prosthesis

MDPI

Review

The Conometric Connection for the Implant-Supported Fixed Prosthesis: A Narrative Review

Saturnino Marco Lupi [1], Claudia Todaro [1], Dario De Martis [1,*], Paola Blasi [2], Ruggero Rodriguez y Baena [1] and Stefano Storelli [3]

[1] Department of Clinical Surgical, Diagnostic and Pediatric Sciences, University of Pavia, 27100 Pavia, Italy
[2] Private Practice, 16100 Genova, Italy
[3] Department of Biomedical, Surgical and Dental Sciences, University of Milan, 20122 Milan, Italy
* Correspondence: dariodemartis@gmail.com; Tel.: +39-382-516-255

Abstract: Aim: The conometric concept was proposed as a possible connection between the abutment and the prosthetic coping. This research aimed to review the features and possible clinical uses of this connection in an implant-supported fixed prosthesis. Methods: An electronic search was conducted on an online database for the topic in object; articles published in international literature were considered and the research gave 17 results, and 6 parameters were analyzed. Results: This connection eliminated the possibility of cement residues in the subgingival region, reducing the risk of inflammation of peri-implant soft and hard tissues; not having to remove the cement residues, it is possible to place the margins in more apical portions, improving the aesthetics outcomes of the rehabilitations. It is also known that the retention by means of a screw causes a weakening of the restoration. The retentive force is adequate for fixed rehabilitation even after a high number of insertion–disengagement cycles; in vitro studies have also shown a high bacterial sealing. Implant rehabilitation using preformed components, such as conometric hoods, is helpful for CAD/CAM, so a digital workflow is possible. Several types of prosthesis were presented, all of which demonstrated adequate clinical performance in the follow-up observation. Conclusions: This type of connection seems to be suitable to support fixed implant rehabilitations, but long-term clinical studies are needed to validate this system.

Keywords: implant-supported dental prosthesis; fixed partial denture; conometric connection; dental implant abutment design

Citation: Lupi, S.M.; Todaro, C.; De Martis, D.; Blasi, P.; Rodriguez y Baena, R.; Storelli, S. The Conometric Connection for the Implant-Supported Fixed Prosthesis: A Narrative Review. *Prosthesis* **2022**, *4*, 458–467. https://doi.org/10.3390/prosthesis4030037

Academic Editor: Bruno Chrcanovic

Received: 11 July 2022
Accepted: 12 August 2022
Published: 16 August 2022

1. Introduction

In the dental field, for many years now, implantology can be considered a safe rehabilitation method, stable over time and with a largely predictable success [1,2]. The success of rehabilitation depends not only on the prolonged stay in the oral cavity of the manufacture, but also on the number and nature of possible complications, whether they are of a technical or biological nature (including inflammatory and infective disease) [3–5]. Among these complications, it is possible to identify the possibility of detachment of the prosthesis from the implant, the creation of marginal gaps below occlusal loads, and the permanence of cement residues below the gum margin [6].

Cement residues may be responsible for inflammation of the periodontal tissues with possible increases in the rate of resorption of the support tissues [7]. It is known from the literature that a high percentage of peri-implant pathologies can result from a prosthetic misfit or from cement residues [8,9]. The clinician must keep these factors in mind knowing that currently there are no universally recognized techniques that allow a restitutio ad integrum [10]. Keeping in mind and trying to overcome these drawbacks or weaknesses, research and industry in the implant field have developed a type of prosthetic connection between the implant (therefore between abutment) and the conometric hood [6]. This type of connection consists in the creation of two cones on the surfaces of the abutment (male cone—Patrix) and prefabricated coping (female cone—Matrix) that are inserted into each other and do not require either cement or screws (Figure 1).

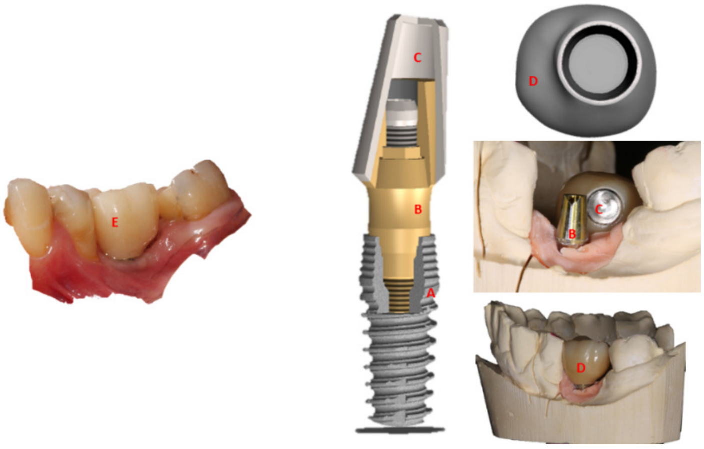

Figure 1. Example of conometric connection diagram. (**A**) Fixture; (**B**) Conometric Abutment; (**C**) Conometric Hood or Coping; (**D**) Prosthetic Manufact CAD-CAM Project; (**E**) clinical view.

