

The Dent-Liner

A Bulletin Dealing With Issues For Dental Health Professionals

Stress-Free Loading With The 3-D Bar Abutment



Peter T. Pontsa, RDT is president of Dent-Line of Canada Inc. with over 37 years of experience in the dental profession as a laboratory owner and a technician. He is a leader in superior professional techniques in fixed and removable restorations and he shares this knowledge through articles and seminars which he regularly provides. He is also a past president of the College of Dental Technologists of Ontario. Currently he is a member of the Ontario Study Club for Osseointegration.

Clinical complications with implants have been reported in combination with endosseous root form implants and the accompanying implant prosthesis. The 3D Bar Abutment and telescopic bar for the overdenture technique was introduced to alleviate many stresses and loading complications associated with this type of treatment. A co-ordinated hand search of earlier studies was published recently. This report focused on clinical statistics concerning problems arising from success or failure of implants and their respective prosthesis. These problems were separated into six groups beginning with; surgical implant loss, bone loss, peri-implant, soft tissue, mechanical and aesthetic/phonetic. (1) The unprocessed statistics were pooled from numerous studies and resources designed to recognize trends noted in the occurrences of these problems. Some of the most common implant complications amongst many were; implant loss in irradiated maxilla (25%), implant loss with maxillary over dentures (21%) implant loss in type IV bone (16%). Although the

implant data had to be obtained from different studies, they do indicate a trend toward a greater loss of implants with over dentures (2). There was a greater loss in the maxilla than the mandibular with fixed complete dentures and over dentures, whereas little difference was indicated with fixed partial dentures. Again implant loss increased with short implants and poor bone quality. Another clinical impediment is masticatory forces acting on implants which are capable of creating adverse stress in the adjoining bone. This effect increases bone defects and subsequently the implants fail. This dilemma which was addressed through a published paper indicated computations of stress occur in the implant zone. The computations were completed with finite element analysis utilising 3 dimensional computer models. The models replicated implants located in vertical positions in the posterior area of the mandible. The findings indicated that an increase in the implant diameter reduced the maximum von Mises equivalent stress values. **Continued on page 2**

Special Interest Articles:

- Stress Free Loading With The 3-D Bar Abutment
- Why are Metal Housings so Important for Attachments?

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Why are Metal Housings so Important for Attachments?

Whenever attachments are used, whether on bilateral, root caps or implant related cases, metal housings are a must. Since the apparatus holds the retention sleeve securely in place while acting as a buffer between the retention sleeve and the denture base acrylic resin. The most critical aspect of methyl methacrylates is that it absorbs water slowly over a period of time. The absorption is undoubtedly due primarily to the polar properties of the resin molecules. This process is the science of diffusion of the water molecules according to the laws of diffusion. The diffusion presumably occurs between the macromolecules, which are forced slightly apart. In this respect the action of the water is not unlike that of plasticizer, which softens the acrylic. It has been estimated that for

each 1 % increase in the weight of water absorbed the acrylic resin expands in a linear fashion by 0.23 %. Because macromolecules are forced apart by the diffusion of water they are rendered more mobile, with the result that inherent stresses can result in possible changes in the shape of the denture. There is no apparent difference between heat or self curing resins in this regard. The net result of the processing contraction and the subsequent expansion due to water sorption is that after several months in the patient's mouth the compression moulded heat cured acrylic resin will be slightly undersized molar to molar, Where as the self curing acrylic resin will be slightly oversized. This **continued on page 4**

Stress-Free Loading with the 3-D Bar Abutment cont'd..



Four SKY implants were inserted using flapless surgery and connected immediately with a 3D-BarAbutment. The first 3D-BarAbutment is screwed on the implant.



When screwing on the abutments, the ball joints compensate for horizontal divergences of up to 80° and vertical divergences of up to 40°.

