

# REHABILITATION OF PATIENTS WITH FIXED IMPLANT SUPPORTED PROSTHESES: A REVISIT TO THE MODERATE SHORTENED DENTAL ARCH CONCEPT

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## Abstract

The recent advances in dental implant technology and various clinical researches support implant supported hybrid prostheses. The screw-retained implant hybrid complete denture offers a secure, cost-effective treatment for the completely edentulous patients.

The Shortened Dental Arch (SDA) concept was initially described for the natural dentition. However, with the increasing popularity of the All-on-4 treatment modality, this concept has been adopted extensively in implant dentistry in its moderate form (as implant supported fixed hybrid prostheses replace up-to first molars on either side). Using the SDA concept, dentists can avoid complex surgical procedures and still can provide patients an evidence-based oral rehabilitation.

**Key words:** – Implant Supported Prosthesis, Rehabilitation, Shortened Dental Arch.

## Introduction

According to 8<sup>th</sup> Edition of Glossary of Prosthodontics Terms, 2005<sup>1</sup> various terminologies related to hybrid denture and implants are as following:

**Hybrid denture:** slang for any modification or alteration in the usual form of a dental prosthesis.<sup>1</sup>

**Hybrid prosthesis:** slang for a nonspecific term applied to any prosthesis that does not follow conventional design. Frequently it is used to describe a dental prosthesis that is composed of different materials, types of denture teeth (porcelain, plastic, composite), variable acrylic denture resins, differing metals or design etc. It may refer to a fixed dental prostheses, removable dental prostheses, or maxillofacial prostheses.<sup>1</sup>

**Implant:** any object or material, such as an alloplastic substance or other tissue, which is partially or completely inserted or grafted into the body for therapeutic, diagnostic, prosthetic, or experimental purposes.<sup>1</sup>

**Implant Denture:** *usage.* a denture is not an implantable device. Dental prostheses (fixed dental prostheses, removable dental prostheses) as well as maxillofacial prostheses can be supported and retained in part or whole by dental implants.<sup>1</sup>

**Shortened Dental Arches (SDA):** Käyser AF defined 'shortened dental arches' (SDA) as the functional, aesthetic, and natural dentition of no more than 20 teeth with an intact anterior region but a reduced number of occluding pairs of posterior teeth.<sup>2</sup>

Reported benefits of SDA includes simplification of oral hygiene (OH) maintenance, better prognosis of the remaining teeth, reduction in treatment cost, and preservation of oral tissues. SDA was first used in 1981 by the Dutch prosthodontist And Kayser for a dentition with loss of posterior teeth. After clinical studies, he concluded

that there is sufficient adaptive capacity in subjects with SDA when at least four occlusal units are left (one unit corresponds to a pair of occluding premolars; a pair of occluding molars corresponds to two units).<sup>3</sup>

## Implant Supported Hybrid Prosthesis

The implant-supported hybrid denture has many advantages. Although as few as two to four implants may be used for support, it is beneficial to use more than two implants in the unlikely event that one of the implants fails to function during the patient's life span. Implant placement surgery is relatively simple to perform and, in experienced hands, may take less than an hour. The resultant implant-supported denture has good stability and retention, and patients who receive them have improved function and satisfaction.<sup>4,5</sup>

Another benefit of implant-supported prostheses is that after receiving implants, patients may eat a diet with more fibre. If this is proven, the implant-supported denture would make an important contribution to general health and well-being. Studies have measured the rate of residual ridge resorption in the five years after implant placement. The rate of resorption is decreased significantly from the rates seen with conventional dentures, and recent research has shown that the height of the posterior ridge increases with continued use of implant-supported prostheses.

A 2002 consensus statement developed by scientists and expert clinicians at a symposium on the efficacy of hybrid dentures for the treatment of edentulous patients held at McGill University in Montreal, Quebec, Canada, lists a mandibular hybrid denture as the first choice in treating edentulous patients.<sup>4</sup>

## Concept of Moderate Shortened Dental Arches

A review of the literature on SDA concluded that "shortened dental arches comprising anterior and premolar teeth in general fulfil the requirements of a functional

dentition.”<sup>3</sup> *In the original Brånemark implant treatment, a moderate SDA concept was applied.*<sup>7</sup> In spite of the lack of complete molar support, excellent long-term functional outcome has been demonstrated.<sup>8,9,10</sup> Although not everybody agrees with the SDA concept, no systematic clinical study with conflicting results was found.<sup>3</sup> However, subjects with extreme SDA may exhibit functional problems.<sup>11</sup>

The term moderate has been added as an adjective to the SDAe concept, as in the original SDA concept teeth upto second premolars are being restored, whereas in the implant supported hybrid fixed dentures teeth upto first molar are being restored/replaced. A recent Japanese study found that for full satisfaction of masticatory function at least one pair of opposing first molars was necessary.<sup>12</sup>

Nevertheless, it seems that most of the recent literature accepts the opinion that acceptable dental occlusion is possible in subjects with a reduced dentition. How many teeth are required cannot be answered in general but must be evaluated individually with respect to the wide variation in occlusal morphology and individual adaptability present in the population.<sup>13,14</sup>

#### Discussion

For the patient facing the loss of all his or her remaining natural teeth, the extreme resorption of the mandibular denture bearing areas results in unstable and non-retentive dentures with resultant pain and discomfort. The loose and unstable lower complete denture is one of the most common problems faced by denture patients.<sup>15,16</sup>

A very important factor to be considered for long term success of implant prosthesis is the occlusal status of the implant. Dental implant prosthesis must be examined and followed up on a regular basis. Occlusal overload can be deleterious for implant survival or implant success.<sup>17</sup>

The SDA concept was accepted by a great majority of dentists but not widely practised. The studies reviewed showed that shortened dental arches comprising anterior and premolar teeth in general fulfil the requirements of a functional dentition.<sup>3</sup>

The World Health Organization indicates that a functional, esthetic, natural dentition has at least 20 teeth, while the literature indicates that dental arches comprising the anterior and premolar regions meet the requirements of a functional dentition.<sup>18</sup>

#### Summary and Conclusion

There are no published Randomized Controlled Trials (RCTs) comparing modern implants and conventional prostheses in patients with SDAs. Even if it can be assumed that implant prostheses will provide better long-term outcome than a removable partial denture, the possibility to avoid replacement of the lost molars should be considered according to the SDA concept. In a unilateral SDA, where a removable partial denture is admittedly difficult to fabricate

and use, an implant restoration would ideally be the treatment of choice provided resources are available.<sup>7</sup>

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