Implants in Conjunction With Removable Partial Dentures: A Literature Review

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Many authors have written about the merits of implant-supported complete overdentures, which have been used clinically with high success rates for the fully edentulous patients. The complete overdenture has proven to be an improvement over conventional complete prostheses with respect to chewing efficiency, patient comfort, and satisfaction.1-4 The context of increasing life spans and evidence from various national dental health surveys in industrialized countries indicate that the proportion of edentulous people will continue to decline and that more people will retain more teeth into old age.5,6 Projections based on data from such surveys6-7 suggest a decline in tooth loss but an increased need for management of partial edentulism in patients with compromised oral or general health status. This trend of age-related increased tooth retention suggests that partially edentulous cohorts will be older than before and probably less disposed than younger people to such treatment with extensive tooth or implant-supported fixed partial dentures. Consequently, socioeconomic factors and population trends suggest increased future treatment needs with different partial prostheses.8 A well-constructed removable partial denture can be an excellent treatment alternative.9-12 Yet, these patients deserve the best esthetic and functional results possible. In these cases, a limited number of strategically placed dental implants in conjunction with the remaining natural teeth can establish a favorable removable partial denture design by significantly reducing the effect of the reciprocal arm and improving the fulcrum line position. When an implant or a limited number of implants is used to support the removable partial denture, additional retention is achieved, and the need for unesthetic buccal retentive arm clasps is avoided at the esthetic zone.13-15

The aim of this article is to review the literature regarding implants with removable partial dentures and evaluate the evidence for this clinical approach. A MEDLINE/PubMed search from 1990 to 2006, focusing on the use of implants with removable partial dentures and related features, was supplemented with a hand search to identify relevant peer-reviewed English articles published in dental journals and textbooks on removable partial dentures. (Implant Dent 2007;16:1–) Key Words: removable partial dentures, dental implants, partially edentulous patients, cost-effective, treatment alternative

LITERATURE REVIEW

A MEDLINE/PubMed database search was limited to peer-reviewed articles published in English between 1990 and 2006, focusing on the use of implants with removable partial dentures and related features such as residual ridge resorption, need and demand for prosthodontic treatment, and cost-effectiveness of dental treatment, all related to implants and removable partial prostheses. The digital search was supplemented with a hand search to identify relevant peer-reviewed English articles published in dental journals and textbooks on removable partial dentures. Few case reports, 1 short-term retrospective follow-up (1–4 years), and 1 longitudinal clinical study (2–7 years) were identified.

CONSIDERATIONS FOR THE KENNEDY CLASS I AND II SITUATIONS

Common complaints associated with the Kennedy class I (bilateral free end) and II (unilateral free end) removable partial dentures situations are lack of stability, minimal retention, unesthetic retentive clasping, and discomfort upon loading.16

Kelly17 in 1972 described the combination syndrome as a common problem associated with the mandibular bilateral partial denture distal extension opposing a maxillary complete denture, which is characterized by downgrowth of the maxillary tuberosities, papillary...
hyperplasia, resorption of the premaxilla, overeruption of the mandibular anterior teeth, and resorption of the posterior mandible. These signs may be found in 24% of the population wearing a maxillary complete denture opposing a bilateral distal extension partial denture. Kelly discussed various possibilities to avoid combination syndrome. He proposed using roots of anterior mandibular teeth to support an overdenture. He also mentioned the option of using endodontic implants to preserve questionable roots for support in the posterior part of the mandible. Controversy exists regarding the potential development of combination syndrome also in those patients using an implant-supported overdenture with 2 anterior implants, since this type of restoration can act as a bilateral distal extension situation. A posterior implant stop would most likely eliminate the potential for this to happen. An obvious advantage of an implant with a removable partial denture in this case is that the extension of the bases can be reduced, since the implant provides the same stability as a terminal abutment would in a Kennedy class III situation. The altered cast impression, a standard technique for maximizing posterior support in the class I situation, can be omitted as well. One of the most challenging situations to treat with a removable partial denture is in certain cases classified as Kennedy class II, when there are abutments only on 1 side of the arch. The long lever arm to the unilateral edentulous side results in an unstable removable prosthesis, if treated conventionally. A strategically placed dental implant can establish an improved removable partial denture design by significantly reducing the effort arm and improving the fulcrum line position.

