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A CASE REPORT

Biofunctional Prosthetic System: Paving a way to unmatched quality and comfort-A Case Report

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ABSTRACT

Recent advancements in removable prosthodontics include the Biofunctional Prosthetic System (BPS), a system that mirrors the aesthetic, comfort, functional, and phonetic attributes of natural dentition. This clinical report describes the prosthetic restoration of a 70-year-old edentulous patient who was dissatisfied with her decade-old denture. To improve the fit, we selected the Biofunctional Prosthetic System (BPS) for the new prosthesis. BPS is designed to work harmoniously with the body, optimizing function while providing comfort and a natural appearance. The functional impression technique, combined with the simulation of jaw movements using the Stratos 100 articulator in BPS, ensures that the denture meets stringent requirements. The BPS denture incorporates Ivoclar teeth that replicate the anatomy of natural teeth. Made of three layers of cross-linked acrylic resins, these teeth contribute to a lifelike appearance and are resistant to wear. The BPS system uses a controlled heat/pressure polymerization process, ensuring a proper fit. This case report aims to elucidate the straightforward process of fabricating a BPS denture.

Key words: Biofunctional Prosthetic System, Prosthodontics, Complete denture, Esthetics

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INTRODUCTION

The Biofunctional Prosthetic System (BPS) is designed to enhance the patient's experience by delivering comfort, functionality, and aesthetic appeal.[1] Despite advancements in implant dentistry, a significant portion of the population still experiences partial or complete edentulism. There is a demand for high-quality removable prostheses, but traditional complete dentures often require extensive time and appointments to construct.[2] Some patients find conventional complete dentures unsatisfactory due to issues like instability, discomfort during chewing, and speech difficulties, which can lead to psychological effects.[3] The BPS technique has evolved to address these shortcomings, minimizing appointment times and enhancing aesthetic outcomes.[4]

The construction of a Biofunctional Prosthetic System differs significantly from that of a conventional complete denture. It is tailored to accommodate the functional movements of the oral cavity, ensuring that the denture adapts to the surrounding tissue, thereby offering improved function, form, and aesthetics.[5] Each step in BPS may vary depending on the materials used. The protocol for making a BPS denture is straightforward and easy to understand.[6] Learning the system accurately can make it more effective than conventional dentures. The materials involved include impression materials, an articulator, a facebow, special denture teeth, and the denture base materials, using an injection molding method.[7]

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The impression making and recording the maxillomandibular relation is standardized in the BPS method, making it easier for the dentist to understand and apply. There are four clinical procedures in the BPS technique, which reduce the appointment time for the patient. The maxillomandibular relation is done using intraoral tracers, and the teeth setting is based on the patient's anatomical landmarks.[8] This system prioritizes the patient's functional movement. The specially made Ivoclar teeth set provides excellent aesthetics and phonetics when set according to anatomical landmarks.

CASE REPORT

A 70-year-old female patient reported to the Department of Prosthodontics, SRM Dental College, Ramapuram, Chennai, Tamil Nadu, India, with the chief complaint of missing teeth in her upper and lower arches for the past 20 years. She wanted dentures with optimal comfort and aesthetics. She had lost her teeth due to extractions done 20 years ago because of extensive caries and weak periodontal support. She had been rehabilitated with conventional removable maxillary and mandibular dentures 10 years ago but was not satisfied with the fit and aesthetics of her existing dentures. Her medical history revealed diabetes for 15 years, for which she was on medication. On clinical examination, she was completely edentulous with well-rounded maxillary and mandibular arches without any bony spicules (Fig. 1). After obtaining informed consent, various treatment plans were discussed. The treatment plan aimed to restore her masticatory efficiency, improve aesthetics, and provide an excellent fit with BPS dentures for both arches.

