



UNIVERSIDADE FEDERAL FLUMINENSE
FACULDADE DE ODONTOLOGIA

**REPOSIÇÃO PROTÉTICA VERSUS FECHAMENTO DO ESPAÇO NA AGENESIA
DO INCISIVO LATERAL SUPERIOR: UMA REVISÃO SISTEMÁTICA**

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**REPOSIÇÃO PROTÉTICA VERSUS FECHAMENTO DO ESPAÇO NA AGENESIA
DO INCISIVO LATERAL SUPERIOR: UMA REVISÃO SISTEMÁTICA**

GIORDANI SANTOS SILVEIRA

Dissertação apresentada à Faculdade de Odontologia da Universidade Federal Fluminense, como parte dos requisitos para obtenção do título de Mestre, pelo Programa de Pós-Graduação em Odontologia.

Área de Concentração: ORTODONTIA

Orientador: Prof. Dr. José Nelson Mucha
Coorientadora: Prof^a. Dr^a. Cláudia Trindade Mattos

Niterói

2015

BANCA EXAMINADORA

Prof. Dr. José Nelson Mucha

Instituição: Faculdade de Odontologia da UFF

Decisão: _____ Assinatura: _____

Prof^a. Dr^a. Cláudia Trindade Mattos

Instituição: Faculdade de Odontologia da UFF

Decisão: _____ Assinatura: _____

Prof. Dr. Dauro Douglas Oliveira

Instituição: Faculdade de Odontologia da PUC-MG

Decisão: _____ Assinatura: _____

DEDICATÓRIA

Para Lucca e Gustavo, detentores da natural curiosidade infantil que todo pesquisador nunca deveria perder.

AGRADECIMENTOS

Aos meus pais, Ana e Galvão, pelos ensinamentos intencionais ou não, pelo apoio incondicional às minhas escolhas, e principalmente à minha mãe pelo frequente apoio logístico, me substituindo na rotina paterna com sua particular amabilidade.

À minha esposa, Juliana, que inegavelmente ficou sobrecarregada no cuidado de nossos filhos no decorrer destes dois anos, pela minha frequente ausência.

Ao meu irmão, Vandrê, pela acolhida total em terras fluminenses e pela oportunidade de renovar o nosso convívio fraterno.

Àquele que me apresentou a Ortodontia, Professor Alexandre Fortes Drummond, pela amizade e respeito que sempre dedicou a mim.

Aos professores do curso de especialização em Ortodontia da Universidade de Itaúna, Minas Gerais, pelos ensinamentos; especialmente os Professores Marcos Souza Pinto de Carvalho e Luiz Fernando Eto, pelos incentivos, reconhecimento e amizade.

À CAPES (Coordenação de Aperfeiçoamento de Pessoal de Nível Superior) pela concessão da bolsa de estudo que me permitiu custear parte dos gastos referentes às várias viagens de Belo Horizonte à Niterói.

Ao coordenador do curso, Professor Oswaldo de Vasconcellos Vilella, com quem compartilho a paixão pela história e os livros, pelos ensinamentos e, especialmente, por sua intervenção incisiva (trocadilho incidental) que foi fundamental no “ressurgimento” deste trabalho, tal qual a mitológica fênix.

Ao meu orientador, Professor José Nelson Mucha, por sua irrestrita atenção em ensinar-me de ortodontia à tecnologia, pela sua orientação assertiva e dinâmica, pela sua particular capacidade de me motivar, pelas oportunidades confiadas à mim que resultaram em significativas publicações e prêmio; enfim, pelo orgulho de ser seu aluno. Quando se convive com um ídolo corre-se o risco de ver confirmado o aforismo “Como são admiráveis as pessoas que não conhecemos bem”; felizmente, a minha experiência com este Mestre é uma antítese do Millôr.

À minha orientadora, Professora Cláudia Trindade Mattos, por sua abnegação e dedicação na coorientação deste trabalho, mesmo estando de licença maternidade. Admito um pesar por não ter convivido mais tempo com esta profícua pesquisadora e atenciosa professora.

À Daniele Masterson Tavares Pereira, bibliotecária do centro de saúde da UFRJ, a quem reverencio a competência profissional e a generosidade, pela extraordinária orientação na elaboração das estratégias de busca deste trabalho. Sem exageros, representa o arquétipo do funcionário público que um país que pretende ser relevante deveria valorizar e privilegiar em seus quadros.

Ao professor Alexandre Trindade Simões da Motta, contemporâneo na Ortodontia, pelos ensinamentos e exemplo de postura profissional, informal, mas não menos respeitosa, que com tanta propriedade o deixa próximo dos seus alunos; e pela contribuição na publicação mais significativa da minha carreira, devidamente comemorada sob a refrescante brisa da Barra da Tijuca, aos sabores italianos, inclusive de Montalcino.

À Professora Adriana de Alcântara Cury Saramago, pela disponibilidade e diligência na correção e nas sugestões dadas na confecção deste trabalho, além da sua particular amabilidade e gentileza.

Às Professoras Andréa Fonseca Jardim da Motta, Beatriz de Souza Vilella, Mariana Martins e Martins e Márcia Tereza de Oliveira Caetano, pelo convívio amistoso e atenção dispensada a mim.

À minha turma de mestrado, a qual denomino, “Os Ortoito”: Henry, Letícia, Luíza, Marlon, Ricardo, Rizomar e Thaís, pela valiosa troca de experiências, pelo companheirismo, pelos divertidos “seminários” na filial niteroiense de um estabelecimento australiano, e, sobretudo, pela amizade consolidada.

Aos colegas da 9ª turma do curso de especialização, pela acolhida, salutar convivência e ensinamentos (muitos!). Em especial, ao Johnny de Gauw e à Natália Almeida, pelas parcerias que resultaram em trabalhos já publicados e outros que ainda serão; e à Lillian Chinem, pelo exemplo de postura “zen”, gentileza e atenção.

À Dona Lizete, portadora de contagiante sorriso e alegria, por manter o nosso ambiente tão aconchegante.

RESUMO

Silveira GS. Reposição protética versus fechamento do espaço na agenesia do incisivo lateral superior: uma revisão sistemática.[dissertação]. Niterói: Universidade Federal Fluminense, Faculdade de Odontologia; 2015.

Introdução: Ausências de incisivos laterais superiores são desafiadoras quanto à definição do melhor tratamento. O objetivo desta revisão foi determinar, com a melhor evidência disponível na literatura, o melhor tratamento para a agenesia do incisivo lateral superior, avaliando-se os resultados estético, oclusal (funcional) e periodontal, entre reposição protética e fechamento ortodôntico do espaço. **Material e método:** As bases de dados eletrônicas (Cochrane Central Register of Controlled Trials - CENTRAL, MEDLINE via PubMed, Web of Science, Scopus e LILACS) foram pesquisadas sem restrição de idioma ou data. Uma pesquisa manual nas listas de referências dos potenciais estudos também foi realizada. **Resultados:** A busca inicial identificou 2174 artigos, sendo 1196 excluídos por serem duplicados. Títulos e resumos de 978 artigos foram acessados, e 954 foram excluídos. Foram lidos na íntegra 24 artigos, 12 foram excluídos após a aplicação dos critérios de inclusão e exclusão, restando 12 artigos incluídos. Na análise do risco de viés, 2 estudos foram classificados como baixo risco, 4 como médio risco e 6 como alto risco de viés. Dados dos artigos selecionados foram extraídos e compilados em tabela para a comparação e a análise dos resultados. **Conclusões:** Próteses dentossuportadas parecem apresentar um custo periodontal maior do que o fechamento do espaço; próteses implantossuportadas apresentaram resultados satisfatórios em até 3 anos; o fechamento do espaço foi mais bem avaliado esteticamente do que as reposições protéticas; e a presença ou não da desoclusão lateral guiada pelos caninos não apresentou relação com a função oclusal e nem com os sinais e sintomas de DTMs.

Palavras-chave: Agenesia, incisivo lateral superior, fechamento ortodôntico do espaço, ortodontia, prótese dentária, prótese dentária implantossuportada.

ABSTRACT

Silveira GS. Prosthetic replacement versus space closure in maxillary lateral incisor agenesis: A systematic review [dissertation]. Niterói: Universidade Federal Fluminense, Faculdade de Odontologia; 2015.

Introduction: Maxillary lateral incisor agenesis is a challenge as regards definition of the best treatment. The aim of this study was to determine, by means of the best evidence available in the literature, the paramount treatment for maxillary lateral incisor agenesis, evaluating the esthetic, occlusal (functional) and periodontal results between prosthetic replacement and orthodontic space closure. **Material and Method:** Electronic databases (Cochrane Central Register of Controlled Trials - CENTRAL, MEDLINE via PubMed, Web of Science, Scopus and LILACS) were searched with no restriction on language or initial date. A manual search in the reference lists of the potential studies was performed. **Results:** The search identified 2174 articles, and 1196 were excluded because they were duplicates. Titles and abstracts of 978 articles were accessed, and 954 were excluded. In total, 24 articles were read in full, 12 were excluded after applying the inclusion and exclusion criteria, with the 12 remaining articles being included. In the risk of bias analysis, 2 studies were classified as low risk, 4 medium risk, and 6 with high risk of bias. Data were extracted from the articles selected, and a table was compiled for comparison and analysis of the results. **Conclusions:** Tooth-supported prosthodontics appear to present a higher periodontal cost than space closure; implant-supported dental prostheses showed satisfactory in 3 years follow-up; space closure was better evaluated esthetically than prosthetic replacements; and the presence or absence of a canine rise showed no relationship with occlusal function or with signs and symptoms of TMDs.

Keywords: Agenesis; maxillary lateral incisor; orthodontic space closure; orthodontics; dental prosthesis; dental prosthesis, implant-supported.

1 - INTRODUÇÃO

Aproximadamente 20% de todos os dentes congenitamente ausentes são incisivos laterais superiores.^{19,63} A agenesia bilateral é mais comum do que a ausência unitária^{62,63} e há predomínio no sexo feminino.^{62,63} Esta situação clínica desperta um grande interesse nos pacientes pelo tratamento ortodôntico devido ao impacto estético negativo, geralmente percebido pela assimetria do sorriso e pela presença de espaços (diastemas) entre os dentes.^{12,19}

Pode-se considerar que as opções de tratamento para a agenesia dos incisivos laterais superiores são: prótese parcial removível,¹⁸ prótese parcial fixa convencional,^{16,18} prótese adesiva,^{16,19} prótese implantossuportada,^{11,23,45} autotransplante dentário^{64,65} e fechamento ortodôntico do espaço seguido de recontornos dentários.^{4,8,18-22} A escolha da melhor alternativa terapêutica continua sendo um tema polêmico no meio acadêmico e profissional, com mais de cinco décadas de debates.^{1-7,12} O ponto central desta falta de consenso é a decisão em provisionar espaço para a reposição dos dentes ausentes ou realizar o fechamento ortodôntico dos espaços.

Diversos autores^{2,9-11,12,15} apresentaram parâmetros utilizados na definição entre o fechamento ou a abertura do espaço, tais como: volume labial; ângulo nasolabial; comprimento do lábio superior; protrusão maxilo-mandibular; relação molar; condições de espaço, apinhamentos ou diastemas; além da cor, formato e posição dos caninos.

