

## Systematic Review Dental Implants

# Success rate and complications associated with dental implants in the incisive canal region: a systematic review

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**Abstract.** A systematic review was conducted to evaluate the success rate of dental implants placed in the incisive canal region and the complications related to this procedure. An electronic search was performed in the PubMed, Scopus, and Web of Science databases. Articles reporting the incisive canal deflation technique or neurovascular bundle lateralization technique, with or without concomitant dental implant installation and grafting procedures, were evaluated. Ten articles met the inclusion criteria; only one retrospective study and one longitudinal clinical trial were found. A total of 91 implants were installed in this region, and implant success ranged from 84.6% to 100%. With regard to complications, three articles reported temporary sensory loss. Permanent sensory loss in the palatal mucosa region was reported in one study applying neurovascular bundle lateralization. Five studies were assessed in the quality analysis: four were of moderate quality and one was of low quality. Although a high success rate was described in the selected studies, caution is recommended when dental implants are installed in the incisive canal region due to the low level of evidence available. Regarding complications, there are no parameters for predicting the occurrence of sensory disturbances or the extent of damage with the use of incisive canal deflation or neurovascular bundle lateralization.

**Key words:** dental implant; maxillary incisive canal; nasopalatine canal; incisive foramen.

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### Introduction

Rehabilitation of the anterior maxillary region remains a clinical challenge in dental implantology. Predictable and precise planning and execution of the treatment are essential to achieve good

aesthetic, phonetic, and functional outcomes<sup>1</sup>.

Post-extraction dental bone resorption may hinder the placement of dental implants in this region<sup>2</sup>, especially in cases where the patient has had an edentulous segment for a long period of time,

and also in complex cases where there is bone loss due to trauma. Thus, it is often necessary to perform grafting procedures prior to implant placement. Guided bone regeneration with barrier membranes, ridge expansion of the alveolar process, and particulate bone and bone block

procedures are among the surgical grafting techniques currently in use, as well as combinations of these techniques. Different types of graft may be used, such as autogenous bone (from the same patient), allogeneic bone (from individuals of the same species), xenogeneic bone (from a different species to that of the recipient), and alloplastic material (biomaterial of synthetic origin)<sup>3</sup>. However, in complex cases of bone atrophy, particularly those that occur in the anterior maxilla, options for reconstructive grafting and the distribution of implants in the edentulous segment may be restricted due to an insufficient height and thickness of bone, as well as the presence of important anatomical structures such as the incisive canal.

The incisive canal is located in the midline of the maxilla, and its foramen is described as a funnel-shaped hole situated between the two halves of the palate, behind the upper central incisors<sup>4</sup>. This canal contains the nasopalatine nerve and the terminal branch of the nasopalatine artery, which provide innervation and vascularization to the palatal region from canine to canine. These structures also form anastomoses with the greater palatine nerve and artery, so there is a collateral neurovascular supply<sup>5</sup>. Great variations in the shape and size of this canal are reported in the literature<sup>6,7</sup>. The dental status of the anterior maxilla (presence or absence of one or two central incisors), as well as patient sex and age, can have an influence on the morphology of the canal<sup>6-16</sup>.

Bone graft filling of the site for anterior maxilla dental implant rehabilitation has been performed successfully using two techniques: incisive canal deflation and neurovascular bundle lateralization<sup>17,18</sup>. The former consists of the removal of the neurovascular bundle and the use of a particulate graft, which can be concomitant or not with dental implant placement, while the latter is described as the manipulation of the neurovascular bundle in a posterior direction, usually associated with bone grafting, with or without concomitant dental implant installation. There have been reports of the occurrence of complications, such as hyperesthesia and hypoesthesia, with the use of both of these techniques<sup>17,18</sup>.

This surgical procedure can provide an elective anchorage area for dental implants in a region thought to be critical. This systematic literature review was performed to obtain an answer to the following guiding question: What is the success rate of dental implants installed in the

incisive canal region and what are the complications that can be expected with this type of surgery?

## Materials and method

### Procedure

This systematic review was conducted according to the criteria of the PRISMA statement (Preferred Reporting Items for Systematic Reviews and Meta-Analyses)<sup>19,20</sup>.

