system that always involve manual mix cartridges.
   c. material is not elastic.
   d. all of the above

5. With regard to impression making and the delivery of force to the denture-bearing tissue, which of the following is a dominant theory that has been put forward?
   a. definitive-pressure impressions
   b. maximal-pressure impressions
   c. negative-pressure impressions
   d. all of the above

6. In the edentulous maxilla, the primary stress-bearing area is (are) the:
   a. residual ridge.
   b. rugae area.
   c. palate.
   d. buccal shelves.

7. For the edentulous mandible, the primary stress-bearing area is (are) the:
   a. residual ridge.
   b. rugae area.
   c. palate.
   d. buccal shelves.

8. Once correctly established, the tray stops permit:
   a. no need to border mold the impression tray.
   b. strength for the impression tray.
   c. displacement of underlying soft tissue.
   d. adequate and even space between the tray and denture-bearing tissue for the impression material.

9. Instruct the patient in Valsalva's maneuver to:
   a. functionally form the maxillary labial borders of the tray.
   b. statically develop the denture-bearing areas of the edentulous mandible.
   c. develop the maxillary buccal notches.
   d. functionally form the posterior border of the tray.

10. Use _________ viscosity in the areas of flabby or mobile tissue.
    a. extra-low
    b. low
    c. medium
    d. high
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Importance of a detailed clinical examination: Report of a case of fibrous dysplasia

Lida Radfar*, Heath Evans**, and Farah Masood***

* Associate Professor of Oral Medicine, Department of Oral Diagnosis and Radiology, University of Oklahoma College of Dentistry
** Senior dental student, University of Oklahoma College of Dentistry
*** Associate Professor of Oral & Maxillofacial Radiology, Department of Oral Diagnosis and Radiology, University of Oklahoma College of Dentistry

Corresponding Author:
Lida Radfar, D.D.S., M.S.
Diplomate, American Board of Oral Medicine
Associate Professor of Oral Medicine
Department of Oral Diagnosis and Radiology
University of Oklahoma College of Dentistry
1201 N. Stonewall Avenue
Oklahoma City, OK 73117
Phone: (405) 271-5988
lida-radfar@ouhsc.edu

Key words:
clinical examination, fibrous dysplasia, radiographic finding, clinical manifestations

Introduction:
Fibrous dysplasia (FD) is a congenital, metabolic, nonfamilial, rare skeletal disease characterized by a loss of normal bone production and abnormal proliferation of fibrous connective tissue with poorly formed trabeculae of woven bone. FD is a benign fibro-osseous disease that often occurs in young children and adolescents. Lichtenstein1 in 1938 was the first to suggest the term “fibrous dysplasia” and noted that the lesion can occur not only in multiple bones (polyostotic form) but also in a single bone (monostotic form).2 Patients develop bony expansions that contain fibrous tissue and irregular woven bone trabeculae.3 Various dental anomalies may also be associated with FD.4 Fibrous dysplasia is a skeletal disease caused by postzygotic activating mutations of the GNAS1 gene that encodes for the Gsα subunit of the heterotrimeric G protein complex. It results in activation of the adenyly cyclase enzyme and overproduction of 3', 5'-cyclic adenosine monophosphate (cAMP).5-6 Fibrous dysplasia accounts for two percent of all bony tumors5 and seven percent of all benign neoplasms of bone.7 In general, the more extensive the disease the earlier the onset of symptoms. The monostotic form of the disease is much more common (70 percent of cases) than the polyostotic variety, which accounts for only 20 percent of cases. The remaining ten percent are associated with such syndromes such as McCune Albright syndrome and cherubism.8-9 Although fibrous dysplasia may occur in any bone of the body, the jaws and skull are among the most commonly affected bones.10-11 While the maxilla is more commonly affected than the mandible, maxillary lesions sometimes involve adjacent bones separated by sutures (such as zygoma and sphenoid). Therefore, they are not strictly monostotic.9, 12