As características que privilegiariam a manutenção ou abertura do espaço para a reposição protética do incisivo lateral são as seguintes: ângulo naso-labial aberto, lábios finos, relação molar classe I ou III de Angle, diastemas generalizados, e incompatibilidade de cor entre o incisivo central superior e o canino.^{2,12,15}

Já o fechamento do espaço poderia ser o tratamento de escolha para os pacientes com: biprotusão dento-alveolar e relação molar de classe I, relação molar de classe II sem deficiência de espaço no arco inferior, relação de classe I com discrepância negativa de espaço no arco inferior, canino inclinado para mesial e com dimensão mesiodistal menor do que o incisivo central.^{2, 8,9,20}

Por outro lado, a escolha pela abertura ou fechamento do espaço também pode ser determinada pela experiência de cada profissional e pela interação entre o ortodontista, o protesista e o especialista em dentística restauradora. Em um estudo¹⁷ realizado no Reino Unido, os ortodontistas foram mais propensos ao fechamento do espaço, ao passo que os profissionais da dentística restauradora e implantodontia à abertura do espaço. Além disso, quando o ortodontista estava inserido em um ambiente multidisciplinar a indicação de fechamento de espaço foi menos frequente em comparação aos ortodontistas que trabalhavam sozinhos.¹⁷

A decisão por uma alternativa de tratamento envolvendo a ausência de incisivos laterais superiores deve englobar dados de diagnóstico específicos^{2,9-11,12,15} e informações pós tratamento^{18,19,24,45} que tenham embasamento científico, e não opiniões dogmáticas com alternâncias históricas como as observadas durante o século passado.²⁴

Andrade et al.²⁶ constataram, por meio de uma revisão sistemática, não existir evidência científica que sustente qualquer uma das opções de tratamento para a agenesia do incisivo lateral superior, pois não identificaram nenhum ensaio clínico randomizado (RCT) ou quasi-RCT. Reconheceram, entretanto, que este problema clínico é tão complexo, pelas diversas variáveis envolvidas, que a resposta pelo melhor tratamento pode nunca ser dada se for considerada apenas a evidência oriunda de RCTs. Portanto, estudos com menor hierarquia de evidência poderiam ser considerados para a determinação e orientação de procedimentos clínicos nestes casos.

Sendo assim, a presente revisão sistemática tem como objetivo determinar, com a melhor evidência disponível, a melhor modalidade de tratamento para os casos de agenesia do incisivo lateral superior, por meio da avaliação dos resultados estético, oclusal (funcional) e/ou periodontal das opções de reposição protética e fechamento ortodôntico do espaço.

Poderia ainda ser formulada como Hipótese Nula que os resultados são similares, ou então como Hipótese Alternativa que um tratamento apresenta vantagens sobre o outro em determinados aspectos clínicos.

2 - METODOLOGIA

Na elaboração deste estudo adotou-se as orientações e diretrizes determinadas pelo *Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement*.²⁷

2.1 Critérios de Seleção

Para auxiliar a busca e a aplicação dos critérios de inclusão/exclusão foi elaborado o formato (PICO) utilizado: População; Intervenção; Controle/Comparação e; *Outcome* – Desfechos Clínicos (**Figura 1**).

P- População	Indivíduos em dentição permanente, com agenesia de incisivo(s) lateral(is) superior(es), submetidos ao tratamento ortodôntico e/ou protético.
I- Intervenção	Fechamento dos espaços e reposições protéticas
C- Comparação	Características clínicas após fechamento dos espaços e reposições protéticas
O- Outcome – Desfechos Clínicos	Identificar o tratamento com os melhores resultados estéticos, oclusais (funcionais) e/ou periodontais imediatos e em acompanhamento pós-tratamento.
Pergunta	Qual tratamento, entre o fechamento do espaço ou substituição protética, apresenta melhores resultados nas ausências de incisivo lateral superior.
Hipótese Nula	Os resultados são similares

Figura 1. Formato PICO.

Os estudos selecionados foram: a- Ensaio prospectivos randomizados (RCTs); b- Ensaio prospectivos controlados (CCTs); c- Estudo retrospectivo longitudinal; d- Estudos caso-controle.

A **Figura 2** descreve os critérios de inclusão/exclusão utilizados. Todos os estudos que avaliaram os resultados, especificamente os aspectos: oclusal, periodontal e/ou estético, dos diferentes tratamentos protéticos e do fechamento ortodôntico do espaço para os casos de agenesia dos incisivos laterais superiores, unilateral e/ou bilateral, na dentição permanente, foram incluídos.

Para os casos de reposição protética não foi feita distinção entre aqueles que tiveram intervenção ortodôntica prévia ou não. Já na modalidade de fechamento ortodôntico do espaço, apenas os casos tratados com aparelhos ortodônticos fixos foram incluídos.

Os demais critérios de exclusão aplicados foram: perda dentária por trauma ou cárie, ausência de outros dentes na maxila, outras anomalias dentárias (dentes supranumerários, retidos ou ectópicos), tratamentos interceptativos ou provisórios, pacientes portadores de síndromes ou fissuras lábio-palatinas, relato de cirurgia ortognática, artigos de revisão, artigos de opinião, relatos e série de casos, descrição de técnicas e estudos que utilizaram imagens manipuladas ou criadas em computador.

I- Critérios de inclusão	II- Critérios de exclusão
1. Ensaios prospectivos randomizados (RCTs), ensaios prospectivos controlados (CCTs), estudos retrospectivos longitudinais e estudos caso-controle.	Estudos epidemiológicos, revisões narrativas, artigos de opinião, relato de casos, artigos com imagens criadas ou manipuladas no computador.
2. Portadores de agenesia de incisivos laterais superiores (uni ou bilateral).	Ausências de outros dentes na maxila e outras anomalias dentárias (ectopia, dente supranumerário, dente retido, transposição).
3. Dentição permanente.	Pacientes com patologias, síndromicos e/ou fissurados.
4. Tratamentos concluídos : ortodôntico com fechamento do espaço e reposições protéticas.	Tratamentos ortodônticos corretivos com aparelhos removíveis, interceptativos e próteses provisórias.
5. Avaliação dos resultados nos parâmetros: estéticos e/ou oclusais (funcionais) e/ou periodontais.	Trabalhos de descrição de técnicas protéticas e/ou cirúrgicas.

Figura 2. Critérios de inclusão e exclusão dos estudos.

2.2 Fontes de Busca

A pesquisa bibliográfica foi concluída em setembro de 2014, com atualização em janeiro de 2015, sem restrição de data inicial ou de idioma. Para identificar os estudos publicados foi realizada uma pesquisa eletrônica computadorizada, utilizando-se as seguintes bases de dados: Biblioteca Cochrane (<http://www.bireme.br/cochrane>) - *The Cochrane controlled trials register*; *Medline database- Entrez PubMed* (<http://www.ncbi.nlm.nih.gov/>); Web of Science - via portal Periódicos Capes; Scopus – via portal Periódicos Capes; e Lilacs (Centro Latino Americano e do Caribe de informação em ciências da saúde) - via portal Periódicos Capes.

As referências dos trabalhos listados na pesquisa também foram analisadas para selecionar possíveis artigos relevantes ausentes nas bases de dados.

2.3 Estratégia de busca eletrônica

O processo de identificação dos estudos foi executado, sob orientação de uma bibliotecária com larga experiência em buscas bibliográficas (D.P.F.), utilizando as palavras chaves, expressões e as suas possíveis combinações obtidas através de um mapeamento conceitual, a fim de englobar o maior número de trabalhos relacionados com os objetivos propostos para este estudo. As estratégias de busca estão ilustradas na **Figura 3**.

Base de dados	Estratégia de busca
Pubmed	<p>("upper lateral incisor"[tiab] OR "maxillary lateral incisor"[tiab] OR incisor[MH] OR incisor[tiab]) AND (anodontia[mh] OR anodontia[tiab] OR "teeth agenesis"[tiab] OR "tooth agenesis"[tiab] OR hypodontia[tiab] OR oligodontia[tiab] OR "dental agenesis"[tiab] OR "partial anodontia"[tiab] OR "missing teeth"[tiab] OR "missing tooth"[tiab] OR "absent teeth"[tiab] OR "absent tooth"[tiab] OR "congenitally missing"[tiab] OR "congenitally absent"[tiab] OR missing[tiab] OR absent[tiab]) AND (Orthodontics[MH] OR "orthodontic treatment"[tiab] OR "orthodontic therapy"[tiab] OR Tooth movement[MH] OR "orthodontic movement"[tiab] OR "teeth movement"[tiab] OR Orthodontic space closure[MH] OR "orthodontic space closure"[tiab] OR "orthodontic dental space closure"[tiab] OR "canine substitution"[tiab] OR "mesial movement of canine"[tiab] OR "mesial movement of cuspid"[tiab] OR Dental implants[MH] OR "dental implant"[tiab] OR "single tooth implant"[tiab] OR "single-tooth implant"[tiab] OR "single-tooth implants"[tiab] OR "single-tooth dental implant"[tiab] OR Denture, partial, fixed[MH] OR "Denture partial fixed"[tiab] OR fixed bridge* OR "fixed partial denture"[tiab] OR pontic[tiab] OR Denture, partial, removable[MH] OR "denture removable partial"[tiab] OR Denture, partial, fixed, resin-bonded[mh] OR "maryland bridge dental"[tiab] OR "resin-bonded bridge"[tiab] OR "resin-bonded fixed partial denture"[tiab] OR "resin-bonded acid etched fixed partial denture"[tiab] OR Dental prosthesis[MH] OR "dental prosthesis"[tiab] OR "prosthetic replacement"[tiab] OR Dental prosthesis, implant-supported[MH] OR "prosthesis implant-supported dental"[tiab])</p>
Web of Science	<p>#1: TS=("upper lateral incisor" OR "maxillary lateral incisor" OR incisor) #2: TS=(anodontia OR "teeth agenesis" or hypodontia OR oligodontia OR "dental agenesis" OR "partial anodontia" OR "missing teeth" OR "missing tooth" OR "absent teeth" OR "absent tooth" OR "congenitally missing" OR "congenitally absent" or missing or absent) #3: TS=(orthodontics OR "orthodontic treatment" OR "orthodontic therapy" OR Tooth movement or "teeth movement" OR "Orthodontic space closure" OR "orthodontic space closure" OR "orthodontic dental space closure" OR "canine substitution" OR "mesial movement of canine" OR "mesial movement of cuspid" OR Dental implants OR "single tooth implant" OR "single-tooth dental implant" OR "Denture partial fixed" or fixed bridge* OR "fixed partial denture" OR pontic OR "Denture partial removable" OR "Denture partial fixed resin-bonded" OR "maryland bridge dental" OR "resin-bonded bridge" OR "resin-bonded fixed partial denture" OR "resin-bonded acid etched fixed partial denture" OR "Dental prosthesis" OR "dental prosthesis" OR "prosthetic replacement" OR "Dental prosthesis implant-supported" OR "prosthesis implant-supported dental") #1 AND #2 AND #3 (DocType=All document types; Language=All languages)</p>
Scopus	<p>("upper lateral incisor" OR "maxillary lateral incisor" OR incisor) AND (anodontia OR "teeth agenesis" or hypodontia OR oligodontia OR "dental agenesis" OR "partial anodontia" OR "missing teeth" OR "missing tooth" OR "absent teeth" OR "absent tooth" OR "congenitally missing" OR "congenitally absent" or missing or absent) AND (orthodontics OR "orthodontic treatment" OR "orthodontic therapy" OR Tooth movement or "teeth movement" OR "Orthodontic space closure" OR "orthodontic space closure" OR "orthodontic dental space closure" OR "canine substitution" OR "mesial movement of canine" OR "mesial movement of cuspid" OR Dental implants OR "single tooth implant" OR "single-tooth dental implant" OR "Denture partial fixed" or fixed bridge* OR "fixed partial denture" OR pontic OR "Denture partial removable" OR "Denture partial fixed resin-bonded" OR "maryland bridge dental" OR "resin-bonded bridge" OR "resin-bonded fixed partial denture" OR "resin-bonded acid etched fixed partial denture" OR "dental prosthesis" OR "prosthetic replacement" OR "Dental prosthesis implant-supported" OR "prosthesis implant-supported dental")</p>
Lilacs	<p>("incisor" or "incisivo lateral superior" or "incisivo lateral maxilar" or "incisivos laterales superiores") AND ("anodontia" or "anodontia" or "anodoncia" or "agenesia dental" or "agenesia dentária" or "tooth agenesis" or "teeth agenesis" or "dental agenesis" or "hipodontia" or "hipodoncia" or "hypodontia" or "oligodontia" or "oligodoncia" or "dente ausente" or "ausência dentária" or "ausencias de dientes" or "dientes ausentes" or "absent tooth" or "missing tooth" or "missing teeth" or "anodontia parcial" or "anodoncia parcial" or "partial anodontia" or "ausência congênita" or "ausencia congénita" or "congenitally missing" or "congenitally absent") AND ("orthodontics" or "tooth movement" or MH:"orthodontic space closure" or "dental implants" or "denture, partial, fixed" or "denture, partial, removable" or "denture, partial, fixed, resin-bonded" or "dental prosthesis" or "dental prosthesis, implant-supported" or "ortodontia" or "ortodoncia" or "orthodontics" or "tratamento ortodôntico" or "tratamiento ortodôntico" or "orthodontic treatment" or "movimento dentário" or "movimiento dentario" or "tooth movement" or "teeth movement" or "fechamento de espaço ortodôntico" or "fechamento do espaço" or "cierre del espacio ortodôntico" or "cierre del espacio" or "orthodontic space closure" or "mesialização do canino" or "movimento mesial do canino" or "substituição canina" or "movimiento mesial del canino" or "sustitución canina" or "mesial movement of canine" or "mesial movement of cuspid" or "canine substitution" or "implantes dentários" or "implante dental" "implantes dentales" or "dental implant" or "dental implants" or "implante unitário" or "implante dental unitario" or "single tooth implant" or "single-tooth implants" or "single-tooth dental implant" or "prótese fixa" or "prótese fixa parcial" or "protésis fija" or "protésis parcial fija" or "fixed brigde" or "partial fixed bridge" or "denture partial fixed" or "prótese parcial removível" or "protésis parcial removible" or "denture partial removable" or "prótese adesiva" or "protésis adhesiva" or "denture partial fixed resin-bonded" or "prótese dentária" or "reposição protética" or "protésis dentales" or "sustitución protésica" or "dental prosthesis" or "prosthetic replacement" or "prótese dentária implantossuportada" or "prótese implantossuportada" or "protésis dentales implantosoportadas" or "protésis implantosoportadas" or "dental prosthesis implant-supported")</p>