Tissue-ward rotation during function, around the fulcrum line created between the abutment teeth closest to the edentulous area, is prevented. Keltjens and Halterman in 1993 and 1999 described a number of clinical cases where 2 implants were used to assist in the support of a mandibular bilateral distal extension removable partial denture opposed by a maxillary complete denture. Each implant was placed in the first molar area, and on 1 occasion, only vertical support was derived from the implants with no retentive elements, while on another occasion, additional retention was provided by magnets, which were attached in the distal extension denture base over the implants. From a short-term experience, using implants, the authors claim was to maintain the integrity of the vertical dimension of occlusion and prevent degenerative changes that could have led to what Kelly described as the combination syndrome. Giffin in 1996 reported a case where a Kennedy class II mandibular arch was restored using a combination of a single molar implant at the edentulous alveolar crest with an extracoronal resilient attachment to support and retain a removable partial denture. The patient claimed that the implant-supported side of the prosthesis felt more natural and was preferred for mastication over the tooth-supported side.

Mitrani et al in 2003 described a retrospective study with a follow-up of at least 1 year to a maximum 4 years of 10 partially edentulous patients unsatisfied with their removable partial dentures (Kennedy class I and II). They were treated with posterior osseointegrated implants to provide stability and/or retention of the removable prostheses, eliminating the need for clasps when possible. The authors performed a follow-up clinical evaluation consisting of patient satisfaction, radiographic examination, and soft tissue health. Results indicated consistent increased satisfaction in all patients, minimal component wear, no radiographic evidence of excessive bone loss, and stable peri-implant soft tissues. Kuzmanovic et al in 2004 described a case where a Kennedy class I mandibular arch was restored using a combination of bilateral single molar implants with ball attachments to support and retain a chromium-cobalt removable partial denture. The authors reported no complications after 2 years.

**Residual Ridge Resorption Related to Implants and Removable Prostheses—General Aspects**

There are clear indications and little doubt that removable dentures are an important causative factor in the bone resorption process. This is supported by studies showing significant differences in residual alveolar bone between edentulous subjects wearing, or not wearing, removable dentures. Subjects not wearing dentures had more remaining bone. In groups of patients who had been wearing complete mandibular dentures for different lengths of time, the continuous bone resorption stopped in the areas distal to the mental foramina after the patients had been provided with implant-supported prostheses placed anterior to the foramina. Animal studies have shown that continuous pressure from an experimental denture caused bone resorption when exceeding a threshold value and that the resorbed bone was not reshaped when pressure was discontinued.

Kordatzis et al in 2003 compared the posterior mandibular residual ridge resorption in patients with conventional dentures and implant overdentures. The results were that the estimated average reduction in posterior mandibular residual ridge height was 1.63 mm in 5 years for conventional denture groups and 0.69 mm for implant overdenture groups (i.e., almost 1 mm less). The authors concluded that depending on biomechanical factors, bone areas adjacent to the implants might be more favored. One should expect that reduced resorption rates with implant-supported overdentures could be attributed to the less unfavorable loading of bone adjacent to the implants and the protection of the residual posterior ridge from excessive loading, which is inversely proportional to the distance from the implant. The current author et al in 2005 reported that a limited number of strategically placed dental implants in conjunction with the remaining natural teeth can establish a favorable removable partial denture design by significantly reducing the reciprocal arm and improving the fulcrum line position. This prevents rotation toward the tissue during function, and repeated relining of the denture to restore posterior support is prevented. In these large edentulous areas, bone is preserved as a result of the remodeling stimulus around osseointegrated implants.
PARTIAL DENTURES

IMPLANT-SUPPORTED FIXED PARTIAL DENTURES AS ABUTMENTS FOR REMOVABLE PARTIAL DENTURES

Jang et al in 1998 described a clinical case report to investigate how a single implant-supported porcelain-fused-to-metal crown in the mandibular right cuspid area can function as an abutment to support a removable partial denture in conjunction with the remaining mandibular teeth: right first incisive to left canine. From a short-term experience, the authors report no bone loss around the implant, or crown or abutment loosening.

LONG-TERM STUDIES ON IMPLANTS WITH REMOVABLE PARTIAL DENTURES

The current author et al in 2005 published the first longitudinal study in English that was aimed to determine whether the use of a limited number of implants, with no rigid connection between implants and teeth and as few as possible prosthetic element requirement, is a viable solution for improving unfavorable removable partial dentures design and esthetics. Fifteen partially edentulous patients with an unfavorable number and distribution of abutment teeth were treated, each with a limited number of implants (total of 33 implants), from 1997 to 2004, resulting in an improved removable partial denture design.

