



# Autologous Transplant of the Mandibular Third Molar into a Post-extraction Tooth Socket. Case Report

## Trasplante autólogo del tercer molar mandibular en el alveólo posextracción. Reporte de caso

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### ABSTRACT

#### Keywords:

Tooth transplantation; prognosis; oral surgery.

Dental transplantation is a surgical alternative that consists of transplanting a tooth from one alveolus to another in the same patient. It is beneficial when replacing missing teeth in young patients with a high success rate, provides vital, proprioceptive rehabilitation with excellent aesthetic results without altering adjacent teeth, and is cheaper. The purpose of this case report is to show the clinical sequence of a surgical approach to the dental autotransplantation of the lower third molar into the post-extraction socket of the lower right first molar, without endodontic treatment. The case presented is a 15-year-old female patient with a diagnosis of non-restorable extensive caries in tooth 46. An interdisciplinary board decided to carry out the treatment with an autologous transplant of the lower right third molar into the post-extraction socket of the lower first molar from the same quadrant. Post-operative follow-up examinations were performed for a year. Dental transplantation is an excellent treatment option when it comes to replacing missing teeth since it offers multiple functional and aesthetic advantages, mainly for children and young adults.

### RESUMEN

**Palabras clave:** autotrasplante; pronóstico; cirugía bucal.

El trasplante dental es una alternativa quirúrgica que consiste en trasplantar un diente de un alveolo a otro en un mismo paciente, muy útil al momento de reemplazar órganos dentarios perdidos en pacientes jóvenes, con una alta tasa de éxito. Presenta ventajas provechosas para los pacientes, lo que brindan una rehabilitación vital, propioceptiva y excelente estética, sin alterar dientes adyacentes. Adicionalmente, representa una alternativa menos costosa. El presente reporte de caso tiene como objetivo mostrar la secuencia clínica del abordaje quirúrgico de autotrasplante dental de un tercer molar inferior en el alveolo postextracción del primer molar inferior derecho, llevado a cabo sin necesidad de tratamiento endodóncico. Se presenta el caso de una paciente de 15 años de edad con diagnóstico de caries extensa no restaurable en el 46. Se decide, a través de una junta interdisciplinaria, llevar a cabo el tratamiento con trasplante autólogo del tercer molar inferior derecho en el alveolo postextracción del primer molar inferior de la misma hemiarcada. Se realizan controles postquirúrgicos durante un año. El trasplante dental es una excelente opción de tratamiento a la hora de reemplazar piezas dentarias perdidas pues ofrece múltiples ventajas funcionales y estéticas, principalmente en niños y adultos jóvenes.

## INTRODUCTION

The loss or absence of permanent teeth in both, children and young adults, can occur due to multiple causes, the most common being congenital conditions, dentoalveolar trauma, periodontal disease or caries<sup>1</sup>. However, some treatments allow restoring functionality and occlusal stability such as autogenous transplant or dental autotransplantation, which is a tremendous surgical alternative for oral rehabilitation in young patients<sup>2</sup>.

The technique of dental autotransplantation is based on moving a tooth from one position to another within the oral cavity to a post-extraction or surgically created alveolus. It is commonly confused with terms such as dental reimplantation, which consists in replacing an avulsed or intentionally extracted tooth to perform endodontic treatments in the alveolus and implant, which involves the placement of an artificial tooth in a surgically prepared alveolus<sup>3</sup>.

Dental autotransplantation is an effective surgical method in young patients for replacing a tooth that is not restorable, and its long-term survival rate is high, being between 63.3–94.6% for ten years. The challenge of planning their replacement not only lies in the number and location of missing teeth but also in the age and root development stage of the tooth to be transplanted<sup>4</sup>. It is necessary to meet ideal conditions to get the expected results; good periodontal health status, healthy receiving areas with bone and adequate thickness of tables to receive donor, and wholly formed or open tooth apex. On the other hand, position and dimensions of the tooth to be transplanted should be analyzed for their general health status; if they have underlying diseases, they must be controlled. The most commonly used teeth for this procedure are healthy non-functional third molars, premolars, canines that are included or impacted, and supernumeraries<sup>5</sup>.

