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Trabalho de Conclusão de Curso

Uso de prótese ocular estética e seus benefícios em paciente anoftálmico unilateral

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Trabalho de Conclusão de Curso apresentado ao Departamento de Odontologia da Faculdade de Ciências da Saúde da Universidade de Brasília, como requisito parcial para a conclusão do curso de Graduação em Odontologia.

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À minha família, meu filho, meus pets e amigos próximos.

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“Ouse, arrisque, não desista jamais e saiba valorizar quem te ama, esses sim merecem seu respeito. Quanto ao resto, bom, ninguém nunca precisou de restos para ser feliz”.

Clarice Lispector

RESUMO

Pacientes anoftálmicos podem sofrer com prejuízos psicológicos e fisiológicos, devido à perda do globo ocular. A reabilitação, por meio de próteses oculares estéticas personalizadas, é capaz de promover a estética apropriada e permitir a função dos tecidos periorbitais, garantindo conforto e qualidade de vida para esses pacientes. O objetivo deste trabalho foi apresentar os benefícios oferecidos após a reabilitação de paciente anoftálmico unilateral direito, por meio de prótese ocular externa. O paciente foi submetido a uma cirurgia de catarata após a qual houve complicação no olho direito, tendo a necessidade de fazer a sua enucleação. Estando por 4 anos sem reabilitação, procurou o projeto de extensão de Prótese Bucomaxilofacial do HUB/EBSERH, onde constatou-se a necessidade da reabilitação protética. Foram realizados procedimentos clínicos e laboratoriais, envolvendo a moldagem da cavidade anoftálmica, inclusão em mufla, termopolimerização de esclera artificial, provas e ajustes de volume da prótese, pintura e centralização da íris artificial, bem como caracterização e recobrimento de sua face estética com resina incolor, previamente à instalação. Foi observado que, após a instalação da prótese, a estética facial foi restaurada, juntamente com o bem-estar do paciente ao se sentir confortável e conseguir se reconhecer no espelho como um indivíduo completo novamente. Neste trabalho, concluiu-se que foi possível alcançar reabilitação funcional, estética e psicossocial, por meio de prótese ocular personalizada, promovendo a autoestima do paciente, com boa adaptação e naturalidade.

Palavras-chave: Anoftalmia; Olho artificial; Qualidade de vida; Prótese maxilofacial.

ABSTRACT

Anophthalmic patients may suffer from psychological and physiological damage due to the loss of the eyeball. Rehabilitation, by means of customized aesthetic eye prostheses, can promote appropriate aesthetics and allowing the function of periorbital tissues, ensuring comfort and quality of life for these patients. The aim of this paper was to present the benefits offered after the rehabilitation of a right unilateral anophthalmic patient by means of external ocular prosthesis. The patient underwent cataract surgery, after which there was a complication in the right eye, requiring enucleation. After being without rehabilitation for 4 years, he sought the Buccomaxillofacial Prosthesis extension project of the HUB/EBSERH, where the need for prosthetic rehabilitation was verified. Clinical and laboratory procedures were performed, involving the molding of the anophthalmic cavity, inclusion in a muffle, thermopolymerization of artificial sclera, testing and volume adjustment of the prosthesis, painting and centralization of the artificial iris, as well as characterization and covering of its aesthetic face with clear resin, prior to installation. It was observed that, after the installation of the prosthesis, facial aesthetics was restored, along with the patient's well-being in feeling comfortable and being able to recognize himself in the mirror as a complete individual again. The conclusion of this study was that it was possible to achieve functional, aesthetic and psychosocial rehabilitation by means of a customized ocular prosthesis, promoting the patient's self-esteem, with good adaptation and naturalness.

Keywords: Anophthalmia; Artificial eye; Quality of life; Maxillofacial prosthesis.

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1 INTRODUÇÃO

A face é uma região de extrema importância para o ser humano. Essa parte do corpo reflete diretamente fatores como idade, estética, expressão de emoções, etnia e identidade pessoal. Os olhos são órgãos que participam de forma preponderante nessas características reproduzidas pela expressão facial. [1–6]

A ausência do olho pode afetar o indivíduo em seu contexto cotidiano, além da perda da visão. Existe um grande impacto físico e psicológico em pacientes com anoftalmia. [2–8] É comum, nesses indivíduos, haver os sentimentos de tristeza, vergonha, timidez e a necessidade de esconder a região afetada. Em estudo realizado por Cabral et al. [8], essa situação impactou diretamente na vida social, profissional, escolar e familiar em, pelo menos, metade da população analisada, provocando mais repercussões em pacientes do sexo feminino. O uso de prótese ocular externa é capaz de garantir qualidade de vida para pacientes anoftálmicos, no que diz respeito à satisfação conforme a sua aparência física, adequada função psicossocial e conforto durante o uso da prótese [9].

A perda do olho pode ocorrer por traumas, defeitos congênitos ou patologias [3,5–7,10], quando não há reabilitação da cavidade, diversas alterações teciduais podem ocorrer, como a contratura do tecido mole, redução do tamanho e profundidade da cavidade ocular, ptose, incompetência muscular das pálpebras e diminuição do movimento residual da musculatura [11,12].

Do ponto de vista biopsicossocial do indivíduo, a reabilitação por meio de próteses oculares estéticas é de extrema importância. Próteses oculares devem ser confeccionadas de modo a conferir conforto, garantir a estética e restaurar funções comprometidas. Essas próteses podem ser confeccionadas de modo personalizado ou por meio de próteses pré-fabricadas.

Os modelos pré-fabricados estão disponíveis em diversas cores, tamanhos e formatos. Esses olhos artificiais podem não se adaptar de forma adequada à anatomia da cavidade anoftálmica, podendo causar inflamação e danos à mesma [2–4,6,7,10,11], sendo seu uso indicado principalmente de forma provisória ou imediata após a cirurgia [5].