The perfect adaptation between the two components is achieved through the use of industrially manufactured materials [11]. The absence of cementation and a perfect fit between the components, therefore, eliminates two of the etiological factors. Prosthetic retention is guaranteed, as previously mentioned, thanks to a perfect fit, but above all, thanks to the physical phenomenon of friction between bodies [12]: this force characterizes two bodies intimately in contact and is opposed to the reciprocal motion. The subgingival placement of the prosthetic margin does not involve an inflammatory risk, due to an excess of cement or a gap [11]. SEM analysis of the interface zones between the hood and abutment, after the system has been subjected to a load, did not show an appreciable gap; therefore, this entails a lower risk of bacterial colonization [6]. The purpose of this work is to analyze the studies in the literature and to investigate the clinical implications regarding this type of connection.

2. Results

2.1. Absence of Cement or Screw

Both cemented and screwed prostheses have some disadvantages [13]. The use of cemented ones has become a standard in implant prosthetic restorations [14]. Despite many advantages, cemented restorations have the disadvantage of having to completely eliminate the excess of cement in the soft tissues around the implant structure [15]. A study presented a strong relationship between residual cement and the development of chronic peri-implant pathologies [16]. Complications have been associated with excess residual cement [17,18]. In vitro testing showed the presence of cement residues in all samples tested, in a more apical location than the margin of the prosthetic crown [19,20]. From a clinical point of view, it was proven that the excess of cement can cause peri-implantitis [16]; but the role of cement in the etiology of peri-implant pathologies is not yet completely clear. It was proposed in the literature that cement remnants can act as an irritant factor for soft tissues: an analogy can be made with tartar in teeth involved in periodontal disease [21]; in addition, bacterial over-infection may occur [22], or a possible toxic reaction to soft tissue cement [23]. One of the possible causes of cement residues in the peri-implant region is the clinical practice of positioning the prosthetic margins subgingivally for aesthetic reasons [20]. This, however, carries with it the risk of an incomplete removal of the cement and, therefore, an iatrogenic damage [20]. An in vitro study showed that it is impossible to clean all the cement surpluses when the margin is placed from 1.5 to 3 mm apically at the margin of the soft tissues [19]. In fact, other researchers, in in vitro experiments, showed that despite efforts, complete removal of cement is not possible: cleaning the excess around the abutment with the margins positioned apically at the gum margin, at a depth equal to or greater than 2 mm, was found to be impracticable [20]. The results of a prospective clinical study showed that more than 80% of prosthetic rehabilitations present an excess of cement, although the operators believed they had performed a meticulous cleaning [16]. In addition to the presence, the characteristics of the cement can also influence the results: resinous-based cements were more difficult to remove from the smooth surface of the implants [19]. Therefore, selective clinical use, in the implant field, of cement with lower adhesive properties was also proposed [20]. In summary, it can be concluded that it is difficult to remove all excess cement after cementation if the margins are located subgingivally. The deeper the position of the margin, the greater the difficulty in detecting excess cement. Only when the margin is visible can all cement residues be removed. Therefore, it was recommended to use individual abutments with clinically visible margins and easily removable cement for the cementation of prostheses or to give preference to screwed prostheses [20].

Therefore, following these evaluations, the use of a fixed prosthesis with a conometric connection, which does not require cement, could have advantages for clinical management, for the post-operative course, and for the long-term stability of soft and hard tissues.

2.2. Marginal Adaptation and Bacterial Sealing

In conometric connection, the retentive force is given only by friction and this needs intimate relationships and high precision; to achieve it, a perfect adaptation between the abutment and coping is necessary, which is held responsible for the failure of bacterial infiltration of the artifact. An insufficient adaptation determining a gap at the level of the margin of the conometric connection can support the formation of bacterial plaque; this reorganization of the microflora can be the primus movens of bacterial inflammation and bone crest resorption [24,25]. The internal and marginal adaptations of the abutment-coping system are determining factors as to the biointegrity, the bacteriological seal, and the maintenance of the health of the peri-implant tissues [24]. The natural path of bacteria begins at the interface level, which is within the gap between the hood and the abutment, extending into the deepest portions [6]. It was demonstrated through in vitro microbiological testing that there is no presence of bacteria either living or dead in the portions inside the prosthetic conometric connection. This can, therefore, be considered an acceptable prosthetic component from this point of view [6,26]. Scanning electron microscope (SEM) analysis of the marginal area showed minute and punctual micro-gaps (1.67–2.04 μm), although planar surfaces were in intimate contact [26]. The average gaps between the conometric connection of the analyzed systems vary between 2 and 3 μm; considerably greater is the discrepancy between the hood and the prosthetic crown, which has a gap that can reach up to 145 μm: this is a virtual gap; in fact, with the cementation procedures, the latter is filled [26]. It is clear from the literature that a complete seal can be provided when the conometric connection is activated with a force of 50 N [27]. Zirconia is known to cope with loads greater than 1500 N in in vitro experiences [28]. The cap under an adequate insertion force deforms in its most apical portion, and this involves an intimate contact that determines an adequate marginal seal. From the studies in the literature, this space does not seem to be sufficient for bacterial proliferation, provided the hood must be properly fitted to avoid the risk of an insufficient seal and prosthetic detachment [6]. Cementation and finishing of the cement performed extraorally allow favorable control of the prosthesis–soft tissue interface, reducing possible inflammatory factors [11]. Taking into account these factors, it can be considered that marginal adaptation and, therefore, an adequate bacteriological seal are favorable factors for implant health [27].