Clinically, craniofacial FD usually presents as a slow growing, painless, hard, non-mobile, non-tender swelling. The onset of the disease is often gradual, and patients only seek treatment when severe facial deformity or functional disturbance is present. Lesions located at the jaws are more ossified, and expansion of the buccal cortical plate is more frequent than expansion on the lingual side.12-13 Proliferation of the tumor may cause interference with tooth eruption. Displacement or missing teeth at the site of the lesion
could lead to malocclusion.\textsuperscript{9,10} However, despite the frequency of craniofacial involvement the dental features of FD have been poorly characterized, mainly in isolated case reports with sparse information about its effects on dental tissues.\textsuperscript{14-17} The development, eruption, and shedding of primary teeth followed by the development and eruption of permanent teeth are sequential events that may be altered by metabolic dysfunction within dental tissues or the presence of bony lesions within the jaws. It remains unclear whether the presence of FD in the jaws has any effect on tooth development and function. Macroscopically, the lesion appears grayish white or red and is highly vascular with a gritty texture due to the presence of newly formed bone spicules.\textsuperscript{10,13}

Histologically, the lesion is fibrous, consisting of proliferating fibroblasts in a compact stroma of interlacing collagen fibers. Occasional foci of calcification or cartilaginous tissue may be found. There is no sharp demarcation between the dysplastic bone and the adjacent normal bones. Some lesions of the jaw may undergo a progressive maturation in which the proportion of fibrous tissue diminishes and calcification increases with increasing age.\textsuperscript{13}

Radiographic features can present in a spectrum of four different patterns: ground glass (condensed/granular trabeculae), radiolucent (lytic), mixed radiolucent/radio-opaque (mixed density), and radio-opaque (sclerotic). The ground glass pattern is most prevalent in the maxilla and mandible of patients below 21 years; in patients over 21 the radio-opaque pattern is more prevalent in the maxilla while the mixed radiolucent/radiopaque pattern is more prevalent in the mandible.\textsuperscript{18}

Fibrous dysplasia has been known to recede in puberty with stabilization expected in early adulthood. In the craniofacial region, FD usually does not need to be treated except for cosmetic reasons.\textsuperscript{19,20} The craniofacial involvement is difficult to treat due to location, uncontrolled proliferation, and compression of nerves. Visual disturbances, severe facial deformity, and uncontrolled excess of growth hormone have been reported in monostatic FD.\textsuperscript{19,20} Surgical intervention is indicated for patients with symptoms or functional impairment.\textsuperscript{21} Recent studies used antiosteolytic agents such as bisphosphonates to prevent osteolytic activity in the benign bone tumors.\textsuperscript{22-23} These studies reported decrease in pain intensity clinically and bone refilling of osteolytic sites radiographically after using bisphosphonates.\textsuperscript{22-23} In the following case report, an adult case of incidental FD with mild pain upon palpation is presented.

**Case Report:**
A 31-year-old black female presented to the College of Dentistry complaining of not being able to eat comfortably due to missing posterior teeth. She also requested a more esthetic appearing upper denture. She further reported that she had neglected her dental care primarily due to finances. Her past medical history was not significant. She had a Caesarean section in 2000, and a benign ovarian cyst was removed uneventfully in 2004. She takes Alesse (100 mcg levonorgestrel/20 mcg ethinyl estradiol tablets, Wyeth-Ayerst Laboratories) hormone pills for birth control. She reported no allergies to any medicine, and denied using alcohol, tobacco, or recreational drugs. Her family history was not contributory.

Clinical examination was unremarkable except for a slight expansion of the right mandibular edentulous area of teeth #30-31. The patient expressed mild pain upon palpation in this area. She also reported an occasional spontaneous vague pain in the area during the past year. The pain was insidious in onset, occurred once every two or three months, and was alleviated by ibuprofen.

Diagnostic Imaging: A panoramic image was made which showed a radiolucent-radiopaque lesion in the right posterior region of the mandible extending from the first molar region to the ascending ramus area (Fig. 1).