A principal vantagem de obter a prótese de forma personalizada é permitir a moldagem da cavidade anoftálmica, garantindo adaptação adequada à anatomia do paciente.

Além disso, permite a caracterização semelhante ao olho natural [2–7,10,11]. Entretanto, essa técnica exige maior habilidade do operador e requer mais etapas clínicas e laboratoriais.

É necessário garantir a reabilitação estética, funcional e o conforto físico e psicológico do paciente. Dessa forma, o objetivo deste trabalho foi relatar o caso de um paciente com anoftalmia unilateral, reabilitado por meio de uma prótese ocular estética personalizada e os benefícios provenientes do tratamento.

2 RELATO DE CASO

Paciente G.T.S., 73 anos, gênero masculino, foi atendido na Clínica do projeto de extensão universitária de Prótese Bucomaxilofacial, na Clínica de Ensino da Unidade de Saúde Bucal do Hospital Universitário de Brasília/EBSERH, para confecção de uma prótese ocular estética. Durante o exame clínico, observou-se ptose e incompetência de movimentação palpebral, sem atrofia da cavidade ocular. Foi realizada a anamnese, quando o paciente comentou sobre a vergonha quanto sua aparência e decidiu se esconder atrás dos óculos escuros (Figura 1). Membros da família, que o acompanhavam, relataram que os netos sentiam medo do paciente pela ausência do olho. Diante da situação, o mesmo optou pelo isolamento social.

O paciente relatou que, após realizar a cirurgia de catarata no olho direito, houve complicações, não especificadas pelo paciente, que levaram a sua enucleação (Figura 2), em 2018. Após a cicatrização e remodelação teciduais, foi encaminhado pelo oftalmologista responsável para reabilitação. Foram 4 anos entre a perda ocular e a reabilitação. Após apresentar encaminhamento para ingresso em lista de espera do serviço de reabilitação, o tempo de espera foi ampliado, devido à pandemia de Covid-19, período em que não houve continuidade dos atendimentos eletivos. O paciente não encontrou outro serviço público de reabilitação maxilofacial, aguardando o retorno das atividades.

Figura 1 - Paciente com visão monocular, utilizando óculos escuros, para enfrentamento social

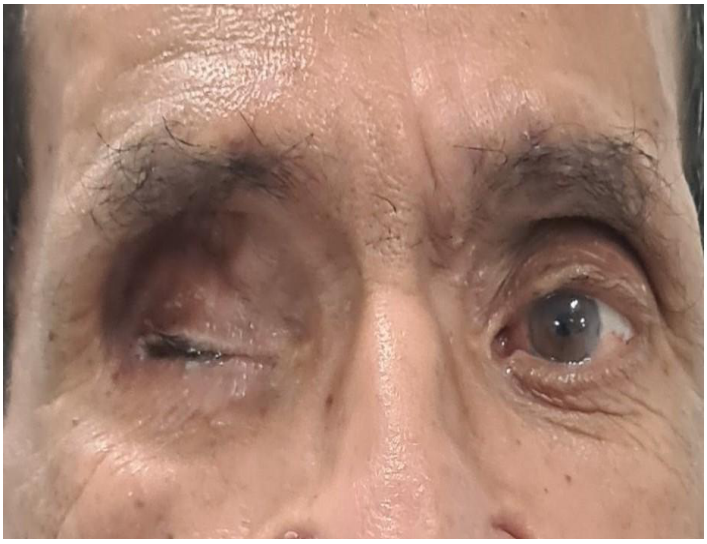

Figura 2 – Paciente com anoftalmia unilateral, por enucleação

Para o paciente, foi proposta a reabilitação ocular externa individualizada. Para isso, foi realizada a moldagem da cavidade anoftálmica do olho direito. Previamente à moldagem, utilizou-se anestésico local em geleia (cloridrato de lidocaína, Pharlab, Brasil), administrado topicamente sobre a mucosa da região.

Após anestesia, seringa descartável de 10ml (Luer Lock, Descarpack, Brasil) foi adaptada a uma moldeira pré-fabricada de resina acrílica (JET incolor, Clássico Ltda, Brasil), com formato externo semelhante ao do bulbo ocular, sendo inserida no interior da cavidade, para verificação de tamanho e conforto (Figura 3). A moldeira apresentava perfurações para

retenção mecânica do material de moldagem. Silicone de condensação fluido (Xantopren, Kulzer, Alemanha) foi proporcionado e manipulado, sendo inserido no interior da seringa descartável (Luer Lock, Descarpack, Brasil). O material de moldagem foi inserido na cavidade até o seu preenchimento (Figura 4). Ao paciente, foi solicitado que realizasse movimentos oculares, para a obtenção de uma cópia funcional.

Figura 3 - Prova da moldeira pré-fabricada de resina acrílica

Figura 4 - Preenchimento da cavidade anoftálmica do paciente, com silicone de condensação fluido (Xantopren, Kulzer, Alemanha)

O molde obtido com o procedimento de moldagem foi envolvido por silicone de condensação extraduro laboratorial (Zetalabor, Zhermack, Alemanha), (Figuras 5A, B). Em mufla metálica, este molde envolvido por material elastomérico foi incluído em gesso (Gesso pedra tipo III, Asfer Ltda, Brasil).

