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- 2. McAllister BS, Hagnignat K. Bone augmentation techniques. *J Periodontal.* 2007 Mar; 78(3):377-96.
- Blum B, Moseley J, Miller L, Richelsoph K, Haggard W. Measurement of bone morphogenetic proteins and other growth factors in demineralized bone matrix. *Orthopedics*. 2004 Jan;27(1 Suppl):s161-5.



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Odontogenic Tumor: A Case Report of a multicystic ameloblastoma in mandible treated with intraoral bone graft surgery and osseointegrated implants

Luis Eduardo Benevides de Moraes, DDS¹ • Eduardo Jose de Moraes, MSc² Nathalia Benevides de Moraes, DDS³

Abstract



he ameloblastoma is an invasive odontogenic tumor with benign character and might promote bony destruction. A large number of approaches are preconized such as aggressive resections with safety margin which lead to functional and esthetical sequelae. The present article consists in a case report of a 24 years old female patient presenting a multicystic ameloblastoma in the anterior region of the mandible. The patient was submitted to a conservative resection followed by bony reconstruction with autogenous bone graft taken from the retromolar region associated to PRP (platelet-rich plasma). After satisfactory remodeling of the graft, osseointegrated implants were installed and the patient was rehabilitated with a fixed prosthesis. Patient was followed for a period of 5 years showing no signs of recurrence. It is possible to conclude that the treatment performed in this case provided lower morbidity and was able to satisfy patient's expectations.

KEY WORDS: Bone graft, dental implants, odontogenic tumor, multicystic ameloblastoma

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Figure 1: Preoperatory Panoramic Xray

BACKGROUND

Ameloblastoma is an odontogenic epithelial tumor that accounts for approximately 10% of odontogenic tumors and 1% of all tumors and cysts of the jaws.¹ It is a locally aggressive tumor with benign character, leading to bony destruction and facial deformities. Treatment modalities have been extensively discussed in the literature and are still a focus of controversy, varying from a simple surgical excision till big resections with safety margins.² It is classified in 3 principal subtypes according to its clinical and radiographic conditions. The literature has divided clinical ameloblastomas into Unicystic, Multicystic and Pheripheral subtypes.^{2,3} The prognosis of lesion as well as its treatment seems to be intimately related to the clinical and radiographic subtype and its confirmation by histopathological exam. The surgeon has at his disposal radical techniques for treatment of odontogenic tumors, however large resections can often create sequelae, because the bony destruction and the radical eradication of this pathology interfers with the prosthetic rehabilitation and with psychological aspects of the patient. Some authors have shown that the bony reconstruc-



Figure 2: Preoperatory CT occlusal view.



Figure 3: Preoperatory CT.

tion techniques play an important role in creating ideal conditions for the installation of osseointegrated implants followed by a prosthetic rehabilitation.^{4,5} The present article consists in a case report of a patient with a mandibular ameloblastoma who was submitted to a bony reconstruction with autogenous bone graft after tumor resection and rehabilitated with osseointegrated implants.

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Figure 4: Histopathologic Diagnosis islands of epithelium.



Figure 6: - Occlusal view of lesion after teeth removal.

CASE REPORT

A 24-year-old woman presented for treatment with a slight swelling in the anterior region of the mandible, more specifically in the region of teeth (FDI numbering system) 31, 32, 33 and 34. In the radiography, a multiloculated radiolucent image similar to a multicystic ameloblastoma could be observed (Fig 1). In the CT scan,



Figure 5: Frontal view of lesion.



Figure 7: View of lesion after resection.

swelling of the lingual and buccal cortical could be noticed as a consequence of expansion of the lesion (Figs 2 and 3). The patient was very nervous and depressed with the situation because she had already presented to other dentists that proposed radical treatments. In the histopathologic study, the presence of islands of epithelium similar to the epithelium of the

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Figure 8: - Donor site approach and bone block osteotomy.



Figure 9: Bone blocks fixation during reconstruction surgery.



Figure 10: Second Stage after 6 months with bone blocks integration.

enamel organ in a stromal of mature fibrous connective tissue confirmed the diagnosis (Fig 4).

Under general anesthesia, an intra sulcular incision with margins designed for a better visualization of the lesion followed by buccal and lingual detachment and exodontia of ele-



Figure 11: Implants placed after removal of microscrews.

ments 31, 32, 33 and 34 that were associated to the lesion were performed (Fig 5 and 6). A segmental resection with removal of the buccal bone plate was executed, followed by osteotomy with round burs in the lingual bone plate (Fig 7). The resection was then extended

de Moraes et al



Figure 12: Panoramic Radiography after implants installation.



Figure 13: Prosthetic rehabilitation.



Figure 14: CTCB panoramic image control after five years.

and two teeth adjacent to the lesion were removed, elements 41 and 35. The left retromolar region was accessed for the removal of the autogenous bone blocks which were fixed with titanium micro screws of 1.5 mm of diameter and 12 mm of length, associated to par-



Figure 15: Clinical exam for implants control after five years.

ticulate bone graft mixed with platelet-rich plasma (PRP) in order to fill the gaps (Figs 8 and 9). The final suture was performed with non-resorbable material (mononylon 5-0; Johnson&Jhonson/Ethicon-Somerville, NJ). During the postoperative period, antibiotic prescription (Cephalosporin 1g 4 times per day 6/6 hours for 7 days) was made, (Tenoxicam 20mg 2 times per day 12/12 hours for 3 days) and chemical control of biofilm (Chlorexidine 0,12% rinses 4 times per day). The suture was removed after 1 week and the patient was followed up monthly during 6 months.

After a period of 6 months, another surgery was performed for implants placement. The same surgical approach used in the first surgery was then performed and satisfactory incorporation of the graft to the recipient site could be observed, with clinical signs of bony remodeling (Fig 10). The micro screws were removed and four osseointegrated implants with dimensions of 3,75 x 13mm (Conexão Sistema de Prótese - São Paulo - Brazil) were installed (Fig 11 and 12). The same pharmacological protocol and period of follow up in the first surgery was performed. After another period of 6 months, the implants were exposed with subsequent prostheses installation. The patient has been benefited with esthetical and functional gains, demonstrating satisfaction with the results (Fig 13).

The patient was followed up during a period of 5 years and presented healthy conditions of the bone, without presence of signs of recurrence Imaging periodical exams were performed during 5 years after prosthetic rehabilitation and healthy bone was identified, without images associated to pathologies. The prosthesis was periodically removed and implants were examined, without evidence of bone loss and mobility.

DISCUSSION

The multicystic ameloblastoma has a more aggressive and invasive biological behav-

ior being generally recommended radical approaches for treatment. Classically, a block resection of the lesion between 1 and 2 cm of safety margins is preconized. This technique is preferred because ameloblastoma cells can be found up to 8 mm from the radiographic and clinical margins of the lesion.^{2,7} Di Cosola et al² confirmed in their study that unicystic ameloblastomas seems to have recurrence potential but lower when compared to the multicystic type. The authors² consider the conservative approaches such as the enucleation and curettage or the association of both good options for treatment, having a significant rate of success.