CENTRAL	<ul style="list-style-type: none"> #1 "upper lateral incisor" #2 "maxillary lateral incisor" #3 MeSH descriptor: [Incisor] explode all trees #4 #1 or #2 or #3 #5 MeSH descriptor: [Anodontia] explode all trees #6 "tooth agenesis" #7 hypodontia #8 oligodontia #9 "missing teeth" #10 "missing tooth" #11 "absent teeth" #12 "absent tooth" #13 "congenitally missing" #14 "congenitally absent" #15 #5 or #6 or #7 or #8 or #9 or #10 or #11 or #12 or #13 or #14 #16 MeSH descriptor: [Orthodontics] explode all trees #17 "orthodontic treatment" #18 "orthodontic therapy" #19 MeSH descriptor: [Tooth Movement] explode all trees #20 "orthodontic movement" #21 "teeth movement" #22 MeSH descriptor: [Orthodontic Space Closure] explode all trees #23 #16 or #17 or #18 or #19 or #20 or #21 or #22 #24 MeSH descriptor: [Dental Implants] explode all trees #25 "dental implant" #26 "single tooth implant" #27 "single-tooth implant" #28 "single-tooth dental implant" #29 #23 or #24 or #25 or #26 or #27 or #28 #30 MeSH descriptor: [Denture, Partial, Fixed] explode all trees #31 "fixed bridge" #32 "fixed partial denture" #33 pontic #34 #30 or #31 or #32 or #33 #35 MeSH descriptor: [Denture, Partial, Fixed, Resin-Bonded] explode all trees #36 "resin-bonded bridge" #37 "resin-bonded fixed partial denture" #38 #35 or #36 or #37 #39 MeSH descriptor: [Dental Prosthesis] explode all trees #40 "prosthetic replacement" #41 #39 or #40 #42 MeSH descriptor: [Dental Prosthesis, Implant-Supported] explode all trees #43 "implant-supported dental prosthesis" #44 "prosthesis implant-supported dental" #45 #42 or #43 or #44 #46 #23 or #29 or #34 or #38 or #41 or #45 #47 #4 and #18 and #46
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Figura 3. Lista dos parâmetros usados em cada base de dados.

Dos resultados obtidos foram eliminados os artigos repetidos. Os títulos e resumos foram lidos de forma independente por dois revisores (G.S.S. e N.V.A.) e os artigos que apresentavam características compatíveis aos critérios de inclusão desta pesquisa foram selecionados para a leitura do texto na íntegra.

Dos artigos incluídos foram extraídos os dados para serem organizados em tabelas, também de forma independente pelos dois revisores (G.S.S. e N.V.A.). As discordâncias entre os 2 revisores nestas duas etapas foram resolvidas por meio de uma reunião de consenso com um terceiro pesquisador (C.T.M.). Quando foi

observada a falta de dados nos artigos para permitir a comparação com outros trabalhos, tentou-se obtê-los através de contato com os autores por meio de correio eletrônico.

Para determinar o risco de viés de cada um dos estudos selecionados utilizou-se como referência o *Cochrane Handbook for Systematic Reviews of Interventions* (versão 5.1.0)²⁸ com seis domínios específicos distintos entre os estudos prospectivos e os retrospectivos, dentre os quais: cálculo amostral, geração da sequência aleatória, ocultação de alocação, cegamento de medidas, desfechos incompletos, relatos de perdas e outras fontes de viés. Cada um dos estudos foi classificado como baixo, médio ou alto risco de viés segundo o seguinte critério: baixo, se 5 ou mais domínios foram considerados adequados; moderado, se 3 ou 4 domínios tiveram a resposta “sim”; e alto, se o estudo recebeu 2 ou menos respostas “sim”.²⁹ Dois revisores (G.S.S e N.V.A.) avaliaram, de maneira independente, o risco de viés de cada um dos estudos selecionados e as discordâncias foram resolvidas numa reunião com um terceiro pesquisador (C.T.M.).

2.4 Seleção dos Estudos

A fim de reduzir a subjetividade, apenas os estudos que apresentaram critérios bem definidos de avaliação dos parâmetros: oclusal, estético e/ou periodontal, passíveis de análise quantitativa, foram selecionados, conforme descrito abaixo:

2.4.1 Critérios estéticos

A percepção da aparência dentária pode ser avaliada de três maneiras: (1) autoavaliação dos pacientes submetidos ao tratamento;^{19,44} (2) avaliação de fotografias de tratamentos realizados, classificados por leigos, dentistas e

ortodontistas;^{46,47} e (3) investigação da presença ou classificação de parâmetros estéticos profissionais preconizados pela literatura.^{43,48-50}

A autoavaliação e a avaliação de tratamentos de terceiros podem ser acessadas através do uso de escala visual ou questionários que exploram a avaliação com adjetivos antônimos.

Na escala visual analógica (EVA)⁴⁴ o avaliador marca um ponto que demonstra a percepção da atratividade do sorriso em um segmento de reta de 100mm de comprimento, onde a extremidade esquerda representa o pior aspecto estético e a extremidade direita o melhor.

O índice estético de Eastman⁶⁶ lança mão de questionários em que há três opções de resposta para cada pergunta: positiva, negativa e sem opinião.

Já o Índice Estético Dentário de Iowa⁶⁷ apresenta uma associação das duas metodologias anteriores sendo baseada em seis pares de adjetivos contrários – como: bom/ruim; satisfatório/insatisfatório; feio/bonito; atraente/não atraente; comum/incomum; e agradável/desagradável – e há uma escala de 1 a 6 para cada um destes pares, com os adjetivos positivos relacionados ao número 1 e os negativos ao 6.

Os parâmetros estéticos preconizados na literatura são: WHR: relação largura/altura;^{48,49} GZ: zênite gengival do incisivo lateral superior;⁴⁸ GP: proporção áurea nos seis dentes anteriores;⁴⁹ ACD: dimensão de contato aparente;⁵⁰ e índice PES/WES.⁴³

A relação largura/altura (WHR)^{48,49} é obtida dividindo-se a largura do dente pela sua altura. Este parâmetro foi comparado entre os incisivos laterais naturais, coroas dos implantes e caninos recontornados a fim de identificar se havia diferenças significativas com impacto na estética.

O zênite gengival (GZ)⁴⁸ é definido como o ponto mais apical do contorno gengival. Ele geralmente está localizado à distal do longo eixo para os incisivos e caninos, enquanto que para os incisivos laterais ele coincide com o longo eixo. Para a análise do GZ, uma linha (GZL) é traçada ligando o GZ do incisivo central e o GZ do canino, para cada lado da arcada, e mede-se a distância perpendicular do GZ do incisivo lateral a esta linha. A distância é considerada positiva quando o GZ do incisivo lateral está posicionado abaixo da linha GZL e negativa quando está acima.

De acordo com alguns autores,⁴⁸ o ideal estético é aquele em que o zênite do incisivo lateral está abaixo dos zênites do incisivo central e canino.

A proporção áurea (GP)⁴⁹ que compreende a razão de 0,618 para 1, foi descrita por Pitágoras, matemático grego, como uma tentativa de correlacionar ciência e beleza. Alguns autores⁴⁹ recomendam que a largura do incisivo lateral superior deve estar em GP com a largura dos incisivo central superior numa vista frontal, bem como o canino com o incisivo lateral superior.

A dimensão de contato aparente (ACD)⁵⁰ é a distância medida entre o ponto de contato e a crista da papila. É um importante parâmetro de avaliação das áreas proximais dos dentes anteriores, principalmente no que diz respeito à presença de espaços negros, com consequências estéticas e fonéticas.