The studies present in the literature are mainly in vitro studies under nondynamic conditions; this entails strong limitations even if they are an interesting starting point for an initial approach to the problem under scrutiny. It should also be considered that bacteria without a space in which to settle have no way to aggregate; therefore, reducing the available space, that is the gap, means reducing their possibility of aggregation in plaque and its consequences on the peri-implant tissues. Possible future research ideas could concern the study under dynamic and in vivo conditions, which would allow an evaluation of this type of connection after a follow-up period of permanence in the oral cavity.

2.3. Retention Force

Analyzing the systems of conometric connection, it is necessary to differentiate those that have an anti-rotational system and those that do not; while the former can also be used for restorations that are limited to a single element, the second must support larger restorations that have at least two abutments; in fact, although the retentive force can be compared to traditional methods (cementation), the rotation forces could lead to a detachment of the restoration [11]. The conformation of the abutment influences the retentive capacity; in fact, through in vitro experiments, it was shown that with the increase in the base diameter and the height, the force necessary for the detachment of the cap also increases. Moreover, the use of a double-pulse insertion approach, applied with specific tools, has proven to increase the retentive force [29]. Activation with the provided force pulse causes a deformation at a marginal level with a stress residue, although well below the limit thresholds of the materials, which creates a "wedge" effect, providing retention and a marginal seal [27,30]. Retention depends on mechanical factors such as friction between the surfaces of the components, negative pressure, surface adhesion of metals, and technical characteristics of the structure above such as degree of conometry, height, materials used, and surface treatment [31]. In addition to the structural characteristics, the operational characteristics must be considered, among which are the insertion force and the number of insertion/removal cycles [32].

The retentive force is inversely proportional to the angle formed by the cone perpendicular to the base, that is, the greater the angle, the smaller the retentive force; otherwise, tending the walls to parallelism, the retention force will be maximum [31]. This study indirectly brings with it the possibility of developing an equation that relates the required mechanical characteristics to the required retention and vice versa [31]. Retention for structures that include more than one implant abutment, in addition to conicity, is also influenced by the degree of parallelism of abutments [12]. A disparity of parallelism up to 5 + 5 degrees is tolerated without the retention being affected [33].

It was demonstrated in vitro through 5000 insertion–separation cycles that the retentive force is almost constant. It was, therefore, seen that the system of conometric connection produces a constant and adequate retentive force over time [34].

The conometric connection to express the right degree of retention must be well positioned and fully fitted [35]. Experimentally, in vitro, the retentive force was established, after activating the connection with an impulse of 30 N, with values that settled on average from 40.46 N per 6 degrees of conicity to 253 N per conicity of 1 degree [31].

This type of connection is, therefore, characterized by sufficient retentive capacities for its clinical use; in the future, it would be interesting to conduct studies, also of a clinical nature, which could validate its effectiveness for greater degrees of disparallelism.

2.4. Digital Workflow

This type of connection—being prefabricated industrially—well lends itself to a digital approach; the use of a digital workflow might make possible the scanning of the spatial position of the pillar once the exact conformation of the abutment is known. In guided surgery, the implant position can be planned following a philosophy guided by the restoration combining the radiographic information with that of the design acquired with the scan [12].

A limit now is that not all the conometric hoods are present in the libraries; in fact, a step in the digital workflow must be added by manually scanning the hoods and importing them into the library. In guided surgery, the design software allows planning both the position of the implants and the angle of the abutments, resulting in the achievement of the best possible parallelism [33]. In the case of rehabilitation supported by a welded bar, the digital design allows the maintenance of a space in the structure for the housing of the bar, after which the bar can be intra-orally welded to ensure perfect passivity and, therefore, maximum retention [12].

The relationship between conometry and complete digital CAD/CAM is interesting; in fact, the possible occlusal or marginal discrepancies due to scanner or software approximation errors are bypassed during the secondary cementation procedure. In the study by Degidi et al. [36] where all patients received a fixed partial rehabilitation supported by two implants finalized with monolithic lithium disilicate, the authors differ from the analogic protocol by performing all stages digitally. Control in the three dimensions of the implant position is crucial to achieve a favorable prosthetic outcome; in fact, cone-in-cone engagement is impossible to achieve if there is a lack of parallelism greater than 25 degrees between the two implants; this is the compensation limit of angled abutments [36].

In the case of planning immediate rehabilitation, it is necessary to assess that the shoulder margins of the coping do not come into contact with the alveolar bone to allow for adequate engagement [37].

