FULL-ARCH IMPLANT-SUPPORTED PROSTHESES: COMPLICATIONS, RISK DETERMINANTS, AND MAINTENANCE BURDEN

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Abstract: *Full-arch implant-supported prostheses are widely used for the rehabilitation of complete edentulism and usually demonstrate high implant and prosthesis survival. However, long-term success should not be judged by survival alone. A restoration may remain in function while being affected by peri-implant disease, marginal bone loss, repeated prosthetic repair, and a substantial need for supportive care. This thesis summarizes current evidence on biologic and technical complications of full-arch implant-supported prostheses, examines the main risk determinants, and highlights maintenance burden as a clinically relevant outcome. The paper is based on a structured critical review of publications indexed in PubMed/MEDLINE, Scopus, and Web of Science. The available evidence indicates that peri-implant mucositis, peri-implantitis, late implant loss, wear or fracture of restorative materials, screw-related complications, and repeated maintenance procedures remain central long-term concerns. Current comparisons of four- and six-implant protocols generally show similar survival and biologic outcomes, whereas differences are more often related to biomechanics, restorative complexity, and service burden. Therefore, treatment planning should incorporate not only*

anatomy and initial stability, but also hygiene access, patient adherence, prosthetic material, and the projected maintenance load.

Keywords: *complete edentulism, full-arch implant-supported prosthesis, biologic complications, technical complications, peri-implantitis, maintenance burden, All-on-4, All-on-6.*

Introduction: Full-arch implant-supported rehabilitation has become an established treatment for patients with complete edentulism because it restores function quickly and improves quality of life. Yet the literature and routine practice often overvalue implant survival and undervalue the cumulative burden of complications that develop during long-term function. Survival is important, but it is not equivalent to success. It does not show whether the patient experiences recurrent soft-tissue inflammation, progressive bone loss, repeated fracture of prosthetic material, screw loosening, or multiple unscheduled visits.

For this reason, full-arch rehabilitation should be interpreted as a long-term restorative system rather than a one-stage surgical-prosthetic event. The true prognosis depends on biologic stability, prosthetic integrity, cleansability, and the patient's capacity to comply with supportive care. The purpose of this thesis is to summarize the major complications of full-arch implant-supported prostheses, identify the principal risk determinants, and define maintenance burden as an independent parameter of long-term treatment success.

Materials and Methods: This thesis was prepared as a structured critical literature review. The search strategy covered PubMed/MEDLINE, Scopus, and Web of Science, with additional hand-searching of reference lists from key studies. The main concepts were full-arch implant prosthesis, fixed complete dental prosthesis, All-on-4, All-on-6, biologic complications, technical complications, peri-implantitis, marginal bone loss, and maintenance. Preference was given to systematic reviews, comparative studies, randomized

clinical trials, and large retrospective cohorts. Because the available literature is heterogeneous in definitions, materials, and maintenance protocols, the evidence was synthesized in a critical narrative format.

Results and Discussion: The reviewed evidence shows that high survival does not eliminate the burden of complications. Biologic and technical events accumulate over time, and their importance becomes clearer as follow-up length increases.

Among biologic complications, peri-implant mucositis is one of the most common findings. In full-arch cases, plaque control is often more difficult than around single crowns because prosthetic contours and the subprosthetic space may limit hygiene access. Thus, mucositis in this setting is not only an inflammatory problem; it is also a design and maintenance problem. If biofilm control is inadequate and professional follow-up is irregular, peri-implantitis may occur. In a full-arch system this complication is especially important because the loss or destabilization of one implant may alter force distribution across the entire prosthesis.

Marginal bone loss is another key indicator, but it must be interpreted carefully. Early remodeling after loading is not equal to failure, whereas progressive bone loss combined with inflammation or overload signals structural instability. Comparative studies of four versus six implants usually report small differences in bone loss and survival, which means that implant number alone is not a universal determinant of outcome. Implant position, bone quality, cantilever design, prosthetic contour, and supportive care are often more decisive.

Technical complications are equally important because they directly affect comfort, cost, and treatment continuity. Metal-acrylic full-arch prostheses remain common because they are affordable and reparable, yet they are prone to wear of acrylic resin, chipping or fracture of veneering material, tooth debonding, and repeated repair. Screw loosening, occlusal corrections,

and replacement of prosthetic components further increase the long-term service burden. Although most of these events can be managed, their accumulation over several years changes the real clinical and economic value of treatment.

The debate between four and six supporting implants should therefore be approached critically. Six implants may improve load distribution in selected cases, but they also increase surgical complexity, cost, and restorative demands. Four-implant protocols can also provide reliable outcomes when case selection is correct and the prosthesis is well designed. Both concepts are viable, and the choice should depend on bone volume, anatomic limitations, prosthetic space, antagonist dentition, parafunctional risk, and the feasibility of long-term maintenance.

Risk determinants can be grouped into three levels. Patient-related determinants include poor oral hygiene, smoking, parafunctional activity, systemic conditions affecting tissue stability, and low adherence to recall visits. Anatomical determinants include reduced bone volume, compromised maxillary bone quality, and unfavorable implant distribution. Restorative and organizational determinants include bulky prosthetic contours, poor cleansability, delayed recognition of inflammation, and inadequate supportive peri-implant care. These factors interact, which is why technically successful delivery does not guarantee a favorable long-term course.

Maintenance burden should therefore be considered an independent clinical outcome. It includes the frequency of unscheduled visits, professional hygiene requirements, periodic prosthesis removal, repairs, component replacement, and the time and financial costs imposed on the patient. This perspective is more clinically meaningful than survival alone because it reflects how the prosthesis performs in real long-term use.

Conclusion: Full-arch implant-supported prostheses are an effective treatment for complete edentulism, but their assessment must extend beyond

implant survival. Biologic complications such as peri-implant mucositis, peri-implantitis, marginal bone loss, and occasional implant loss remain clinically significant. Technical complications also accumulate over time and often determine the practical burden of treatment. Current evidence suggests that four- and six-implant protocols frequently achieve similar survival and biologic results, while differences are more often expressed in biomechanics, restorative complexity, and maintenance demands. The true measure of success is not only whether the prosthesis survives, but how stably and economically it can be maintained during long-term follow-up.

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