Throughout the study follow-up (2–7 years), the implant survival rate was 100%, and prosthetic complications were minor. All patients reported superior satisfaction with the partial dentures and good chewing efficiency. The results indicate that this clinical approach is a viable and cost-effective treatment option. Van Zegbroeck (personal communication) in 2000 reported a 5-year follow-up of 21 cases treated with implant ooth-supported removable partial dentures. The survival of implants, teeth, and functioning prosthesis was 100%. No decay or mobility was found, and the survival rate of the prosthetic components was 74%.

Salvaging Failed Fixed Implant Therapy

McAndrew in 2002 reported a case where 4 implants were placed in the maxilla of a partially edentulous patient with a treatment plan of an implant-supported fixed partial denture. Three of the implants failed to osseointegrate and were removed. A swing-lock removable partial denture was fabricated, and an O-ring attachment was used on the implant to provide additional retention for the prostheses. The author reported that 15 months later, the prostheses was entirely satisfactory to the patient, and the remaining teeth and implant were in sound condition. The current author and Karas in 2004 described the prosthetic rehabilitation of a partially edentulous patient using a removable partial denture involving teeth and implants as an alternative to unsuccessful fixed implant therapy. Since the patient declined any additional dental implant therapy, this treatment option solved a difficult clinical problem derived from the failure of 2 strategic implants, and provided the patient with an esthetic and functional prosthesis.

Asvanund and Morgano in 2004 described a treatment approach for a partially edentulous patient where a fixed metal-ceramic restoration was not practical due to unfavorably positioned implants and deficient contour of the alveolar ridge at the anterior maxillary zone. The definitive treatment plan included an implant-supported milled-bar partial overdenture. Jivraj and Chee in 2005 described a clinical case that presented with multiple episodes of screw loosening of an implant-supported restoration replacing the maxillary left incisor, secondary to developing reduced posterior support that could not be reestablished with fixed implant-supported restorations due to the patient’s financial constrains. The patient had already adjusted to a maxillary removable partial denture. A healing abutment was placed on the implant to permit a positive metal-to-metal contact with the internal surface of the framework providing support to the prostheses. The authors’ opinion was that this method was the least invasive and most economical approach for this patient to address the issue of repeated screw loosening. Uludag and Celik in 2006 described a case with poorly positioned dental implants. The patient declined a second reparative surgery and the associated cost. For this situation, considering the interarch space and maxillomandibular relationship, a removable partial denture appeared to be more appropriate. The use of angulated abutments enabled restoration of misaligned implants with a maxillary removable partial denture supported by 3 implants.

Connecting Teeth and Implants to Support Implants With Removable Partial Dentures

Jackson in 1990 reported a case where the patient had 1 remaining tooth, the lower right first premolar, and 2 implants were placed in the mandibular cuspid sites. An 8-unit porcelain-fused-to-metal bridge was designed to telescope over cement-in implant heads and the natural abutment. Magnetic keepers were cantilevered, extracoronal, off the distal abutments, and a removable partial denture with a hollow receptacle was then fabricated.

Ganz in 1991 placed 2 implants on the patient’s maxillary right area and splinted them to the remaining 3 teeth (left lateral incisive to first premolar) with a bar attachment. This served as a substructure to retain a removable partial denture that, in the author’s opinion, would fulfill the functional and esthetic requirements of the patient without jeopardizing the prognosis of the remaining 3 natural teeth. Amer in 1993 reported a case where a patient had in the mandibular arch only the cuspid and first bicuspid retained, with 3 implants placed in the symphysis region. Cast posts were prepared for the 4 remaining teeth, and an implant-connecting bar united all the implants and teeth, using O-ring retention to retain a complete denture.

In these case reports, the disadvantages were the complexity of the design and added features that increased the treatment time and cost. The design involved a rigid prosthetic connection of natural teeth and dental.
implants. There is a differential resilience between an implant and natural tooth because of the osseointegration of the implants and lack of peri-implant soft tissue attachment such as the periodontal membrane in natural teeth. Considering the differential resilience, since implants and teeth were rigidly connected by the substructure, the load to the prostheses will be borne mainly by the implants in normal function, risking the intrusion of natural teeth as described in different reports.48-51