The use of proprietary technology was recently proposed to produce personalized conometric abutments [38].

In addition to compensatory capabilities, the advantage of these custom angled cone-in-cone abutments is the ability to adapt different implant systems to the conometric concept. Moreover, it is simpler than making the abutments in the mouth parallel after choosing them from those in stock. The coronal part maintains the same morphology characterizing the conometric connection, while the underlying one makes it customized, correcting the parallelism, emergency gingival profile, and height. The maximum correction range is 30° [38].

In this context, digital technology seems to be an advantage, both for the correct spatial positioning of the implant and for its future prosthetic finalization. The first aspect is fundamental in order to obtain a correct engagement and, therefore, a good clinical success, also having the potential to design and realize customized abutments that satisfy the parallelism characteristics required by the clinical case. The second involves a finalization of the rehabilitation: the latter, in fact, tolerates the possible inaccuracies due to the CAD/CAM process thanks to a secondary cementation; in addition, with the digital methods, it is possible to achieve an immediate prosthesis. A necessary upgrade is the acquisition of the morphology of the conometric hoods and the respective abutments in the CAD software libraries, thus reducing the operational steps.

2.5. Follow-Up Evalutation

Several studies describing the follow-up process were considered.

The first study considered involves total fixed prostheses supported by four implants and connected through a conometric connection. A total of 100 implants were placed in 25 patients. During a 2-year follow-up period, a success rate of 97.77% of implants and a 100% prosthetic were observed. All the implants proved healthy and without clinical problems, and hard and soft peri-implant tissues responded well. In the aforementioned study, implants with the conometric abutment were inserted and loaded into the mandibular region by a fixed full-arch total prosthesis; both implants and the abutment showed a success rate close to 100%. As for the type of conometric connection, it proved to be stable and free from prosthetic complications in all cases in the first year of follow-up; in the first year, there were also two cases of peri-implant inflammation successfully treated. The low onset of complications presented is probably due to the easy hygiene tasks that patients and professionals can perform compared to other types of fixed complete prostheses [39].

In a 2016 case-series, 39 patients were rehabilitated with 78 implants that supported provisional partial fixed dentures reinforced with titanium. During the 3 years of follow-up, none of these were disconnected [35].

In a 2018 case-series, a total of 12 partially edentulous patients were rehabilitated with fixed partial dentures (FPDs), or fixed complete rehabilitation. A total of 27 implants with customized abutments were placed, with a follow-up of 18 months. During the observation period, there were no detachments of the prosthesis from the connections, no implant failures, or complications of a prosthetic nature [38].

In 2018 also, a study reported 76 patients who received two implants each with a cone-in-cone connection supporting definitive partial rehabilitations in monolithic zirconia. Of these rehabilitations, only one failed due to fracture during normal use after 41 months. For the remaining rehabilitations, there were no technical or biological problems, and there was no statistically significant change in bone size. From a prosthetic point of view, the results are encouraging; in fact, during the follow-up of 5 years, no prosthesis detached [40].

The same study group evaluated, in 65 patients, FPD made of lithium disilicate, and supported by two implants with conometric connection, for three years. Only two failures were recorded, one due to trauma and one due to breaking the framework. In addition, three patients reported minor chipping that were resolved promptly. During the observation period, no significant changes were observed in peri-implant bone tissue and in survival rate. None of the rehabilitations analyzed were lost. In addition to the integrity of the prosthetic, there was absolute respect for the biology of soft and hard tissues, identified by the absence of inflammation or infection. Patients who received a questionnaire regarding their satisfaction were adequately satisfied with the aesthetic results. During the three years of observation, there was no disconnection of the prostheses [41].

A 2019 study evaluated the placement of two implants in the premolar and molar region, in a healthy or post-extractive site, finalized with a monolithic fixed lithium disilicate prosthesis. Of the initial 25 patients, one was ruled out due to anatomical complications that did not allow this approach, and one due to missed follow-up. The follow-up period lasted 24 months. Two patients (8.7%) reported chipping of the antagonist teeth. The synergy between a platform-switched implant design and a conical connection between the implant, the abutment, and the hood placed inside the prosthesis created an environment in which the healed soft tissues remained stable regardless of the material of the final prosthesis. The results show the absence of inflammation or peri-implant infections. During the observation period, no complication has been reported concerning the prostheses, probably due to the extraoral polishing of the prosthesis after the intraoral cementation of the latter on the hoods to avoid the possible mis-fit due to the full-digital production method [36].

3. Materials and Methods

An electronic and manual search was conducted. Relevant articles were searched on The Web of Knowledge of Thomson Reuters, the Excerpta Medica database (Embase) by Elsevier, and on the PubMed database of the US National Library of Medicine. As the topic has so far been little investigated, the following types of studies were included: expert opinions, case reports, case series, consensus reports, meta-analyses, systematic reviews, randomized controlled clinical studies, observational studies, experimental studies in animals, in vitro, and humans. Studies in English, German, Spanish, and French were included. The following research strings were used: (*Conometric connection OR crown-abutment connection OR conical connection OR cementless connection*). Articles that do not deal with conometric connection of the prosthesis to the abutment were excluded (Figure 2). Data obtained from identified and relevant publications were extracted and compared, and overall findings were summarized in a narrative manner. The research gave 17 results (Table 1) and, among these 6 common fields of interest, the following were detected: advantages due to the absence of cement or screw, marginal adaptation and bacterial sealing, retention force, digital approach, follow-up, and types of prostheses.