O índice PES/WES⁴³ é uma combinação da avaliação estética dos tecidos moles peri-implantares denominada "*Pink Esthetic Score*" com o índice "*White Esthetic Score*" que foi proposto para avaliar os aspectos estéticos da coroa do implante. Sendo assim, o PES/WES não limita-se apenas aos aspectos do tecido mole em volta do implante, mas também à parte visível da prótese implantossuportada. Dez variáveis são avaliadas: papila mesial, papila distal, curvatura da mucosa vestibular, convexidade da raiz/cor, textura do tecido mole na região vestibular do implante, forma da coroa, volume, cor, textura da superfície e translucência. Uma escala de 0,1 ou 2 é assinalada para cada um dos parâmetros através de comparação direta com o dente natural contralateral de referência, estimando o grau de compatibilidade e incompatibilidade, ou seja, maior valor, maior compatibilidade. O escore máximo possível é 10, tanto para o PES quanto para o WES, o que representa a maior equivalência com o dente natural contralateral. É utilizado para os casos unilaterais.

2.4.2 Critérios de avaliação da saúde periodontal

A situação dos tecidos de suporte dentário pode ser avaliada, basicamente, por quatro índices: gengival, irritante, de placa e periodontal. Sendo que cada um

destes é aplicado para cada dente individualmente em quatro (vestibular, lingual, mesial e distal) ou seis sítios (mesiovestibular, vestibular, distovestibular, distolingual, lingual e mesiolingual), de acordo com o método utilizado.^{18,19,68,69}

No índice gengival cada medida é ranqueada de 0 a 3 de acordo com a severidade da inflamação, mudança de cor, edema, sangramento à sondagem, contorno gengival e ulceração.⁶⁸ Há também o registro de sangramento à sondagem presente ou ausente, sem considerar a quantidade.⁶⁸ A retração gengival vestibular pode também ser avaliada em relação à junção cimento-esmalte, como: (a) visível; (b) visível com menos de 2 mm de superfície radicular exposta; e (c) visível com 2 mm ou mais de superfície radicular exposta.^{68,69}

No índice irritante ou de retenção a escala também pode ser de 0 a 3 de forma crescente, com base na presença e severidade de irritantes, como: cálculo, excesso de restaurações e lesão cariosa.⁶⁸ Alternativamente, estes fatores de retenção podem ser avaliados em relação à margem gengival, como: sem contato, em contato, e ≥ 1 mm apical.⁶⁹

O índice de placa pode ser obtido através da porcentagem da cobertura coronária pela placa bacteriana, numa escala de 0 a 3, revelada por evidenciadores de placa,⁶⁸ ou ainda pelo registro da presença ou ausência de placa bacteriana sob sondagem.⁶⁹

O índice periodontal pode ser avaliado pela maior medida registrada de profundidade de sondagem do sulco gengival nos sítios de medida, para cada dente, com uma sonda periodontal de Michigan.¹⁸ Ou ainda, pelo registro da presença de bolsas com mais de 3 mm.⁶⁹

Nos casos de avaliação de implantes, a mudança pós-cirúrgica no nível ósseo marginal peri-implante é definida como a modificação na distância entre a junção intermediária (*abutment*) – implante e o ponto mais coronal do osso, observado em radiografias periapicais obtidas com posicionadores.⁷⁰ A profundidade de sondagem mesial e distal pode ser registrada nos períodos pós-tratamento, além da presença ou não de sangramento neste exame. O nível da gengiva marginal após a inserção da coroa do implante pode ser avaliado segundo o índice papilar.⁷¹

2.4.3 Critérios de função oclusal e disfunção

Através de exames clínicos realiza-se a avaliação estática e dinâmica da oclusão nos seguintes parâmetros, utilizando-se carbono ou cera interoclusal: distância sagital, vertical e lateral entre relação cêntrica e máxima intercuspidação habitual, identificada entre: $< 0,5$ mm e $\geq 0,5$ mm; presença de guia pelos dentes caninos, função em grupo e número de dentes em contato no lado de trabalho; registro do número de contatos no lado de balanceio durante lateralidade; e identificação de contatos prematuros na guia anterior.^{18,19}

Para a determinação do índice Helkimo⁷² de disfunção clínica faz-se necessário o exame de alguns parâmetros como: extensão máxima dos movimentos mandibulares, desvios mandibulares na abertura, sons nas ATMs, travamento das ATMs ou luxação, dor muscular e nos movimentos mandibulares. Um questionário direcionado para os sintomas das disfunções têmporo-mandibulares, parafunção e qualidade dos contatos oclusais completa as condições para o cálculo do índice para cada indivíduo e, finalmente, a classificação entre: disfunção ausente ou leve, disfunção moderada e disfunção severa.

3 - ARTIGO PRODUZIDO

Prosthetic replacement versus space closure in maxillary lateral incisor agenesis: a systematic review

Treatment options of maxillary lateral incisor agenesis: a systematic review

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ABSTRACT

Introduction: Maxillary lateral incisor agenesis is a challenge as regards decision of the best treatment. The aim of this study was to determine, by means of the best evidence available in the literature, the paramount treatment for maxillary lateral incisor agenesis, evaluating the esthetic, occlusal (functional) and periodontal results between prosthetic replacement and orthodontic space closure. **Material and Method:** Electronic databases (Cochrane Central Register of Controlled Trials - CENTRAL, MEDLINE via PubMed, Web of Science, Scopus and LILACS) were searched with no restriction on language or initial date. A manual search in the reference lists of the potential studies was performed. **Results:** The search identified 2174 articles, and 1196 were excluded because they were duplicates. Titles and abstracts of 978 articles were accessed, and 954 were excluded. In total, 24 articles were read in full, 12 were excluded after applying the inclusion and exclusion criteria, with the 12 remaining articles being included. In the risk of bias analysis, 2 studies were classified as low risk, 4 medium risk, and 6 with high risk of bias. Data were extracted from the articles selected, and a table was compiled for comparison and analysis of the results. **Conclusions:** Tooth-supported prosthodontics appear to present a higher periodontal cost than space closure; implant-supported dental prostheses showed satisfactory in 3 years follow-up; space closure was better evaluated esthetically than prosthetic replacements, and the presence or absence of a canine rise showed no relationship with occlusal function or with signs and symptoms of TMDs.

Keywords: Agenesis; maxillary lateral incisor; orthodontic space closure; orthodontics; dental prosthesis; implant-supported.

INTRODUCTION

The treatment of maxillary lateral incisor agenesis continues to be a polemic topic in the academic and professional media, after over five decades of debates.¹⁻⁷ The central point of this lack of consensus is the decision to provide space for the prosthetic replacement of these absent teeth, or orthodontic closure of the spaces, followed by anatomic contouring of the canines.

Some authors⁸⁻¹² have considered that certain clinical characteristics must be analyzed for definition of the best therapeutic alternative to be implemented, such as: age, type of sagittal malocclusion, condition of space in the dental arches, and facial profile.

Other authors have had opposed opinions. Those who defend prosthetic replacement of the absent incisors and maintenance of the maxillary canines in a Class I relationship, base themselves on the requirement of occlusion protected by the canine (during lateral movements of the mandible)^{13,14} and the difficulty of obtaining adequate esthetics when the canine plays the role of the lateral incisor, either due to the difference in color, shape and/or root volume.^{15,16} On the other hand, those who defend orthodontic space closure, generally orthodontists,¹⁷ argue that the periodontal status is more favorable than the cases with fixed or removable dentures.^{8,18,19} In addition, the esthetic appearance obtained is closer to the natural aspect, than that of any artificial replacement, provided that the orthodontist performs in the canine the correct enameloplasty and adequate lingual torque of the root.^{2,8,20,21}

There are numerous articles on this subject, but the large majority are narrative reviews, articles of opinion, case series and case reports.^{1-6, 8-12, 20-23} The comparative studies of Nordquist and McNeill¹⁸ (1975), and Senty²⁴ (1976), may be considered classics, due to their pioneering nature, although in one²⁴ the analysis was eminently subjective. Robertsson and Mohlin¹⁹ (2000), taking advantage of the technical improvements in dental prostheses (i.e. porcelain bonded to gold and resin-bonded bridge) incorporated into this interval of 25 years, conducted a study that also occupies an outstanding place in dental literature, considering the frequency with which it is referenced. However, none of these three studies^{18,19,24} have evaluated

the implant-supported dentures that are at present considered the first prosthetic option for the absence of these teeth.^{16,25}

Andrade et al.²⁶ by means of a systematic review conducted in 2011 and published in 2013, found that there is no scientific evidence that supports any of the options of treatment for maxillary lateral incisor agenesis, because they did not identify any randomized clinical trial (RCT) or quasi-RCT. Nevertheless, they recognized that this clinical problem is so complex, because of the different variables involved, that the answer to the best treatment may never be given if one were to consider only the evidence arising from RCTs; therefore, studies with a lower hierarchy of evidence may be considered for the determination and guidance of clinical procedures in cases of maxillary lateral incisor agenesis.

Therefore, the aim of the present systematic review was to determine, with the highest level evidence available, which is the best treatment modality of cases of maxillary lateral incisor agenesis, by means of evaluation of the esthetic, occlusal (functional) and periodontal results, of the options of prosthetic replacement and orthodontic space closure.

MATERIAL AND METHOD

The report of this systematic review was carried out in accordance with the guidance and guidelines determined by the *Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement*.²⁷ The following study designs were included in this review: randomized controlled study (RCT), controlled clinical trials (CCT), longitudinal retrospective and case-control studies.

All the studies that evaluated the results of the different prosthetic treatments and orthodontic space closure procedures for cases of unilateral and/or bilateral maxillary lateral incisor agenesis, in permanent dentition, and which specifically evaluated the occlusal, periodontal and esthetic aspects, were included.

For the cases of prosthetic replacement, no distinction was made between those in which there had been previous orthodontic intervention, or not. Whereas in

the orthodontic space closure modality, only the cases treated with fixed orthodontic appliances were included.

The other exclusion criteria applied were as follows: tooth loss due to trauma or caries; absence of other teeth in the maxilla; other dental anomalies (supernumerary, impacted or ectopic teeth); interceptive or provisional treatments; patients with syndromes or cleft lip and palate; report of orthognathic surgery, review articles, opinion articles, series of case reports, descriptions of techniques and studies that used images that were manipulated or created on computers.

The following electronic databases were searched in September 2014, without restriction on language or initial date: Cochrane Central Register of Controlled Trials (CENTRAL), MEDLINE via PubMed, Web of Science, Scopus and LILACS. The search strategies illustrated in **Table 1** were obtained under the guidance of a librarian experienced in bibliographic searches in the area of health, by means of a process of identification of key words, expressions and their possible combinations, in order to encompass the largest number of studies related to the objectives proposed for this study. A manual search in the reference lists of the potential studies, and an additional electronic search to update the results was performed in January 2015.

Of the results obtained, repeated articles were eliminated. The titles and abstracts were read independently by two reviewers (G.S.S. and N.V.A.). The articles that showed characteristics compatible with those of the inclusion criteria of this research were selected to read the text in full.

From the articles included, data were extracted to be organized in tables, and this was also done independently by the two reviewers (G.S.S. and N.V.A.) Disagreements between the 2 reviewers in these two stages were resolved by means of a consensus meeting with a third researcher (C.T.M.). When a lack of data was observed in the articles, in order to allow comparison with other studies, an attempt was made to obtain them by contacting the authors by e-mail.