ESTHETIC AND FUNCTIONAL CONSIDERATIONS WITH IMPLANTS WITH REMOVABLE PARTIAL DENTURES

Budtz-Jorgensen et al.4 in 2000 stated that the rationale for this treatment is to place a limited number of implants capable of sustaining an entirely implant and tooth-supported removable partial denture without visible retentive elements. The authors’ opinion is that the treatment with tooth and implant-supported removable partial dentures might have particular relevance in instances where the interarch space is too limited for aesthetically and techni-cally acceptable metal-ceramic fixed partial dentures. de Carvalho et al.5 in 2001 described a maxillary partially edentulous case where an implant-retained removable partial denture without retentive clasps was used. This approach required: (1) fewer patient visits and laboratory procedures, (2) the use of a minimal number of implants, (3) lower financial obligations, and (4) no sinus elevation surgery. The authors concluded that the detachable partial prosthesis over implants allows easier oral hygiene by the patient, and provides superior esthetics and phonetics in cases involving advanced ridge resorption. Chee52 in 2005 presented a case of a partially edentulous patient with a history of trauma to the maxilla, with a consecutive avulsion of 4 maxillary teeth, with a significant ridge loss. The patient presented with a removable partial denture and was satisfied with the esthetics of the restoration, but not with its stability. He elected to have an implant-supported partial overdenture to restore the missing teeth and tissue in stead of undergoing multiple surgeries to restore the missing alveolar ridge tissue. The arch form and dentition was restored with the partial overdenture, and the patient was satisfied with the stability and esthetics of the restoration. The authors’ opinion was that the added advantage of this implant-supported overdenture was to obtain support from the implants and have minimal tooth and tissue coverage.

NEED AND DEMAND FOR PROSTHODONTIC TREATMENT

The concepts of need and demand are central in studies on dentistry. Need has been defined as “the quantity of dental health care which expert opinion judges ought to be consumed over a relevant time period, in order to remain or become as dentally healthy as is permitted by existing knowledge.”53 However, such a definition gives little attention to the individual’s personal comfort and quality of life. Need, however defined, does not always lead to demand for treatment,54 depending on factors such as individual preferences, cost, cultural differences, psychosocial considerations, comfort, age, and accessibility of services. In most industrialized countries, the demand for prosthodontic treatment is influenced more by aesthetic demands rather than by a few missing teeth in the posterior regions.55,56 Therefore, so-called sociodental factors, social and cultural background, socioeconomic aspects, oral comfort, and appearance should be included and evaluated when dealing with need and demand for prosthodontic treatment. The professional attitude toward need must be that there is no true objective or subjective need. Need is established only in communication with mutual respect between the professional and the patient.57 This point has to be taken into consideration when evaluating the treatment approach of implants with removable partial dentures compared to other more expensive and complex treatment options, since it can satisfy in many cases the patient’s needs and treatment outcome expectations.

ECONOMIC EVALUATION OF IMPLANTS WITH REMOVABLE PARTIAL DENTURES: COST-EFFECTIVENESS

Because of the elective character of implant therapy, it is necessary to inform the patient thoroughly so that he or she is able to participate in the decision about adequate treatment. Thus, implant treatment options and alternative therapies should be discussed, advantages and disadvantages explained, and benefits expected from the different treatment options clarified. As the patients have to pay for the treatment, their financial means must also be considered, and the decisive factor may be the relationship between costs and benefits.58 To describe this relation and facilitate a comparison of different treatment modalities, a complete economic evaluation, such as the cost-effectiveness analysis, is required.59,60 In implant therapy, treatment costs gradually increase with the number of implants placed and depend on the materials used.61,62 It is important that patients receive value for their proposed treatment. Think of value in the form of the following equation:

\[
\text{Value} = \frac{\text{Results + Process Quality}}{\text{Cost of Care to Patient}}
\]

Value will be created in the eyes of the patient only if the patient’s satisfaction with treatment outcomes and the way care is delivered are greater than the cost he or she will incur to receive that care. A greater number of patients turn down treatment because they do not understand the value it represents.54 Unless the patient has some means for a more limited treatment option, the financial barrier can be an absolute impediment to case acceptance. The current author et al.13 in 2005 reported that the analysis of the costs of implants with removable partial dentures compared with implant-supported fixed partial dentures showed that patients save more than 50% on treatment costs when implants with removable partial dentures are used. The longer the multiunit implant-supported fixed partial denture required, the more money saved with the proposed implants with the removable par-
tial denture approach. Costs become even more relevant when bone augmentation procedures are required in conjunction with implant placement.