Many techniques are proposed for the treatment of ameloblastoma, but it is consensus that the main objective of therapeutics consists in the complete eradication of the lesion, eliminating recurrences and the necessity of other surgeries. Some authors⁸ preconizes a marginal resection with safety margins for cases in general of ameloblastoma, but recognizes that the treatment must be individualized for each patient and lesion, being this idea corroborated by Cury, Dib, Santos Pinto.¹

For Nakamura et al.⁹ each case must be analyzed individually and in a meticulous way, priming for a conservative approach in situations which tumors are found in initial stages, even if it presents a higher risk of recurrence. This conduct is considered valid because chances of complications and sequelae are reduced. This point is maybe the most difficult and requires common sense by the professional concerning the treatment of aggressive lesions of the oral cavity. The idea of a radical approach wasn't accepted well by the patient and its execution would lead to not only surgical sequelae

but also in the decreasing of quality of life. Adjuvant techniques such as cryotherapy and Carnov's solution 10%, haven't been utilized. Samman & Lee¹⁰ observed rates of recurrence of 10% with the utilization of Carnoy's solution in unicystic ameloblastomas. Cury et al.¹ related in their study rates of recurrence of 30% in lesions treated with liquid nitrogen. Salmassy & Pogrel¹¹ defend the utilization of cryotherapy in aggressive lesions of the jaws larger than 5 cm in its major diameter after resection in association to bone grafts in blocks. However, these techniques can't be utilized indiscriminately. Some authors cited complications like paresthesia, lesion of surrounding tissues, postoperative wound dehiscence, pathologic fractures, pain, swelling and infection.^{1,2}

On the other hand, autogenous bone is the most frequent type of graft used in oral and maxillofacial surgery and might be harvested from various parts of the body, such as: iliac crest, calvaria, ribs, body of the mandible (retro-molar region) and chin.4,6,12,13,14 Chiapasco et al⁴ demonstrated that osseointegrated implants can be utilized with success after large reconstructions with the utilization of autogenous bone grafts harvested from the ribs. Zachariades¹⁵ presented 4 cases of recurrences of ameloblastoma in bone grafts. The author confirmed that although recurrences of tumor in bone grafts may occur, these are not common, being related rarely in the literature.. Others authors^{5,14} concluded that the distraction osteogenesis promote efficiently vertical augmentations turning possible implants placement in patients presenting partial edentulism and mandibular defects after tumors resections.

Mareque et al.6 presented the onlay bone

graft from the iliac crest as an option in the reconstruction of defects after tumor resection for posterior implants placement and prosthetic rehabilitation. The literature¹³ consider the retro-molar region as an intraoral donor site because it allows the removal of good quantity of bone, enough for reconstruction of regular defects. This region is indicated as a donor site because it offers lower morbidity and more postoperative comfort for the patient¹³. In this case report, a conservative segmental resection was preferred, being complemented by osteotomy with round burs, providing lower morbidity and diminishing postoperative sequelae.

CONCLUSION

It is possible to conclude that a conservative treatment of aggressive lesion as the ameloblastoma using intra-oral autogenous bone graft for reconstruction permits implants placement with a good prosthetic rehabilitation. This treatment option is predictable and viable presenting good results and low morbidity.

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Disclosure

The authors report no conflicts of interest with anything reported in this article.

References

- Curi M, Dib L, Pinto D. Management of solid ameloblastoma of the jaws with liquid nitrongen spray cryosurgery. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 1997; 84: 339-44.
- Di Cosola M, Turco M, Bizzoca G, Tavoulari K, Capodiferro S, Escudero-Castaño N, Lo Muzio L. Ameloblastoma of the jaw and maxillary bone: clinical study and report of our experience. Av. Odontoestomatol 2007; 23(6): 367-373
- Barnes L . Pathology and genetics of head and neck tumors. World Health Organization. 2005; p. 430.
- Chiapasco M, Colletti G, Romeo E, Zaniboni M, Brusati R. Long-term results of mandibular reconstruction with autogenous bone grafts and oral implants after tumor resection. Clin Oral Impl Res. 2008; 19: 1074-1080.
- Kunkel M, Wahlmann U, Reichert T, Wegener J, Wagner W. Reconstruction of mandibular defect following tumor ablation by vertical distraction osteogenesis using intraosseous distraction devices. Clin Oral Impl Res. 16, 2005, 89-97.
- Mareque J, Mareque S, Romero J, Atín M, Redecila P, Martin G. Mandibular ameloblastoma. Reconstruction with iliac crest graft and implants. Med Oral Patol Oral Cir Bucal 2007; 12: E73-
- 7. Pogrel M, Montes D. Is there a role for enucleation in the management of ameloblastoma ?. Int J Oral Maxillofac Surg. 2009; 38: 807-812.
- 8. Pogrel M. Treatment of Keratocysts: The case for decompression and marsupialization. J Oral Maxillofac Surg. 2005; 63: 1667-1673.
- Nakamura N, Higuchi Y, Mitsuyasu T, Ferry S, Ohishi M. Comparison of longterm results between different approaches to ameloblastoma. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2002; 93: 13-20.
- Samman N, Lee P, Ng I. Unicystic ameloblastoma use of Carnoy's solution after enucleation. Int J Oral Maxillofac Surg. 2004; 33: 263-267.
- Salmassy D, Pogrel M. Liquid nitrogen cryosurgery and immediate bone grafting in the management of aggressive primary jaw lesions. J Oral Maxillofac Surg. 1995; 53; 784-790.
- Keller E, Tolman D, Eckert S. Surgical-Prosthodontic reconstruction of advanced maxillary bone compromise with autogenous onlay block bone grafts and osseointegrated endosseous implants: A 12-year study of 32 consecutive patients. Int J Oral Maxillofac Impl. 1999; 14: 197-209.
- Misch C. Comparison of intraoral donor sites for onlay grafting prior to implant placement. Int J Oral Maxillofac Impl. 1997; 12: 767-776.
- Chiapasco M, Zaniboni M, Rimondini L. Autogenous onlay bone grafts vs. alveolar distraction osteogenesis for the correction of vertically deficient edentulous ridges: a 2-4 year prospective study on humans. Clin Oral Impl Res. 2007; 18: 432-440.
- Zachariades N. Recurrences of ameloblastoma in bone grafts. Int J Oral Maxillofac Surg. 1988; 17: 316-318.

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Abstract

Background: Achieving predictable esthetic results in the anterior maxilla are a challenge for clinicians mainly due to lack of adequate soft and hard tissues volume. To predictably obtain pleasing results, early soft tissue management is necessary especially during implant temporization period.

Methods: The current case presentations describe а novel immediate provisionalization and flapless implant placement approach by using a roughened cervical surface of the immediate provisional, and later a customized impression technique to optimize the peri-implant soft tissue profile.

Results: The results of this technique have shown excellent soft tissue health, appearance and stability. These results were satisfactory for both the patients and the clinicians.

Conclusion: The concept of a flapless implant placement in well-developed and healed site combined with an immediate provisionalization have shown very encouraging clinical results, however it is essential to validate these findings through a well-controlled clinical trial.

KEY WORDS: Dental implants, prosthodontics, provisionalization, case series

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Figure 1: Interim RPD replacing a missing maxillary left central incisor.



Figure 2: High smile line with class I Seibert alveolar ridge deformity.



Figure 3: De-epithelization of edentulous space tissue.

