

Role of Shortened Dental Arch (SDA) concept in treatment planning – A case report

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I. Introduction

Traditionally dentists believe replacement of all missing /lost teeth is necessary to meet functional demands of the patient and to preserve integrity of the masticatory apparatus. Not replacing all the lost teeth is believed to affect TM joint and supporting tissues of teeth. Thus having 28 teeth is considered as norm, classically referred to as 28 teeth syndrome. All efforts were made to replace all the missing teeth. Restoring dentition to 28 teeth, not only increases the cost of the treatment for the patient but also places huge responsibility on the patient to maintain optimum hygiene as fixed and /or removable prosthesis require high level of patient compliance, leading to increase in rate of failure of restorations. This sometimes makes clinician to think whether he is over treating the patient. Some clinicians challenged concept of restoring dentition to 28 teeth. Dr MM De Van through his works and observations concluded that perpetual preservation of what is remaining is more important than replacing what is lost. Many times replacing minimum number of teeth or maintaining few teeth in oral cavity is enough to meet patient's esthetic and functional demands.

Shortened Dental Arch (SDA) concept has evolved through the works of dutch prosthodontist Arnd Keyser and colleagues 1981, who studied the dynamics of having shortened dental arch and its impact on masticatory efficiency and on masticatory apparatus(1 -8). It was shown from their works that having minimum of four occlusal units (one occlusal unit representing one pair of occluding premolar) or 20 teeth in total, is all that is necessary to maintain and meet esthetic and functional demands of the patient. They found sufficient adaptive capacity in subjects with SDA.

WHO also adopted their work and stated retention of a healthy, natural, functioning dentition comprising not less than 20 teeth and not requiring a prosthesis as their goal for oral health. Especially in developing countries, where due to economic conditions SDA concept can provide a viable treatment option. Thus SDA concept reduces cost, time and failures from over treatment.

SDA concept has changed the way treatment planning is done today. No treatment or minimal treatment is considered sometimes as best option for certain situations.

II. Case Presentation

A case presented here justifies the successful application SDA concept in treatment planning for the patient. Elderly male patient aged 45 years reported to the department of prosthodontics, ibnsina national college for medical studies, Jeddah, Saudi Arabia for treatment for his condition.

His pre operative condition can be seen in the photographs. (Figure 1a,1b,1c,) Patient was extremely affected psychologically with this dental condition, but was highly motivated to get treated.

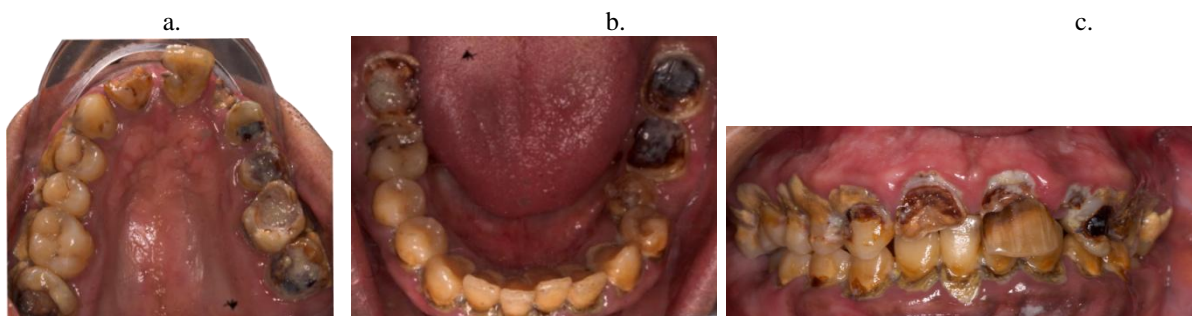


Fig 1a,1b,1c: Pre operative photographs

Thorough examination of the patient was done. His expectations and motivation level and dental attitude were all recorded. Diagnostic casts and wax ups were performed. (Fig 2a,2b)



Fig 2a, 2b: Diagnostic wax up

All the treatment options were discussed with patient. Options to replace all the missing teeth with removable prosthesis, dental implants were presented. During treatment planning discussions with patient, patient presented his unaffordability to replace his missing teeth. His smoking habit was also concern for us to consider dental implants. After weighing the advantages and disadvantages, patient was presented with SDA concept. The advantages like cost, time and ease of maintenance was presented to the patient. After obtaining necessary consent, treatment was commenced in phases. Preliminary phase involved extractions of hopeless teeth. Phase I (etiopathic phase) scaling was done to get plaque under control. Patient was motivated for proper oral hygiene methods. Plaque and bleeding scores were recorded pre operatively and during the phases of treatment. All the carious teeth were restored. Endodontic treatments of the pulpally involved teeth were carried out. Fiber post (3M Dental) and composite core as foundation restoration performed on teeth number 11,21, 23, 24 and 26. Tooth number 25 was extracted earlier by the patient for orthodontic purposes.. Crowns were planned on endodontically treated teeth (11,21, 23, 24 and 26.) to protect them from fracture. (Fig 3a, 3b)



Fig 3a, 3b: Teeth preparations and Final impression using Elastomeric impression material.

Patient was followed up periodically up to one year (Fig 4a,4b,4c,4d and 4e). Patient showed high level of compliance with the treatment provided. There were no subjective masticatory inefficiencies reported. Radiographically there were no pathological changes noted. (Fig 5). Patient was satisfied functionally and esthetically.