To determine the risk of bias of each of the studies selected, an adaptation was made, using as reference, the Cochrane Handbook for Systematic Reviews of Interventions (version 5.1.0)²⁸, with six specific and different domains between the prospective and retrospective studies. Each of the studies was classified as having

low, medium or high risk of bias, in accordance with the following criterion low, if 5 or more domains were considered adequate; moderate, if 3 or 4 domains obtained the response "yes"; and high, if the study received 2 or fewer "yes" responses, according to that used by Mai et al.²⁹ Two reviewers (G.S.S and N.V.A.) independently evaluated the risk of each of the studies selected, and disagreements were resolved in a meeting with a third researcher (C.T.M.).

RESULTS

The initial search identified 2174 articles, and 1196 were excluded because they were duplicates. The titles and abstracts of the 978 remaining articles were accessed, of which 954 were excluded because they were not related to the subject, or because they did not fulfill the eligibility criteria. Twenty-four articles were read in full, with 11 being excluded for the following reasons: absence of other teeth in the maxilla,³⁰⁻³⁷ orthodontic treatment with removable appliance^{38,39} and comparison of the esthetic demand of different social groups without distinction between the types of treatment.⁴⁰

Of the 13 articles that met the inclusion criteria, two were prospective studies 1 RCT⁴¹ and 1 CCT,⁴² which longitudinally evaluated periodontal alterations of implants. The others were retrospective studies: one⁴³ that longitudinally evaluated esthetics and periodontal alterations of implants, and 10 case-control studies^{18,19,24,44-50} that compared the results of different types of treatment. It was decided to exclude one of the case-control studies²⁴ because the occlusal and esthetic evaluations were basically descriptive, with a highly subjective nature, consequently, without possibility of applying quantitative criteria. Therefore, 12 studies were included in this review **(Figure 1)**.

Three studies^{18,19,45} compared the periodontal and occlusal results of cases of space closure with tooth-supported^{18,19} and implant supported dental prostheses.⁴⁵ One study¹⁹ also compared the esthetic result, evaluated by the patients themselves, and two studies^{18,45} evaluated the presence of signs and symptoms of TMD.

Whereas the other 6 studies^{44,46-50} compared only the esthetic results of the different types of treatment. In three studies,^{44,46,47} dental professionals and laypersons evaluated photographs without knowing the type of treatment performed. Armbruster et al⁴⁶ used the best results of each treatment modality, and Thamir et al⁴⁷ selected cases with median results.

In the other three studies⁴⁸⁻⁵⁰ different esthetic criteria were used, such as WHR: width/height ratio, GZ: gingival zenith of the maxillary lateral incisor, GP: Golden proportion in the 6 anterior teeth, and ACD: apparent contact dimension, in one and the same sample, varying only between individuals with unilateral and/or bilateral agenesis. This information about the sample was obtained from one of the authors by means of e-mail contact, and other data also not cited in the article were obtained, such as the age of individuals of the sample and time of evaluation in post-treatment (**Table 2**). This same research group also conducted the study that compared the functional and periodontal aspects both in space closure and with implant-supported dental prostheses.⁴⁵

The risk of bias was divided into two tables (**Tables 3 and 4**) in accordance with the guidance of the Cochrane Handbook,²⁸ which does not recommend comparison using the same criteria used in prospective and retrospective studies. There is an intrinsic difference between these two study designs which presupposes a higher risk of bias in retrospective studies, irrespective of the total risk evaluated of the studies of each table are in the same category (for example: low). Only two articles in this category were considered, one prospective⁴¹ and the other, retrospective.⁴³ Four retrospective studies^{44-46,49} were classified as having medium risk of bias and the others^{18,19,42,47,48,50} as having high risk of bias, including 1 of them being a prospective study.⁴²

Periodontal Status

There were two types of periodontal evaluation. The first type of evaluation made use of the comparison of types of treatment using the following indexes: gingival, irritant, plaque, periodontal and/or papilla, which categorized edema and gingival color, bleeding on probing, ulcerations, retentive factors, quantity of bacterial

plaque, probing depth, gingival retraction on the vestibular surface and filling of the interdental space by the papilla.^{18,19, 45}

Nordquist and McNeill¹⁸ identified differences ($p < 0.01$) between the space closure group and the groups with prosthetic replacement (**Table 2**). Among the dental prostheses evaluated, the group with removable dentures presented the largest quantity of bacterial plaque on the central incisors and canines, and the group with fixed dental prostheses the highest index of mechanical irritant and pocket depth values in these same teeth.

Robertsson and Mohlin¹⁹ investigated whether the situation of porcelain bonded to gold and resin-bonded bridge could present better periodontal results, but this was not confirmed. With regard to the prevalence of gingival dehiscence on the vestibular surface of maxillary premolars, no study^{18,19,45} found significant difference between the groups. When space closure was compared with implant-supported dental prosthesis, the results of all the indexes were similar, with the exception of the papilla index; that is, there was less filling of the interdental space by the papilla between the central and prosthetic lateral incisor in the implant group.⁴⁵

In the second type of evaluation, longitudinal follow-up was made of the cases of implant-supported dental prostheses,⁴¹⁻⁴³ in which the following were evaluated: bone loss, probing depth, gingival index (GI), plaque index (PI), frequency of bleeding on probing (BOP), and papilla Index (PIS). The results found are listed in **Table 2**.

Occlusal function

Static and dynamic occlusion,^{18,19} and the signs and symptoms of temporomandibular disorders (TMDs)^{19,45} were compared between the types of treatment.^{18,19,45} The occlusal evaluation was measured by the following: presence of cuspid rise or group function, number of contacts on the working side, difference between RC and OC in the anterior and lateral direction, number of premature contacts on the side of balance, and number of premature contacts on the anterior guide.^{18,19} The signs and symptoms of TMDs were obtained by means of clinical exams that recorded the maximum extension of the mandibular movements,

mandibular deviation on opening, locking, luxation and sounds in TMJs; and questionnaires, based on the Helkimo clinical dysfunction index.^{19,45}

Nordquist and McNeill,¹⁸ and Robertsson and Mohlin¹⁹ found statistically significant differences only in the prevalence of group function, which was present in 100%¹⁸ and 96%¹⁹ of the space closure groups, and 89%¹⁸ and 67%¹⁹ in the prosthetic replacement groups. For De Marchi et al,⁴⁵ 42% of the space closure group and 20% of the group with implants presented group function, and the prevalence of abfraction showed no difference between the groups.

As regards the TMJ dysfunction index (modified Helkimo) no statistically significant differences were found between the space closure groups and those with prosthetic replacement^{19,45} (**Table 2**), and in one study¹⁹ 72% of the sample presented no or only mild dysfunction of the TMJ.

Esthetics

Dental esthetics were evaluated in three ways: (1) self-evaluation by the patients themselves who were submitted to the treatment;^{19,44} (2) evaluation of photographs of the treatments performed, classified by laypersons, dentists and orthodontists,^{44,46,47} and (3) investigation of the presence or classification of professional esthetic parameters recommended by the literature.^{43,48-50}

Robertsson and Mohlin¹⁹ used a questionnaire in which the opinions of patients were assessed, with regard to the shape, color and symmetry of the teeth, and distribution of spaces between them in the anterior region of the maxilla. The opinions about these points showed no significant differences between the groups, except for the color of teeth close to the central incisors, in which 80% of patients in the prosthetic replacement group were satisfied, against 45% of the space closure group of patients ($p < 0.01$). There was 73% dissatisfaction with the symmetry of teeth in cases of unilateral incisor agenesis against 40%, considering the total sample, irrespective of the type of treatment performed. As regards the appearance of the teeth, 93% of the patients in the space closure group were very or moderately satisfied, against 65% in the prosthetic replacement group of patients ($p < 0.05$). Similarly, when the opinion about the appearance of their teeth compared with those

of their friends was evaluated, the space closure group also showed greater satisfaction ($p < 0.05$) than the prosthetic replacement group of patients.

De-Marchi et al⁴⁴ used a visual analog scale, as regards the degree of satisfaction with the smile esthetics. The individuals who were treated were shown to be significantly more satisfied with their own smile than those in the untreated group. When considered alone, the space closure group was the one evaluated as being the best.

In the study of Armbruster et al⁴⁶ the laypersons attributed the highest scores to cases of space closure with canines moved in the mesial direction, better than the control group (individuals with normal dentition).

Considering the total group, or isolated groups of clinical dentists, orthodontists and laypersons; the highest scores were attributed to space closure, and the lowest scores (worst esthetics) to the untreated cases.⁴⁷

Mangano et al⁴³ evaluated the esthetics and bone loss in single Morse cone implants in a follow up period of 36 months. The esthetic result was evaluated objectively by one independent examiner, by means of the PES/WES index, which categorizes the characteristics of the surrounding periodontal structures (PES) and the coronal prosthetic element itself (WES), on a scale from 1 to 10, with 10 being the most favorable score. The final result was very well evaluated in the two requisites with mean values of over 8. It was also observed that 40% of the gingival papillae did not completely fill the interdental space, and there was no gingival recession in the period observed.

Three studies⁴⁸⁻⁵⁰ used the same sample to compare space closure, replacement with implant and a control group with normal dentition, based on different professional esthetic parameters.

Pini et al^{48,50} analyzed the width/height ratio of the six anterior teeth and the gingival zenith of the tooth or dental prosthesis located in the position of the lateral incisor. There were no differences ($p < 0,05$) between the three groups in the two parameters,⁴⁸ however, when a different statistical test was used,⁵⁰ the space closure group presented a difference from the implant and control groups, in gingival zenith. The golden proportion of the 6 anterior teeth was investigated by Pini et al,⁴⁹ and no successive proportion was found between the central and lateral incisors, and lateral

incisors and canines, in any of the groups, without significant differences among them. The ACD (apparent contact dimension), obtained by measuring the distance from the gingival papilla crest to the point of contact, revealed greater exposure of the interdental space ($p < 0.05$) in the group of implants than in the other two groups.⁵⁰

As a result of the heterogeneity of the studies included in this systematic review (**Table 2**), particularly in the types of designs of the researches and variables evaluated, it was not feasible to perform a meta-analysis.

DISCUSSION

During the bibliographic searches to conduct this study, two systematic reviews^{26,51} were identified. One of these⁵¹ selected the articles that compared space closure with implants in cases of absence of maxillary anterior teeth. Whereas the other review²⁶ contemplated only the treatment of maxillary lateral incisor agenesis, and in spite of not having found any RCTs, presented three studies.^{19,32,38} Out of both reviews, only one article¹⁹ fulfilled the inclusion criteria, and was selected for this review.

When analyzing the studies selected for this review, it was observed that the majority of the data extracted about the treatment of maxillary lateral incisor treatment continued to be obtained from retrospective studies, but no longer exclusively, because two prospective studies were found.^{41,42} However, it is important to point out that only one type of treatment (i.e. implant) was evaluated, and the post-treatment observation period was short, up to 3 years.

The risk of bias evaluation in the selected studies found gaps in practically all the domains, such as: sample calculation, random sequence generation, blinding of allocation and blinding of measures. Of these, the sample calculation is perhaps the only item that could have been performed in all the studies.