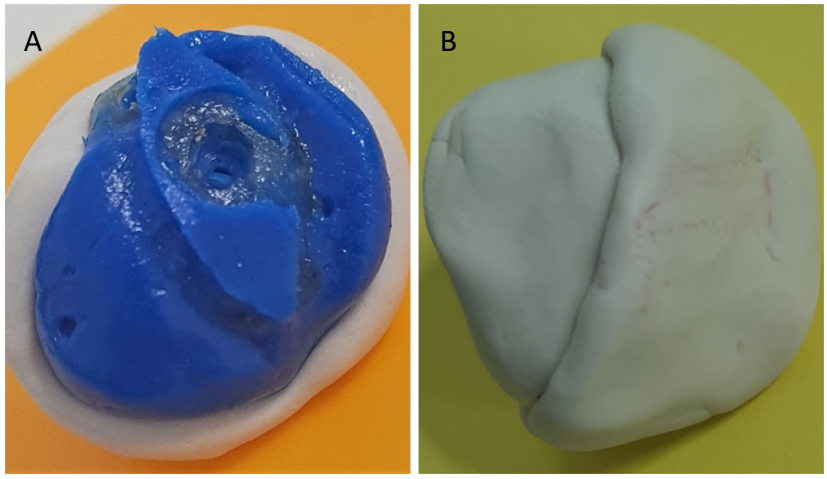

Figura 5 – (A)Molde obtido pela moldagem funcional da cavidade anoftálmica, (B) envolvido em silicone de condensação extraduro laboratorial (Zetalabor, Zhermack, Alemanha)

Após a cristalização do gesso, a mufla foi aberta e retirado o molde da futura prótese. Manipulou-se resina acrílica termopolimerizável (n. 2, A. O. Clássico Ltda, Brasil), acomodada no interior da mufla, que foi prensada em prensa de mão e levada ao processo de termopolimerização em água em ebulição, por 20 minutos.

Após tempo de resfriamento natural, foi realizada a abertura da mufla e retirada a esclera protética. A remoção dos excessos de resina acrílica foi realizada com broca de tungstênio maxicut e o acabamento obtido pelo uso de lixas de diferentes granulações, com polimento da esclera artificial obtido pelo uso de pasta de polimento universal em disco de pano.

Com o auxílio de uma fotografia do olho natural do paciente, iniciou-se a confecção da íris artificial. Um disco de cartolina preta foi obtido com o auxílio de um vazador de couro, no diâmetro desejado. A íris artificial foi pintada com tinta a óleo (Oil Colors Classic, Acrilex, Brasil), de acordo com o olho remanescente.

Em consulta clínica, a esclera protética foi provada em cavidade anoftálmica, para verificação do volume e da adaptação, realizando os ajustes necessários para a obtenção de simetria facial (Figuras 6A-D). Ao determinar o preenchimento adequado da cavidade anoftálmica, foi realizada a marcação da centralização da íris artificial, utilizando caneta permanente de ponta fina preta, com o paciente olhando para um ponto fixo em uma parede distante (Figura 6A).

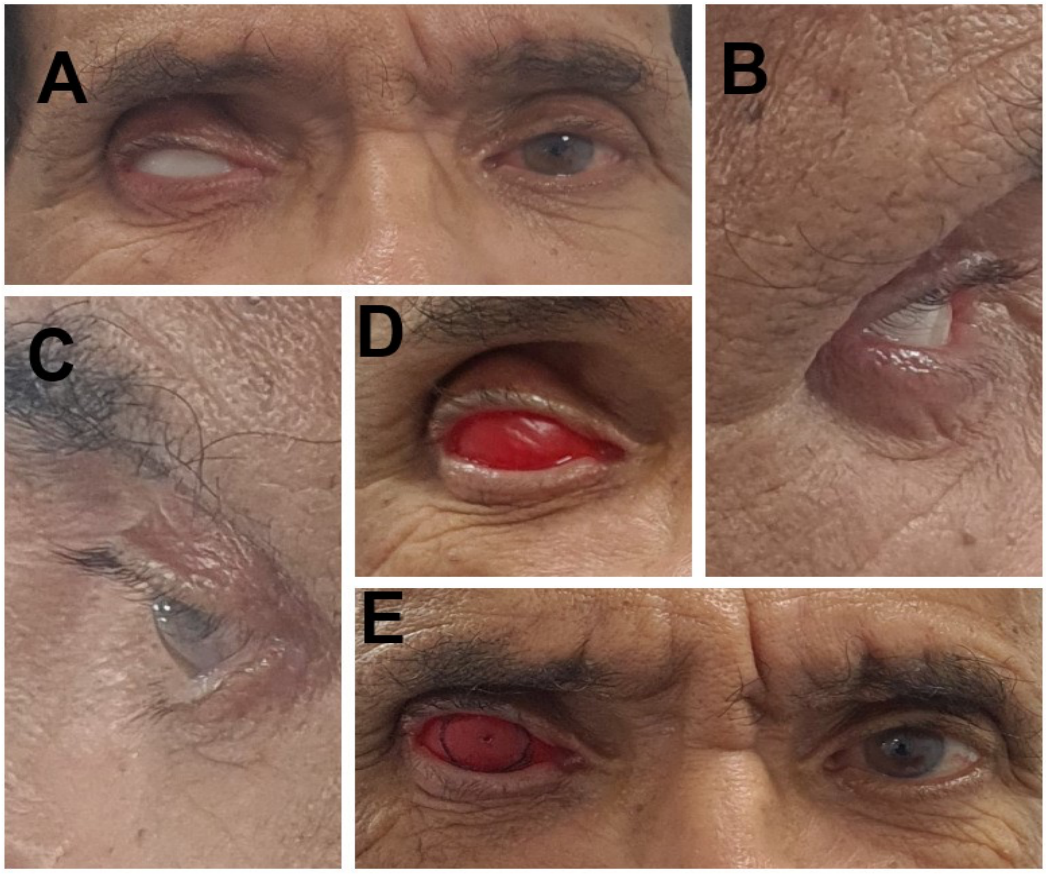

Figura 6- (A) Prova da esclera protética de resina. (B) Perfil do paciente lado direito. (C) Perfil do paciente lado esquerdo. (D) Acréscimo de cera para aumento da curvatura ocular. (E) Centralização da íris

A íris artificial foi colada sobre um platô confeccionado sobre a esclera artificial, tendo o seu centro coincidente com a marcação realizada em clínica. A caracterização da esclera artificial foi obtida com fios de lã vermelha, para mimetizar os vasos sanguíneos. A esclera caracterizada foi posicionada no interior da mufla metálica, após novo processo de inclusão, devido ao novo formato, para processo de termopolimerização, desta vez, com resina acrílica termopolimerizável incolor (Triunfo, Brasil) para cobertura de toda a face estética da prótese.