INTRODUCTION

The replacement of missing anterior teeth with dental implants is a well-documented treatment in the dental literature. However, achieving predictable esthetic results in the anterior maxilla is a challenge mainly due to lack of consistent soft and hard tissue healing patterns. In the past, implant placement with 3 - 6 months of healing time was desirable for the osseointegration process.¹ Today, there is an increased demand to reduce treatment time and minimize the number of surgical procedures. Therefore immediate implant placement and loading, especially

in the anterior maxillary region, is used with successful outcomes.²⁻³ Flapless implant surgery is an effective treatment with minimal bleeding, postoperative discomfort⁴⁻⁸ and high implant survival rates of 91% to 98%.9-11 Further, flapless implant placement in conjunction with immediate restoration aids in preserving the soft tissue and improve the esthetic outcome.¹²⁻¹³ The management of the soft tissue is essential to maximize the esthetic results during the osseointegration healing period.¹⁴ The current paper presents a novel technique to create an appropriate emergence profile around the immediate provisional implant crown. The technique depends on careful manipulation of the soft tissue by using a slightly roughened cervical third of the provisional crown leading to a slow, controlled gingival enlargement. The tissue is carefully monitored to ensure the development of an optimal emergence profile. Finally, a customized impression technique is used to accurately transfer the final tissue contour from the oral cavity to a laboratory working model to fabricate the definitive crown.15



Figure 4: Flapless implant placement with a radiographic view of the final implant placement.



Figure 5: Frontal view after two months showing the contour of the soft around the provisional crown.

METHODS

Clinical Presentation

A 34-year old female patient presented with a missing maxillary left central incisor, the tooth was extracted four years ago due to a failed endodontic therapy and replaced with an interim maxillary partial removable denture prosthesis (RPD) (Figure 1). Clinical examination revealed a minor class I ridge deficiency¹⁶ with a thick periodontal biotype¹⁷ and high smile line¹⁸ (Figure 2). A bone-sounding technique showed insufficient bone in the buccopalatal direction and the periapical radiograph indicated approximately 13 mm of bone height.

Technique

The emergence profile of the future implant crown was initiated by de-epithelizing the soft tissue of the edentulous area using a round, coarse diamond bur (Figure 3). The tissue surface of the artificial tooth was modified from a ridge lap to an ovate shape contour using auto-polymerizing acrylic resin material (Jet acrylic, Lang Dental Mfg. Co., Wheeling, IL).^{21, 22} The new ovate shape artificial tooth helped to create an appropriate emergence profile for the future implant crown.^{23, 24}



Figure 6: Flowable composite used to preserve the architecture of the soft tissue and final PVS impression made.

Implant Placement with Immediate Provisionalization

The patient received antibiotics (Amoxicillin 500 mg, Teva Pharmaceuticals, Sellersville, Pennsylvania, USA) starting 24 hours before the procedure and for seven days after. Under local anesthesia and using the surgical guide, the sequential implant osteotomy was performed through the soft tissue without flap elevation and according to the implant surgical protocol; a 3.7 mm diameter and 11.5 mm length implant (Tapered Screw-Vent[®], Zimmer Dental Inc., Carlsbad, California, USA) was inserted with primary stability at 40 Ncm (Figure 4). Immediately after the implant placement, an interim abutment was manually torqued to the implant, a provisional crown was fabricated with auto-polymerizing acrylic resin and modified to the proper contour. The facial surface was left slightly roughened at the cervical third to induce a controlled inflammatory process. The occlusion was adjusted to eliminate any centric or eccentric contacts, and the crown was cemented to the abutment using Temp-Bond (3M ESPE AG, Seefeld, Delaware, USA), the implant was allowed to heal for 4 months. During the osseointegration process, the roughened cervical third of the provisional crown was monitored and adjusted to obtain a favorable soft tissue profile (Figure 5).

The Definitive Restoration

After four months, the provisional crown and abutment were removed, the impression coping was connected to the implant, and flowable composite resin materials (Tetric Flow, Ivoclar Vivadent, Amherst, New York, USA) were injected around the impression coping and light cured (Figure 6). The composite resin helped supporting the soft tissue the contour. The impression was made using a polyvinylsiloxane material (Imprint II, 3M ESPE AG, Seefeld, Delaware, USA) and sent to the laboratory. A definitive custom abutment was fabricated and connected to the implant and torgued to 30 Ncm, and a definitive crown was also manufactured using all-Zirconia ceramic material (Procera, Nobel Biocare, Yorba Linda, California, USA) and cemented with resin cement (Variolink, Ivoclar Vivadent, Florida, USA). Fol-

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Figure 7: Final crown placed with 12 month follow-up.



Figure 8: Thin periodontal biotype with class I Seibert alveolar ridge deformity.



Figure 9: Interim removable partial denture with an ovate shape artificial tooth.

low-up through 12 months showed stable results with firm periodontal tissues (Figure 7).

The second patient was a 46-year-old female presented with a missing maxillary left central incisor fourteen years ago due to a traumatic injury to the region. Seibert class I ridge deformity was present and thin periodontal biotype with a low smile line were evident (Figure 8). Treatment options were discussed and the patient agreed to have guided bone regeneration (GBR) to increase the labialpalatal ridge width followed by dental implant. The GBR procedure was completed using particulate freeze-dried cancellous bone allograft and a resorbable collagen membrane (Biomend Extend, Zimmer Dental, Carlsbad, CA) and the area allowed to heal for 6 months.

During the initial healing period, a space between the surgical site and the artificial tooth of the interim RPD was created to ensure an undisturbed healing process. The soft tissue of the edentulous space was developed for



Figure 10: Provisional crown with roughened cervical surface two month after flapless implant placement (notice the enlargement of the soft tissue)



Figure 11: 12 months follow up with adequate soft tissue stability around the implant crown.



Figure 12: Preoperative clinical and radiographic views of the fractured right central incisor



Figure 13: One year postoperative clinical and radiographic views of the final implant.

the future implant crown using the same technique described for the first patient (Figure 9). Ridge mapping was performed 6 months after healing and adequate bone width of 7 mm was present. A dual acid etched-surfaced root-form implant, 3.25 mm in diameter and 11.5 mm in length (OsseoTite NT, Biomet 3i, Palm Beach Gardens, Florida, USA) was inserted. The provisional abutment, the immediate provisional crown and the definitive restorations were fabricated with the same technique described for the first patient, with the crown left slightly rough at the cervical third. Soft tissue enlargement was observed during the healing period (6-8 weeks) (Figure 10). Clinically, the soft tissue appeared to be stable around the final crown at 12 months follow-up (Figure 11).

The third patient presented with an infected right maxillary central incisor and horizontal root fracture at the apical third (Figure 12). A socket preservation procedure was completed using particulate bone allograft and resorbable membrane after extracting the tooth. Using the same technique with the previous cases, an implant supported single tooth was placed and restored. The soft tissue contour appeared to be stable at 12 months after the definitive crown was cemented (Figure 13).