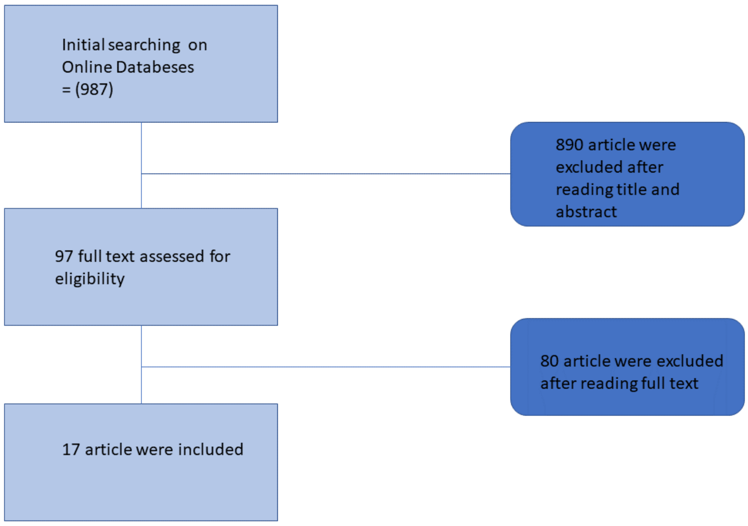

Figure 2. Diagram of inclusion studies.

Table 1. Findings of the digital research and extraction. Legend: FPD = Fixed Partial Denture; CP = Complete Denture, F.U. = Follow Up, LS2 = Lithium Disilicate, yy = Years.

References	Study Type	Features	Outcomes
Bressan et al. 2014	Prospective Study	CP supported by 4 implants F.U. 2 yy	No biological or technical adverse events. Good hygiene control.
Bressan et Lops. 2014	In Vitro	Computational investigation of coping-abutment system	Conometric connection could be considered a fixed system if it is adequately activated. Retention and insertion forces are proportional.
Bressan et al. 2017	In Vitro	Microbial leakage at conometric prosthetic connection	Good microbiological seal and a very low rate of leakage are demonstrated. They are good factors for biological health.
Bressan et al. 2018	Case Series	CAD/CAM crown with conometric retention	Good technical and biological response. It is shown that different brands of implant could be used with the association of conometric abutments.
Degidi et al. 2016	Case Series	Conometric connection for immediate loading provisional FPD	The cases show a high rate of success and a good biological response.
Degidi et al. 2018 (a)	Observational Study	5yy F.U. of zirconia FPD supported by conometric abutments	Good prosthetic response and manufacturing due to the space between the coping and the antagonist tooth. 100% rate of implant success.
Degidi et al. 2018 (b)	Observational Study	Definitive LS2 FPD supported by conometric abutments	Small prosthetic accidents, but a very good health of the peri-implant tissue.
Degidi et al. 2019	Observational Study	2 yy F.U. of CAD-CAM FPD supported by conometric abutments	The conometric connection demonstrates a good factor for the support tissue. Possible mis-fit due to the CAD-CAM production could be erased by the cementation of the prosthesis on the coping.

Table 1. *Cont.*

References	Study Type	Features	Outcomes
Degidi et al. 2020	Dental Technique	Use of a conometric connection for a single crown in posterior area	Good technical and biological feedback; according to the study, the clinician must pay attention at the insertion phase and must correct any interference.
Antonaya-Martis et al. 2016	In Vitro	Evaluation of retention using different conical degree	Retention force is inversely proportional to the conicity.
Nardi et al. 2017	In Vitro	Evaluation of retention strength of conical welding caps for fixed implant prosthesis	Impulse activation increases retention force up to 87%.
Zhang et al. 2008	In Vitro	Retentive characteristics of conical crown system over long-term cycle of in vitro use	An adequate retention force was carried out.
Gherke et al. 2021	In Vitro	Bacterial migration in conical indexed abutment	No bacterial translocation could be individuated. SEM observation demonstrated small microleakage at the interface abutment-coping.
Gherke, Hartjen et al. 2021	In Vitro	Marginal adaptation and leakage at conometric connection for a single crown	No bacterial colonization of the space abutment-coping could be observed.
Albiero et al. 2018	Dental Technique	Implementation using digital scanner with conometric connection	Angulation well predictable in CAD phase. Welding caps are time-saving.
Albiero et al. 2019	Case Report	Guided-welded and CAD-CAM shell for CP supported by conometric abutments	Prosthetic Guided Treatment. CAD phases are very complex. Good hygiene procedure due to the easy removal procedures of the prosthesis.
Albiero et al. 2021	Case Report	CAD/CAM crown using full digital process. Immediate post-extraction single implant	Prosthetic margin apically and extreme aesthetics with total health of the around tissue.