Fig 4a, 4b,4c,4d,4e: One year post operative follow up photographs

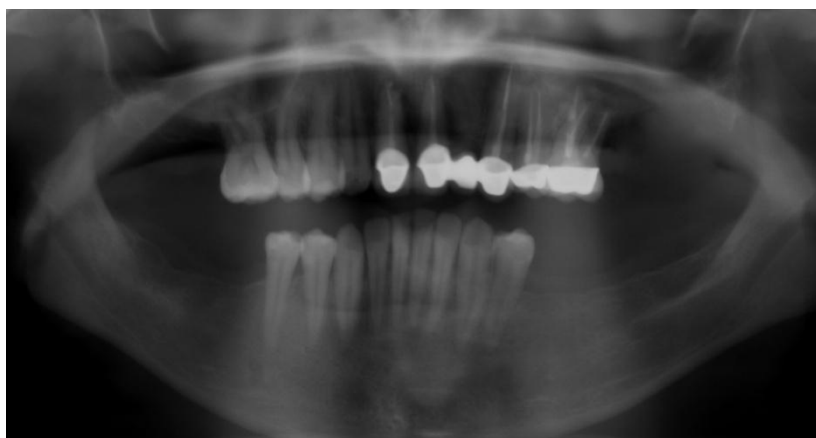
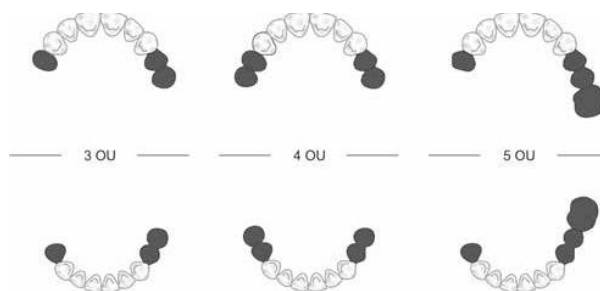


Fig 5. Post operative one year follow up Orthopantograph

III. Discussion

Kayser reported that classic case of shortened dental arch refers to having four occlusal units distributed symmetrically in both arches. Different pattern of shortened dental arch have been reported in the literature, varying from 1 to 5 occlusal units. (Fig 1) (9)



In this case patient had second premolar missing in second quadrant. Tooth number 26 was found in place of missing tooth number 25. In quadrant three occlusion was till tooth number 34. Considerations to replace tooth number 35 with dental implant was ruled out because of patient's smoking and poor economic status. Many times dentists are faced with more challenges to replace lost molars mainly due to lack of abutment support and proximity of anatomical structures like maxillary sinus and mandibular nerves. Replacing lost posteriors with RPD has its concerns with regards to patient acceptance mainly with retention and discomfort during mastication. Oral hygiene and prosthesis hygiene practice by the patient is also very important for the long term prognosis. Decision to not replace any teeth with prosthesis seemed to be best for patient.

Though SDA concept has been widely accepted by the dental professionals, it is still not widely practiced. Many of the concerns surrounding SDA concept which were listed in the literature are masticatory inefficiency, occlusal instability, distal migration of posterior teeth, anterior teeth overloading and periodontal breakdown and TMJ joint dysfunction. (1 to 9)

Watanabe et al study on the occlusal and TMJ loads in patients with shortened dental arches. They evaluated load on TMJ by voluntary clenching in patient with complete and shortened dental arch. They reported that loading was less in patients with shortened dental arch.

Witter et al study also found that the shortened dental arch is not a risk for temporomandibular dysfunction. They further evaluated use of free end saddle rpd in reducing symptoms of TMD and concluded that use distal extension rpds did not prevent signs and symptoms of TMDs. They also reported no improvement in function using RPDs.

Kayser et al in their study found that there was no masticatory inefficiency reported in patient with four occlusal units. They found masticatory efficiency decreased significantly in patients less than four occlusal units. They concluded that there were enough adaptive capacity for patient to maintain adequate oral function in shortened dental arches.

Masticatory inefficiency and occlusal instability were mainly reported in extremely shortened dental arch having 1 to 3 occluding units (one occluding unit comprises of one pair opposing premolars, a molar corresponds to two occluding units). Shortened dental arch with 4 to 5 occluding units have shown to have better functional adaptive capacity and meets esthetic and functional demands of the patient. Having an intact anterior segment of teeth is important for successful use of SDA concept.

Hence in SDA concept treatment is usually concentrated in preserving anterior teeth till premolars. In this case, challenge was to preserve integrity of the anterior teeth segment, which was done with endodontic treatment and fiber post and composite core build up and crowns. Missing tooth 22 was replaced with a fixed dental prosthesis, as having intact anterior teeth is important for the prognosis of the shortened dental arch.

SDA concept renders itself as better treatment option as it meets most of the functional and esthetic demands of the patient and provides ease of maintenance both to patient and dentist. Application of SDA concepts in treatment planning avoids any over treatment by the clinician and also makes treatment more economical and acceptable to the patient. Lastly the decision to consider should be based on patient acceptance, periodontal status of the dentition, cost and patient willingness to undergo complex dental procedures.

IV. Conclusion

SDA concept offers solutions for minimum replacement of teeth which reduces cost and duration of the treatment. It avoids risk of over treatment of the patient. SDA concept has evolved strongly with evidences to back up itself as viable treatment option while considering treatment planning for replacement of the teeth. Many dentist and prosthodontist consider SDA Concept as important tool in treatment planning.

Conflicts of Interest:

We the authors declare that there is no conflicts of interest regarding the publication of this paper.

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