So by utilising a larger implant diameter rather than increasing the length, better stress distribution levels can be achieved. (3) Another study, by Yacoub, Ismail, and Mao entitled the "Transmission of Bone Strain in Craniofacial Bones Of Dentulous Human Skulls Upon Dental Implant Loading" had similar findings. The trio mention bone strain resulting from dental implant loading was distributed to cortical bone, not only adjoining to but also distant from the dental implants (4). The large diameter implant was more facilitative of stress transfer to cortical bone than the small diameter implant tested. Principal

implant constancy and bone concentration are variables that are judged necessary to accomplish conventional osseointegration and long term clinical survival of implants. This prompted a study which was to investigate the effect of four different bone qualities on stress distribution in implant supported mandibular crowns. They used 3-dimensional finite element analysis to accomplish the findings. The results were confirmed that von Mises stress values in D3 and D2 bone were 163 MPa and 180 MPa respectively and reached the highest values at the neck of the implant. The von Mises **Continued on page 3**



The bar arms can be modified to provide a stable tube in tube connection.



The individually shortened riders are placed on the bar.

Featured Product; Bredents Thermoplastic Clasps



Bredent's Thermoplastic Clasps

The Bredent thermoplastic clasp can be used as an invisible clasp with different tooth colours. These clasps can be used in the construction of a new partial denture or to repair a clasp on a previously constructed partial whether it has broken off or if an extension is required because of a recent extraction. The clasps are available in both right and left quadrants and are available in packages of eight. There are four basic shades from the Vita

shade guide, starting with A2, A3, B2 and B3. The clasps are oversized so that they can be trimmed to conform to the abutment tooth. A flameless heat source will soften the clasp so as to adapt them to the configuration of the tooth. Final trimming can be carried out before polishing. This new product is available now. For additional information contact the order desk at **Dent-line of Canada at 1-800-250-5111.**

Bredents Plaster Knife



Bredents " New " Plaster Knife

The new plaster knife is multipurpose, with an ergonomically shaped handle for optimum transfer of force that helps simplify daily procedures. The extra long and narrow blade is perfectly suited for cutting away excess plaster and is made of stainless steel. It is dimensionally stable, easy to clean; the hard plastic handle has an ergonomic shape that has been designed for right or left hand use. The special cones on the

multi-purpose element simplify removal of the impression tray from the model. When opening flasks the lateral chisel ensures improved transmission of force because of the high leverage effect of the knife handle. While a separate impact surface has been provided on the opposite side to protect the back of the knife. For further information and pricing. **Call Dent-line at 1-800-250-5111.**

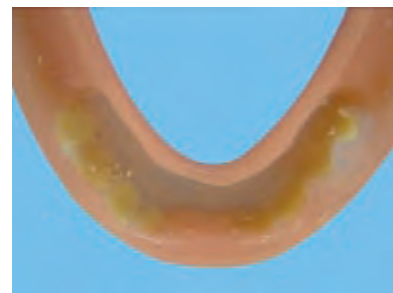
Stress-Free Loading with the 3-D bar Abutment, cont'd...

stress values in D1 and D2 bone quality were 150 MPa and 152 MPa respectfully at the neck of the implant. A more homogeneous stress distribution was seen in the entire bone. Because the trabecular bone was less resistant to deformation than the other bone qualities modelled, the stress magnitudes were greatest for D3 and D4 bone (4). Another factor to clinical complications we encounter is when implants are placed in the anterior mandibular supporting a screw retained prosthesis. This generates an anterior cantilever with the entire prosthesis acting as a class 1 lever and thus placing the anterior implant under alternating tension and compression during function. Within the imitations of a recent study, anterior cantilevers in mandibular implant supported screw retained prosthesis were common and appeared to be reliant on implant assignment and prosthesis design (6). The ratio of anterior to posterior cantilever lengths was approximately 1:2. Screw loosening is an indicator, of lateral stresses and flexure. During this project, a total of 65 screws were utilized of which 7 became completely loose. If the screws had not come loose as a result of the loading, perhaps the bar could have broken or the implants themselves would have become loosened and failed. The 3D Bar Abutment addresses these loading and flexing issues. It was designed with an abutment, ball joints and a telescopic bar. When they are joined together and screwed in place on the implant, a preformed manufactured bar for an over denture is created. Under loading, tension or compression, the ball joint allows three-dimensional motion of the bar arms.