Figure 1: Both maxillary and mandibular edentulous arch

PROCEDURE

Visit 1: The BPS recommends impression making similar to the mucostatic method, minimally compressing tissues using a combination of irreversible hydrocolloids of varying densities in the same impression. Fast-setting alginate (Zhermack Tropicalgin) was used to record impressions of the maxillary and mandibular arches using 28 and 33 number trays from the Accu BPS impression trays (Fig. 2). The occlusal centric tray was loaded with high-density elastomeric material (Dentsply Aquasil Soft Putty) and inserted into the patient's mouth to get the initial vertical dimension (Fig. 3). This vertical dimension was used for mounting the casts obtained from initial impressions using the horizontal guide (Fig. 4). Custom trays (Elite LC Trays) and wax occlusal rims (Hindustan Dental Modelling Wax) were fabricated over the primary casts, and the patient was recalled for the second visit (Fig. 5).

Figure 2: Diagnostic impression using Alginate material in ACCU TAYS

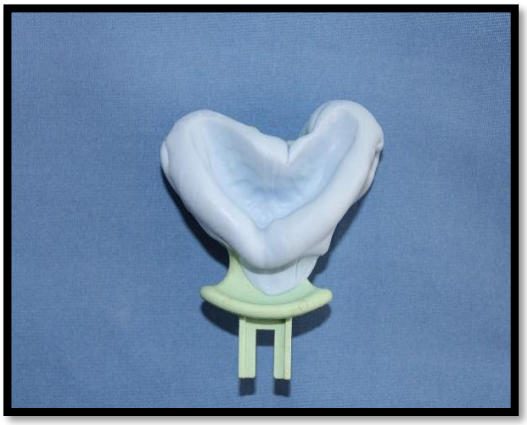

Figure 3: Tentative Vertical Dimension established using centric tray

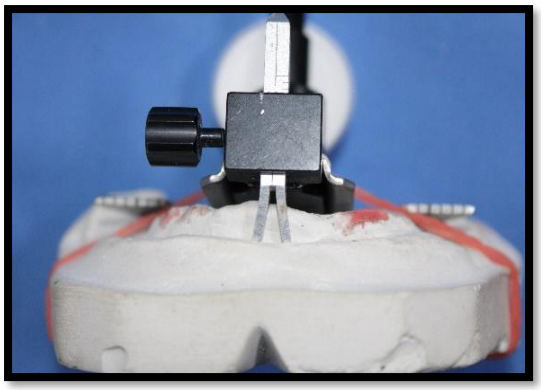

Figure 4: Guide pin of the horizontal guide to mount the casts

Figure 5: Custom Trays and occlusal rims fabrication

Visit 2: Tray adhesive was applied over the borders, and border molding was performed using heavy body elastomeric impression material (Aquasil Ultra heavy regular set) in a single step, after which the secondary impression was recorded with light body elastomeric material (3M ESPE Express XT light body) (Fig. 6).

Figure 6: Border Moulding and Secondary Impression recorded

The Gnathometer M (Ivoclar, Germany) tracing device was attached to the rims, facilitating the clinical procedures of face-bow record and centric jaw registration. The patient was asked to perform all mandibular movements, and an arrowhead tracing was obtained (Fig. 7). The centric lock was placed, and the rims were secured with bite registration paste. The rims were then removed, and casts were poured with maxillary and mandibular impressions, and a trial denture was fabricated (Fig. 8) using BPS teeth (SR Vivodent S PE / S DCL) setting principles and template.

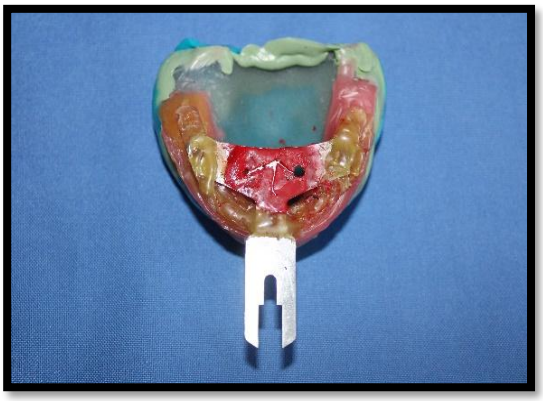

Figure 7: Gothic arch tracing done and centric point obtained

Figure 8: Teeth setting done in Stratos 100

Visit 3: The patient was recalled for a wax trial; the fit and occlusal relations were checked intraorally (Fig. 9), and then the denture was sent to the laboratory for processing.