Contraindications for this procedure should always be taken into account such as the possibility of rehabilitating the tooth to be replaced, acute infection in the recipient site, traumatic exodontia

of tooth to be transplanted, uncooperative patients or uncontrolled underlying diseases<sup>6</sup>.

Although dental autotransplantation is not currently considered the gold standard for replacing missing teeth, it is a valuable therapeutic option that should be considered in specific cases since it offers a high success rate and a lower cost for the patient<sup>7</sup>. The main advantage of this method is that it uses autologous tissue and preserves the alveolar bone of the recipient site and adjacent teeth by maintaining the periodontal ligament, fulfilling a nutritional function. Furthermore, the periodontal ligament helps to stimulate the development of bone structures following the alveolar growth of the young patient with potential good aesthetic results in the anterior sector. Compared with other prosthetic treatment alternatives such as fixed partial prosthesis or implant rehabilitation, only autologous transplants can offer proprioception during the development of masticatory functions<sup>8</sup>.

This case report aims to show the clinical sequence of the surgical approach to the dental autotransplant of the lower third molar to a post-extraction alveolus of the lower right first molar, without endodontic treatment, in a young patient.

## CLINICAL CASE REPORT

A 15-year-old, single, ninth-grader female patient from mixed ethnicity was referred by General Dentistry to the stomatology and oral surgery service at the University of Cartagena, Colombia, with her mother in 2018. There was no relevant background on the case, and the patient was in apparent good general health conditions. The clinical stomatology examination revealed 80% coronal destruction and presence of an active fistula in the vestibular sulcus associated with the lower right first molar. She was diagnosed with irreversible hyperplastic pulpitis. The other anatomical structures were healthy. Upon imaging examination, furcation involvement, widening of the periodontal ligament, and radio lucidity were observed in the mesial root compatible with an apical lesion.

A multidisciplinary meeting was held, including rehabilitation, endodontics, and oral surgery specialists to assess clinical and radiographic findings and establish the most appropriate treatment. Due to the advanced tooth destruction identified, the meeting initially suggested tooth extraction and rehabilitation with a fixed prosthesis or an implant upon coming of age. Finally, it determined a treatment plan: performing an autologous transplant of her lower right third molar, in Nolla's stage 8, after extracting the right lower first molar.

### Surgical procedure

The procedure was explained to the patient and her mother, including advantages and disadvantages. The mother authorized it by signing the informed consent. Three days before the first procedure, the patient was under antibiotic treatment with 500 mg amoxicillin capsules, taking one every eight hours for seven days, due to an active infectious process. The exodontia of the lower right first molar was performed, accompanied by bone curettage and tissue detoxification with a tetracycline solution in physiological saline, reaching thus elimination about the periapical lesion. After four days, she underwent surgery again under local anesthesia; the first alveolus was prepared, and the septum was removed (Figure 1).



Figure 1. Post-extraction alveolus of the lower right first molar.

A linear scalloped incision was made in the right retromolar area; a mucoperiosteal flap was lifted, and osteotomy and ostectomy were performed. The lower third molar was exposed, and dislocation and exodontia of tooth 48 were carried out without touching the pericoronal cap or dental roots (Figure 2).



Figure 2. Extraction of the lower right third molar for transplantation into the recipient alveolus.

The tooth was immediately transplanted into the recipient area, left in infraocclusion to avoid occlusal loads, and "X" stitch was put in above the tooth to control mobility (Figure 3).



Figure 3. Immediate post-surgical evolution, transplantation and infraocclusion tooth.