Compensation of divergence of 80% allows connections even in cases of extremely unfavourable implant positions. The 3-D Bar Abutment can be utilized on a new over denture or existing denture provided there is adequate room for abutment, bar and riders. Until now there has not been an optional treatment method that will address clinical complications such as loading, transversely or vertically and the cantilevering problems encountered. The 3-D Bar Abutments indicated for immediate connections and is stress free even with extreme divergences of implant positioning. The riders are polymerized into the denture or silicone can be used for a tight yet flexible connection to compensate for the movement of the Bar Abutment. In any event this optional treatment procedure may extend the life of the implants by reducing clinical complications which lead to implant failure and loss. **Source Peter T. Pontsa RDT.**

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(1) Goodacre, J.C.; Bernal, G.; Rungcharassaeng, K. & Kan, J.Y.K. "Clinical Complications with Implants and Implant Prosthesis" Journal of Prosthetic Dentistry, Aug., 2003, Vol. 90, No 2. (2) Goodacre, J.C.; Bernal, G.; Rungcharassaeng, K. & Kan, J.Y.K. "Clinical Complications of Osseointegrated Implants" Journal of Prosthetic Dentistry, May 1999, Vol. 81, No. 5 (3) Himmlova, L.; Dostalova, T.; Kacousky, A.; Konvickova, S. "Influence of Implant Length and Diameter on Stress Distribution: A Finite Element Analysis" Journal of Prosthetic Dentistry Vol. 91, No. 1 (4) Yacoub, N.I.; Ismail, Y.H.; Mao, J.J. "Transmission of Bone Strain in the Craniofacial Bones of Edentulous Human Skulls Upon Dental Implant Loading" Journal of Prosthetic Dentistry Aug., 2002, Vol. 88, No. 2. (5) Sevimax M.; Turhan, F.; Kilicarslan, MA.; Eskitascioglu, G. "Three Dimensional Finite Element Analysis of the Effect of Different Bone Quality on Stress Distribution in an Implant Supported Crown" Journal of Prosthetic Dentistry, Mar., 2005 Vol. 93, No.3. (6) Brosky, M.E.; Koriath, T.W.P.; "The Anterior Cantilever in the Implant-Supported Screw Retained Mandibular Prosthesis" Journal of Prosthetic Dentistry Mar. 2003 Vol. 9. No.3.



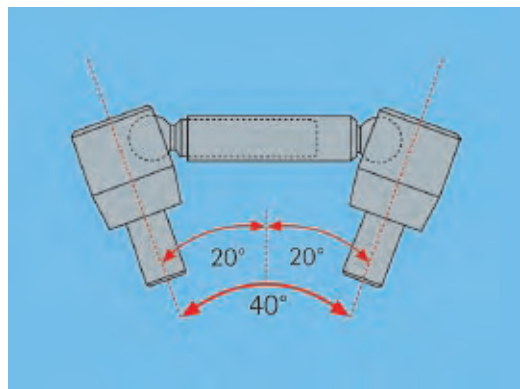
The existing denture is refined to fit the new 3D-Bar Abutment.



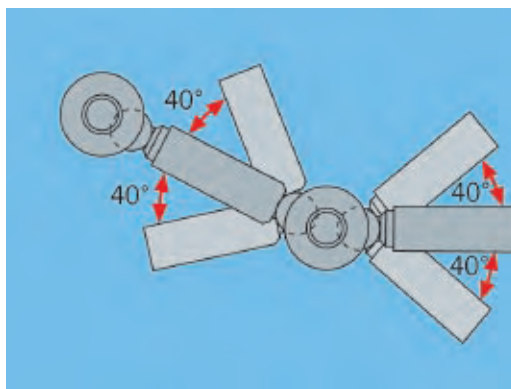
The bar riders are polymerized into the denture.