4. Conclusions

A careful analysis of studies presented in the literature has shown that the type of conometric connection performs well from the point of view of retentive force, marginal seal, biological inertia, and respect for the peri-implant tissues. Therefore, it is possible to place the prosthetic margins deep into the gingival sulcus with an increase in the aesthetics of rehabilitation. In addition, it lends itself well to a digital approach, either more traditional or fully digital. Further advantages are the prosthetic finalization in the same session of the implant placement, and a correct analysis of the parallelisms between the implant abutments and the design of prosthetic structures compatible with an intra-orally welded substructure. With this type of connection, rehabilitation of single elements, bridges of multiple elements, fixed partial prostheses, and fixed total prostheses were carried out.

As for follow-up, most studies evaluated this type of rehabilitation for a short/medium period while only one study reported medium-term data. Although it is difficult to complete studies with long-term follow-up, it is important to highlight that such studies would be necessary to gain a greater knowledge of the clinical behavior of this type of connection. Moreover, in vitro studies with dynamic loads could be conducted for a more effective simulation of the masticatory load.

A limit of this study is the absence of articles in the literature, concerning this topic, with a high level of significance, so only case reports, observational studies, dental techniques, and in vitro experiences have been considered. It is advisable to conduct a study with a more scientific matter such as RCTs, or retrospective or cohort studies to improve the knowledge in this new field of prostheses.

Author Contributions: Conceptualization, S.M.L. and D.D.M.; methodology, C.T.; validation, S.S.; resources, S.S.; data curation, C.T. and P.B.; writing—original draft preparation, P.B., S.M.L. and D.D.M.; writing—review and editing, S.M.L., C.T., R.R.y.B., S.S., and D.D.M.; supervision, R.R.y.B.; project administration, C.T. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Pjetursson, B.E.; Thoma, D.; Jung, R.; Zwahlen, M.; Zembic, A. A Systematic Review of the Survival and Complication Rates of Implant-Supported Fixed Dental Prostheses (FDPs) after a Mean Observation Period of at Least 5 Years. *Clin. Oral Implants Res.* **2012**, *23*, 22–38. [CrossRef] [PubMed]
2. Rizzo, S.; Zampetti, P.; Rodriguez, Y.; Baena, R.; Svanosio, D.; Lupi, S.M. Retrospective Analysis of 521 Endosseous Implants Placed under Antibiotic Prophylaxis and Review of Literature. *Minerva Stomatol.* **2010**, *59*, 75–88. [PubMed]
3. Pjetursson, B.E.; Brägger, U.; Lang, N.P.; Zwahlen, M. Comparison of Survival and Complication Rates of Tooth-Supported Fixed Dental Prostheses (FDPs) and Implant-Supported FDPs and Single Crowns (SCs). *Clin. Oral Implants Res.* **2007**, *18*, 97–113. [CrossRef] [PubMed]
4. Butera, A.; Gallo, S.; Pascadopoli, M.; Luraghi, G.; Scribante, A. Ozonized Water Administration in Peri-Implant Mucositis Sites: A Randomized Clinical Trial. *Appl. Sci.* **2021**, *11*, 7812. [CrossRef]