A follow-up examination was conducted after eight days, where a proper healing process was observed, and sutures were removed. After 45 days, a first periapical radiograph was taken, showing primary and secondary stability of the tooth in question, as well as periodontal ligament formation at the level of the apical and middle thirds (Figure 4).

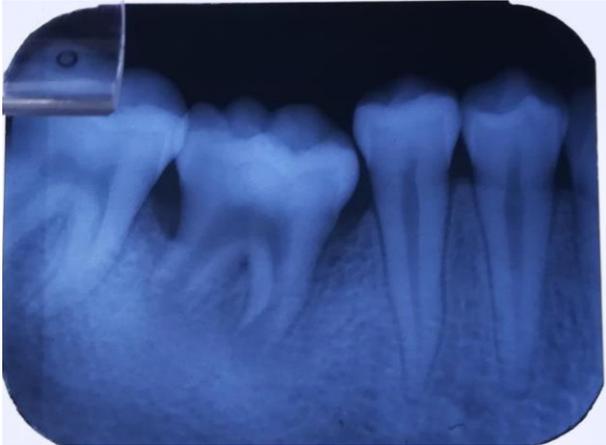


Figure 4. Radiographic follow-up 45 days after surgery.

On a follow-up visit eight months later, good evolution was noted, vitality tests were positive with healthy periodontal tissues, and dental mobility was not observed. Nolla's stage 9 in tooth 48 was demonstrated with excellent functionality and occlusal stability (Figure 5).



Figure 5. Follow-up after eight months: positive vitality tests and healthy periodontal tissues.

Another follow-up visit one year later showed healthy periodontal tissues; functionality, occlusal stability and dental vitality test were positive, with Nolla's stage 9 (Figure 6).

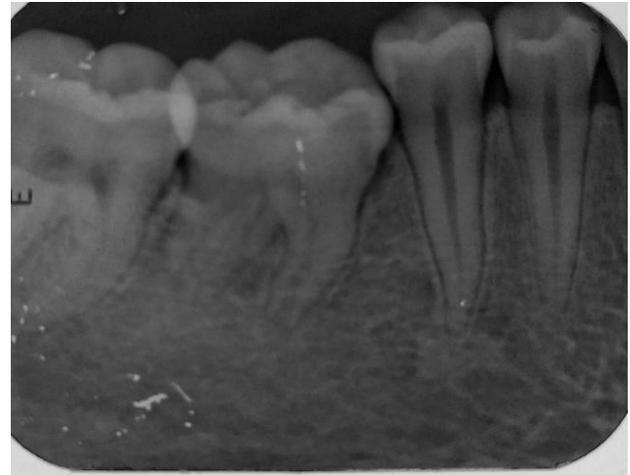


Figure 6. Radiographic follow-up one year after the surgery.

### Declaration on ethical aspects

The authors declare that the procedures followed conform to ethical standards of the responsible human experimentation committee, World Medical Association, Helsinki's Declaration and Resolution 8430/1993, which establishes the scientific, technical, and administrative regulations for health research in Colombia.

### DISCUSSION

Autologous dental transplantation is undoubtedly a valuable therapeutic alternative for oral rehabilitation in young patients. It works with immature teeth or incomplete root formation. It has many advantages, including its low-cost, periradicular tissues helping to heal and regenerate the alveolar bone, a high level of clinical success, proprioception since it presents periodontal ligament and other tissues from the teeth. No other restorative treatment offers this alternative. Likewise, it has complications such as infection in the recipient area, loss of the transplanted tooth, traumatic extraction of the tooth to be transplanted, and loss of transplant tissues<sup>9</sup>.

Currently, numerous studies have reported a high success rate for transplanted teeth with incomplete root formation, which after a year is approximately 97.4 %, and a low complication rate (< 5 %)<sup>10</sup>. This

matches the results achieved in a follow-up conducted, in which no pathological clinical signs of pulp or periodontal disease were detected.