The indication for opening/maintenance of space or closure with movement of canines in the mesial direction was backed mainly by the characteristics presented by the patients, such as: labial volume, nasolabial angle; upper lip length; maxillo-

mandibular protrusion; molar relation; space conditions - crowding or diastemas; color, shape and position of canines; and age.^{8-12,16}

A 35-year-old individual with Class III (Angle) and anterior deficiency of the upper lip does not have the same indication for treatment as a 15-year-old patient with dental and upper lip protrusion, Class II (Angle) and aligned mandibular arch. Space opening is the treatment of choice in the first mentioned case and space closure, the choice in the second case.⁵¹ Therefore, generation of the random sequence in the distribution of the sample between the 2 treatment groups (opening followed by prosthetic replacement versus space closure) to be observed, finds an ethics barrier when a prospective comparative study is being conducted. The groups to be compared in this study design are¹⁹ and will in fact differ with regard to the diagnostic characteristics.

Blinding of allocation and blinding of measures become unfeasible, because the treatment modality is identifiable in the clinical exam. There is no way to guarantee that the examiner performs the measurements with complete exclusion of his/her convictions.

Within the parameters evaluated in the studies selected and included, esthetic evaluation demonstrated the possibility of blinding the measurements when the layperson public was used as evaluator. Whereas, the presence of dentists as evaluators may be seen with reservations in this domain, because in some photographs, it is possible to identify the type of treatment performed, and again, the opinion of professionals may be influenced by the extent of their knowledge.

In addition to these limitations, there is also the difficulty in obtaining an adequate number of individuals, as determined by the sample calculation, to undergo the treatments, each in a standardized manner, and still have a long-term post-treatment evaluation, without ignoring the sample losses throughout the study. One study²⁶ has previously warned about the importance of considering data, other than only those arising from RCTs, to back up clinical practice with regard to the treatment of maxillary lateral incisor agenesis, on pain of never having these data. From this point of view, one could therefore consider that the best information that has been researched up to the present date, collected, organized and available, is contained in the present review.

Tooth-supported dental prostheses, irrespective of the modality, present a worse periodontal condition than that of cases of space closure, in which there are only natural teeth.^{18,19} Factors leading to bacterial plaque retention, such as pontics, clasps on removable dentures and eventual under-contours and maladaptations to abutment teeth of conventional fixed dentures have been pointed out as the main features responsible for this condition.

None of the studies^{18,19,45} that evaluated space closure made reference to the presence of fixed splinting, in spite of the recognized tendency towards reopening of spaces and the recommendation to bond them for stability of the result.^{8,20,21,52} Probably, this difference in periodontal status was observed by the absence of fixed splinting in the space closure groups, since it presents factors for bacterial plaque retention, such as orthodontic archwires and resins.

On the other hand, the implant-supported dental prostheses showed a similar tendency towards plaque retention to that of cases of space closure.⁴⁵ There are three important periodontal problems related to implants in the anterior region of the maxilla, with consequent unfavorable esthetic effect: vestibular gingival retraction,^{30,51,53-55} incomplete filling of the interdental space by the papilla⁵⁶ and infraocclusion of the implant,^{34,51,53,54,55} especially in follow-ups of approximately 10 years.

Furthermore, there are reports of bone losses around the implants, with high variability among individuals.^{54,55} The data from the studies included present vestibular gingival retraction of 0.6 mm in 12 months,⁴² bone losses with a mean of 1.0 mm^{41,42} and 0.5 mm.⁴³ But the post-treatment follow-up time was shorter than 4 years. The PIS index, 3 (i.e. papilla filling the interdental space) was found in 82% of the implants in the study of Zarone⁴², and in 49% of the implants in the study of Degidi⁴¹.

Although commercial brands, surgical and prosthetic protocols of implants may influence the results obtained,⁴³ comparison of these two studies^{41,42} revealed that when the follow-up period was longer than 12 months, the presence of papilla filling the interdental spaces was drastically reduced.

Comparison of the gingival papillae between the cases of space closure, and those of implants revealed less filling of the interdental space by papillae between the

central and lateral incisor in the implant group.⁴⁵ It should also be pointed out that the patients evaluated in these studies were youngsters⁴¹⁻⁴³ and these variables have a tendency to worsen over the years.^{30,45,51} One must also expect a loss of leveling between the implant crown and adjacent over the course of time, due to the continual eruption of natural teeth,^{51,53-54} even in adult patients.³⁴ This situation becomes more critical from the esthetic point of view, in the cases of a gummy smile and unilateral replacement.^{51,54,55}

With regard to esthetic evaluation, the comparison of WHR in the 6 anterior teeth revealed a greater width of canines moved in the mesial direction and a greater height of implants than that of natural lateral incisors.⁴⁸ The adequate position of the lateral incisor "Gingival Zenith" in the cases of space closure was shown to be more critical to obtain ($p < 0.05$), also with negative values, but care must be taken of implants as well, because of their greater height.

The prevalence of "Golden Proportion" was low in the cases of maxillary lateral incisor agenesis, irrespective of the treatment modality, being similar to that of other studies that investigated it in health dentitions.⁴⁹ The "Apparent Contact Dimension" confirmed greater difficulty with obtaining complete filling of the interdental spaces by papillas with implants when compared with space closure.⁵⁰ When using the PES/WES index for the first time in the evaluation of maxillary incisors implants, Mangano et al⁴³ recorded very favorable results, but once again, the follow-up time was only 3 years.

Despite these aspects having been critically evaluated by professionals in dentistry, it is fundamental to know what the esthetic perception of laypersons is, and the perception the patients themselves have of the results of each treatment modality. In three^{19,46,47} of the four studies^{19,44,46,47} that evaluated esthetic perception the laypersons and patients themselves considered the results with space closure as having a better esthetic appearance than that of tooth- and implant-supported dental prostheses. In the study of De Marchi et al,⁴⁴ there was no difference between space closure and the implant, in the opinion of laypersons and dentists, but in the evaluation of the patients themselves, space closure was evaluate as being better.

At the other extreme, adhesive Maryland Bridges alternated with implants in the ranking of having the worst esthetic appearance in the opinion of laypersons and

dentists, in two studies.^{46,47} Curiously, when the best cases were evaluated, the modality with the worst scores was replacement with implant,⁴⁶ whereas in the cases of median results “what one sees in the streets and not those that are shown at congresses” SIC⁴⁷ revealed that the adhesive Maryland Bridge prostheses were considered the worst. As was recognized by the authors of this study,⁴⁷ there are limitations to this type of study design when there is no standardization of the age of patients and post-treatment time of the results that are being evaluated. To compare a prosthetic treatment in a photograph taken at a post-treatment time of years with space closure recorded immediately after removal of the appliance runs a high risk of bias, because one knows that with the passage of years there is a tendency towards worsening of the periodontal indicators,^{30,45,51} with reflection on esthetics.

Two studies^{18,19} suggested that the Class I relation of the canines presented no functional advantages when compared with the maxillary canine placed in the position of the absent lateral incisor. However, it should be pointed out that the presence of guide by the canine in the samples of the majority of studies was low. Surprisingly, in patients with prosthetic replacement, only 11%¹⁸ and 33%¹⁹ of the quadrants presented cuspid rise. Whereas in another study,⁴⁵ the cuspid rise was found in 80% of the group with canines in Class I.

In a first analysis, one could infer that the orthodontists in the latter study⁴⁵ were more diligent in the treatments performed by obtaining canine protected occlusion, than those of the other two studies.^{18,19} It would show a lack of seriousness to consider this conjecture, if we paid attention to the post-treatment follow-up time. In the former two studies the mean follow-up time was 7 years¹⁹ and 10 years,¹⁸ whereas in the latter⁴⁵ it was 3 years. Obtaining canine protected occlusion may not be considered completely stable, because with the passage of years, it tends to be replaced by the group function, due to the inevitable and common wear of the maxillary canines.^{57,58} Moreover, this is not necessarily a cause of TMDs.^{19,45,57,59} The studies^{19,45} that made use of the Helkimo dysfunction index found a low rate of dysfunction in spite of the low prevalence of guide by the canines. Whereas, it is not news that the etiology of TMD is multifactorial and that static and functional occlusion play a secondary role,⁵⁷⁻⁶¹ ranging from 10 to 20%, without, however, being directly related in the context of cause-effect.⁵⁹

Almost all the data evaluating treatments available for maxillary lateral incisor agenesis continue to be supported by evidence basically arising from retrospective studies, with all their intrinsic limitations. The results are based on periods of post-treatment follow-up shorter than 10 years. The findings here compiled and analyzed must be interpreted and evaluated in conjunction of the expectations of patients and those responsible for them, the experience and interdisciplinarity of the professional team, and the financial aspect, in order to arrive at the best possible treatment for the individual, respecting his/her particularities.

Further prospective controlled studies are necessary in order to provide more compelling scientific evidence; however, due to the difficulties and limitations imposed on the investigation of this subject, perhaps the next achievements will be the results of new retrospective studies that endeavor to eliminate some of the gaps in the studies conducted up to now, and pointed out in this review, such as: absence of sample calculation, lack of blinding of the evaluation (when possible) and relatively short period of post-treatment evaluation.

CONCLUSIONS

Tooth-supported dental prosthesis of absent maxillary lateral incisors appear to present a higher periodontal cost than orthodontic space closure treatment.

The major portion of the implant-supported dental prosthesis of absent maxillary lateral incisors presented satisfactory results in 3 years follow-up, but the literature warns about an additional dose of caution as regards the long term result in the anterior region of the maxilla.

The esthetic limitations of fixed tooth- and implant-supported dental prosthesis arouse greater criticism in laypersons, patients and dentists than do the esthetic limitations related to space closure treatment, which was better evaluated than the prosthetic replacements.

The presence or absence of canine rise in the treatment of lateral incisor agenesis presented no relationship with occlusal function or with the signs and

symptoms of TMDs. Moreover, the presence of Class I relation of the canines does not necessarily presuppose the presence of canine protected occlusion.