DISCUSSION

Patient Selection and Factors Affecting the Soft Tissues

In the current patient presentations, thick and thin periodontal biotypes were closely observed using novel flapless implant placement and immediate provisionalization techniques. The combination of flapless implant placement and an immediate provisionalization technique is proved to be helpful in the maintenance of a soft tissue profile around dental implants in the esthetic zone.^{12, 13, 25} Surgical and restorative factors play a role in the development and maintenance of the soft tissue during the healing period around the immediate provisional. Surgically, adequate bone volume presence is important to reduce possibility of dehiscence that could lead to subsequent soft tissue recession. Further, the use of flapless implant surgery plays a significant role in preserving the soft tissue contour around implants.²⁶ Restoratively, soft tissue development with immediate provisionalization is useful to improve the esthetic results. In the current patient presentations, the soft tissue was modified twice (during the interim removable dental prosthesis stage, and later during the osseointegration process) using a roughened immediate provisional to create a natural, harmonious tissue profile. The roughened cervical surface of the immediate provisional induced minimally controlled inflammation that led to the development of an appropriate soft tissue contour and favorable emergence profile. The authors' observations suggest that the concept of controlled minimal inflammation is valuable to improve the soft tissue profile when monitored closely.

Healing with "Controlled Minimal Inflammation Concept"

Although the concept of controlled inflammation may appear unsafe, the natural repair process of any wound involves many healing events that occur simultaneously with the inflammation process. When a flapless implant procedure is performed, injury and inflammation are initiated and the healing events start at the same time. During this period, the cells are undergoing mitotic division to repair and regenerate the injured tissue.²⁷ The presence of the roughened cervical surface of the immediate provisional leads to inflammation that results in an enlarged thick granulation tissue formation; hence increases the soft tissue volume.²⁸ Once the desired profile was achieved through the roughened surface, the provisional crown and abutment were removed and the impression was immediately made. Thus, the roughened surface improves the soft tissue and thereby achieving the desired esthetic results.

Many different techniques have been used for maintenance and formation of soft tissue profiles during the immediate provisionalization period. Lee et al. evaluated the gingival margin using a flapless implant surgical technique around 76 implants, taking dental casts at 1 week, 1 month, and 4 months after implant placement. The results demonstrated a better coronal growth of the gingival margin occurring at 1 week (0.7 +/- 0.3 mm) and 4 weeks (0.2 + - 0.2 mm), with no change at 4 months (0.0 +/- 0.3 mm).²⁶ Although flapless implants induced coronal growth of the gingival tissue at 1 and 4 weeks, it is the authors' opinion that the additional enlargement of the soft tissue through the controlled inflammation by roughening the cervical part of the immediate provisional during the initial 2 months of immediate provisionalization can further improve the esthetic results.

CONCLUSIONS

The current patient presentations describe a novel technique to optimize the soft tissue response during the osseointegration healing period. It combines a minimally invasive, flapless implant surgery with a unique concept of using controlled minimal inflammation to enlarge the soft tissue during the first 2 months of healing. Later, the soft tissue profile is maintained using a customized impression technique. Overall, the technique demonstrated no adverse effects on clinical implant osseointegration and good periodontal health was observed in all the patients. To the author's knowledge, the combination of the aforementioned techniques is a novel approach. Although the results in this report have been satisfactory, it is the authors' opinion that it is essential to validate these findings through a well-controlled clinical trial.

Disclosure

The authors report no conflicts of interest with anything mentioned in this article.

References

- Albrektsson T, Branemark PI, Hansson HA, Lindstrom J. Osseointegrated titanium implants. requirements for ensuring a long-lasting, direct bone-to-implant anchorage in man. Acta Orthop Scand. 1981;52(2):155-70.
- Crespi R, Cappare P, Gherlone E, Romanos GE. Immediate versus delayed loading of dental implants placed in fresh extraction sockets in the maxillary esthetic zone: A clinical comparative study. Int J Oral Maxillofac Implants. 2008 Jul-Aug;23(4):753-8.
- Mijiritsky E, Mardinger O, Mazor Z, Chaushu G. Immediate provisionalization of single-tooth implants in fresh-extraction sites at the maxillary esthetic zone: Up to 6 years of follow-up. Implant Dent. 2009 Aug;18(4):326-33.
- Fortin T, Bosson JL, Isidori M, Blanchet E. Effect of flapless surgery on pain experienced in implant placement using an image-guided system. Int J Oral Maxillofac Implants. 2006 Mar-Apr;21(2):298-304.
- Cannizzaro G, Leone M, Consolo U, Ferri V, Esposito M. Immediate functional loading of implants placed with flapless surgery versus conventional implants in partially edentulous patients: A 3-year randomized controlled clinical trial. Int J Oral Maxillofac Implants. 2008 Sep-Oct;23(5):867-75.
- Cannizzaro G, Leone M, Esposito M. Immediate versus early loading of two implants placed with a flapless technique supporting mandibular bar-retained overdentures: A single-blinded, randomised controlled clinical trial. Eur J Oral Implantol. 2008 Spring;1(1):33-43.
- Cannizzaro G, Leone M, Torchio C, Viola P, Esposito M. Immediate versus early loading of 7-mm-long flapless-placed single implants: A splitmouth randomised controlled clinical trial. Eur J Oral Implantol. 2008 Winter;1(4):277-92.

- Cannizzaro G, Torchio C, Leone M, Esposito M. Immediate versus early loading of flapless-placed implants supporting maxillary full-arch prostheses: A randomised controlled clinical trial. Eur J Oral Implantol. 2008 Summer;1(2):127-39.
- 9. Brodala N. Flapless surgery and its effect on dental implant outcomes. Int J Oral Maxillofac Implants. 2009;24 Suppl:118-25.
- Campelo LD, Camara JR. Flapless implant surgery: A 10-year clinical retrospective analysis. Int J Oral Maxillofac Implants. 2002 Mar-Apr;17(2):271-6.
- 11. Rocci A, Martignoni M, Gottlow J. Immediate loading in the maxilla using flapless surgery, implants placed in predetermined positions, and prefabricated provisional restorations: A retrospective 3-year clinical study. Clin Implant Dent Relat Res. 2003;5 Suppl 1:29-36.
- De Kok IJ, Chang SS, Moriarty JD, Cooper LF. A retrospective analysis of peri-implant tissue responses at immediate load/provisionalized microthreaded implants. Int J Oral Maxillofac Implants. 2006 May-Jun;21(3):405-12.
- De Rouck T, Collys K, Wyn I, Cosyn J. Instant provisionalization of immediate single-tooth implants is essential to optimize esthetic treatment outcome. Clin Oral Implants Res. 2009 Jun;20(6):566-70.
- Jemt T. Restoring the gingival contour by means of provisional resin crowns after single-implant treatment. Int J Periodontics Restorative Dent. 1999 Feb:19(1):20-9.
- 15. Koutrach M, Nimmo A. Preservation of existing soft-tissue contours in the transition from a tooth to an implant restoration in the esthetic zone using a flapless approach: A clinical report. J Prosthodont. 2010 Jul;19(5):391-6.
- Seibert JS. Reconstruction of deformed, partially edentulous ridges, using full thickness onlay grafts. part I. technique and wound healing. Compend Contin Educ Dent. 1983 Sep-Oct;4(5):437-53.