**Prosthodontics for the Many, Not Just For the Few**

Evidence of oral health quality improvement is more obvious, particularly since the advent of osseointegration. However, partial and complete edentulism is still experienced by millions of people even in some of the most advanced economies in the world. The emerging popularity of the 2-implant-supported overdenture appears to be an important initiative, but it may remain restricted to the very few high-per-capita-income countries. Prosthodontics offers an extraordinary range of treatment possibilities for oral rehabilitation. However, its reliance on the high technology and cost-limits it to relatively few people. To provide treatment for the many, cost-effective conventional treatment is required but with adequate quality control. Owen introduced the philosophy of “appropriatech”: using appropriate technology (both methods and materials) to provide cost-effective treatment without sacrificing biofunctional and prosthodontic principles. In his opinion, it ought to be possible to set out, for each procedure, a minimum acceptable protocol that will conform to generally accepted prosthodontic principles, and will assist patients in regaining chewing function and esthetic rehabilitation, and thereby significantly improve their quality of life. Minimum acceptable protocols could also be reconciled with evidence-based clinical practice guidelines that could be adapted for socioeconomic circumstances.

The clinical modality of implants with removable partial dentures could easily adapt to the “appropriatech” philosophy by providing a cost-effective treatment without sacrificing biofunctional and prosthodontic principles, and in this way, an improved restoration is becoming available for the many and not just for the few.

**Discussion**

Dental treatment of partially edentulous patients is becoming more important because people are saving more teeth, and the fully edentulous population diminishes.\(^5\)\(^-\)\(^8\)

Almost all partially edentulous patients desire the benefits of implant restorations; but, unfortunately, many of them cannot or will not meet the criteria to have fixed implant-supported restorations because of anatomical, medical, financial, or personal reasons. In situations when financial, systemic, or local conditions preclude the use of a fixed partial denture, a well-constructed removable partial denture can be a valid treatment alternative.\(^9\)\(^-\)\(^12\) However, a significant proportion of prescribed removable partial dentures are not used.\(^8\) In this context, it must be clearly recognized that practical problems with removable partial dentures (lack of stability and retention, unesthetic retentive clasping, and discomfort upon loading) are common and may be the reason why so many patients stop wearing their removable partial dentures. Yet, these patients deserve the best esthetic and functional results possible. In these cases, a limited number of strategically placed dental implants in conjunction with the remaining natural teeth can establish a favorable removable partial denture design by significantly reducing the effect of a reciprocal arm and improving the fulcrum line position. When an implant or a limited number of implants are used to support the removable partial denture, additional retention is achieved, and the need for unesthetic buccal retentive arm clasps is avoided at the esthetic zone.\(^13\)\(^,\)\(^16\)

Other advantages of implants with removable partial dentures are that the existing natural dentition is retained, extensive surgery is avoided, hard and soft tissues are easily “replaced” by the denture’s flanges, the extent and length of the treatment are reduced, hygiene access is facilitated, failed implant-supported fixed partial dentures cases are salvaged, flexibility is achieved in long-term care and future changes in the remaining dentition are easily restored, patient’s satisfaction increases, and the patient’s financial limitations are addressed.\(^13\)\(^-\)\(^16\),\(^23\)\(^-\)\(^27\),\(^39\)\(^-\)\(^47\),\(^52\) These factors will often favor the use of implants with removable partial dentures and should be considered when contemplating restorative treatment options.

**Conclusions**

A MEDLINE/PubMed database search was limited to peer-reviewed articles published in English between 1990 and 2006, focusing on the use of dental implants with natural teeth in removable partial denture design. Few case reports, 1 short-term follow-up (1–4 years), and 1 longitudinal clinical study (2–7 years) were identified. On the basis of this review of the literature, it may be concluded that the use of a limited number of implants to improve unfavorable removable partial denture design and esthetics is a viable solution for partially edentulous patients. Further research with controlled prospective clinical trials is needed.

**Disclosure**

Not applicable.

**References**

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PALABRAS CLAVES: dentaduras parcialmente removibles, implantes dentales, pacientes parcialmente edentulosos, costo eficaz, tratamiento alternativo

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Implantes em conjuncção com dentaduras parciais removíveis: revisão da literatura

RESUMO: Embora os benefícios das próteses removíveis suportadas por implante sejam imediatamente aparentes para os pacientes totalmente desdentados e tenham sido bem documentados, há uma escassez de estudos relacionados à combinação de implantes com dentaduras parciais removíveis (IRPDs) em pacientes parcialmente desdentados. O objetivo deste artigo é revisar a literatura referente a IRPDs e avaliar a evidência para esta abordagem clínica. Uma busca em Medline/PubMed de 1990 a 2006, focalizando o uso de IRPDs e características relacionadas, foi suplementada por uma busca manual para identificar artigos em relevantes em inglês, revisados por pares, publicados em periódicos e livros-texto de odontologia sobre dentaduras parciais removíveis (RPDs).

