

Aesthetic rehabilitation in lower mandibular area for agenesia in site 4.2: A case report and literature review

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Abstract

Agenesis, or congenital absence of one or more dental elements, is one of the most frequently occurring craniofacial disorders in humans and is a clinical problem that compromises aesthetics and dental function from an early age. It is a condition that can involve both deciduous and permanent dentition, with contextually different prognoses and treatment solutions.

In both cases, the clinical management of this issue involves a multi-disciplinary approach designed to cover the comprehensive dental needs of patients with agenesia. Among the elements of the permanent dentition less commonly affected by this malformation are the lower lateral incisors, whose absence may be rare but, at the same time, aesthetically and functionally debilitating for the patient.

Aim: The current study presents a review of the existing literature regarding the prevalence, etiology, and classification of the various clinically detectable dental agenesia, with a focus especially directed toward absent mandibular lateral incisors and possible clinical dental management to resolve the problem. This article's description of a case report aims to outline a possible aesthetic rehabilitation approach in the presence of these rare cases of agenesia and then present the clinical results obtained through implant-prosthetic rehabilitation combined with orthodontic therapy.

Materials and Methods:

The objective examination performed on the patient revealed the agenesic absence of element 4.2; however, before implant placement, orthodontic therapy was performed to create the necessary space. Once therapy was completed, after informed consent and drug treatment, implant placement was performed with concomitant tissue regeneration techniques mediating autologous and heterologous materials.

Results:

A follow-up 12 months after functional loading showed excellent healing of the involved tissues, both radiographically and on objective examination.

Conclusions

Multi-disciplinary clinical management in the presence of agenesia is essential for correctly rehabilitating the missing element, thus allowing the achievement of an optimal and possibly long-lasting prognostic outcome.

Keywords: Agenesis, Hypodontia, Agenesis lateral incisors, Single implant-prosthetic solutions.

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Introduction

Hypodontia, or dental agenesis, is one of humans' most common craniofacial disorders. It can occur as part of a recognized genetic syndrome or as a single non-syndromic trait [1][2]. A tooth is thus defined as congenitally absent when it has not erupted within the oral cavity, has not been accidentally extracted or lost, and is not visible radiographically [3]. However, it is necessary to distinguish hypodontia from other different types of dental agenesis. This one involves several teeth ranging from one to six, unlike oligodontia (lack of six or more teeth) and anodontia (lack of all elements), which are much rarer pathologies with greater oral cavity impairments. In a comparison of bilateral and unilateral agenesis, Polder et al. [5] found that bilateral agenesis occurs more often at the maxillary lateral incisors than at the other teeth, where unilateral agenesis is more common. Except for third molars, which appear to be the elements most affected by this pathology, the prevalence of hypodontia possesses a variable range, varying from 1.6 to 36.5 percent depending on the population considered [4]. Although it is a prevalent condition, especially in the Caucasian race, the etiology of hypodontia has not yet been clearly identified, although both environmental and genetic factors are believed to be involved, with the latter playing a more significant role. Hypodontia is typically associated with several specific features, including the site of agenesis and the size of adjacent teeth. Agenesis would not affect the upper jaw and mandible differently [5], although one study found the mandible to be more frequently affected than the upper arch [6]. There would not appear to be a significant sex difference at the level of agenesis deciduous dentition, although, in permanent dentition, there would appear to be a greater preference