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- Ochsenbein C, Ross S. A reevaluation of osseous surgery. Dent Clin North Am. 1969 Jan;13(1):87-102.
- Tjan AH, Miller GD, The JG. Some esthetic factors in a smile. J Prosthet Dent. 1984 Jan;51(1):24-8.
- Wilson DJ. Ridge mapping for determination of alveolar ridge width. Int J Oral Maxillofac Implants. 1989 Spring;4(1):41-3.
- Chen LC, Lundgren T, Hallstrom H, Cherel F. Comparison of different methods of assessing alveolar ridge dimensions prior to dental implant placement. J Periodontol. 2008 Mar;79(3):401-5.
- Garber DA, Rosenberg ES. The edentulous ridge in fixed prosthodontics. Compend Contin Educ Dent. 1981 Jul-Aug;2(4):212-23.
- Miller MB. Ovate pontics: The natural tooth replacement. Pract Periodontics Aesthet Dent. 1996 Mar;8(2):140.
- 23. Al-Sabbagh M. Implants in the esthetic zone. Dent Clin North Am. 2006 Jul;50(3):391,407, vi.
- Sadan A, Blatz MB, Bellerino M, Block M. Prosthetic design considerations for anterior single-implant restorations. J Esthet Restor Dent. 2004;16(3):165,75; discussion 175.
- Becker W, Goldstein M, Becker BE, Sennerby L, Kois D, Hujoel P. Minimally invasive flapless implant placement: Follow-up results from a multicenter study. J Periodontol. 2009 Feb;80(2):347-52.
- Lee DW, Huh JK, Park KH, Chai JK, Kim CK, Moon IS. Comparison of interproximal soft tissue height for single implants and contra-lateral natural teeth. Clin Oral Implants Res. 2009 Dec;20(12):1320-5.
- Trowbridge H et al. Inflammation: A Review of the Process. 5th edition. Quintessence books. 1997. Ch 8, P.149-165.
- Trowbridge H et al. Inflammation: A Review of the Process. 5th edition. Quintessence books. 1997. Ch 7, P.129-142.

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Using Bone Expanders and Piezoelectric Surgery for Ridge Expansion to Facilitate Immediate Dental Implant Placement: Case Reports

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Abstract

Background: Narrow dentoalveolar ridges remain a serious challenge for the successful placement of endosseous implant. In this paper we describe a ridge splitting technique using bone expanders and piezoelectric surgery blades. The approach enables treatment of ridges as thin as 2.5 mm at the alveolar crest and simultaneous placement of dental implants. In two cases reported in this article the alveolar crest widths are less than 2.5 mm. We prefer to place implants immediately after the expansion rather than expansion and placing bone graft and waiting until healing completes. This technique is preferred because it accomplishes everything in a single visit.

Methods: Using the piezoelectric surgery and bone expanders technique, we split the atrophic alveolar ridge and immediately placed dental implants between the split ridge plates. The ridges were allowed to heal for 3 months prior to implant loading.

Results: Horizontal widths of the alveolar ridges were increased from 1.6 mm to 6 mm on average and no fractures of alveolar plates were encountered. After 3 months of healing, the expanded alveolar ridges appeared to heal with bone filling the piezoelectric splits and 100% survival of dental implants was seen 5 months after implant loading.

Conclusions: The preliminary results of this study indicate that ridge expansion alone or in combination with GBR can be considered an effective and safe procedure for treatment of width insufficiency of alveolar ridges on the purpose of implant application.

KEY WORDS: Dental implants, piezoelectric surgery, ridge splitting, guided bone regeneration

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Figure 1: Case 1 with an edentulous ridge demonstrating labial and buccal bone resorption.



Figure 2: Case 2 with an edentulous ridge demonstrating labial and buccal bone resorption.



Figure 3: Case 1 pre-surgical radiograph.

INTRODUCTION

Alveolar ridge atrophy is a serious problem that often limits the use of endosseous dental implants. When an anterior tooth in the mandible is lost, often as a result of trauma or endodontic complications, the labial wall of the alveolar socket resorbs rapidly and the residual ridge actually consists of the previous palatal wall.¹ Therefore,



Figure 4: Case 2 pre-surgical radiograph.

the alveolar ridge is predominantly reduced in the horizontal dimension, and immediate implant placement with routine techniques is not possible because of the discrepancy between the thickness of the ridge and the diameter of the implant. Although numerous procedures have been devised to augment the alveolar crest with autogenous bone grafting, such as the ribs and



Figure 5: Mesial and distal vertical incisions with the crest of the ridge reflection of the bilateral premolar regions slightly toward the lingual aspect.



Figure 6: Mesial and distal vertical incisions.



Figure 7: Alveolar ridge after using piezoelectric ridge splitting.

iliac crest, sometimes in conjunction with a barrier membrane, a risk of dehiscence and infections of the mucosa may interfere with the graft.²⁻⁴ Furthermore, a two-stage approach to implant placement is generally advocated, lengthening treatment time and increasing cost. In 1992, Simion et al.⁵ introduced a split-crest-bone manipulation technique. The purpose of this technique was to create self-



Figure 8: Piezoelectric surgery tip while splitting the bone.

space making defects by splitting the atrophic crests into two parts with a longitudinal greenstick fracture and placing the implant between them, which is also an effective technique for severely thin alveolar bone. This is advocated when a standard osteotomy technique in which a crest width of 4 mm is not readily available.^{6,7} In the cases reported in this article, we utilized spe-



Figures 9 a & b: Bone expanders being used for Case 1.





Figure 10a

Figures 10 a, b, c: Bone expanders being used for Case 2.



Figure 10b



Figure 10c



Figure 11a



Figure 11b





Figure 11c

cific dental implants (Microdent Systems, Barcelona, Spain) due to the fact that they are tapered in shape and tapped into position similar in fashion to the driving of a wedge. The present study reports two cases of severe mandibular alveolar atrophy during placement of an immediate tapershaped implant associated with a ridge widening procedure using non traumatic expanders.

CASE PRESENTATIONS

A 66 year old Egyptian female and a 62 year old

Egyptian male were referred for prosthetic treatment associated with implant placement. Clinical examination showed an edentulous margin with obvious labial and buccal bone resorption (Figs. 1, 2). The radiographic appearance indicated an adequate bone height for implant placement, except that the view of the anterior mandible region revealed knife-edge morphology. For the purpose of placing the implant with a conical abutment that assists fixed bridge support, four dental implants were



Figure 12: Implant placement in Case 1.



Figure 14: Case 1 post-surgical radiograph.

planned to be placed in the anterior segments of the mandible and premolar areas (Figs. 3, 4).

METHODS

After appropriate anesthesia, an incision was made on the crest of the ridge of the bilateral premolar regions slightly toward the lingual aspect while mesial and distal vertical incisions were extended in the buccal direction for the purpose of flap relief (Figs. 5, 6). Using a periosteal elevator, mucoperiosteal flaps were buccally elevated



Figure 13: Vertical mattress sutures used for Case 2.