Após concluída a polimerização e realizado o processo de acabamento e polimento (Figura 7), a prótese ocular estética foi instalada (Figura 8).

Figura 7 - Prótese ocular finalizada

Figura 8 - Paciente anoftálmico com a prótese ocular estética instalada

Durante consulta de instalação, foram observadas adaptação, estética facial agradável, livre de ptose palpebral, apresentando correto posicionamento de cílios e permitindo a funcionalidade dos movimentos oculares. O paciente demonstrou total satisfação com o resultado obtido.

A prótese ocular tem uma durabilidade de cerca de 5 anos, necessitando, após esse tempo, realizar nova. Consultas para polimento da prótese em uso são aconselháveis, até sua

substituição. Foi instruído ao paciente retirar a prótese para dormir, realizar a lavagem com água e sabão neutro, sempre que retirar a prótese, e realizar consultas rotineiras com o oftalmologista, para acompanhar a saúde da região.

Consulta após 1 mês da instalação foi realizada, para verificar se a prótese ocular se mantinha com bom polimento.

3 DISCUSSÃO

É comum pacientes anoftálmicos apresentarem, após a cirurgia de enucleação, aprofundamento do sulco palpebral superior, ptose, ectrópio e diminuição do tônus muscular da pálpebra inferior, características que incorporam a síndrome pós-enucleação da órbita (SPEO) [11,12]. No relato de caso apresentado, o paciente apresentou perda de suporte palpebral, ptose e incompetência palpebral, contudo, sem atrofia e ectrópio.

O uso de próteses oculares externas permite uma reabilitação fisiológica dos tecidos periorbitais, garantindo a trajetória correta das secreções da glândula lacrimal, prevenindo o acúmulo de secreções e protegendo a mucosa de corpos estranhos, garantindo o suporte adequado aos tecidos periorbitais, evitando problemas como aqueles mencionados anteriormente, garantindo aparência mais estética. [11]. Os resultados obtidos na reabilitação descrita neste trabalho estão de acordo com a literatura, e possibilitaram benefícios não somente estéticos, mas contemplaram funções comprometidas pela enucleação.

Em estudo realizado por Makrakis et al. (2021) [13], demonstrou-se que a reabilitação da cavidade anoftálmica, por meio de próteses oculares, promoveu benefícios na qualidade de vida de forma estatisticamente significante no estado de saúde geral, entretanto, não houve diferença significante ao avaliar função social, vitalidade, papel emocional da reabilitação, saúde mental, função fisiológica e seu papel físico.

Em outro estudo, realizado por Ruiters et al. (2021) [9], foi demonstrado que o uso de próteses oculares garantiu aos pacientes anoftálmicos satisfação com relação à sua aparência física, conforto durante o uso e gerou benefícios do ponto de vista psicossocial. No caso do paciente desse estudo, houve grande satisfação e foi observada mudança com o cuidado pessoal e autoestima, bem como relatada melhora no convívio social.

Próteses personalizadas, se comparadas às próteses pré-fabricadas, apresentam melhor adaptação à cavidade anoftálmica do paciente, o que permite uma melhor distribuição da pressão, menos regiões que propiciam o acúmulo de detritos e secreção, garantem uma movimentação da prótese mais próxima do que é fisiológico para o paciente e um contorno mais adequado da região [11]. Além disso, podem ser personalizadas de acordo com a estética do paciente. Sua melhor adaptação também garante menor incidência de lesões traumáticas devido ao uso da prótese, se comparadas com as pré-fabricadas [4, 10].

As próteses personalizadas dependem de uma moldagem adequada da cavidade anoftálmica para obterem sucesso na reabilitação. Diferentes formas de moldagem são descritas na literatura, podendo ser impressões: diretas/externas; com o auxílio de um olho pré-fabricado, modificado ou não, ou moldeira de estoque; impressão com o auxílio de prótese pré-fabricada do paciente, modificada ou não; e a técnica da cera sobre a esclera [14]. Em casos de irregularidades da cavidade anoftálmica ou ausência de moldeiras de estoque, pode ser necessário confeccionar uma moldeira individual. [10,14] No presente relato de caso, a técnica utilizada foi a impressão auxiliada pelo uso de uma moldeira pré-fabricada de resina acrílica, que facilitou a inserção do material e adaptação das pálpebras durante moldagem.

O paciente que utiliza uma prótese ocular deve também estar ciente dos cuidados de higiene e manutenção da sua prótese. Em relação a esse tema, ainda não há consenso na literatura, entretanto, em estudo realizado por Evelin (2018) [15], foi demonstrado que um protocolo de higiene utilizando sabão neutro nas mãos, no rosto e na prótese diariamente ou semanalmente não demonstrou diferença estatisticamente significante entre as modalidades, embora clinicamente a limpeza diária demonstrou melhora nos sinais clínicos de edema palpebral, secreção excessiva e redução do empastamento dos cílios, em comparação com o protocolo semanal.

A utilização de sabão neutro permite o uso do mesmo produto, tanto para lavar a cavidade anoftálmica, mãos e prótese, além de ser um produto relativamente barato, o que facilita a adesão dos pacientes aos hábitos de higiene. É contraindicada a utilização de produtos abrasivos ou que possam causar a corrosão da prótese. [15]. O paciente do presente relato obteve rápida adaptação tanto ao uso quanto aos cuidados de limpeza da prótese.