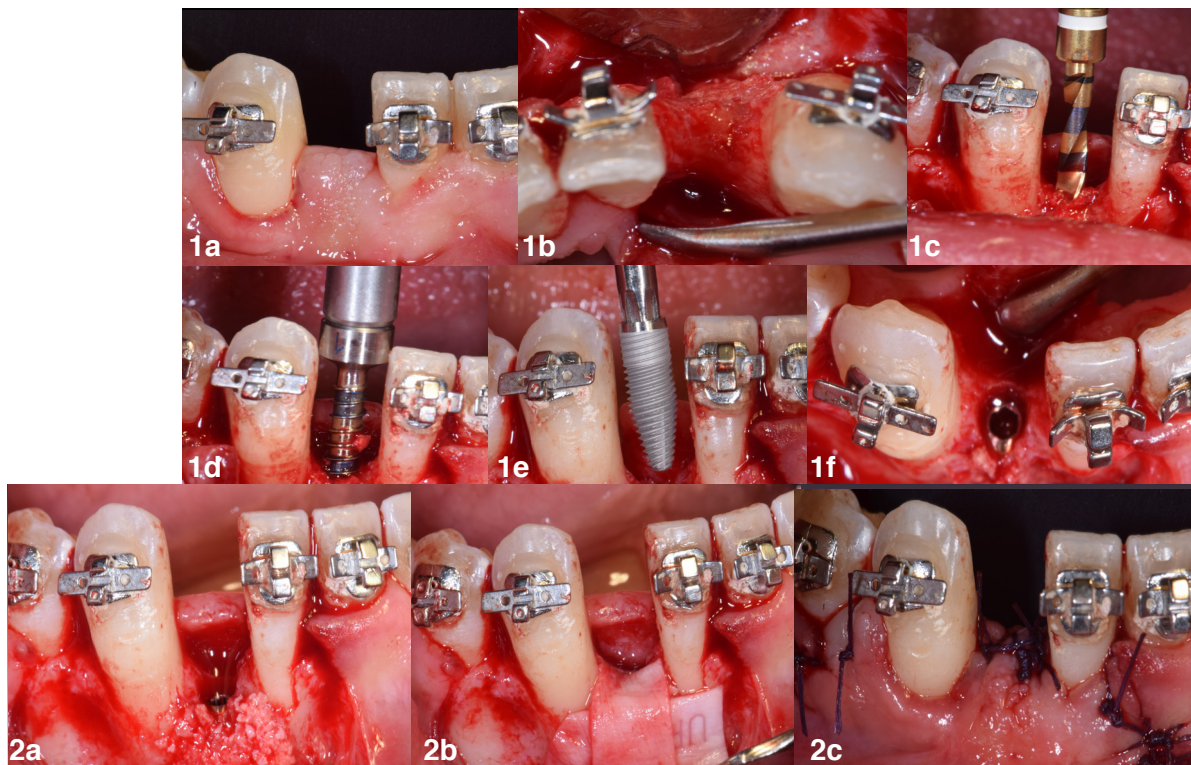
for the female sex [7]. After third molars, mandibular second premolars and maxillary lateral incisors appear to be the most frequently absent elements [8]. Agenesis of the mandibular lateral incisors, on the other hand, appears to be much rarer [9].

Case report

The patient, a twenty-seven-year-old woman, presents for her first visit to the Department of Dentistry and Dental Prosthetics of the Vita-Salute San Raffaele Hospital, directed by Prof. E. F. Gherlone. On objective examination, agenesis of the right mandibular lateral incisor is evident; however, the space between the canine and central incisor is reduced due to their displacement. The patient states that she lost the deciduous element corresponding to the agenesis tooth late compared to its usual age and did not perform orthodontic therapy to maintain the space. Therefore, to allow the performance of proper aesthetic-functional rehabilitation, it was decided, in agreement with the patient, to perform preliminary orthodontic therapy (Fig. 1a) so that adequate "uprighting" could be achieved for future implant insertion.

Once the optimal space was achieved, surgical therapy was then carried out, assisted, however, by careful drug therapy:

- Levofloxacin: 500 mg once per day for ten days to be started the day before surgery
- Medrol 0.16 mg: one pill the morning of surgery; three-quarters of a pill the following morning of surgery; half a pill two days after surgery; one-quarter of a pill three days after surgery
- ToraDol drops 20 ml: twenty-five drops as needed



Figures 1-2. Implant placement with autologous and heterologous tissue grafts.

Before implant placement, the Split Crest technique (Fig. 1b), widely used in bone augmentation procedures for implant purposes, was performed. Thus, an osteotomy was made along the contour of the residual bone ridge (which was very thin and not very pronounced), and mechanical expansion proceeded.

The implant site was then prepared with the appropriate drills (Fig. 1c-1d); at the same time, a biomaterial (BIOBONE BioSafin) was used, and autologous bone was taken for removal from the implant site was inserted (Fig. 1e). A Winsix TTSL implant having 2.9 mm of diameter and 11 mm of length was then inserted (Fig. 1e). The site was waiting for tissue healing, and adequate timing of implant osteo-integration, the case was then finalized with a prosthetic reconstruction made of layered zirconia (Fig. 3).

FOLLOW-UP

Follow-up visits, aimed at clinical and radiographic examination, were performed one week after implant placement. After that at three months, six months, and then annually. The patient was instructed, by a dental hygienist, in mechanical plaque control by the use of an electric or manual toothbrush, interproximal brushes, and Super Floss type floss (Oral B, Procter & Gamble, Cincinnati, OH, USA). Whereas, professional oral hygiene procedures were performed every three months following implant placement [10,11].