Figure 15: Case 2 post-surgical radiograph.

sufficiently to visualize alveolar ridge anatomy. The bone crests revealed that the ridge widths were approximately 1.6 mm in horizontal width and the buccal aspect had a concave form. Piezoelectric surgery was used carefully to create a channel along the crest of the bone (Figs. 7, 8). By using the piezoelectric surgery tips, the channels were extended to a depth of 8 to 10 mm to reduce the occurrence of cortical plate fracture in the subsequent procedures. After cortical plate separation, the first bone expander was inserted



Figure 16: Case 1 final prosthesis.

to its full length. The expander left in place for 30 seconds for bone remodeling then the expander was removed and the second bone expander was inserted in the bone to the length of 14 mm and left in position for 30 seconds then removed, then the third bone expander was inserted to the length of 14 mm and left in position for 30 seconds (Figs. 9-11). After preparing the alveolar ridge for receiving the implant body, immediate placement of dental implants was achieved after removing the expanders to prevent the relapse of bone expansion. Releasing incisions in the periosteum at the base of the flap were made to enhance the elasticity of the flap. Closure was carried out by using vertical mattress sutures (Figs. 12, 13).

Stage 2 surgery was scheduled 3 months after the implantation. Complete healing of the defects had taken place, and the fixtures were covered by regenerated bone. A conical abutment was attached to the implant fixture (Figs. 14, 15). For the final prosthesis, the fixed bridge at first patient and over denture at second patient were seated with no functional disorders were observed during five months of follow-up (Figs. 16, 17).



Figure 17: Case 2 final prosthesis.

DISCUSSION

Alveolar atrophy may present an anatomical limitation to the placement of endosseous implants.¹ Many osseous augmentation techniques, including bone grafting, use of membranes for guided tissue regeneration ⁸⁻¹³ and ridge splitting procedures⁵⁻⁷ have been used in the treatment of this problem. The following are the benefits of ridge splitting procedures compared with other methods: 1) the ridge splitting procedures avoid donor-site morbidity caused by autogenous bone harvesting; 2) the ridge splitting procedures often allows for simultaneous implant placement which significantly shortens the treatment time.

The split-crest technique applied in the present case showed that a preoperative ridge width between 1.5 mm and 3.0 mm had a postoperative ridge width gain between 1 mm and 4 mm after a healing period of six months. Most ridge splitting procedures associated with immediate implant placement have used expanded polytetrafluoroethylene (ePTFE) membranes or poly-gelatin 910 mesh for guided

tissue regeneration. Although the possible benefits of guided tissue regeneration have received considerable attention in previous studies, the use of a membrane increases the risk of complications, such as infections, painful inflamed tissues, and disrupted wound healing. As such, no membrane was used in our cases. In addition, various studies have reported complication rates of 20% to 50% when using membranes.

In ridge splitting procedures associated with immediate implant placement, primary wound closure is generally more difficult compared with that of a standard implant placement and the risk of membrane exposure increases because the natural crest is dramatically augmented. For these reasons, we treated five atrophy cases, including the present ones, without the membrane technique. Subsequent wound healing and osseointegration of the implants were uneventful. Furthermore, the reason for successful regeneration surrounding the implant without the membrane technique may be attributed to the small size and tapered shape of the expanders, which is a beneficial shape to gradually widen a split crest. Only a small percentage of fusiform defects are made by the splitting process. In a small percentage of defect cases, the membrane is not essential for bone regeneration.

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Disclosure

The authors report no conflicts of interest with anything mentioned in this article.

References

- Jensen J, Sindet-Pedersen S, Oliver AJ. Varying treatment strategies for reconstruction of maxillary atrophy with implant: Results in 98 patients. J Oral Maxillofac Surg. 1994;52:210–216.
- De wiji FLJA, Cune MS. Immediate labial contour restoration for improved esthetic: A radiographic study on bone splitting in anterior single-tooth replacement. Int J Oral Maxillofac Implant. 1997; 12:686–696.
- 3. Misch CM, Misch CE. The repair of localized severe ridge defects for implant placement using mandibular bone grafts. Implant Dent. 1995;4:261–267.
- Sindet-Pedersen S, Enemark H. Reconstruction of alveolar clefts with mandibular or iliac crest bone grafts: A comparative study. J Oral Maxillofac Surg. 1990;48:554–558.
- Simion M, Baldoni M, Zaffe D. Jawbone enlargement using immediate implant placement associated with a splitcrest technique and guided tissue regeneration. Int J Periodontics Restorative Dent. 1992;12:462–473.
- Summers R. The ridge expansion osteotomy (REO). Compend Contin Educ Dent. 1994;15:422–436.
- Duncan JM, Westwood M. Ridge widening for the thin maxilla: A clinical report. Int J Oral Maxillofac Implants. 1997;12:224–227.
- Schultz AJ, Gaper AH. Guided tissue regeneration using absorbable membrane (polyglactin 910) and osseous grafting. Int J Periodontics Restorative Dent. 1990;10:9–17.
- Nyman S. Bone regeneration using the principle of guided tissue regeneration. J Clin Periodontol. 1991;18:494–498.
- Nevins M, Mellonig JT. Enhancement of the damaged edentulous ridge to receive dental implants: A combination of allograft and GORE-TEX membrane. Int J Periodontics Restorative Dent. 1992;12: 97–111.
- 11. Rominger JW, Triplett RG. The use of guided bone regeneration to improve implant osseointegration. J Oral Maxillofac Surg. 1994;52:106–113.
- Gotfredsen K, Nimb L, Buser D, et al. Evaluation of guided boneregeneration's around implants placed into fresh extraction sockets: An experimental study in dogs. J Oral Maxillofac Surg. 1993;51: 879–886.
- Gotfredsen K, Warrer K, Hortin- Hansen E, et al. Effect of membranes and porous hydroxyapatite on healing in bone defects around titanium dental implants. Clin Oral Implants Res. 1991;2:172–178.
- Warrer K, Gotfredsen K, Hortin- Hansen E, et al. Guided tissue regeneration ensures osseointegration of dental implants placed intoextraction sockets. Clin Oral Implants Res. 1991;2:166–171.
- Becker W, Becker B, Handelsman M, et al. Guided bone regeneration for implants placed into extraction sockets: A study in dogs. J Periodontol. 1991;62: 703–709.

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Substance Abuse & Misuse of Prescription Drugs for Temporomandibular Disorders

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Abstract

Background: Prescription drugs in the United States are often subject to abuse or misuse. *Opioids* are the most abused and misused analgesics of the narcotic drugs. The article deals with abuse and misuse problems associated with other groups of prescription drugs that are used in temporomandibular joint (TMJ) therapy, i.e., tranquilizers, muscle relaxants, and antidepressants. Therapy for Temporomandibular Disorder (TMD) often employs these drugs on an acute or chronic basis.

Methods: Flow charts are given that diagrammatically depict pharmacological therapy for chronic pain and dysfunction in dentistry. Structural representations of prescribed medications for pain are provided. Prescription drug therapy in the treatment of TMJ/TMD is diagrammed.

Results: Figure 1 provides a summary of drugs used in pain management as they relate to substance abuse/misuse in dentistry. Fig-

ure 2 summarizes prescriptions used in the treatment of the pain and dysfunction found in TMJ/TMD. Acute drug therapy centers on and *cyclobenzaprine* benzodiazepines the their peripheral antispasmodic/anticonfor vulsant actions and their relaxant effects on skeletal muscle. As to chronic therapy, the primary drugs employed are the antidepressants (e.g., *amytryptiline*) that are active in control of long-term pain. Infrequently, in chronic TMJ/ TMD cases with severe or persistent pain, the opioids or other narcotic agents are employed on a continuing basis for ongoing therapy.