5. Butera, A.; Pascadopoli, M.; Pellegrini, M.; Gallo, S.; Zampetti, P.; Cuggia, G.; Scribante, A. Domiciliary Use of Chlorhexidine vs. Postbiotic Gels in Patients with Peri-Implant Mucositis: A Split-Mouth Randomized Clinical Trial. *Appl. Sci.* **2022**, *12*, 2800. [CrossRef]
6. Gehrke, P.; Hartjen, P.; Smeets, R.; Gosau, M.; Peters, U.; Beikler, T.; Fischer, C.; Stolzer, C.; Geis-Gerstorfer, J.; Weigl, P.; et al. Marginal Adaptation and Microbial Leakage at Conometric Prosthetic Connections for Implant-Supported Single Crowns: An In Vitro Investigation. *Int. J. Mol. Sci.* **2021**, *22*, 881. [CrossRef] [PubMed]
7. Salvi, G.E.; Cosgarea, R.; Sculean, A. Prevalence and Mechanisms of Peri-Implant Diseases. *J. Dent. Res.* **2017**, *96*, 31–37. [CrossRef]
8. Albrektsson, T.; Canullo, L.; Cochran, D.; De Bruyn, H. "Peri-Implantitis": A Complication of a Foreign Body or a Man-Made "Disease". Facts and Fiction. *Clin. Implant Dent. Relat. Res.* **2016**, *18*, 840–849. [CrossRef]
9. Urdaneta, R.A.; Marincola, M.; Weed, M.; Chuang, S.K. A Screwless and Cementless Technique for the Restoration of Single-Tooth Implants: A Retrospective Cohort Study. *J. Prosthodont.* **2008**, *17*, 562–571. [CrossRef]
10. Sanz, M.; Chapple, I.L. Clinical Research on Peri-Implant Diseases: Consensus Report of Working Group 4. *J. Clin. Periodontol.* **2012**, *39*, 202–206. [CrossRef]
11. Degidi, M.; Nardi, D.; Sighinolfi, G.; Degidi, D. The Conometric Concept for the Definitive Rehabilitation of a Single Posterior Implant by Using a Conical Indexed Abutment: A Technique. *J. Prosthet. Dent.* **2020**, *123*, 576–579. [CrossRef]
12. Albiero, A.M.; Benato, R.; Momic, S.; Degidi, M. Guided-Welded Approach Planning Using a Computer-Aided Designed Prosthetic Shell for Immediately Loaded Complete-Arch Rehabilitations Supported by Conometric Abutments. *J. Prosthet. Dent.* **2019**, *122*, 510–515. [CrossRef]
13. Michalakis, K.X.; Hirayama, H.; Garefis, P.D. Cement-Retained versus Screw-Retained Implant Restorations: A Critical Review. *Int. J. Oral Maxillofac. Implants* **2003**, *18*, 719–728.
14. Jung, R.E.; Pjetursson, B.E.; Glauser, R.; Zembic, A.; Zwahlen, M.; Lang, N.P. A Systematic Review of the 5-Year Survival and Complication Rates of Implant-Supported Single Crowns. *Clin. Oral Implants Res.* **2008**, *19*, 119–130. [CrossRef]
15. Chee, W.; Felton, D.A.; Johnson, P.F.; Sullivan, D.Y. Cemented versus Screw-Retained Implant Prostheses: Which Is Better? *Int. J. Oral Maxillofac. Implants* **1999**, *14*, 137–141.
16. Wilson, T.G., Jr. The Positive Relationship Between Excess Cement and Peri-Implant Disease: A Prospective Clinical Endoscopic Study. *J. Periodontol.* **2009**, *80*, 1388–1392. [CrossRef]
17. Bornstein, M.M.; Lussi, A.; Schmid, B.; Belser, U.C.; Buser, D. Early Loading of Nonsubmerged Titanium Implants with a Sandblasted and Acid-Etched (SLA) Surface: 3-Year Results of a Prospective Study in Partially Edentulous Patients. *Int. J. Oral Maxillofac. Implants* **2003**, *18*, 659–666.
18. Abboud, M.; Koeck, B.; Stark, H.; Wahl, G.; Paillon, R. Immediate Loading of Single-Tooth Implants in the Posterior Region. *Int. J. Oral Maxillofac. Implants* **2005**, *20*, 61–68. [CrossRef]