Como limitações do estudo, importa destacar a limitação de aquisição de insumos pela instituição, agravada pela inexistência de produtos nacionais que contemplem a confecção específica de próteses oculares, bem como a necessidade de habilidade manual para o

desenvolvimento de todo o processo. Outra limitação importante se refere à ausência de instrumento que avaliasse, objetivamente, a qualidade de vida do paciente, o que poderia comprovar cientificamente a mudança observada pelo próprio e por todos os envolvidos na reabilitação.

Envolvendo um trabalho manual, quase artístico, desenvolvido pelo próprio cirurgião-dentista, que associa seu conhecimento técnico-científico à reabilitação, é possível melhorar a qualidade de vida de pacientes que apresentam ausência ocular, em diferentes esferas de sua vida. A Odontologia, atuando além da cavidade bucal, pode alcançar resultados muito importantes para a reinserção social de pacientes com visão monocular, como apresentado.

4 CONSIDERAÇÕES FINAIS

Neste trabalho, concluiu-se que foi possível alcançar reabilitação funcional, estética e psicossocial, por meio de prótese ocular personalizada, promovendo a autoestima do paciente, com boa adaptação e naturalidade.

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ANEXOS

NORMAS DA REVISTA

JOURNAL OF PROSTHODONTICS
Implant, Esthetic, and Reconstructive Dentistry

AMERICAN COLLEGE OF PROSTHODONTISTS

JOURNAL OF PROSTHODONTICS

Instructions for Authors (Revised January 2023)

SCOPE

The *Journal of Prosthodontics* promotes the advanced study, science, and practice of prosthodontics, implant, esthetic, and reconstructive dentistry. It is the official journal of the American College of Prosthodontists, the association that represents the dental specialty of prosthodontics. The *Journal of Prosthodontics* serves both researchers and practicing clinicians by providing a forum for the presentation and discussion of evidence-based prosthodontic research, treatment concepts, techniques, and procedures. The objective of the *Journal of Prosthodontics* is to facilitate the effective worldwide transmission of new and innovative prosthodontic-related research and knowledge. The journal publishes original scientific articles presenting information that is new and relevant to prosthodontics. Additionally, it publishes reports of innovative techniques and clinical treatments, systematic reviews of topics of interest to the field of prosthodontics, reviews of new instrumentation and products, new uses for existing material, digital technology advances related to prosthodontics, instructive clinical reports, editorials, and announcements of importance to the prosthodontic community.

MANAGING EDITOR

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ARTICLE TYPES ACCEPTED

Article type	Description	Abstract type	References	Figures and Tables (total combined)	Total Word pages*
Original Articles					
Research	Original research, in vivo or in vitro	**Structured**: Purpose, Materials and Methods, Results, Conclusions	No limit	8	10
Clinical report	Report of the presentation, treatment, and follow-up of an individual patient	Non-structured	30	10	10
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Other types					
Reviews	Systematic reviews preferred, contact the editor prior to submitting a non-systematic review	**Structured**: Purpose, Methods, Results, Conclusions	No limit	7	No limit
Letter to the Editor**	Report original data, discuss published articles, or present hypotheses	None required	15	2	4

*Text only (page count does not include title, references, tables, or figures)

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While we will read and respond to all letters, we will only publish a select few. We are most likely to publish letters that deal with a controversial topic, advocate for the field of prosthodontics, or that take issue with research published in the *Journal of Prosthodontics*. While a letter may be critical, in order to be considered for publication, it must not be insulting. Criticism should be constructive, and arguments made should be appropriately referenced to previously published work.

Upon approval for publication, we will publish the letter in the next available print issue of the *Journal of Prosthodontics*. When written in response to an article published in the *Journal*, we will also give the author of the original article the opportunity to respond. If they choose to do so, we will attempt to publish the letter and response in the same issue.

MANUSCRIPT PREPARATION

Organization and basic formatting of the manuscript

Element	Description
Font	12-point, Times New Roman or 10-point Arial
Line spacing	Double-spaced throughout
Margins	One inch (2.5 cm)
Page size	Letter (8 ½ x 11) inches
Page numbers	Yes; start with the title page as page 1, place on lower right-hand corner
Line numbers	Do not use
Required layout	**Title page**: separate file with complete list of authors, affiliations, and conflict of interest **Main Text file (Research & Reviews)**: Abstract & Keywords, Introduction, Materials & Methods, Results, Discussion, Conclusions, Acknowledgements (*optional*, *must be blinded for review*), References **Main Text file (Clinical Reports/Technique articles)**: Abstract, & Keywords, Introduction, Clinical Report (or Technique), Discussion, Conclusion/Summary, Acknowledgements (*optional*, *must be blinded for review*), References **Tables** can be placed at the end of the main text file or uploaded in a separate text file. Each table must be numbered and include a title/brief description. **Figures and Figure Legends** can be placed at the end of the main text file or uploaded as individual figure files. Captions/legends must be visible. **Multipart figures** must be submitted as one file with parts a, b, c, etc labeled. Use lowercase letters to delineate and cite figures. In text, and in figures use Fig 1a

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Videos	.mp4, .mov

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A running title (abbreviated title), not exceeding 60 letters and spaces

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If the work has previously been presented, the name, place, and date of meeting(s)