PALAVRAS-CHAVE: dentaduras parciais removíveis, implantes dentários, pacientes parcialmente desdentados, tratamento alternativo a preço acessível

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Имплантаты в сочетании с частично съемными зубными протезами: обзор литературы

РЕЗЮМЕ: Если преимущества съемных протезов с опорой на имплантаты для пациентов с полной потерей зубов очевидны и всесторонне подтверждены документами, то исследований, направленных на изучение сочетания имплантатов с частичными съемными зубными протезами (IRPD) у пациентов с потерей некоторых зубов, недостаточно. Целью данной статьи является обзор литературы по IRPD и оценка доводов в пользу такого клинического подхода. Поиск данных по использованию IRPD и их соответствующим характеристикам в системе Medline/PubMed за период с 1990 по 2006 гг. был дополнен ручным поиском соответствующих англоязычных статей по частичным съемным зубным протезам (RPD), прошедших коллегиальное рассмотрение и опубликованных в журналах и учебниках по стоматологии.

КЛЮЧЕВЫЕ СЛОВА: частичные съемные зубные протезы, зубные имплантаты, пациенты с частичной потерей зубов, рентабельность, альтернативное лечение
インプラントと着脱部分義歯の併用：文献研究

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要約：Implant-borne removable prosthesesは、完全無歯患者への有効性が明らかであり文献も多いのであるが、部分無歯患者に対するインプラントと遊離端義歯（IRPD）の併用に関しては研究が非常に少ない。本論文の目的はIRPD関連の文献を調べ、この臨床法を実際に評価することにあった。まずMedline/PubMedで1990年〜2006年の期間のIRPD関連の文献を検索され、これに歯科学会誌と教科書における遊離端義歯（RDP）に関するpeer reviewによる評価を含む英語文献が加増された。

キーワード：遊離端義歯、デンタルインプラント、部分無歯患者、コスト効果、treatment alternative

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植牙結合局部活動義歯：文献評論

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摘要:

目的：雖然種植活動假牙對全部缺牙患者有明顯的助益，而且也有許多文件記載，然而有關部分缺牙患者混用植牙和活動局部義齒（IRPD）的研究仍付之闕如。本文的主要目的是檢閱IRPD相關文獻，評估此臨床做法的證據。從1990年至2006年的Medline／PubMed資料庫中，集中尋找有關IRPD的使用和相關專題，再輔以人工查詢，找出同行發表於牙科期刊和教科書上有關活動局部義齒（RDP）的英文評論文章。

關鍵字：活動局部義歯、牙科移植、局部缺牙患者、成本效益、治療選擇

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가철성 국소 의치 관련 이식물: 문헌 검토

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초록: 완전 무치 환자에 대한 이식물-배개 가철성 보철물의 편익은 쉽게 확인되며 문서화가 잘 이루어져 있지만, 부분 무치 환자에서의 가철성 국소 의치(IRPD)와 이식물의 결합에 관한 연구는 소수에 불과하다. 본 논문의 목적은 IRPD에 관한 문헌을 검토하고 이에 앞서 접근법에 대한 증거를 평가하는 데 있다. IRPD의 사용과 관련 특장에 초점을 맞춰 Medline/PubMed에서 1990년-2006년 논문을 검색한 다음, 동료 전문가 심사를 거쳐(peer-reviewed) 수지 자료 및 교재에 발표된 가철성 국소 의치(RPD)에 관한 영어 논문을 수작업으로 확인하여 찾았다.

핵심 용어: 가철성 국소 의치, 치아 이식물, 부분 무치야 환자, 이용-효과적, 치료 대안

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AUTHOR QUERIES

AUTHOR PLEASE ANSWER ALL QUERIES

AQ1— Is “porcelain-fused-to-metal” correct in the sentence beginning “Jang et al (39) in 1998 described…”? Please confirm throughout the text.

AQ2— Please confirm Reference 59.

AQ3— Is Reference a Web site or journal article? Please provide one or the other.