Figure 9: Wax trial done

Visit 4: Dentures were cured with the injection molding technique using BPS denture base material (SR Ivocap high impact, Ivoclar, Germany). Necessary adjustments were made, and the dentures were delivered to the patient (Fig. 10).

Figure 10: Denture insertion done

Recall: The patient was recalled after six months and examined. There was no occlusal disharmony or sore spots. The patient was satisfied with her new prosthesis and expressed gratitude for the comfortable prosthesis and a younger appearance.

DISCUSSION

Traditional complete dentures have long been considered a valuable and cost-effective treatment option for a significant number of edentulous patients. However, the success of complete denture treatment outcomes remains unpredictable, often resulting in post-insertion pain, discomfort, denture sores, and a decline in the retention and stability of the prosthesis. Recent advances in CAD/CAM complete dentures have addressed some of these issues, enhancing the quality of prostheses by improving retention, reducing porosity, and minimizing polymerization shrinkage. While considerable efforts have been made in the field of rehabilitation and prosthetic care, the escalating consumer demand for reasonably priced yet aesthetically pleasing dentures poses a significant challenge for dentists and dental lab technicians. In response to these challenges, the Biofunctional Prosthetic System (BPS) has emerged, emphasizing the principle of bilateral balanced occlusion to enhance form, function, and aesthetics in a shorter treatment duration compared to conventional methods [9,10]

In a comparative study conducted by Vivek SP et al., patient satisfaction was evaluated through a questionnaire survey covering various aspects, including retention, aesthetics, thickness, and smoothness of the denture. The results indicated a very satisfactory to satisfactory response level, particularly in terms of retention, aesthetics, and phonetics, when utilizing BPS dentures[7]

In a crossover trial conducted by Matsuda KI et al to assess the clinical acceptability of BPS compared to conventional complete dentures, the findings demonstrated the superiority of BPS in terms of occlusal feel, comfort, aesthetics, and retention. The results were highly satisfactory. Additionally, the Oral Health Impact Profile for edentulous subjects, Japanese version (OHIP-EDENT-J), indicated a complete absence of pain, psychological discomfort, and functional difficulties, including speech and mastication.[4]

The satisfaction of patients with complete dentures is significantly influenced by factors such as the quality of the mandibular residual alveolar ridges, retention and stability of the mandibular dentures, accuracy in reproducing the retruded jaw relationship, and patient adaptability. BPS Denture stands out in providing excellent retention due to the harmonious balance of surrounding muscular forces, and its lingual flanges are contoured in a manner that allows sufficient space for the normal actions of the tongue. [11]

According to reports, the Biofunctional Prosthetic System (BPS) method for complete denture fabrication has demonstrated the capability to restore masticatory function to a degree comparable to that achieved through a conventional protocol. This holds true both physiologically and in accordance with the patient's perceptions.[12,13,14,15]

CONCLUSION

This case report shows that the Biofunctional Prosthetic System (BPS) can be effective in terms of aesthetics, form, function, and comfort from the patient's perspective. The dental practitioners involved, with limited clinical training, were able to produce complete dentures and achieve satisfactory results with this method. Further research, clinical trials, and long-term follow-up studies are required to establish the effectiveness of the BPS technique in prosthetic full-mouth rehabilitation.

CONFLICT OF INTEREST

None

REFERENCES

1 Yen HJ, Chen MS. Using BPS^® to Make Maxillary Complete Denture and Mandibular 2-implant Retained Overdenture in an Edentulous Patient-A Case Report. 中華民國家庭牙醫學雜誌. 2016 Sep 1;11(2):15-22. DOI 10.6566/JFD/2016.11(2).15

2 Shakeel, Sk & Shetty, Shishir & Reddy, Sesha & Shetty, Raghavendra & Vannala, Venkataramana & Philip, Shaju & Atef, Ahmed. (2020). Biofunctional prosthetic system in prosthodontics – a systematic review. Czasopismo stomatologiczne. 72. 274-277. DOI 10.5114/jos.2019.93847.