19. Agar, J.R.; Cameron, S.M.; Hughbanks, J.C.; Parker, M.H. Cement Removal from Restorations Luted to Titanium Abutments with Simulated Subgingival Margins. *J. Prosthet. Dent.* **1997**, *78*, 43–47. [CrossRef]
20. Linkevicius, T.; Vindasiute, E.; Puisys, A.; Peciuliene, V. The Influence of Margin Location on the Amount of Undetected Cement Excess after Delivery of Cement-Retained Implant Restorations. *Clin. Oral Implants Res.* **2011**, *22*, 1379–1384. [CrossRef]
21. White, D.J. Dental Calculus: Recent Insights into Occurrence, Formation, Prevention, Removal and Oral Health Effects of Supragingival and Subgingival Deposits. *Eur. J. Oral Sci.* **1997**, *105*, 508–522. [CrossRef]
22. Tan, B.; Gillam, D.G.; Mordan, N.J.; Galgut, P.N. A Preliminary Investigation into the Ultrastructure of Dental Calculus and Associated Bacteria. *J. Clin. Periodontol.* **2004**, *31*, 364–369. [CrossRef]
23. Schedle, A.; Franz, A.; Rausch-Fan, X.; Andreas, S.; Lucas, T.; Samorapoompichit, P.; Sperr, W.; Boltz-Nitulescu, G. Cytotoxic Effects of Dental Composites, Adhesive Substances, Compomers and Cements. *Dent. Mater.* **1998**, *14*, 429–440. [CrossRef]
24. Canullo, L.; Peñarrocha, M.; Monje, A.; Catena, A.; Wang, H.-L.; Peñarrocha, D. Association Between Clinical and Microbiologic Cluster Profiles and Peri-Implantitis. *Int. J. Oral Maxillofac. Implants* **2017**, *32*, 1054–1064. [CrossRef]
25. Caricasulo, R.; Malchiodi, L.; Ghensi, P.; Fantozzi, G.; Cucchi, A. The Influence of Implant-Abutment Connection to Peri-Implant Bone Loss: A Systematic Review and Meta-Analysis. *Clin. Implant Dent. Relat. Res.* **2018**, *20*, 653–664. [CrossRef]
26. Gehrke, P.; Burg, S.; Peters, U.; Beikler, T.; Fischer, C.; Rupp, F.; Schweizer, E.; Weigl, P.; Sader, R.; Smeets, R.; et al. Bacterial Translocation and Microgap Formation at a Novel Conical Indexed Implant Abutment System for Single Crowns. *Clin. Oral Investig.* **2021**, *26*, 1375–1389. [CrossRef]
27. Bressan, E.; Stocchero, M.; Jimbo, R.; Rosati, C.; Fanti, E.; Tomasi, C.; Lops, D. Microbial Leakage at Morse Taper Conometric Prosthetic Connection: An in Vitro Investigation. *Implant Dent.* **2017**, *26*, 756–761. [CrossRef]
28. Schriwer, C.; Skjold, A.; Gjerdet, N.R.; Øilo, M. Monolithic Zirconia Dental Crowns. Internal Fit, Margin Quality, Fracture Mode and Load at Fracture. *Dent. Mater.* **2017**, *33*, 1012–1020. [CrossRef]
29. Nardi, D.; Degidi, M.; Sighinolfi, G.; Tebbel, F.; Marchetti, C. Retention Strength of Conical Welding Caps for Fixed Implant-Supported Prostheses. *Int. J. Prosthodont.* **2017**, *30*, 553–555. [CrossRef]
30. Bressan, E.; Lops, D.; Tomasi, C.; Ricci, S.; Stocchero, M.; Carniel, E.L. Experimental and Computational Investigation of Morse Taper Conometric System Reliability for the Definition of Fixed Connections between Dental Implants and Prostheses. *Proc. Inst. Mech. Eng. Part H J. Eng. Med.* **2014**, *228*, 674–681. [CrossRef]
31. Antonaya-Martin, J.; Del Rio-Highsmith, J.; Moreno-Hay, I.; Lillo-Rodríguez, J.; Gomez-Polo, M.; Celemin-Viñuela, A. CAD/CAM Conic Crowns for Predictable Retention in Implant-Supported Prostheses. *Int. J. Prosthodont.* **2016**, *29*, 230–232. [CrossRef]
32. Beuer, F.; Edelhoff, D.; Gernet, W.; Naumann, M. Parameters Affecting Retentive Force of Electroformed Double-Crown Systems. *Clin. Oral Investig.* **2010**, *14*, 129–135. [CrossRef]
33. Albiero, A.M.; Benato, R.; Momic, S.; Degidi, M. Implementation of Computer-Guided Implant Planning Using Digital Scanning Technology for Restorations Supported by Conical Abutments: A Dental Technique. *J. Prosthet. Dent.* **2018**, *119*, 720–726. [CrossRef]
34. Zhang, R.-G.; Hannak, W.B.; Roggensack, M.; Freesmeyer, W.B. Retentive Characteristics of Ankylos SynCone Conical Crown System over Long-Term Use in Vitro. *Eur. J. Prosthodont. Restor. Dent.* **2008**, *16*, 61–66.
35. Degidi, M.; Nardi, D.; Piattelli, A. The Conometric Concept: Coupling Connection for Immediately Loaded Titanium-Reinforced Provisional Fixed Partial Dentures—A Case Series. *Int. J. Periodontics Restor. Dent.* **2016**, *36*, 347–354. [CrossRef]
36. Degidi, M.; Nardi, D.; Sighinolfi, G.; Degidi, D.; Piattelli, A. The Conometric Concept: A two-year follow-up of fixed partial cerec restorations supported by cone-in-cone abutments. *J. Prosthodont.* **2019**, *28*, e780–e787. [CrossRef]
37. Albiero, A.; Benato, R.; Momic, S.; Degidi, M. Computer-Aided Crown Design Using Digital Scanning Technology for Immediate Postextraction Single-Implant Restorations Supported by Conical Indexed Abutments. *Int. J. Periodontics Restor. Dent.* **2021**, *41*, 135–140. [CrossRef]
38. Bressan, E.; Venezze, A.; Magaz, V.; Lops, D.; Ghensi, P. Fixed Conometric Retention with CAD/CAM Conic Coupling Abutments and Prefabricated Syncone Caps: A Case Series. *Int. J. Periodontics Restor. Dent.* **2018**, *38*, 277–280. [CrossRef]
39. Bressan, E.; Lops, D. Conometric Retention for Complete Fixed Prosthesis Supported by Four Implants: 2-Years Prospective Study. *Clin. Oral Implants Res.* **2014**, *25*, 546–552. [CrossRef]
40. Degidi, M.; Nardi, D.; Sighinolfi, G.; Piattelli, A. The Conometric Concept: A 5-Year Follow-up of Fixed Partial Monolithic Zirconia Restorations Supported by Cone-in-Cone Abutments. *Int. J. Periodontics Restor. Dent.* **2018**, *38*, 363–371. [CrossRef]
41. Degidi, M.; Nardi, D.; Sighinolfi, G.; Piattelli, A. The Conometric Concept: Definitive Fixed Lithium Disilicate Restorations Supported by Conical Abutments. *J. Prosthodont.* **2018**, *27*, 605–610. [CrossRef] [PubMed]