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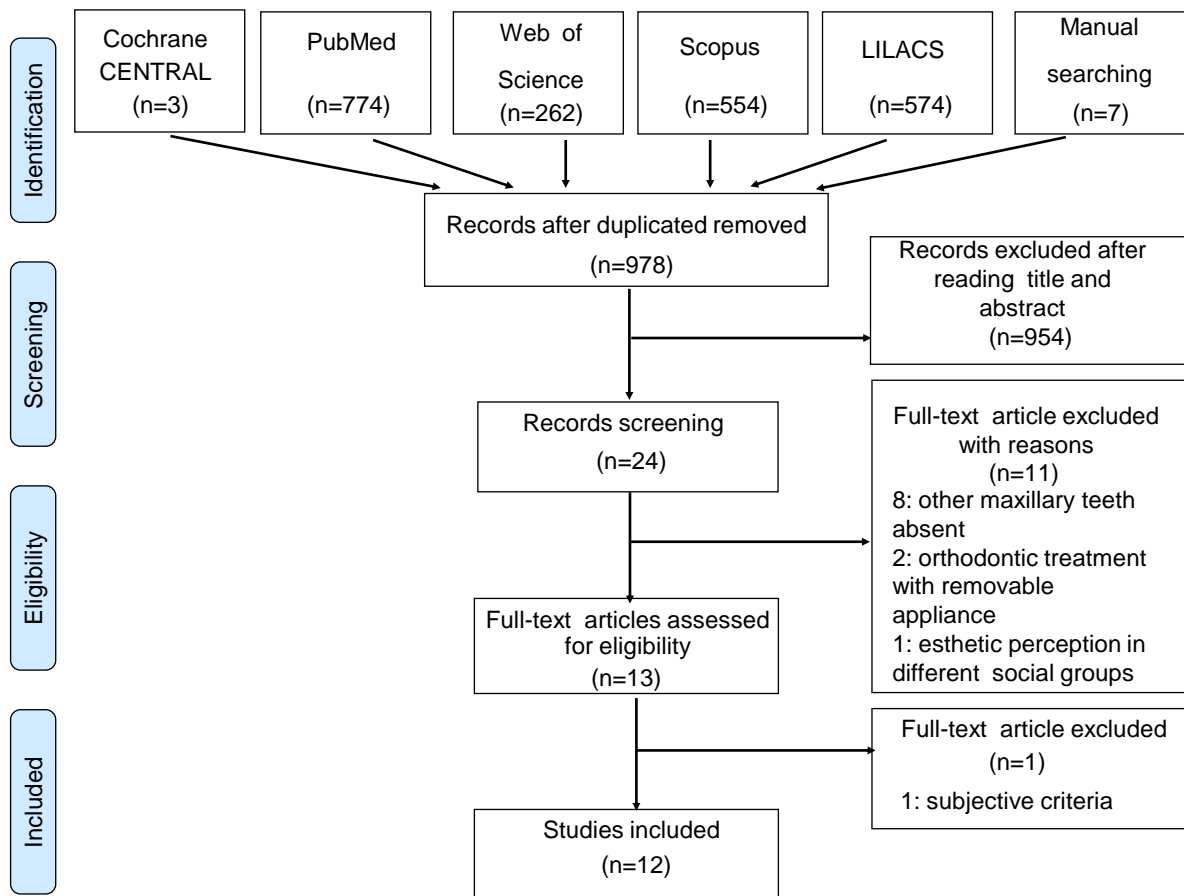


Figure 1 - Prisma flowchart of this systematic review

Table 1 - Parameters used for search in each database

Data base	Search strategies
Pubmed	<p>("upper lateral incisor"[tiab] OR "maxillary lateral incisor"[tiab] OR incisor[MH] OR incisor[tiab]) AND (anodontia[mh] OR anodontia[tiab] OR "teeth agenesis"[tiab] OR "tooth agenesis"[tiab] OR hypodontia[tiab] OR oligodontia[tiab] OR "dental agenesis"[tiab] OR "partial anodontia"[tiab] OR "missing teeth"[tiab] OR "missing tooth"[tiab] OR "absent teeth"[tiab] OR "absent tooth"[tiab] OR "congenitally missing"[tiab] OR "congenitally absent"[tiab] OR missing[tiab] OR absent[tiab]) AND (Orthodontics[MH] OR "orthodontic treatment"[tiab] OR "orthodontic therapy"[tiab] OR Tooth movement[MH] OR "orthodontic movement"[tiab] OR "teeth movement"[tiab] OR Orthodontic space closure[MH] OR "orthodontic space closure"[tiab] OR "orthodontic dental space closure"[tiab] OR "canine substitution"[tiab] OR "mesial movement of canine"[tiab] OR "mesial movement of cuspid"[tiab] OR Dental implants[MH] OR "dental implant"[tiab] OR "single tooth implant"[tiab] OR "single-tooth implant"[tiab] OR "single-tooth implants"[tiab] OR "single-tooth dental implant"[tiab] OR Denture, partial, fixed[MH] OR "Denture partial fixed"[tiab] OR fixed bridge* OR "fixed partial denture"[tiab] OR pontic[tiab] OR Denture, partial, removable[MH] OR "denture removable partial"[tiab] OR Denture, partial, fixed, resin-bonded[mh] OR "maryland bridge dental"[tiab] OR "resin-bonded bridge"[tiab] OR "resin-bonded fixed partial denture"[tiab] OR "resin-bonded acid etched fixed partial denture"[tiab] OR Dental prosthesis[MH] OR "dental prosthesis"[tiab] OR "prosthetic replacement"[tiab] OR Dental prosthesis, implant-supported[MH] OR "prosthesis implant-supported dental"[tiab])</p>
Web of Science	<p>#1: TS=("upper lateral incisor" OR "maxillary lateral incisor" OR incisor) #2: TS=(anodontia OR "teeth agenesis" or hypodontia OR oligodontia OR "dental agenesis" OR "partial anodontia" OR "missing teeth" OR "missing tooth" OR "absent teeth" OR "absent tooth" OR "congenitally missing" OR "congenitally absent" or missing or absent) 3#: TS=(orthodontics OR "orthodontic treatment" OR "orthodontic therapy" OR Tooth movement or "teeth movement" OR "Orthodontic space closure" OR "orthodontic space closure" OR "orthodontic dental space closure" OR "canine substitution" OR "mesial movement of canine" OR "mesial movement of cuspid" OR Dental implants OR "single tooth implant" OR "single-tooth dental implant" OR "Denture partial fixed" or fixed bridge* OR "fixed partial denture" OR pontic OR "Denture partial removable" OR "Denture partial fixed resin-bonded" OR "maryland bridge dental" OR "resin-bonded bridge" OR "resin-bonded fixed partial denture" OR "resin-bonded acid etched fixed partial denture" OR "Dental prosthesis" OR "dental prosthesis" OR "prosthetic replacement" OR "Dental prosthesis implant-supported" OR "prosthesis implant-supported dental") #1 AND #2 AND #3 (DocType=All document types; Language=All languages)</p>
Scopus	<p>("upper lateral incisor" OR "maxillary lateral incisor" OR incisor) AND (anodontia OR "teeth agenesis" or hypodontia OR oligodontia OR "dental agenesis" OR "partial anodontia" OR "missing teeth" OR "missing tooth" OR "absent teeth" OR "absent tooth" OR "congenitally missing" OR "congenitally absent" or missing or absent) AND (orthodontics OR "orthodontic treatment" OR "orthodontic therapy" OR Tooth movement or "teeth movement" OR "Orthodontic space closure" OR "orthodontic space closure" OR "orthodontic dental space closure" OR "canine substitution" OR "mesial movement of canine" OR "mesial movement of cuspid" OR Dental implants OR "single tooth implant" OR "single-tooth dental implant" OR "Denture partial fixed" or fixed bridge* OR "fixed partial denture" OR pontic OR "Denture partial removable" OR "Denture partial fixed resin-bonded" OR "maryland bridge dental" OR "resin-bonded bridge" OR "resin-bonded fixed partial denture" OR "resin-bonded acid etched fixed partial denture" OR "dental prosthesis" OR "prosthetic replacement" OR "Dental prosthesis implant-supported" OR "prosthesis implant-supported dental")</p>
Lilacs	<p>("incisor" or "incisivo lateral superior" or "incisivo lateral maxilar" or "incisivos laterales superiores") AND ("anodontia" or "anodontia" or "anodoncia" or "agenesia dental" or "agenesia dentária" or "tooth agenesis" or "teeth agenesis" or "dental agenesis" or "hipodontia" or "hipodoncia" or "hypodontia" or "oligodontia" or "oligodoncia" or "dente ausente" or "ausência dentária" or "ausencias de dientes" or "dientes ausentes" or "absent tooth" or "missing tooth" or "missing teeth" or "anodontia parcial" or "anodoncia parcial" or "partial anodontia" or "ausência congênita" or "ausencia congénita" or "congenitally missing" or "congenitally absent") AND ("orthodontics" or "tooth movement" or "orthodontic space closure" or "dental implants" or "denture, partial, fixed" or "denture, partial, removable" or "denture, partial, fixed, resin-bonded" or "dental prosthesis" or "dental prosthesis, implant-supported" or "ortodontia" or "ortodoncia" or "orthodontics" or "tratamento ortodôntico" or "tratamiento ortodôntico" or "orthodontic treatment" or "movimento dentário" or "movimiento dentario" or "tooth movement" or "teeth movement" or "fechamento de espaço ortodôntico" or "fechamento do espaço" or "cierre del espacio ortodôntico" or "cierre del espacio" or "orthodontic space closure" or "mesialização do canino" or "movimento mesial do canino" or "substituição canina" or "movimiento mesial del canino" or "sustitución canina" or "mesial movement of canine" or "mesial movement of cuspid" or "canine substitution" or "implantes dentários" or "implante dental" "implantes dentales" or "dental implant" or "dental implants" or "implante unitário" or "implante dental unitario" or "single tooth implant" or "single-tooth implants" or "single-tooth dental implant" or "prótese fixa" or "prótese fixa parcial" or "protésis fija" or "protésis parcial fija" or "fixed brigde" or "partial fixed bridge" or "denture partial fixed" or "prótese parcial removível" or "protésis parcial removible" or "denture partial removable" or "prótese adesiva" or "protésis adhesiva" or "denture partial fixed resin-bonded" or "prótese dentária" or "reposição protética" or "protésis dentales" or "sustitución protésica" or "dental prosthesis" or "prosthetic replacement" or "prótese dentária implantossuportada" or "prótese implantossuportada" or "protésis dentales implantosoportadas" or "protésis implantosoportadas" or "dental prosthesis implant-supported")</p>

Central	<ul style="list-style-type: none"> #1 "upper lateral incisor" #2 "maxillary lateral incisor" #3 MeSH descriptor: [Incisor] explode all trees #4 #1 or #2 or #3 #5 MeSH descriptor: [Anodontia] explode all trees #6 "tooth agenesis" #7 hypodontia #8 oligodontia #9 "missing teeth" #10 "missing tooth" #11 "absent teeth" #12 "absent tooth" #13 "congenitally missing" #14 "congenitally absent" #15 #5 or #6 or #7 or #8 or #9 or #10 or #11 or #12 or #13 or #14 #16 MeSH descriptor: [Orthodontics] explode all trees #17 "orthodontic treatment" #18 "orthodontic therapy" #19 MeSH descriptor: [Tooth Movement] explode all trees #20 "orthodontic movement" #21 "teeth movement" #22 MeSH descriptor: [Orthodontic Space Closure] explode all trees #23 #16 or #17 or #18 or #19 or #20 or #21 or #22 #24 MeSH descriptor: [Dental Implants] explode all trees #25 "dental implant" #26 "single tooth implant" #27 "single-tooth implant" #28 "single-tooth dental implant" #29 #23 or #24 or #25 or #26 or #27 or #27 or #28 #30 MeSH descriptor: [Denture, Partial, Fixed] explode all trees #31 "fixed bridge" #32 "fixed partial denture" #33 pontic #34 #30 or #31 or #32 or #33 #35 MeSH descriptor: [Denture, Partial, Fixed, Resin-Bonded] explode all trees #36 "resin-bonded bridge" #37 "resin-bonded fixed partial denture" #38 #35 or #36 or #37 #39 MeSH descriptor: [Dental Prosthesis] explode all trees #40 "prosthetic replacement" #41 #39 or #40 #42 MeSH descriptor: [Dental Prosthesis, Implant-Supported] explode all trees #43 "implant-supported dental prosthesis" #44 "prosthesis implant-supported dental" #45 #42 or #43 or #44 #46 #23 or #29 or #34 or #38 or #41 or #45 #47 #4 and #18 and #46
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Table 2: Data extracted from studies included in this systematic review