Conclusions: Besides control of the abuse of narcotics, another controversial area in dental prescribing is the abuse or misuse of drugs used in the treatment of TMJ/TMD. Drugs used in the treatment of TMJ/TMD may be abused or misused by the patient who is depressed, anxious, or experiencing withdrawal symptoms from narcotics addiction.

KEY WORDS: Orthodontics, periodontics, osteopenia, bone graft

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INTRODUCTION

Substance abuse and misuse may occur when drugs are prescribed for medicinal use but instead are used for purposes of intoxication.^{1,2} In dental treatment, these untoward negative states are often associated with pain management employing opioids. Substance abuse and misuse with opioids in the management of dental/oral pain has been extensively studied elsewhere in the literature.^{3,4}

Drugs of dental origin that may be abused (for their intoxicating effects) or misused (changed dosages or transferred to another person) are usually medications intended for the treatment of acute or chronic pain.^{5,6} However, this article focuses on "the other substance abuse problem" in dental prescribing, i.e., tranquilizers, muscle relaxants, and antidepressants that are abused or misused for their nontherapeutic psychotropic and intoxicating effects.

DRUG TRANSFERENCE

It is a socialization phenomena and often customary practice in some subcultures in America (e.g., the aging "baby boomers" generation) to share one's prescription drugs with others.7 The rationale is that humanistic feelings are set in motion in the patient to "help your fellow man" who is suffering from an ailment (i.e., pain, anxiety, or depression) that one believes can be helped by transferring prescription medication. Prescription drugs from the dental encounter may be transferred to another person or even sold on the "street". The transference of any medication to a person to which it was not prescribed is illegal according to State and Federal law.8 These "pill popping" adults may not consider themselves substance

abusers, however, because all that is different from abusing prescription drugs and streetillegal abuse is the source of the drug being a pharmacy. Abusers often rationalize erroneously that prescription drugs are screened by the Food and Drug Administration (FDA) and therefore are "safe" to abuse or misuse.⁹

PAIN CONTROL

Drug abusers get prescriptions for painkillers from dental practitioners in private offices, clinics, "urgent care", or hospital emergency rooms.¹⁰ Sometimes, all it takes is a simple call to the dentist to obtain a prescription pain medication (i.e., telephone authorization). Opioid substance abuse and misuse in dental practice centers around prescription of the drugs oxycodone or hydrocodone due to their activity in chronic pain management (Figure 1).

Oxycodone (OxyContin) is a highly addictive drug-exhibiting both marked tolerance and physical dependence.¹¹ Percodan and Percocet (both widely used post-operatively in dentistry), with lower doses of oxycodone than OxyContin, similarly have addiction, abuse, and misuse potentials. Oxycodone is the most abused and misused prescription medication in dentistry and medicine; thereby it is a notorious major "street" narcotic.¹¹

Hydrocodone is generally available in combination products (Vicodin/acetaminophen or Vicoprofen/ ibuprofen) and has a relatively lower addiction potential than oxycodone. However, hydrocodone products will change classification in October, 2014 from DEA Schedule III to Schedule II controlled substance.^{12,13} This DEA Schedule change will reflect increased federal control over the drug and provide a more accurate representation of the elevated abuse, misuse, and addictive qualities of hydrocodone.

narcotic substances that Other are commonly abused or misused in the dental prescription process include the following drugs:Demerol (meperidine) is а synthetic opioid used largely with codeine intolerance (i.e., mostly gastrointestinallybased problems) or in opioid allergies.

Codeine (an opioid) at one time was almost the only analgesic drug used in dentistry for mild to moderate post-operative pain control, but usage for analgesia has been eclipsed in recent years by oxycodone and hydrocodone combination products.

Talwin (pentazocine) although it is a narcotic antagonist, countering the effects of the opioids, it is widely abused in prisons for its hallucinogenic and intoxicating properties.

Are doctors or are patients in control of the process of prescribing drugs (i.e., or not prescribing them at all)? Doctors must consider substance abuse, misuse, and addiction potential before writing prescriptions. Patients are urged by many advertisements in the media from the pharmaceutical companies to "ask their doctors" for certain medications, some with dangerous psychoactive properties--largely analgesics, antidepressants, or anxiolytics. In addition, doctors are pressured into prescribing certain drugs by pharmaceutical company representatives who often come to their offices--leaving ample samples of the drug companies' medicines, product promotion brochures, and sometimes providing other perks (including some that are unethical).

MUSCLE RELAXANTS

Benzodiazepines are prescribed in dentistry for their muscle relaxation, sedation, sleepsometimes anti-convulsive induction, and properties (Figure 2). The most commonly prescribed benzodiazepines are diazepam (Valium), clonazepam (Klonopin), lorazepam (Ativan), chlordiazepoxide (Librium), alprazolam (Xanax), and flurazepam (Dalmane). The most well-known of this group is Valium and its generic form diazepam. Diazepam found its way to the "streets" years ago with widespread abuse, misuse, and with chronic use, the development of tolerance and especially dependence.¹⁴ However, overdose levels and the maximum daily dose of diazepam are quite large and not always toxic at approximately 2000 mg. (the recommended daily dose is 40 mg.) making the drug quite safe with a high therapeutic index.¹⁴ The acute danger of overdose usually lies in combining diazepam with other centrally-acting drugs--most often alcohol. Diazepam is used as a parenterally-administered drug for inducing sedation and general anesthesia during oral surgery procedures. In the treatment of TMJ/TMD, diazepam is used largely for its acute effects in skeletal muscle relaxation and as an anti-spasmodic agent.14

ANTIDEPRESSANTS

Tricyclic antidepressants, especially amytryptiline (generic for Elavil) are used for chronic pain management in the treatment of TMJ/TMD and furthermore appear to function in analgesia in the absence or presence of depression.^{15,16} However, tricyclic antidepressants prescribed in the treatment of TMJ/TMD may be misused by the patient who is merely "feeling down"

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Figure 1: Prescription analgesia in dentistry – Chronic pain management and substance abuse/misuse.

or during withdrawal from existing narcotic abuse.¹⁷ Nonetheless, these drugs are generally not therapeutic with initial doses but require continuing regimens of dosing to achieve their effects.¹⁷ A depressed person may seek to obtain antidepressants by transference from someone under TMJ/TMD treatment. The person obtaining these medications may do so in an attempt to circumvent or "avoid the stigma" associated with mental health treatment.

Prescription Flexeril (cyclobenzaprine) is

employed in TMJ/TMD therapy as a muscle relaxant and peripheral anti-spasmodic associated with acute skeletal muscular pain.¹⁸ Cyclobenzaprine is related structurally and pharmacologically to the antidepressants but is often considered on par with the benzodiazepines for its muscle relaxation effects.¹⁹ Nonetheless, Flexeril is a common drug of "street abuse"-known for its intoxicating and drug potentiating effects when used in combination with alcohol, barbiturates, or other CNS depressants.²⁰



Figure 2: Drug therapy in the TMJ/TMD patient – antidepressants, tranquilizers, and muscle relaxants.