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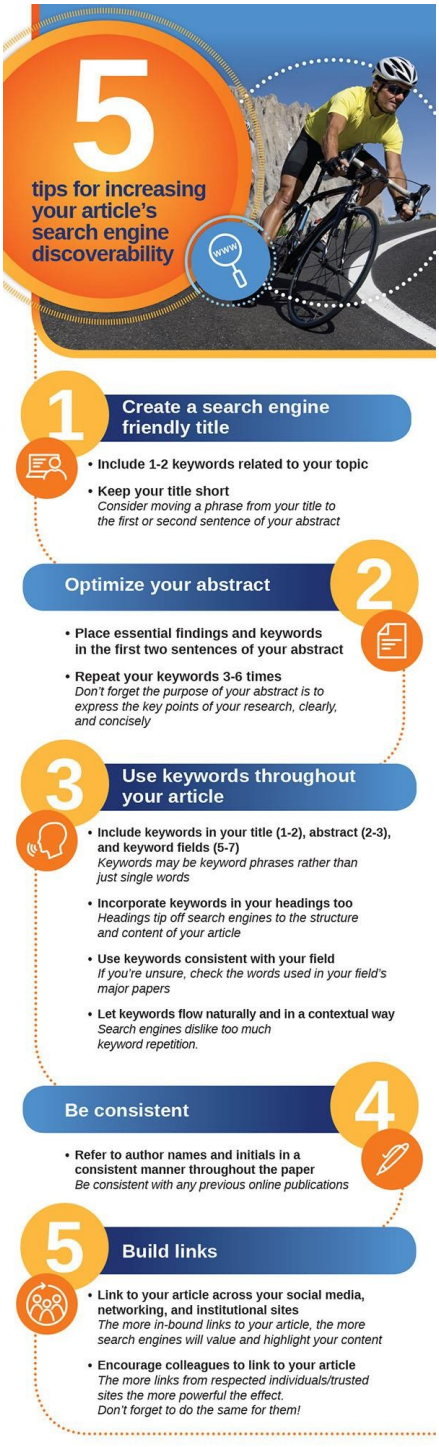

Abstract page

An abstract is required for all manuscripts, with the exception of letters to the editor, and must precede the body of the manuscript. Abbreviations and references should not appear in the abstract. Research manuscripts must conform to the structured abstract format (see above).

Clinical reports and Technique manuscripts do not need a structured abstract. Following the abstract and on the same page, there should be several words not appearing in the title of the manuscript to be titled: KEYWORDS.

Text

Research manuscripts should include the following sections: Introduction (no header), Materials and Methods, Results, Discussion, Conclusion, Acknowledgements (optional), and References. Other manuscripts should begin with two to five introductory paragraphs. The remainder of the manuscript should be divided into sections preceded by appropriate headings (i.e., "Clinical report," "Technique," etc.).

The ***Introduction*** will include the following: a description of the problem that inspired the study and what distinguishes it from previous research that investigated the same problem; a brief discussion of relevant published material that addressed the same problem or that documents methodology used in the study; and the goal of the study, the purpose statement and null hypothesis.

The ***Materials and Methods*** section describes materials or subjects used and the methods selected to evaluate them, including information about the overall design, the nature of the sample studied, sample size, the type of interventions (or treatments) applied to the individual elements in the sample, and the principal outcome measure. All human subject research (including surveys) must include a statement of ethical or institutional review board approval in this section.

Statistical methodology and rationale for sample size determination must be included in this section.

Example: A power analysis was conducted to determine the sample size. The World Health Organization formula was used with 80% power and 0.05 level of significance, and it revealed that 10 specimens per group would be needed to detect the postulated effect size. A total of 120 specimens (40/flexural strength test, 40/impact strength test, and 40/surface roughness and hardness tests) were distributed in two groups.

Gad MM, Fouda SM, Abualsaud R, Aet al. Strength and surface properties of a 3d-printed denture base polymer. J Prosthodont 2021; https://doi.org/10.1111/jopr.13413

Example: The sample size was established using the effect size = 0.25 (medium) or 0.5 (large), a = 0.05, power = 0.8, and number of groups = 3. The results indicated that a total of 159 specimens (medium effect size) or 42 (large effect size) were needed for the fracture loading tests. The analysis showed that 14-53 specimens were needed for each group for the test, and therefore using 15 specimens/group, which is covered by the results of the G-power calculation, was considered appropriate.

Alberto Jurado C, Kaleinikova Z, Tsujimoto A, et al. Comparison of fracture resistance for chairside cad/cam lithium disilicate crowns and overlays with different designs. J Prosthodont 2021; https://doi.org/10.1111/jopr.13411

The *Journal of Prosthodontics* encourages authors to register clinical trials prior to submission at one of the registration sites listed below. The registration number and date of registration should be included in the Materials and Methods section. See "Reporting guidelines" on page 17 below for further details.

The ***Results*** section will be a clear statement of the findings and an evaluation of their validity based on the outcome of statistical tests. When reporting results of statistical tests, actual p values must be reported.

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The ***Conclusion*** section includes only a brief and succinct summary of the findings. **Conclusions should be written in paragraph form, not as a numbered list.**

An ***Acknowledgment (optional)*** section to thank anyone who contributed to the manuscript, but is not a listed author (i.e., statistician, copyeditor, dental technician, photographer, artist). This text should be blinded for review, and can be added after acceptance.

Notes on *Journal of Prosthodontics* style and formatting of the text

Authors are to use current prosthodontic nomenclature and are referred to the *Glossary of Prosthodontic Terms* (9th Edition) and the *Glossary of Digital Dental Terms* (2nd Edition) for accepted terminology.

Please cite these references as:

Glossary of Digital Dental Terms, 2nd Edition. J Prosthodont 2021; 30: 172-181. https://doi.org/10.1111/jopr.13439

Glossary of Prosthodontic Terms (9th Edition). J Prosthet Dent 2017;117:E1-E105. https://doi.org/10.1016/j.prosdent.2016.12.001

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Use the symbol × rather than the letter x as a multiplication sign.

Report the actual P values to 3 decimal places. For P values below 0.001 write P<0.001. Report results to 2 decimal places.

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Minimize the use of subheadings in the text.

Editorial assistance to non-native English speakers

If English is not your native language, we suggest you have a native English speaker read and review the manuscript prior to submission. An English-speaking colleague can be an excellent resource. If you do not know someone who can help you, we recommend that you have your paper professionally edited for English language by a service such as Wiley Publishing's at http://wileyeditingservices.com.