Sometimes depending on the position of a tooth or aesthetic requirements, movements with orthodontic appliances can be chosen<sup>11</sup>. Currently, mini-screws can be used to treat any underlying malocclusion and get the final appropriate position for the autologous transplant; however, they are not indicated in all cases. Some of its advantages are their low cost, controlled forces, and easy placement and removal. Still, they can exert excessive mechanical forces on bone and transplanted tooth, causing occlusal trauma, mobility, and later loss out from teeth. Generally, a tooth to be transplanted is not adjacent to the surgical place; therefore, adequate movements cannot be performed, among other complications<sup>12</sup>.

A controversial perspective regarding this procedure is carrying out a root canal treatment (RCT) from the transplanted tooth when it is immature in a subsequent surgery. Reviews show that it is not necessary to perform endodontic therapy, especially in first three years of evolution. For instance, in Murtadha and Kwok<sup>13</sup>, of a sample of 366 teeth, only 54 (14 %) required RCT, compared with 92 % that required it after six years of follow-up. According to this report, we decided to perform this transplant without filling the ducts, thinking about a good prognosis for the patient.

Authors such as Arbel et al<sup>14</sup> reported the case of a 19-year-old male patient referred for evaluation of tooth 46, which showed type III mobility, sensitivity to percussion and palpation clinically. Diagnostic aids revealed a radiolucent zone over 15 mm in diameter, extending from the mesial root of tooth 47 to distal tooth 45. The diagnosis was acute apical abscess and vertical root fracture. The treatment plan was the extraction of tooth 46, accompanied by curettage and abscess drainage. Subsequently, nine weeks later, a second surgery was performed, in which the right third molar was removed and transplanted into the healing socket of tooth 46, achieving primary stability. When evaluated after one year, the tooth had normal mobility, with no sensitivity to palpation and percussion and positive

responses to pulp tests. Regarding soft tissue, staining was expected, with probing up to 3 mm and no inflammation or sinus tract. In diagnostic aids, no relevant changes and good bone around the tooth were observed.

Since the previous case was similar to that in this report, in which 15-year-old patient had an endodontic pathology and decayed tooth 46, we decided to extract it using bone curettage and detoxification. Finally, we performed the dental transplantation from tooth 48 four days after the extraction since it had an active infectious process. One year later, the patient showed healthy periodontal tissues, a functional tooth, occlusal stability, and positive vitality tests.

The implementation of platelet-rich plasma (PRP) at the time of transplantation has been reported. Using PRP, platelet-derived growth factor (PDGF), transforming growth factor (TGF), interleukins (IL), angiogenesis growth factor (AGF), vascular endothelial growth factor (VEGF), and fibronectin showed good results<sup>15</sup>. Unlike this report, no adjuvant treatment was required, and even so, expected results were achieved. However, since it acts in the healing process and allows stability of transplanted organs, it should be taken into account for future studies and procedures.

## CONCLUSION

Dental transplantation is an excellent therapeutic option when replacing a missing tooth. It offers multiple functional and aesthetic advantages, especially in children and young patients, since restorative treatments such as fixed prostheses and implants are not indicated for this population. Furthermore, it has a favourable long-term prognosis, with subsequent duct treatment and no supplementary procedures, only if ideal conditions are present. So, it requires clinical and radiographic monitoring. Some factors influenced the success of the treatment used in this case, including systemic conditions of the patient, characteristics of the receiving site, the technique used, the quality and quantity of the bone, among others. On the other hand, the use of additional techniques, such as fibrin-rich plasma, bone graft, or connective tissue

to improve prognosis, in combination with transplantation, requires further study and should be considered.

### DECLARATION ON CONFLICTS OF INTEREST

The authors have no conflict of interest to declare.

### CONTRIBUTIONS OF THE AUTHORS

Lead author: Fieldwork, preparation and writing of the manuscript. Second author: Preparation and writing of the manuscript. Third author: Preparation of the manuscript.

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