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Mechanical and Biological Complications of Angled versus Straight Screw Channel Implant-Supported Prostheses: A Systematic Review and Meta-Analysis

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ADMINISTRATIVE INFORMATION

Support - None.

Review Stage at time of this submission - Preliminary searches.

Conflicts of interest - None declared.

INPLASY registration number: INPLASY202460032

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 09 June 2024 and was last updated on 09 June 2024.

INTRODUCTION

Review question / Objective To investigate mechanical and biological complications of ASC compared to SC implant-supported prostheses. The PICO (population, intervention, comparison, outcome) setting of the current meta-analysis included: (1) P: partially edentulous patients restored with implant-supported prostheses; (2) I: partially edentulous patients with ASC implant-supported prostheses; (3) C: partially edentulous patients with SC implant-supported prostheses; and (4) O: mechanical (porcelain/ceramic chip/fracture/delamination and screw loosening/fracture) and biological complications (marginal bone loss (MBL) and pink esthetic score (PES)) of ASC and SC implant-supported prostheses.

Rationale The angled screw channel (ASC) provides a flexibility for screw retention of implant-supported prostheses. The lack of extensive comparative data on the clinical performance of ASC versus straight screw channel (SC) implant-supported prostheses underscores the importance of an evidence-based method for choosing implant restorations.

Condition being studied The PICO (population, intervention, comparison, outcome) setting of the current meta-analysis included: (1) P: partially edentulous patients restored with implant-supported prostheses; (2) I: partially edentulous patients with ASC implant-supported prostheses; (3) C: partially edentulous patients with SC implant-supported prostheses; and (4) O: mechanical (porcelain/ceramic chip/fracture/delamination and screw loosening/fracture) and biological complications (marginal bone loss (MBL)

and pink esthetic score (PES)) of ASC and SC implant-supported prostheses.

METHODS

Search strategy Two authors made independent electronic searches in the PubMed, Embase, and Web of Science databases with keyword of “angled screw channel” OR “angulated screw channel” OR “angled screw” OR “angulated screw” AND “implant".

Participant or population Partially edentulous patients restored with implant-supported prostheses.

Intervention Partially edentulous patients with ASC implant-supported prostheses.

Comparator Partially edentulous patients with SC implant-supported prostheses.

Study designs to be included Randomized controlled trials (RCTs), prospective or retrospective cohort studies.

Eligibility criteria To generate a recruited study list, the following inclusion criteria will be used: 1) case series with ≥10 partially edentulous patient restored with ASC, 2) and investigating the quantitative evaluation of mechanical or biological complications, 3) available data for baseline and follow-up measurement or in peri-implant MBL or PES 5) follow-up time more than 6 months.

Information sources Two authors made independent electronic searches in the PubMed, Embase, and Web of Science databases with keyword of “angled screw channel” OR “angulated screw channel” OR “angled screw” OR “angulated screw” AND “implant".

Main outcome(s) Mechanical complications (porcelain/ceramic chip/fracture/delamination and screw loosening/fracture) of ASC and SC implant-supported prostheses.

Additional outcome(s) The secondary outcome evaluated in this investigation was biological complications (MBL and PES) of ASC and SC implant-supported prostheses.

Data management Two independent authors conduct the data extraction process for the reviewed studies. The process involved extracting demographic information, study design parameters, specific clinical characteristics of each study group, and the primary and secondary outcome values.

Quality assessment / Risk of bias analysis To investigate the methodological quality of recruited clinical studies, we used the Cochrane risk-of-bias tool for RCTs, version 2 (RoB 2), which consisted of 6 main items: randomization process, intervention adherence, missing outcome data, outcome measurement, selective reporting, and overall risk of bias. In the intervention adherence section of RoB 2, there are two options for literature assessment: intention-to-treat (intervention assignment) or per-protocol (intervention adherence). In this meta-analysis, we chose the per-protocol evaluation, since it fits the design of our included studies. Newcastle-Ottawa Scale was applied for non-randomized cohort studies with 7 main criteria: representative of patients, selection of control, ascertain of exposure, demonstration that outcome of interest, comparability of cohorts on basis of design or analysis, and assessment of outcome.

Strategy of data synthesis The current meta-analysis was conducted with a random-effects model, using Comprehensive Meta-Analysis software, version 3 (Biostat, Englewood, NJ). A two-tailed p value less than 0.05 was considered statistically significant. We chose odds ratios and 95% confidence intervals (CIs) to quantify the primary outcomes (mechanical complications such as porcelain/ceramic chip/fracture/delamination and screw loosening/fracture). We chose difference in means and their 95% CIs to investigate the secondary outcome (biological complications such as MBL and PES).
The I2 and Cochran’s Q statistics were used to evaluate the degree of heterogeneity among studies. An I2 value of 25%, 50%, and 75% was considered low, moderate, and high heterogeneity, respectively.

Subgroup analysis None.

Sensitivity analysis To confirm the robustness of the meta-analysis, the sensitivity analyses were performed using one-study removal method to see if there was a significant change in the summary effect size after removing a particular trial from the analysis.

Language restriction English language.

Country(ies) involved United States.

Keywords angled screw channel, angulated screw channel, angled screw, angulated screw, implant, clinical studies, meta-analysis, systematic review.

Contributions of each author

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