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Please note that while this service will greatly improve the readability of your paper, it does not guarantee acceptance of your paper by the journal.

Citations and references

Number references consecutively in the order in which they are first mentioned in the text. Identify references in text, tables, and legends by superscript Arabic numerals.[1] Use the Vancouver reference style format. The

titles of journals must be abbreviated according to the style used in the National Library of Medicine's - NLM Catalog: Journals referenced in the NCBI databases.

If you cannot find a particular journal title in the NLM catalog, try: CAS Source Index (CASSI) search tool Index Medicus - abbreviations of journal titles

Reference numbers should appear after punctuation marks, not before. Example: To date, zirconia dental ceramics have had an excellent clinical performance with a cumulative 5-year survival rate of 92.1% for zirconia-based all-ceramic single crowns,[1] and 90.4% for tooth-supported fixed dental prostheses.[2]

Where appropriate, please cite primary literature. Please also consult and cite as needed the **Glossary of Digital Dental Terms (2nd Edition)** and **Glossary of Prosthodontic Terms (9th Edition).**

Glossary of Digital Dental Terms, 2nd Edition. J Prosthodont 2021; 30: 172-181. https://doi.org/10.1111/jopr.13439

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Article type	**Example**
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Journal article, not yet published in an issue	Kim W, Li XC, Bidra AS. Clinical outcomes of implant-supported monolithic zirconia crowns and fixed partial dentures: A systematic review. J Prosthodont. 2022; https://doi.org/10.1111/jopr.13575
Book	Masri R, Driscoll CF. Clinical Applications of Digital Dental Technology. John Wiley & Sons; 2015
Chapter in a book	Author(s) of chapter - Family name and initials. Title of chapter. In: Editor(s) of book - Family name and initials, editors. Title of book. edition (if not first). Place of publication: Publisher name; Year of publication. p. [page numbers of chapter]. ***Example***: Phoenix RD. Denture base resins: Technical considerations and processing techniques. In: Anusavice KJ, editor. Phillips' Science of Dental Materials, vol 1. 10th ed. Philadelphia, Saunders; 1996. P. 237-271.
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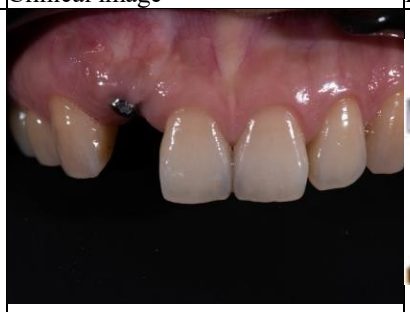
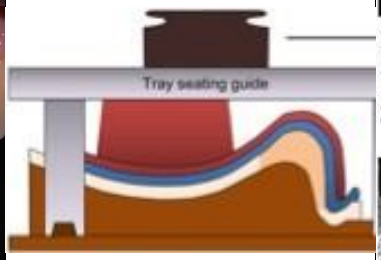
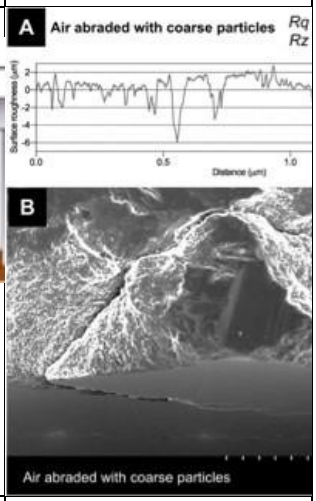
Example			
Resolution	300 dpi +	1200 dpi preferred, 300+ dpi accepted	600 dpi preferred, 300+ dpi accepted
Size	Single column: 84mm/3.3in max width Double column: 172mm/6.7in max width Max height 243mm/9.2 in	Single column: 84mm/3.3in max width Double column: 172mm/6.7in max width Max height 243mm/9.2 in	Single column: 84mm/3.3in max width Double column: 172mm/6.7in max width Max height 243mm/9.2 in
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ETHICAL POLICIES

Data sharing and bioethics

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If any individual data is included (i.e., an identifiable full-face picture in a clinical report), written consent for participation/publication must be obtained from every individual whose data is included. A written statement attesting that the author has received and archived such written patient consent must accompany the

manuscript. For research articles, if authors cannot obtain consent to publish individual data they may only provide summary results. Exclusions to this include:

The patients are de-identified

The patients are dead

There has been a waiver granted by the Institutional Review Board (IRB).

Permissions Form: If identifying details must be retained, the author must attest they have informed consent from the patients (a signed permissions form), see Appendix A below.

Permissions must appear in English. In the case of a non-English speaking patient/author the permission should appear first in the native language with the translation to English below and the signature following both. If the patient cannot be located or refuses to consent to publication, the manuscript will NOT be published. In the event that the patient cannot provide consent due to death or legal incompetency (this includes photos of corpses) permission from the power of attorney is needed as well as proof of power of attorney. If the patient is a minor, a legal guardian must provide permission. Previous publication of news coverage does NOT eliminate a patient's right to privacy and does NOT negate the need for patient permission. This informed consent should be indicated in the text of the article (in the Methods section, if appropriate) or in the Acknowledgments at the end of the article. Permissions forms should be uploaded at the time of submission. Articles will not be reviewed until permissions forms are submitted.

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The *Journal of Prosthodontics* encourages authors to register clinical trials prior to submission at one of the registration sites listed below. The registration number and date of registration should be included in the Materials and Methods section. Please see http:// www.clinicaltrials.gov/ct2/about-studies/learn#WhatIs for more information regarding clinical trials.