Results

The patient was then re-evaluated at a follow-up of approximately 12 months after functional prosthetic loading. An endoral radiograph was then performed to assess the bone quality and osteointegration rate of the inserted implant, which, radiographically, were clearly evident (Fig. 4), highlighting how the support of autologous and heterologous grafts, aided by crestal expansion techniques, may be optimal to promote biological healing processes [12].

Discussion

Dental agenesis is one of the most common abnormalities found in humans. It may be partial or complete; a partial absence of dental elements may manifest as hypodontia or oligodontia. Despite the extreme prevalence of this malformation, the aetiology remains undetermined, although environmental and genetic factors are believed to underlie it [13,14].



Figure 3. Prosthetic finalization.

A basis of genetic origin has been proposed for both syndromic and non-syndromic dental agenesis. Genes implicated in syndromic agenesis are EDA, EDAR, EDARADD, IRF6, MSX1, NEMO, P63, PITX2, and SHH. On the other hand, genes involved in non-syndromic dental agenesis are MSX1, PAX9, and AXIN2 [15].

Among the various causes of non-syndromic origin is also added a probable use of Thalidomide by the mother during gestation in pregnancy [16].

On the other hand, environmental causes underlying this malformation, such as possible trauma, radiotherapy, chemotherapy, osteomyelitis, hormonal influences, and metabolic influences, are believed to be associated with it. Possible iatrogenic causes include inadvertent removal of the dental gem during extraction of the deciduous element [17].

In the case report described above, the patient's hypodontia was not associated with any syndrome, as she was normal in all other aspects and did not suffer from any other abnormalities or malformations of different types. In the case of unilateral agenesis of the anterior sector, a dental midline shift, with the migration of the dental elements close to the site of agenesis to the edentulous space, should be considered very probable if there has been a loss of the corresponding deciduous [18].

The presence of agenesis can cause severe orthognathodontic problems, such as alteration of the intercuspidation, change in the size of the bone bases and their reciprocal relationships, displacement of the midlines, decrease in the vertical dimension, extrusion of dental elements due to lack of antagonists, and aesthetic problems at the level of the anterior group [19]. Therefore, the diagnostic phase and then proper treatment planning in agreement with the patient are critical, as therapeutic solutions may focus on various possible options.

Therefore, a multidisciplinary approach is necessary. Logopedic therapy may be indispensable in cases where congenital front teeth are absent, as they could affect the correct emission of sibilant sounds [20].

There are two treatment options: reopening the agenesis space, which will then be replaced prosthetically, or orthodontic closure of the same. The retention or, if necessary, reopening of the spaces seem to be the more natural choices, as the integrity of the arch and the

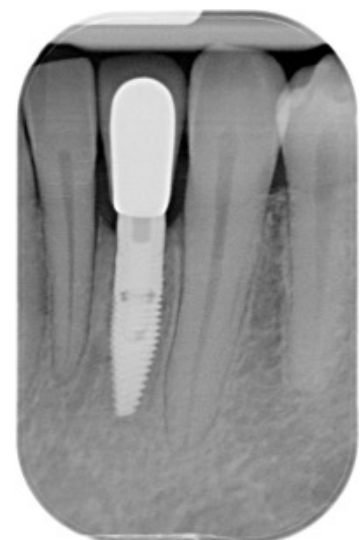


Figure 4. Follow-up endoral rx at one year.

relationships between the two antagonistic arches can be maintained in that case, inter-cusping, and each individual tooth continues to perform its function [21].

For this reason, it was therefore decided to perform rehabilitation with appropriate orthodontic and prosthetic intervention; it should be remembered that therapy can be applied only after the growth of the maxillary and alveolar processes is complete, with waiting times varying according to the patient's age [22]. In the present case, as the patient was already an adult, it was possible to intervene from the first appointments.

Rehabilitation of a single missing tooth is frequently achievable through osteointegration of an implant, and numerous studies have demonstrated excellent stability over time. Data extrapolated from a meta-analysis show that the survival rate of implants supporting single crowns after five years is 97.2%, and at ten years, it corresponds to about 95.2% [23].

However, in the presence of insufficient bone size, bone augmentation techniques using autologous and heterologous grafts, such as the application of membranes of various types and/or autologous bone taken from the patient at the same time as implant insertion, become appropriate [24-26].

Conclusion

Multidisciplinary clinical management in the presence of agenesis appears to be essential for the proper rehabilitation of the missing element, preceded, however, by a careful assessment of the affected area, the age of observation, and the changes that nature may have physiologically brought about, thus allowing the achievement of an optimal and possibly long-lasting prognostic outcome.

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