Two independent reviewers (JSM and GC) performed an electronic literature search of the PubMed (<http://www.ncbi.nlm.nih.gov/pubmed/>), Scopus (<http://www.scopus.com/home.uri>), and Web of Science (<https://www.webofknowledge.com/>) databases.

### Search strategy

The search strategy used in the different databases followed three lines of search elements, using the following medical subject heading (MeSH) terms: (1) Dental Implant[Mesh] OR Implants, Dental OR Dental Implant OR Implant, Dental OR Dental Prostheses, Surgical OR Dental Prosthesis, Surgical OR Surgical Dental Prostheses OR Surgical Dental Prosthesis OR Prostheses, Surgical Dental OR Prosthesis, Surgical Dental AND maxillary

incisive canal; (2) Dental Implant[Mesh] OR Implants, Dental OR Dental Implant OR Implant, Dental OR Dental Prostheses, Surgical OR Dental Prosthesis, Surgical OR Surgical Dental Prostheses OR Surgical Dental Prosthesis OR Prostheses, Surgical Dental OR Prosthesis, Surgical Dental AND nasopalatine canal; (3) Dental Implant[Mesh] OR Implants, Dental OR Dental Implant OR Implant, Dental OR Dental Prostheses, Surgical OR Dental Prosthesis, Surgical OR Surgical Dental Prostheses OR Surgical Dental Prosthesis OR Prostheses, Surgical Dental OR Prosthesis, Surgical Dental AND incisive foramen.

### Study selection

The reviewers (JSM and GC) extracted all data independently from each other. EndNote software (<https://www.myendnoteweb.com/>) was used as an auxiliary tool to organize the items identified and remove duplicates. The entire article selection process, from identification to final selection, is shown in Fig. 1.

For the initial selection, the article titles and abstracts were analyzed after the removal of duplicates. Following this, the final choice of articles to be included was made after full-text reading. Articles that met the eligibility criteria were included. Any uncertainties regarding

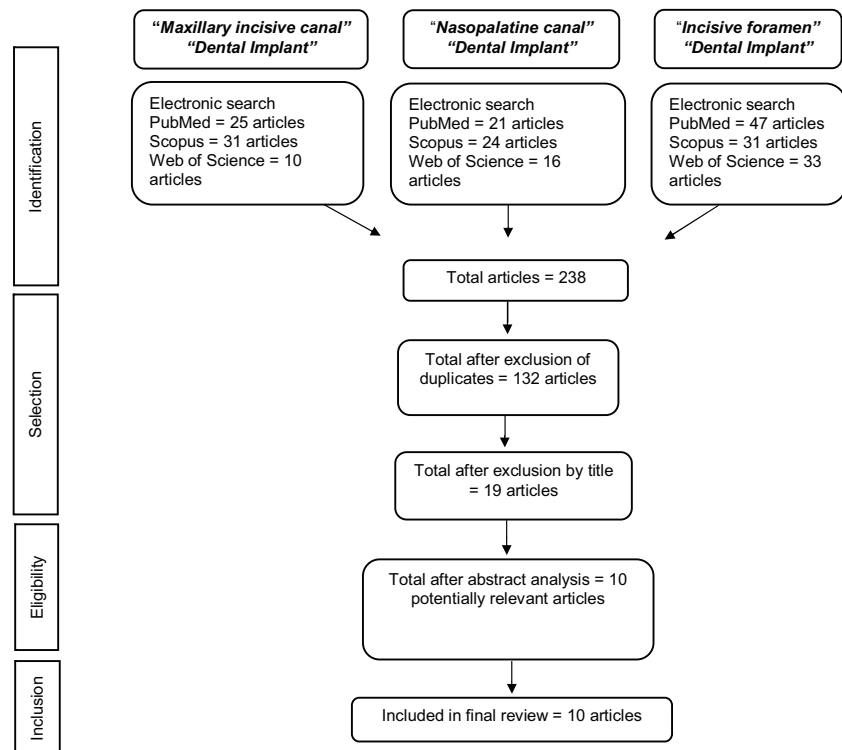


Fig. 1. Flow diagram of the search process.

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