U.S. National Institutes of Health Clinical Trials Registry - http://www.clinicaltrials.gov

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it is not currently being considered for publication by another journal

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Substantial contributions to the conception or design or the work; or the acquisition, analysis, or interpretation of data for the work; AND

Drafting the work or revising it critically for important intellectual content; AND

Final approval of the version to be published; AND

Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

In addition to being accountable for the parts of the work he or she has done, an author should be able to identify which co-authors are responsible for specific other parts of the work. In addition, authors should have confidence in the integrity of the contributions of their co- authors.

When a large multi-author group has conducted the work, the group ideally should decide who will be an author before the work is started and confirm who is an author before submitting the manuscript for publication. All members of the group named as authors should meet all four criteria for authorship, including approval of the final manuscript, and they should be able to take public responsibility for the work and should have full confidence in the accuracy and integrity of the work of other group authors.

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Examples include: a statistician who has consulted on the included statistical tests; a colleague who has edited the document for English clarity, but did not contribute to the content; a photographer or artist who prepared the figures; a dental technician or assistant who was invaluable to the care of the patient being reported on.

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APPENDIX B: MANUSCRIPT SUBMISSION CHECKLIST

This submission checklist is provided to help authors in the final stage of submission. Following this checklist should ensure the editorial office does not return your manuscript to you prior to evaluation. A more complete description of each item is provided under the appropriate heading in the Information for Authors document.

Separate documents are submitted in the following order:

title page, include any previous presentation and explanation of any conflicts of interest;

main text file (manuscript without author identifiers and without tracked changes) including a structured or standard abstract, keywords, body of the text, tables, figure legends;

figures;

supplementary files (if necessary)

Title Page

Title

Running head (abbreviated title) of no more than 60 character spaces

Author(s) full name(s) written as First Name then Last Name, and academic degree(s), and the institutional affiliation(s) of the author(s) at the time of the study. An asterisk after

an author's name and a footnote may indicate a change in affiliation. Department, Institution, Locations. (Example: Department of Prosthodontics, University of North Carolina School of Dentistry, Chapel Hill, NC)

Disclosure of any presentation of this material, to whom, when, and where.

Disclosure of financial support, including grant numbers

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Name, address, and e-mail address of corresponding author

Manuscript Body

No line numbers

Statement is included in the Materials and Methods section that human experimentation has been approved by the local institutional review board or conforms to Helsinki Declaration

Guidelines for the care/use of animals, approved by the institution, have been followed as indicated in the Methods

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The body of **research manuscripts** includes the Introduction (no heading), Materials and Methods, Results, Discussion, and Conclusions headings

The body of **clinical reports and technique manuscripts** includes the Introduction (no heading), Clinical Report/Technique, Discussion, and Summary headings

Abstract

For Original Research Articles, and Review Articles, a structured abstract is included before the body of the manuscript followed by keywords

For other manuscripts (e.g., Clinical Reports/Technique articles), include a conventional, unstructured abstract followed by keywords

Style guide

Abbreviations: spell out the first time used. Example: Fixed partial dentures (FPDs); can be called "FPD" when used again; avoid abbreviations in the abstract

Equipment and/or materials are identified in text by the manufacturer and city and state (US manufacturer) or city and country (non-US manufacturer). Example: (Whip Mix, Louisville, KY); (3Shape, Copenhagen, Denmark)

Formatting of reported values, statistical tests conform to *Journal of Prosthodontics* author guidelines

References

All references are numbered consecutively in the order they are cited in the text

References are Arabic numerals (i.e., 1, 2, 3, etc) in superscript[1]

References appear after punctuation marks.[1]

All listed references have been cited in the text

Tables

Tables are cited in numeric sequence in the text

Tables should be submitted in Word

Figures

Each figure is numbered with an Arabic numeral and cited in numeric sequence in the text (Fig 1).

Photographs of recognizable persons require a signed release from the patient or legal guardian authorizing publication

Figures should be submitted in PDF, JPG, EPS, or TIFF format

Figures with multiple panels (Fig 1a, 1b) should be submitted as a single file

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Informed consent and releases to publish photographs of recognizable persons should be on

file with the author and submitted to the editorial office upon request

Revisions

In addition to the above:

A highlighted copy should be submitted showing all of the changes made throughout the manuscript; do not use the Word "Track Changes" feature

Provide a separate file as a response to the reviewers and editors detailing the changes made or the changes not made, and why the author chose not to make the changes.

APPENDIX C: RESPONSE TO REVIEWERS TEMPLATE

Use this format to respond to reviewers and editors (the remarks in this template are an example only).

Response to Reviewer 1:

The main findings in this manuscript bear a close similarity to other previously published work and I feel that they add little to the conclusions of that manuscript.

Response: We respect the comment of the reviewer and appreciate their insight. However, we feel that the previous paper being referred to does differ from our current submission and that the current manuscript adds new data that continues to build upon the programmatic theme of our laboratory. (Discussion of differences in the two works has been redacted to shorten this document) **Text Change:** We have expanded our discussion to reflect these differences, see page 4.

1) *BSPII and osteopontin are well known to be produced by osteoblast-like cells in culture.*

Response: This is true. However, the results have been noted in standard 2D cultures. Very few studies have analyzed the expression of these proteins in 3D cultures as we have submitted. We have previously reported differences in spatial and temporal expression of BSPII in a 3D mandibular bovine model (Bone 1999). However we did not want to assume that expression in those models would also translate to the aggregate model we describe here.

Text Change: None.

2) *It is not surprising that aggregate Size Correlated to Starting Cell Number, but perhaps "correlated" is the wrong word as there was no rigorous statistical treatment.*

Response: We appreciate the comment and have modified the text accordingly to state the size was associated with cultured cell number.

Text Change: Abstract, Results headings page 7 and 8.

Response to Reviewer 2:

1) *Typographic errors warrant author's attention.*

Response: Thank you.

Text Change: Proofread and corrected.