DISCUSSION

In the United States, both lay and governmental organizations have focused their anti-drug efforts on the control of "street drugs", particularly opioids.²¹ In recent years, the problem of abuse and misuse of prescription pain medications has been addressed by the health community, local and national law enforcement agencies, educational organizations, and by the media. Other dental prescription drugs not used in pain control, some with psychoactive and intoxicating properties, can be highly addictive and damaging to both the physical and mental health. Regulating governments and the health industry have allowed practitioners to prescribe benzodiazepines and other non-pain controlling drugs with psychoactive properties seemingly at will. Regulating and media sources have rarely focused on prescription practices leading to the abuse or intentional misuse of these drugs.

Flow charts (Figures 1 & 2) are provided in this article to aid in understanding the structural relationships of prescription medicines in dental therapy. The darker arrows on the diagrams construct a frequency map for drug action. The schema of Flow chart 1 (Figure 1) provides a summary of drugs used in pain management as they relate to substance abuse and misuse in dentistry. The focus of this Flow chart is on prescription narcotics-especially the opioids. The schema of Flow chart 2 (Figure 2) summarizes prescriptions used in the treatment of the pain and dysfunction found in TMJ/TMD. Acute drug therapy centers on the benzodiazepines and cyclobenzaprine for their peripheral antispasmodic/anticonvulsant activity and their relaxant effects on skeletal muscle. As to chronic therapy, the primary drugs employed

are the antidepressants-especially those that are active in control of long-term pain (tricyclic antidepressants, usually amytryptiline). The benzodiazepines (especially, diazepam) and cyclobenzaprine (Flexeril) are sometimes employed in chronic TMJ/TMD therapy. However, these drugs are prescribed primarily with acute symptomology. Infrequently, though, in chronic TMJ/TMD cases with severe or persistent pain, opioids or other narcotic agents are used on a continuing basis in ongoing therapy.

CONCLUSIONS

Clinical studies of the abuse, misuse, and addiction to prescription drugs of dental origin have focused primarily on the pain-killing opioids--particularly oxycodone and hydrocodone. However, other psychoactive and intoxicating drugs having health concerns and addictive properties are prescribed in dental therapy. These drug groups are the tricyclic antidepressants (especially amytryptiline), the anti-anxiety/ muscle relaxant agents (benzodiazepines), and the skeletal muscle relaxant cyclobenzaprine. Tricyclic antidepressants are often used in the treatment of chronic pain in TMJ/TMD--with their antidepressant and sedative actions providing a pharmacologic plus to therapy. Benzodiazapines are used in acute and chronic TMJ/ TMD therapy mostly for their muscle relaxant, sedative, anti-spasmodic properties, and for their positive effects on countering stress. However, the misuse of benzodiazepines in depressive illnesses may only deepen and extend the depression as the patient falls into a morass of drug overuse and social isolation. Nevertheless, they are virtually overlooked by governmental regulators, the media, and by educational

organizations. The wide abuse and misuse of benzodiazepines is downplayed by society and in our culture-even calling them "mother's little helpers" in a popular song. These drugs can be harmful and sometimes devastating to the mental and physical health of abusing, misusing, or addicted individuals. However, the pharmaceutical industry or practitioners rarely warn the public of the side effects or addiction potential of these drug products.

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Disclosure

The authors report no conflicts of interest with anything mentioned in this article.

References

- Tufts Health Care Institute Program on Opioid Risk Management, 12th Summit Meeting. The Role of Dentists in Preventing Opioid Abuse. March 11-12, 2010.
- Menagatos L. Why dental practitioners need to understand substance use and abuse. Center for Applied Behavioral Health Policy. Arizona State University. J Arizona Dent Assoc-Inscriptions 2011; (25)13: 42-3.
- Denisco R, Kenna G, O'Neil M, Kulich R et al. Prevention of prescription opioid abuse: the role of the dentist. J Am Dent Assoc 2011; (142)7: 800-10.
- Szalavitz M. Dentists, Too, Can Help Battle Painkiller Addiction. Available from: http://healthland.time.com/2011/07/14/ dentists-too-can-help-battle-painkillermisuse. Accessed August 15, 2014.
- Smith S, Comer S, Wasan A, Weiss R. Classification and definition of misuse, abuse, and related events in clinical trials: ACT-TION systematic review and recommendations. J Pain 2013; 154: 2287-96.
- McNeely J, Wright S, Mathews A, Rotrosen J et al. Substance use screening and interventions in dental clinics: Survey of practice-based research network dentists on current practices, policies, and barriers. J Am Dent Assoc 2013; (144)6: 627-38.

7. American Dental Association. Prescrip-

tion Drugs. Mouth Healthy. Available at: http://www.mouthhealthy.org/en/rxabuse. Accessed September 1, 2014.

- Blake V. Fighting prescription drug abuse with federal and state law. Virtual Mentor 2013; (15)5: 443-48.
- Ganzberg S. Pain management Part II: Pharmacologic management of chronic orofacial pain. Anesthesia Prog 2010; (57)3: 114-19.
- Manchikanti L. Prescription drug abuse: What is being done to address this new drug epidemic? Testimony before the Subcommittee on Criminal Justice, drug policy and human resources. Pain Physician 2006; 9: 287-321.
- Elements Behavioral Health. When Dentists Act as Drug Dealers. Available from: http://www.elementsbehavioralhealth.com/ prescription-drug-addiction/when-dentists-actas-drug-dealers/. Accessed August 15, 2014.
- Woolston C. OxyContin and Addiction. Available from: http://consumere.healthday.com/ encyclopedia/substance-abuse-38/drug-abusenews-210/oxycontin-and-addiction-648264. html. Accessed August 15, 2014.
- Reynolds B. Hydrocodone Products Become Schedule II Controlled Substances. Houston Chronicle. Available from: http://www.chron. com/news/health/article/Hydrocodoneproducts-become-Schedule-ii-5737172. php. Accessed September 1, 2014.
- American Dental Association(a). DEA Imposes Tighter Regulations on Hydrocodone Combination Products (HCPs). ADAemail@updates. ada.org. Accessed September 1, 2014.

- Tidy C. Temporomandibular Joint Dysfunction and Pain Syndromes. Available from: www.patient.co.uk/doctor/temporomandibular-joint-dysfunction-and-pain-syndromes. Accessed August 1, 2014.
- Plesh O, Curtis D, Levine J, McCall Jr WD. Amitriptyline treatment of chronic pain in patients with temporomandibular disorders. J Oral Rehab 2000; 27: 834-41.
- Richeimer S, Bajwa Z, Kahraman S, Ransit B et al. Utilization patterns of tricyclic antidepressants in a multidisciplinary pain clinic: A survey. Clinical J Pain 1997; (13)4: 324-9.
- Food and Drug Administration. NDA 17-821/S-045. Flexeril (cyclobenzaprine HCL) Tablets: 3-11. Available from: www. accessdata.fda.gov/.../017821s045lb. Accessed September 15, 2014.
- Winn R, Meiller T, Crossley H. Drug Information Handbook for Dentistry, 20th ed. Hudson OH: LEXI-COMP INC. 2014-2015.
- 20. Chou R, Peterson K, Helfand M. Comparative efficacy and safety of skeletal muscle relaxants for spasticity and musculoskeletal conditions: a systematic review. J Pain Symptom Manage 2004; (28)2: 140-75.
- Zacny J, Bigelow G, Compton P, Foley K et al. College on problems of drug dependence taskforce on prescription opioid non-medical use and abuse: position statement. Drug Alcohol Depend 2003; 69(3): 215-32.

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