3 Saini V, Singla R. Biofunctional prosthetic system: a new era complete denture. J Pharm Bioallied Sci 2011; 3: 170-172. DOI 10.4103/0975-7406.76505

4 Matsuda KI, Kurushima Y, Maeda Y, Enoki K, Mihara Y, Ikebe K. Crossover trial for comparing the biofunctional prosthetic system with conventional procedures. Eur J Prosthodont 2015; 3: 64-70. DOI 10.4103/2347-4610.166182

5 Maisa Omara, Thomas Salzberger, Maren Boecker, Katrin Bekes, Guenter Steiner, Valerie Nell-Duxneuner, Valentin Ritschl, Erika Mosor, Margreet Kloppenburg, Judith Sautner, Bibiane Steinecker-Frohnwieser, Tanja Stamm, Improving the measurement of oral health-related quality of life: Rasch model of the oral health impact profile-14, Journal of Dentistry, Volume 114, 2021,103819, ISSN 0300-5712, DOI 10.1016/j.jdent.2021.103819.

6 Ikebe K, Hazeyama T, Enoki K, et al. Comparison of GOHAI and OHIP-14 measures in relation to objective values of oral function in elderly Japanese. Community Dent Oral Epidemiol 2012; 40: 406-414. DOI: 10.1111/j.1600-0528.2012.00683.

7 Vivek SP, Jagdish SK, Murugesan K, Peter J, Arunkumar CS, Muthukumar B. Comparison of Masticatory Efficiency and Patient Satisfaction of Injection-Molded Conventional Complete Dentures and Biofunctional Prosthetic System Dentures: A Parallel Randomized Clinical Trial. Cureus. 2023 Jul 27;15(7):e 42564. DOI: 10.7759/cureus.42564. PMID: 37637558; PMCID: PMC10460240.

8 The Use of Anatomical Landmarks', 2012. 10.5152/tud.2012.018

9 Khazi SS, Shetty S, Reddy S, et al. Biofunctional prosthetic system in prosthodontics – a systematic review. Journal of Stomatology. 2019; 72(6):274-277.10.5114/jos.2019.93847

10 Noh, Kwantae. Esthetic complete denture fabrication utilizing Biofunctional Prosthetic System (BPS). Journal of the Korean Academy of Esthetic Dentistry [Internet]. 2015 Jun 24;24(1):68–74. 0.15522/JKAED.2015.24.1.68

11 Harsh Kasabwala Et Al. Evaluation Of Quality Of Life And Patient Satisfaction Between Denture wearers Using Conventional Followed By Biofunctional Prosthetic System (BPS) Dentures. International Journal of Pharmaceutical Research, 2020. 10.31838/ijpr/2020.SP1.018.

12 Mohsin AB, Priyanka M, Samee S. Preventive prosthodontics: combination of tooth supported BPS overdenture & flexible removable partial denture. J Appl Dent Med Sci 2015; 1: 81-85. NLM ID: 101671413, ISSN: 2454-2288.

13 Abraham, Abby. (2014). Complete Denture - The BPS Way. The DentCare.1.

14 Regis, Romulo & Cunha, Tatiana & Vecchia, M & Ribeiro, Adriana & Silva-Lovato, Cláudia & de Souza, Raphael. (2013). A randomised trial of a simplified method for complete denture fabrication: Patient perception and quality. Journal of oral rehabilitation. 10.1111/joor.12063.

15 Cunha TR, Della Vecchia MP, Regis RR, Ribeiro AB, Muglia VA, Mestriner W Jr, et al. A randomised trial on simplified and conventional methods for complete denture fabrication: Masticatory performance and ability. J Dent 2013; 41:133 42. 10.1016/j.jdent.2012.09.008.

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