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Faculdade de Odontologia

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Implant-Prosthodontic Rehabilitation of the Cleft Patient – A Systematic Review

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Background

Cleft lip and palate represent the second most frequent congenital deformity. It is usually associated with aesthetic deformations and dental abnormalities as well as with speech, swallowing and growth problems. The majority of the studies that assessed the success of dental implants and prostheses in cleft patients was not held with a thorough and systematic methodology, or presents a small number of patients.

Objective

The aims of this study were: 1) to systematically assess the evidences in the literature of the success and survival rates of implants and dentures in cleft patients and 2) to assess the quality of life of these patients, with focus on aesthetics, masticatory and speech functions.

Materials and Methods

Focused Questions (PICO Scheme)

Question 1: "In cleft lip and palate patients, what is the survival/success rates of installed dentures and implants when compared to dentures and implants installed in non-cleft patients?"

Question 2: "Which impact the dental prostheses rehabilitation, implant-supported or not, can cause on the life of a cleft patient regarding mastication, speech and aesthetics, representing the quality of life of this subject?"

Search Strategy

Inclusion criteria were: 1) RCTs, CCTs, prospective and retrospective clinical studies, or case series; 2) placement of dentures and implants in cleft subjects; 3) minimum of five cleft subjects and one year of follow-up; and 4) surveys on quality of life, masticatory and speech functions, satisfaction with aesthetics. Literature reviews, in vitro and animal studies as well as case reports were excluded. Neither language nor year of publication restrictions were applied.

Electronic search has been performed within 9 databases using MeSH terms and key-words obtained from the literature (Table 1).

Handsearch has been peformed within the lists of references of the clinical studies in the review as well as in 10 international peer-reviewed journals. Handsearch was finalized in August 2011.

Population		Intervention/ Comparison		Outcome		Type of non-included studies
OR		OR		OR		OR
Cleft lip, cleft palate, alveolar cleft, oral cleft, orofacial cleft**	**AND**	dental implants, implant-supported dental prosthesis, cleft palate prosthesis, dental prosthesis, dental implantation	**AND**	Prosthesis failure, survival rate, complications, patient satisfaction, quality of life, success	**NOT**	*in vitro*, animals, review, case reports, preclinical

Table 1. Key-words using MeSH terms.

Screening and Data Collection

The results of electronic searches were exported to the software *EndNote Web* (Thomson Reuters®, New York, USA), where 2 independent and calibrated reviewers (LAM and CP) performed both title and abstract screenings. For full-text screening, PDF files of the articles were obtained and translation was provided whenever needed. A third reviewer (RS) was consulted for any disagreements. Data Collection Form (DCF) was used to collect data from those studies which met all the eligibility criteria. The data compilation was performed in an Excel Spreadsheet, where all the relevant information were categorized.

Quality Assessment

An interpretation of the different levels of evidence of the included studies has been performed. At the end, an estimated risk of bias of the included study (low, medium or high) was arbitrarily assigned to each of the studies by the reviewers.

Results

Electronic search yielded 323 and 180 studies for title and abstract screening, respectively. Following full-text screening and hand search, 27 studies met the eligibility criteria and were used for data compilation (Figure 1).