This generates an anterior cantilever with the entire prosthesis acting as a class 1 lever and thus placing the anterior implant under alternating tension and compression during function!

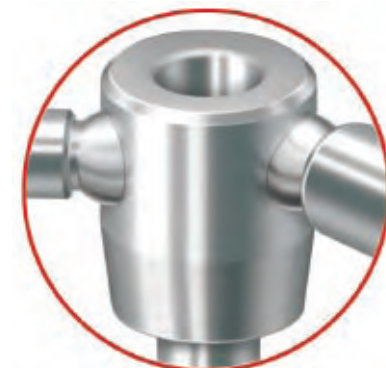
Source; Peter T. Pontsa, RDT



The ball joint allows three dimensional motion of the bar arms. Compensation of vertical divergence of 40° and



horizontal divergence of 80° allows connections even with extremely unfavourable implant positions.



Ball joints are designed to compensate for any divergences.

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Why Are Metal Housings Important? cont'd....

distortion will damage or destroy the male attachments. That is because there is no consistent dimensional stability in acrylic that is normally found in metal housings. Whether prefabricated or manufactured in a dental laboratory. Further more castable burnout parts that anchor the retention sleeves to it should be cast in an alloy with a high Vickers Hardness. To prevent premature wear of the



Four Hader Bar Clips placed in the acrylic without housings.

Special Announcement:

During the Perfecting Your Practice Conference 2005 held at the University of Guelph on June 2nd ,3rd and 4th. Mr. Peter T. Pontsa, RDT presented a powerpoint seminar as well as a hands on demonstration. Mr Ken Frizzel, dd, on behalf of the Denturist Association presented Mr. Pontsa to the participants. The seminar was entitled "Aesthetic Dentures: Options for a Successful Practice". We would like to thank the Denturist Association and president, Mr. Micheal Vout, for allowing us to present our workshop. We at Dent-line of Canada wish the denturists added success for the 2006 Perfecting Your Practice Conference.

Trade News:

The **FDI World Dental Congress** will be held in Montreal August 24th to 27th, at the Palais des Congrès. It is a combined meeting with the Journées Dentaires du Quebec and the Canadian Dental Association. Bredent will have a booth to introduce their new clinical line and the Sky Implants, of which the patented zirconium implant will be profiled. Other new products such as the smile cone abutments, and 3-D Bar Abutment will also be introduced to North America. Please join us at the 6th annual **International Dental Congress** September 16th to 17th at the Renaissance Toronto Airport Hotel, 801 Dixon Rd. Peter T. Pontsa RDT will provide a new seminar titled "**Reaching a New Standard in Denture Aesthetics**". This

working parts an alloy of 250 HV or more should be used. The adjoining pictures indicate a failed case which shows soft gold alloy for the bar and retention sleeves placed directly into the acrylic resin denture base. Yet there are times when there is not sufficient room for a metal housing. In that case an alternative attachment systems would have to be used. **Source Peter T. Pontsa, RDT.**



Excessive wear on the bar between the implants in the right and left quadrant.



Peter T. Pontsa (left); Ken Frizzel (right).

presentation will discuss building the denture from the outside in and will focus using the alma gauge, to placing colour tones, packing, trimming and finishing the denture. For details contact 1-877-882-5840 **Denttechnica** will be held from Friday October 28th to 29th in Montreal at the Hotel Mortagne, 1228 rue Nobel Boucherville. Mr. Peter T. Pontsa RDT and Mr. Hatem Raslan will provide a seminar entitled "**Attachments for Removable Prosthetics**" participants will see new approaches, techniques and attachments that will improve treatment planning for implants, over dentures and partial dentures. Mr. Raslan will translate the seminar into French. For further details contact Mr. Jean Compagna at 1-514-728-5352 or Jocelyne Bouchard at 450-929-0153.