![Figure 1: Panoramic radiograph showing expansion and ground glass appearance in the right mandible. Arrow shows the lesion.](image1.png)

The lesion showed short trabeculae, similar in appearance to ground glass. Some buccal-lingual expansion was noted. Cone beam computed tomography (CBCT) imaging was also done to further evaluate the region. Images were analyzed in axial, coronal, and sagittal planes (Figs. 2 and 3).

![Figures 2-3: Axial (Image 2) and coronal (Image 3) views of the body of the mandible demonstrating ground-glass appearance and expansion.](images2-3.png)
Axial images showed a unilateral lesion with a relatively well-defined outline. Some bucco-lingual expansion of the posterior mandible was noted. The internal density of the lesion was more radiopaque compared to the surrounding bone. The trabecular pattern showed a ground-glass appearance with short thin trabeculae. The buccal and lingual cortical plates appeared to be intact.

A bone biopsy of the area was performed. The results indicated fragments of dense viable cortical bone and areas of viable molten bone with a fibrous connective tissue background. The benign fibro-osseous proliferation, the radiographic appearance, and the clinical findings were all consistent with a diagnosis of fibrous dysplasia. The patient was informed about the nature of the condition. Treatment was not recommended at the time. She will be evaluated every four months for evidence of any further bony changes and clinical symptoms.

Discussion:

Fibrous dysplasia is a rare skeletal disease that causes expansion with abnormal matrix of the involved bone. The bone matrix consists of organic and inorganic components. The association of organic and inorganic substances gives bone its hardness and resistance. The major organic component is type I collagen (95%); other components are amorphous material, including glycosaminoglycans that are associated with proteins.24, 25

Osteoid is uncalcified organic matrix. The inorganic matter represents about 50% of the dry weight of bone matrix, and is composed mostly of calcium and phosphorus, with smaller amounts of bicarbonate, citrate, magnesium, potassium, and sodium. Calcium forms hydroxyapatite crystals with phosphorus but is also present in an amorphous form.26

Bone tissue can be classified according to texture, matrix arrangement, maturity, and developmental origin. Based on matrix arrangement, bone tissue is either lamellar (secondary bone tissue/mature bone) or woven (primary bone tissue/immature bone). The woven bone is immature bone in which collagen fibers are arranged in irregular random arrays. It contains smaller amounts of mineral substance and a higher proportion of osteocytes than lamellar bone. In the normal bone maturation process, woven bone is temporary and is eventually converted to lamellar bone. Woven bone is pathologic in adults, except in areas near the sutures of the flat bones of the skull, in tooth sockets, and at the insertion site of some tendons.27-31

When bone is in an active state, osteoclastic activity always predominates over osteoblastic activity because osteoclasts are three times more efficient at bone resorption than osteoblasts are at bone deposition. Also, osteoclasts have a much shorter life span than osteoblasts.32 In fibrous dysplasia, an expanded bony lesion contains fibrous tissue and changes the ratio of normal bone to woven bone. Craniofacial bones are commonly not affected, but dental anomalies may or may not be present.33

Although symptoms are rarely reported in cases of fibrous dysplasia, our patient had pain in the lower right quadrant. The pain was an incidental finding upon examination, and was not severe enough for the patient to report it when she came to the dental clinic for treatment.

The purpose of reporting this case is to bring to the practitioner’s attention the importance of a detailed clinical and radiographic examination. If our patient had not been examined carefully, the radiographic lesion and associated pain would not have been discovered. Moreover, the radiographic lesion was also not clearly diagnostic. Some patients do not even complain about occasional pain because they are focused on different goals; our patient came in for repair of her tooth function to better facilitate eating and to improve her esthetic appearance.

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| Tulsa Endodontic Practice For Sale | More than enough business for "two" endodontists. Owner will stay part time. Four digital ops, all with microscopes. (405) 359-8784 FINANCING AVAILABLE. |
| Elk City Practice For Sale | New listing. Dr. Retiring in February '09. Busy practice. Staff in place. Call for information right now. (405) 359-8784 FINANCING AVAILABLE. |

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