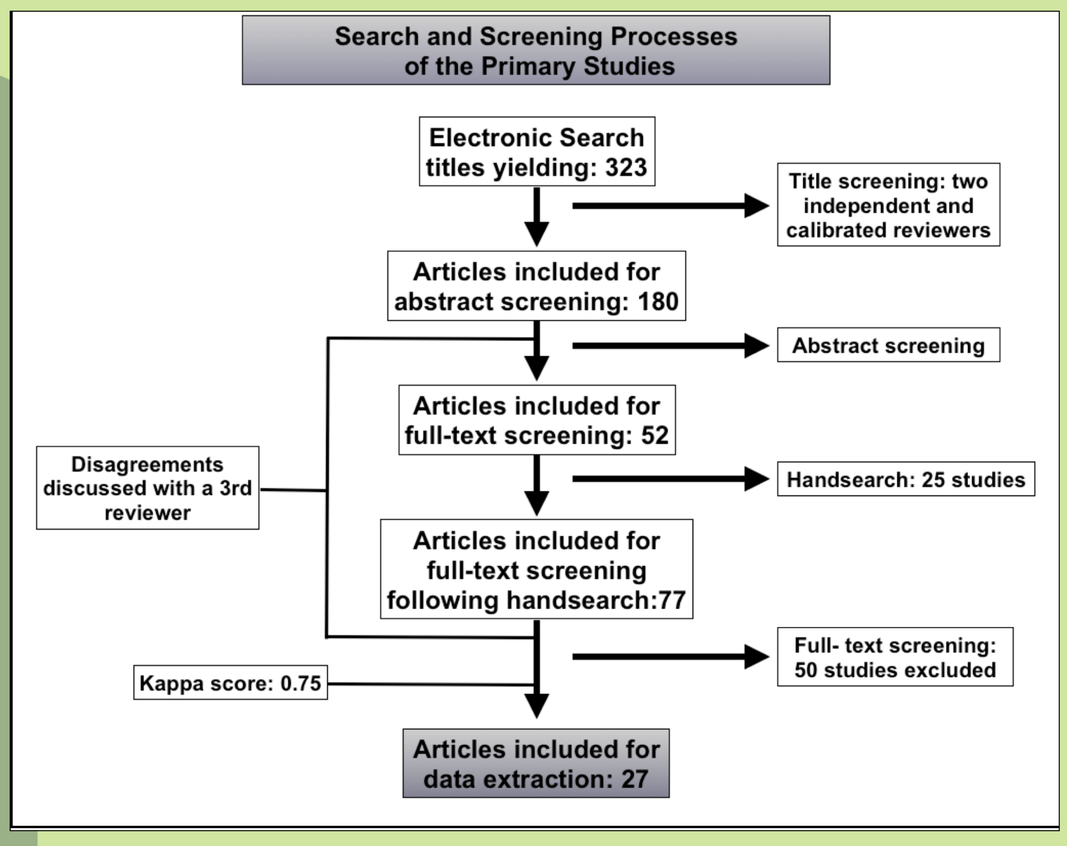

Figure 1. Flowchart of the search and screening processes of the primary studies.

Authors	Title	Journal
Bevilacqua RG, Ritoli EL, Kang C, Mabry K, Castiglione CL.	Midmaxillary internal distraction osteogenesis: ideal surgery for the mature cleft patient.	Plast Reconstr Surg 2008; 121:1768-78.
Deppe H, Horch HH, Kolk A.	Microstructured dental implants and palatal mucosal grafts in cleft patients: a retrospective analysis.	J Craniomaxillofac Surg 2004; 32:211-5.
Duskova M, Kotova M, Sedlackova K, Leamerova E, Horak J.	Bone reconstruction of the maxillary alveolus for subsequent insertion of a dental implant in patients with cleft lip and palate.	J Craniofac Surg 2007; 18(3):630-8.
Ferreira SD, Esper LA, Sbrana MC, Ribeiro IWJ, de Almeida A.	Survival of Dental Implants in the Cleft Area-A Retrospective Study.	Cleft Palate Craniofac J. 2010; 47(6):586-90.
Gaggl AJ, Burger HK, Vimik SA, Schachner P, Chairi FM.	The Microvascular Corticocancellous Femur Flap for Reconstruction of the Anterior Maxilla in Adult Cleft Lip, Palate and Alveolus Patients.	Cleft Palate Craniofac J. 2011. Epub 2011/05/03.
Hartel J, Pogl C, Henkel KO, Gundlach KK.	Dental implants in alveolar cleft patients: a retrospective study.	J Craniomaxillofac Surg 1999; 27: 354-7.
Incici E, Matulene G, Husler J, Salvi GE, Pjetursson B, Bragger U.	Cumulative costs for the prosthetic reconstructions and maintenance in young adult patients with birth defects affecting the formation of teeth.	Clin Oral Implants Res 2009; 20:715-21.
Jansma J, Raghoebar GM, Batenburg RH, Stellingsma C, van Oort RP.	Bone grafting of cleft lip and palate patients for placement of endosseous implants.	Cleft Palate Craniofac J. 1999; 36(1):67-72.
Kramer FJ, Baethge C, Swennen G, Bremer B, Schwestka Polly R, Dempf R.	Dental implants in patients with orofacial clefts: a long-term follow-up study.	Int J Oral Maxillofac Surg. 2005; 34(7):715-721.
Krieger O, Matulene G, Hüsler J, Salvi GE, Pjetursson B, Brägger U.	Failures and complications in patients with birth defects restored with fixed dental prostheses and single crowns on teeth and/or implants.	Clin Oral Implants Res. 2009; 20:809-816.
Laine J, Vahatalo K, Peltola J, Tammisalo T, Happonen RP.	Rehabilitation of patients with congenital unrepaired cleft palate defects using free iliac crest bone grafts and dental implants.	Int J Oral Maxillofac Implants. 2002; 17(4):573-80.
Landes C A.	Implant-borne prosthetic rehabilitation of bone-grafted cleft versus traumatic anterior maxillary defects.	J Oral Maxillofac Surg 2006; 64:297-307.
Lilja J, Yontchev E, Friede H, Elander A.	Use of titanium dental implants as an integrated part of a CLP protocol.	Scand J Plast Reconstr Hand Surg. 1998; 32(2):213-9.
Matsui Y, Ohno K, Nishimura A, Shirota T, Kim S, Miyashita H.	Long-term study of dental implants placed into alveolar cleft sites.	Cleft Palate Craniofac J 2007; 44(4):444-47.
Oczakir C, Balmer S, Mericske-Stern R.	Implant-prosthodontic treatment for special care patients: A case series study.	Int J Prosthodont. 2005; 18(5):383-9.
Pinto JH, Peqoraro-Krook MI.	Evaluation of palatal prosthesis for the treatment of velopharyngeal dysfunction.	J Appl Oral Sci 2003; 11(3):192-97.
Sandor GK, Carmichael RP, Birkovic BM.	Dental implants placed into alveolar clefts reconstructed with tongue flaps and bone grafts.	Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2010; 109:e1-e7.
Takahashi T, Fukuda M, Yamaguchi T, Kochi S.	Use of endosseous implants for dental reconstruction of patients with grafted alveolar clefts.	J Oral Maxillofac Surg. 1997; 55(6):576-83.
Takahashi T, Inai T, Kochi S, Fukuda M, Yamaguchi T, Matsui K et al.	Long-term follow-up of dental implants placed in a grafted alveolar cleft: evaluation of alveolar bone height.	Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2008; 105:297-302.
Cune MS, Meijer GJ, Kooie R.	Anterior tooth replacement with implants in grafted alveolar cleft sites: a case series.	Clin Oral Implants Res. 2004; 15:616-624.
Jensen J, Sindet-Pedersen S, Sci M, Enemark H.	Reconstruction of residual alveolar cleft defects with one-stage mandibular bone grafts and osseointegrated implants.	J Oral Maxillofac Surg. 1998; 56:460-466.
Fukuda M, Takahashi T, Yamaguchi T, Kochi S.	Placement of endosteal implants combined with chin bone graft for dental reconstruction in patients with grafted alveolar clefts.	Int J Oral Maxillofac Surg. 1998; 27:440-444.
Kearns G, Perrott DH, Sharma A, Kaban LB, Vargervik K.	Placement of endosseous implants in grafted alveolar clefts.	Cleft Palate Craniofac J. 1997 Nov; 34(6):520-5.
Noar JH, Orth M.	Questionnaire survey of attitudes and concerns of patients with cleft lip and palate and their parents.	Cleft Palate Craniofac J. 1991 Jul; 28(3):279-84.
Oosterkamp BC, Dijkstra PU, Remmelink HJ, van Oort RP, Sandham A.	Orthodontic space closure versus prosthetic replacement of missing upper lateral incisors in patients with bilateral cleft lip and palate.	Cleft Palate Craniofac J. 2010 Nov; 47(6):591-6.
Lalo J, Kayali A, Toudline B, Majourau-Bouriez A, Essaddam H, Pavy B.	Re`habilitation implantaire des fentes labiopalatines : e`tude re`trospective sur dix ans.	Rev de Stomatol et de Chir Maxillofac. 2007; 108(5):398-406.
Matsui Y, Ohta M, Ohno K, Nagumo M.	Alveolar bone graft for patients with cleft lip/palate using bone particles and titanium mesh: A quantitative study.	J Oral Maxillofac Surg. 2006; 64:1540-1545.