Study	Design	N Participants (gender): treatment modalities	LI Agenesis (bilateral or unilateral)	Patients age: mean (range)	Objective	Parameters evaluated	Method of measurement	Statistical analysis (level of significance)	Results	Follow-up: mean (range)
Nordquist e McNeill, ¹⁸ 1975	Case control	33 patients (not reported): not reported	25 patients (bilateral) 8 patients (unilateral)	Not reported	To compare OSC, FPD and RPD	-Occlusal function -Periodontal status	Clinical examination	F ratio, <i>t</i> test Analysis of variance for one way design (p=0,01)	Periodontal status (OSC>RPD=FPD) Occlusal function (OSC=FPD=RPD)	9,7 years (2,3-25,5 years)
Robertsson e Mohlin, ¹⁹ 2000	Case control	50 patients(m:14 and f:36): 30 OSC, 20 FPD	39 patients (bilateral) 11 patients (unilateral)	25,8 years (18,4 -54,9 years)	To compare OSC versus FPD	-Occlusal function -Signs and symptoms of TMD -Periodontal status -Esthetics	Clinical examination and questionnaire	<i>t</i> test chi-squared (p=0,05)	Occlusal function (OSC=FPD) Signs and symptoms of TMDs (OSC=FPD) Esthetic (OSC>FPD) Periodontal status (OSC>FPD)	7,1 years (0,5-13,9 years)
Armbruster et al, ⁴⁶ 2005	Case control	12 individuals (not reported): 3 MB, 3 DI, 3 OSC, 3ND <u>Evaluators:</u> 43 orthodontists 140 general dentists 29 specialists 40 laypersons	6 patients (bilateral) 3 patients (unilateral)	Not reported	To compare OSC, DI, MB and ND	Esthetics	Intrabucal photos	Two-way ANOVA One-way ANOVA Student Newman Keuls (p=0,05)	Laypersons (OSC>ND>MB>DI) General dentists (ND>OSC>MB>DI)	Not reported
Zarone et al, ⁴² 2006	Controlled clinical trial (CCT)	30 patients (m:11 and f:19): 30 DI	4 patients (bilateral) 26 patients (unilateral)	33 years (21-45 years)	To evaluate implants	Periodontal status	Clinical examination and radiographs	Kolmogorov-Smirnov ANOVA One way ANOVA Turkey's <i>post hoc</i> (p=0,05)	Marginal bone loss: 1,2 ±0,61 mm Probing depth: 2 mm (V,L) 3 mm (M,D) Gingival buccal recession: 0,6 mm (12 months) GI 0: 94%, PI 0: 82% PIS 3: 82%	2 years
Degidi et al, ⁴¹ 2009	Randomized clinical trial (RCT)	60 patients (m:27 and f:33): 60 DI	Unilateral	31,5 years (18 - 55 years)	To compare immediately versus one-stage loaded implants.	Periodontal status	Clinical examination and radiographs	Two-tailed <i>t</i> test (p=0,05)	immediately = one-stage loaded implants Marginal bone loss (mean): 0,8±0,67 mm Probing depth (mean): 2,09±0,7 mm PIS 3 (mean): 45% of implants	3 years

Thams et al, ⁴⁷ 2009	Case control	12 individuals (not reported): 2 MB, 3 DI, 4 OSC, 3 NT <u>Evaluators:</u> 15 orthodontists 15 general dentists 15 laypersons	Not reported (bilateral and unilateral)	Not reported	To compare OSC, DI, MB and NT.	Esthetics	Intrabucal photos	ANOVA (p=0,05)	All groups of evaluators (OSC>DI>MB>NT)	Not reported
De Marchi et al, ⁴⁵ 2012	Case control	68 individuals (m:52 and f:16): 26 OSC, 20 DI, 22 ND	27 patients (bilateral) 19 patients (unilateral)	OSC: 24.9 years(14.1-41.1) DI: 25.1 years (19.0-45.1) ND: 21.3 years(19.1-26.1)	To compare OSC, DI and ND.	Periodontal status Signs and symptoms of TMD	Clinical examination and questionnaire	Fisher's exact test Shapiro-Wilk Mann-Whitney test Non-parametric Kruskal-Wallis (p=0,05)	Periodontal status: plaque index, bleeding upon probing, probing depth, gingival recession (OSC=DI=CG) PIS (OSC=CG>DI) Signs and symptoms of TMDs (OSC=DI=CG)	OSC: 3,9 years DI: 3,5 years
Pini et al, ⁴⁸ 2012	Case control	52 individuals (not reported): 18 OSC, 10 DI, 24 ND	28 patients (bilateral)	OSC: 32,4 years DI: 32, 7 years ND: 21,3 years	To compare OSC, DI and ND	Esthetics	Dental cast	Shapiro-Wilk Wilcoxon Kruskal-Wallis Teste t ANOVA (p=0,05)	WHR: CI, LI, C (OSC=DI=ND) GZ: LI (OSC=DI=ND)	OSC: 5 years DI: 3 years
Pini et al, ⁴⁹ 2012	Case control	48 patients (m:9 and f:39): 28 OSC, 20 DI 25 individuals:ND	28 patients (bilateral) 20 patients (unilateral)	OSC: 24.9 years(14.1-41.1) DI: 25.1 years (19.0-45.1) ND: 21.3 years(19.1-26.1)	To compare OSC, DI and ND	Esthetics	Dental cast	Shapiro-Wilk Wilcoxon Kruskal-Wallis Mann-Whitney U <i>post hoc</i> Friedman <i>post hoc</i> Wilcoxon (p=0,05)	GP Yes CI:LI (DI=ND>OSC) No LI:C (DI=ND=OSC) WHR: LI(mean) (DI=ND <OSC)	OSC : 4,7 years DI: 2,7 years
Pini et al, ⁵⁰ 2013	Case control	52 individuals (not reported): 18 OSC, 10 DI, 24 ND	28 patients (bilateral)	OSC: 32,4 years DI: 32, 7 years ND: 21,3 years	To compare OSC,DI and ND	Esthetics	3D digital image from dental cast	Shapiro-Wilk Sperman correlation Kruskal-Wallis (p=0,05)	WHR: CI, LI, C (OSC=DI=ND) GZ: LI (OSC< ND = DI) ACD (DI> OSC=ND)	OSC: 5 years DI: 3 years
Mangano et al, ⁴³ 2014	Longitudinal retrospective	20 patients (m: 9; f: 11): 20 DI	Unilateral	21,3 years (19,6 – 24,1 years)	To evaluate implants	Esthetics Periodontal status	Dental cast, Intrabucals photos and periapical radiographs	Wilcoxon rank-sum (p=0,05)	PES/WES index : 8,15±1,69 (PES) 8,70 ±0,92 (WES) DIB: 0,49 mm± 0,18mm	3 years

De-Marchi et al, ⁴⁴ 2014	Case control	68 individuals (m:52 e f:16): 26 OSC, 20 DI, 22 ND	27 patients (bilateral) 19 patients (unilateral)	OSC: 24.9 years(14.1-41.1) DI: 25.1 years (19.0-45.1) ND: 21.3 years (19.1-26.1)	To compare OSC, DI and ND	Esthetics	Photo of smile– lower third of the face(visual analog scales)	Fischer <i>post hoc</i> Mann-Whitney Shapiro-Wilk <i>t</i> test Cronbach α ICC Kolmogorov-Smirnov Multifactorial ANOVA One-way ANOVA The Bonferroni correction (p=0,05)	Laypersons and dentists (OSC=DI=ND) Self-evaluation (OSC e DI>ND) (OSC=DI) (OSC>ND) (DI=ND)	OSC: 3,9 years DI: 3,5 years
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m (male); f (female); OSC (orthodontic space closure); FPD (fixed partial denture); RPD (removable partial denture); DI (dental implant); MB (Maryland bridge); ND (normal dentition); > more favorable or more (with statistical difference); < less favorable or less (with statistical difference); = similar (without statistical difference); V (vestibular face); L (lingual face); M (mesial face); D (distal face); GI (gingival index); PI (plaque index); PIS (papilla index score); NT (lateral incisor agenesis not treated); CI (maxillary central incisor); LI (maxillary lateral incisor); C (maxillary canine); DIB (distance between the implant shoulder and bone implant contact); GP (golden proportion); WHR (width/height ratio); ACD (apparent contact dimension); GZ (gingival zenith) PES/WES ("Pink Esthetic Score" / "White Esthetic Score" index) ; TMDs (Temporomandibular disorders).

Table 3: Assessment of risk of bias of experimental studies (prospective)

Study	Design	Sample size calculation	Random sequence generation	Allocation concealment	Blinding of measurements	Incomplete outcome data	Others sources of bias	Risk of bias
Zarone et al., 2006	CCT	No	No	No	No	Yes	No	HIGH
Degidi et al., 2009	RCT	Yes	Yes	Yes	No	Yes	Yes	LOW

Table 4: Assessment of risk of bias of observational studies (retrospective)

Study	Design	Sample size calculation	Random sequence generation	Blinding of measurements	Incomplete outcome data	Withdrawals reported	Others sources of bias	Risk of bias
Nordquist et al., 1975	Case control	No	No	No	Yes	Yes	No	HIGH
Robertsson et al., 2000	Case control	No	No	No	Yes	No	Yes	HIGH
Armbruster et al., 2005	Case control	No	No	No	Yes	Yes	Yes	MODERATE
Thamis et al., 2009	Case control	No	No	No	Yes	Yes	No	HIGH
De Marchi et al., 2012	Case control	No	No	No	Yes	Yes	Yes	MODERATE
Pini et al., 2012	Case control	No	No	No	Yes	Yes	Yes	MODERATE
Pini et al., 2012	Case control	No	No	No	Yes	Yes	No	HIGH
Pini et al., 2013	Case control	No	No	No	Yes	Yes	No	HIGH
Mangano et al., 2014	Longitudinal Retrospective	No	No	Yes	Yes	Yes	Yes	LOW
De-Marchi et al., 2014	Case control	No	No	Yes	Yes	Yes	Yes	MODERATE

4 - CONCLUSÕES

A hipótese nula não foi confirmada.

As próteses dentossuportadas de incisivos laterais superiores ausentes parecem apresentar um custo periodontal maior do que o fechamento ortodôntico do espaço.

A maior parte das próteses implantossuportadas de incisivos laterais superiores ausentes apresenta resultados satisfatórios em até 3 anos, mas a literatura alerta para uma dose adicional de cautela no resultado em longo prazo para a região anterior da maxila.

As limitações estéticas das próteses fixas dento e implantossuportadas despertaram uma crítica maior nos leigos, pacientes e dentistas do que as limitações estéticas relacionadas ao tratamento de fechamento do espaço, que é mais bem avaliado do que as reposições protéticas.

A presença ou não da desoclusão lateral guiada pelos caninos nos tratamentos da agenesia dos incisivos laterais permanentes não apresentou relação com a função oclusal e nem com sinais e sintomas de DTMs. E a presença da relação de classe I dos caninos não pressupõe necessariamente a presença de oclusão protegida pelos caninos.