

Orthodontic Management of Multiple Impacted Teeth in a Patient with Gardner's Syndrome: A Case Report

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Abstract

Gardner syndrome (also known as familial colorectal polyposis) is a rare autosomal dominant condition. It is characterized by osteomas, familial polyposis of the colon, cutaneous epidermoid cysts, soft tissue tumors, as well as certain dental anomalies. We report the case of a 29 years old male patient with Gardner's syndrome who presented with no intestinal polyps but instead had an osteoma on the left side of the mandible and multiple impacted teeth. The case showed the possibility to manage the multiple impacted teeth without jeopardizing the health of the teeth in terms of mobility or significant root resorption taking into consideration the increased bone density in such patients.

Keywords

Gardner's Syndrome, Dental Anomalies, Bone Density

1. Introduction

Gardner's syndrome (also known as familial colorectal polyposis) is an autosomal dominant condition with a prevalence of about 1:15,000. It is characterized by osteomas, familial polyposis of the colon, cutaneous epidermoid cysts, soft tissue tumors as well as dental anomalies. Therefore, the management of this condition requires a multidisciplinary approach that involves general surgeons, gastroenterologists, endocrinologists, neurologists, oral surgeons, radiologists, dermatologists, ophthalmologists, and orthodontists to provide a comprehensive treatment plan. [1] [2]

The prevalence of dental anomalies among patients with Gardner's syndrome is relatively high. These anomalies may take the form of osteomas, dentigerous cysts, supernumerary teeth, retained teeth, and ankylosed submerged teeth. In some cases, the occurrence of these dental anomalies may precede the actual development of colon polyps. [3] This case report sheds light on the orthodontic treatment approach for a patient with Gardner's syndrome who presented to the orthodontic clinic with multiple impacted teeth.

2. Case Presentation

2.1. Diagnosis and Etiology

A 29-year-old male patient visited the orthodontic clinic with a chief complaint of multiple spaces in both dental arches. He had a history of Gardner's syndrome without the presence of colon polyposis. Extra-oral, intra-oral, and radiographic examinations were performed.

The extra-oral clinical examination revealed a mild facial asymmetry due to an osteoma on the left side of the mandible, a straight lateral facial profile, an increased lower anterior facial height, an average smile line, and a normal nasolabial angle (**Figure 1**). No clicking sounds or crepitations were noticed on the mouth opening in the temporomandibular joint area.

The intra-oral clinical examination revealed the presence of a class I incisor relationship, an asymmetrical molar relationship (class III subdivision: class I on the right side and class III on the left side), bilateral posterior crossbite, reduced overbite, generalized spacing in both dental arches, multiple impacted teeth, and congenitally missing mandibular 1st premolars (**Figure 2**).

The panoramic X-ray revealed the presence of congenitally missing mandibular first premolars, retained lower-left primary canine, impacted third molars, impacted maxillary permanent canines, impacted lower right permanent canine, in addition to the presence of an osteoma on the left side of the angle of the mandible (**Figure 3**).

The lateral cephalometric analysis (**Table 1**) indicated a class I skeletal base (ANB angle of 1.5 degrees), a hyperdivergent facial type (S-N/Go-Gn: 41°) with retroclined upper and lower incisors (**Figure 4**).

Based on the above-mentioned findings, the patient was diagnosed with a



Figure 1. Pre-treatment extra-oral photographs.



Figure 2. Pretreatment intraoral photographs.



Figure 3. Pre-treatment panoramic X-ray showing an osteoma with missing and impacted teeth.



Figure 4. Pre-treatment lateral cephalogram.

Table 1. Pretreatment lateral cephalometric readings.

