

Case Report**Rapid Canine Retraction with Dentoalveolar Distraction Osteogenesis: A Case Report**

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ABSTRACT: Conventional orthodontic treatment with either fixed or functional appliances completely relies on the biologic tooth movement, which can only be achieved in a defined period and at a limited rate. So, canine distalization usually takes about 6-8 months. That is why under normal circumstances, conventional treatment with fixed appliances is expected to take at least 20 to 24 months. The duration of treatment is one of the things about which orthodontic patients complain the most. To overcome, this problem a technique of rapid canine retraction has been developed, in which the concepts of distraction osteogenesis are used. This technique is named as dentoalveolar distraction. The purpose of this case report is to present the effect of dentoalveolar distraction technique in the overall duration of orthodontic treatment.

Keywords: Distraction; Distalization; Osteogenesis; Osteotomy; Corticotomy; Dentoalveolar.

Introduction

Distraction osteogenesis is a process where new bone grows by mechanical stretching of the preexisting bone tissue.¹ The most common technique used in distraction osteogenesis is mechanical stretching of the reparative bone tissue by a distraction device placed through an osteotomy or corticotomy site.²⁻⁴ With this technique, new bone generates in the gap of osteotomy or corticotomy at the approximate rate of 1mm per day.⁵ Conventional orthodontic treatment with either fixed or functional appliances completely relies on the biologic tooth movement, which can only be achieved in a defined period and at a limited rate. So, canine distalization usually takes about 6-8 months.¹

That is why under normal circumstances, conventional treatment with fixed appliances is expected to take at least 20 to 24 months.⁶ The duration of treatment is one of the things about which orthodontic patients complain the most. To overcome this problem a technique of rapid canine retraction has been developed, in which the concepts of distraction osteogenesis are used. This technique is named as dentoalveolar distraction.⁶ This technique was first explained and employed by Iseri et al.⁷ and Kisnisci et al.⁸ They did osteotomies surrounding the canines to achieve rapid movement of the canines in the dentoalveolar segment, which is in compliance with the principles of distraction

osteogenesis.⁶ The purpose of this case report is to present the effect of dentoalveolar distraction technique in the overall duration of orthodontic treatment.

Case Report

A female patient aged 18 years reported to the department of orthodontics with the chief complain of proclined upper incisor (fig.1). After examination, it was found o that the case was a maximum anchorage case, as the patient's upper incisor were proclined, lips incompetent & her smile was gummy. So, it was decided to go for rapid canine retraction. A rigid, tooth borne intraoral distraction device was used (fig.2).



Fig 1: Front profile of the patient

The device was made up of stainless steel. The device consisted of two bands to be placed on canine and first molar respectively, and the two bands were connected by a

unidirectionally moving shaft. The device was placed after surgical procedure that included the extraction of the first premolars and osteotomies surrounding the canines.



Fig 2: Canine distraction assembly

Surgical procedure

Surgery was performed on an outpatient basis, under local anaesthesia. The procedure used was the one described by Iseri et al & Kisnisci et al.^{7,8} The first premolar was extracted (fig.3). A horizontal mucosal incision was given parallel to the gingival crevice of the canine and the premolar (fig.4). A mucoperiosteal flap was raised (fig.5).



Fig 3: Extraction of first premolar done

Cortical holes were made in the alveolar bone with a small round carbide bur (fig.6). The holes were joined & osteotomy performed with osteotomes by fracturing the bone surrounding canine (fig.7).

After the irrigation flap was approximated and sutured with 3-0 black silk sutures, an antibiotic & a non steroidal anti inflammatory drug were prescribed for 5 days (fig.8).



Fig 4: Horizontal mucosal incision



Fig 5: Mucoperiosteal flap raised

The distractor was cemented on the canine and the first molar immediately after the surgery (fig.9). Sutures were removed after 7 days, canine distraction started after this latency period of 7 days (fig.10). The distractor was activated twice daily, once in the morning and then at night for a total of 0.8mm per day.



Fig 6: Cortical holes made

Result

The dentoalveolar distraction procedure was completed in a duration of 10 days (fig.11). The canines were fully retracted. Similar results were obtained on the contralateral side (fig.12). There was slight migration of the canines probably due to activation procedures. No complications were noticed postoperatively such as root resorption, root



Fig 7: Osteotomy performed

fracture, dehiscence, ankylosis and there is complete closure of postextraction spaces distal to canine on both sides (fig.13). Before the start of the treatment, the teeth on either side were tested for vitality which was positive. But after completion of the distraction procedure they lost their vitality.



Fig 8: Flap approximated and sutured



Fig 9: Cemented distractor on the canine and first premolar

Discussion

With optimum mechanical force the rate at which biologic tooth movement occurs is approximately 1 to 1.5mm in a span of 4- 5 weeks.⁹ Therefore, in maximum anchorage premolar cases, where the canine distalization has to be done, the expected overall duration of orthodontic treatment is 1.5 to 2 years. This

is one of the aspect about which the orthodontic patient's are mostly concerned. Many attempts have been made in the past by various authors for addressing this problem i.e. for shortening the duration of orthodontic treatment.



Fig 10: Canine distraction started after latency period of 7 days



Fig 11: Retraction of the canines after 10 days



Fig 12: Retraction obtained on the contralateral side

Liou & Huong reported⁵ an innovative approach of rapid canine retraction involving distraction of the periodontal ligament after extraction of the first premolars. Iseri et al⁷ & Kisnisci et al⁸ devised a new technique for the rapid retraction of the canines; they termed it as dentoalveolar distraction. They performed both horizontal and vertical osteotomies

surrounding the canines to rapidly move the canines in the dentoalveolar segment.



Fig 13: Post operative OPG showing complete closure of postextraction spaces distal to canine on both sides

With the use of dentoalveolar distraction, the dentoalveolus could be moved as a single unit for rapid retraction of canines. This technique is independent of the stretching and widening of the periodontal ligament & hence it prevents the stress and overloading of the periodontal tissues.⁶ As far as complications are concerned, we found no complications associated with our case. There was no evidence of any root fracture, root resorption, dehiscence and ankylosis. The only problem which was seen was loss of vitality of canines.

Conclusion: On the basis of clinical and radiographic findings, we concluded that dentoalveolar distraction is a promising technique which can be used in special cases like the one in our case i.e. where maximum anchorage is required.

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