Table 2. List of the 27 articles included.

The 27 included studies are listed in Table 2. No controlled studies (cleft x non-cleft patients), either randomized or not, have been found. There were twenty-six cohort and one cross-sectional study; twenty-one retrospective and only five prospective studies. Due to the broad heterogeneity of the included studies with regards to the study and to the lack of a clear methodology, data compilation was harmed and therefore concise conclusions could not be drawn. Therefore, all with no exception of the studies were classified as of high risk of bias.

Several limitations were found among the studies with regards to the sample: the usual limited sample size, the lack of mentioning ethical aspects, a huge discrepancy on the age range of the patients included (either intra- or inter-studies) and no consideration to confounding factors.

Twenty-one studies reported on implant-supported prostheses and seven on tooth-supported prostheses. Follow-up period ranged from 1 month to 25 years.

Even though the majority of the studies provided implant-borne reconstructions for the patients, there seems to be some evidences showing that some patients can be successfully and satisfactorily rehabilitated with tooth-supported fixed partial dentures, which may represent a better cost-benefit ratio.

Nineteen studies reported on bone grafts, either simultaneously or previously to the implant placement. Several techniques and biomaterials were employed, making comparisons difficult. Even weak, there are some evidences that simultaneous grafting may reduce implant survival rates.

Success rates of implants ranged from 80 to 100%, whereas the prosthetic reconstructions success rates were as follows: telescopic crowns (60%); bar-retained prostheses (78%); and fixed prostheses (78-100%). However, these results should be interpreted with caution since the criteria for survival/ success of the implants were mostly based upon the authors preferences instead of internationally accepted criteria.

Patient's satisfaction with regards to chewing, phonetics and aesthetics ranged from 70 to 85%. Visual Analogue Scale (VAS) as well as non-validated questionnaires were used for this survey. No data on quality of life of cleft patientes were found.

Conclusions

There are some evidences that cleft patients can be successfully rehabilitated with dental prostheses with or without an implant, in combination or not with bone graft, following a comprehensive treatment plan. The methods and results of the included studies were very heterogeneous, therefore a meta-analysis could not be performed.