Measurement	Normal value	Patient reading	Interpretation
SNA	82 degrees	79 degrees	Retrognathic maxilla
SNB	80 degrees	77.5 degrees	Retrognathic mandible
ANB	0-4 degrees	1.5 degrees	Class I skeletal base
U1-Maxillary plane	108 +/- 5 degrees	100 degrees	Retroclined upper incisors
U1-(S-N) Plane	103 +/- 5 degrees	89 degrees	Retroclined upper incisors
L1-Mandibular plane	90 degrees	80 degrees	Retroclined lower incisors
Mandibular plane angle ((S-N)-(Go-Gn))	32 degrees	41 degrees	High angle
Frankfort mandibular plane angle	25 degrees	35 degrees	High angle

class I incisor relationship with a class I skeletal base complicated by class III subdivision molar relationship, reduced overbite, bilateral posterior crossbite, generalized spacing in both arches, and multiple impacted teeth (permanent canines and all third molars).

2.2. Treatment Objectives

As the patient had different forms of malocclusion, the treatment objectives were multi-fold as listed below:

- 1) To maintain a good facial profile and harmony.
- 2) To bring the impacted maxillary and mandibular canines to the line of the arch.
- 3) To align the impacted mandibular third molars and close the spaces in the lower arch.
- 4) To achieve good arch coordination.

2.3. Treatment Alternatives

Two treatment approaches were suggested to the patient. The first plan included fixed orthodontic appliances with surgical exposure of the three impacted canines (teeth number 13, 23, and 33) and surgical extraction of the horizontally impacted mandibular third molars.

The second plan involved fixed orthodontic appliances with surgical exposure for the three impacted canines (teeth number 13, 23, and 33) and the horizontally impacted mandibular third molars. The patient chose the second option since his mandibular first premolars were missing (no consent form was obtained).

2.4. Treatment Progress

A fixed bi-dimensional active self-ligation bracket system with a 0.022 slot was bonded on the teeth. A trans-palatal bar was fitted in the upper arch (between right and left first permanent molars) for anchorage reinforcement (**Figure 5**).

The alignment phase started with the 0.014 Cu NiTi orthodontic arch wires that were put in place for ten weeks. Then, the 0.018 orthodontic NiTi arch wires were placed in both dental arches for ten weeks to complete teeth alignment. Following that, rectangular orthodontic arch wires (0.014 × 0.025-inches NiTi) were fitted in both arches for eight weeks to start torque expression. Then, 0.018 × 0.025 stainless steel arch wires were fitted in both arches as the working arch wires. One month later, the patient was sent to the oral and maxillo-facial clinic for surgical exposure of the impacted permanent canines so that they can be tracked to the line of the arch as shown in **Figure 6**. During the minor surgical procedures, golden chains were bonded on the enamel of the exposed permanent canines to facilitate their traction to the line of the arch. One week later, the orthodontic traction of the surgically exposed permanent canines was started with light force as shown in **Figure 6**.

During the orthodontic treatment, the upper right third permanent molar erupted spontaneously and then became aligned properly with the other maxillary teeth. Then, the impacted mandibular third molars were surgically exposed in a trial to bring them to the line of the arch. Following their supra-gingival emergence, two orthodontic buccal tubes were bonded on the occlusal surfaces of the third molars to facilitate the insertion of an aligning orthodontic arch wire (0.014 Cu NiTi) to bring these teeth to the line of the arch. After six months, the third permanent molars were brought to the line of the arch as shown in **Figure 7**.

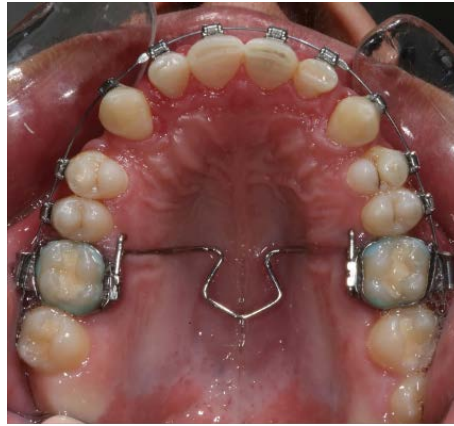


Figure 5. Trans-palatal bar cemented on maxillary 1st permanent molars.



Figure 6. Surgical exposure of the impacted permanent maxillary canines.



Figure 7. Third permanent molars aligned.



Figure 8. Post-treatment frontal intraoral view.

At the end of the active orthodontic treatment, all impacted permanent canines and three impacted third molars were properly aligned as shown in **Figure 8**. The appliance was then de-bonded after a total of treatment duration of 36 months. For retention purposes, two types of retainers were used in each arch to enhance stability and minimize the chances of relapse. A lingually bonded fixed retainer (extending from canine to canine) and a Hawley type retainer were used in the top arch while a lingually bonded fixed retainer (extending from canine to canine) and a vacuum formed retainer was used in the lower arch.

3. Discussion

Gardner's syndrome is an autosomal dominant disorder due to a gene mutation at Chromosome 5. [4] However, the patient in this study did not display any familial history of the disease. Dental anomalies (including supernumerary teeth, missing teeth, compound odontomas, and impacted teeth) are common among patients with Gardner's syndrome and they occur in about 30% - 70% of affected patients. [5] Although patients with multiple osteomas have the highest incidence of dental anomalies, it should be noted that these dental anomalies are not secondary to the bony changes. [6]

The most common skeletal abnormality in patients with Gardner's syndrome is osteomas. They occur in about 68% - 82% of Gardner's Syndrome patients. [5] These tumours are benign and characterized by slow, continuous growth. They are most frequently seen in the mandible, the outer cortex of the skull, and the paranasal sinuses. In this patient, the osteoma occurred at the angle of the mandible (**Figure 3**), a common site for this condition. [7] [8] After consulting an oral and maxilla-facial surgeon, the osteoma was not surgically removed. Instead, it was followed up radiographically for five years during which the size of the tumour did not show any drastic increase. The patient was reminded to continue to follow up on the osteoma clinically and radiographically every 3 - 5 years.

In general, 5.6% - 18.8% of the patients with Gardner's syndrome experience teeth impaction (excluding third molars), with a higher prevalence in the maxilla. Additionally, a unilateral occurrence of the condition is more frequent than a bilateral occurrence. [9] [10] Since the canines play an important functional and

esthetic role in the oral cavity, orthodontists will attempt to tract the impacted canines to the line of the arch to preserve an optimal esthetic and functional position. The difficulty level in the management of impacted teeth varies according to angulation, height, and midline proximity. In this patient, both maxillary canines were tracked to the line of the arch even though the upper right canine had a better prognosis than the left one since it was closer to its normal position. When dealing with an impacted canine, it is important to avoid any contact with the lateral incisor root during traction. To achieve that, the traction of the mandibular canine was first directed distally before being brought to the line of the arch.

Patients with Gardner's syndrome have very high bone density. This may slow down the rate of tooth movement and increase the amount of orthodontically induced root resorption. To minimize the possibility of root resorption, the authors applied light orthodontic forces over a longer follow-up period. This would explain the long treatment duration of a total of 36 months for this patient.

At the end of the orthodontic treatment, minimal spaces were left unclosed in the lower arch due to the increased amount of root resorption on the lower left permanent canine and maxillary lateral incisors areas as shown on the serial panoramic images (**Figure 9**). As the patient was satisfied with the result at this point, the orthodontic treatment was stopped. However, the patient was advised to follow up with orthodontists, oncologists, as well as oral and maxillofacial surgeons to monitor his condition.

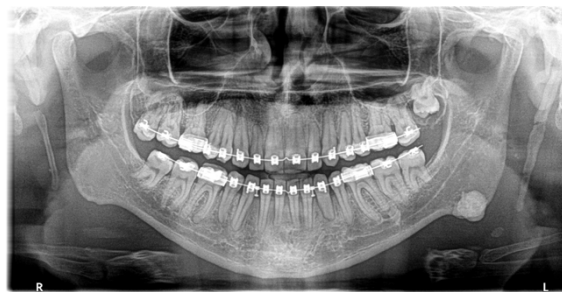


Figure 9. Panoramic X-ray at the end of treatment.

4. Conclusion

Orthodontic management of impacted teeth in patients with Gardner's Syndrome requires a high level of clinical experience and skills. The orthodontist should take into consideration the high bone density in such patients. As demonstrated in this case report, steady and careful treatment is vital in the treatment course to obtain a satisfactory result with minimal damage in terms of root resorption and tooth mobility.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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