Modified Dento-Alveolar Distraction Osteogenesis Technique for Rapid Canine Retraction

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Abstract
Distraction Osteogenesis claims to reduce the duration of treatment as well aid in conservation of anchorage. With the introduction of Dento-alveolar distraction retraction of canine can now be done in about 2-3 weeks with minimal loss of anchorage and little/no root resorption. However, surgical procedure required for dento-alveolar distraction can cause significant swelling and post operative discomfort. Our small modification in the surgical procedure drastically reduces the discomfort and improves patient compliance.

Key words: Dento-alveolar distraction osteogenesis, Canine retraction.

Introduction
Orthodontic tooth movement is a process wherein a mechanical force is applied to induce alveolar bone resorption on the pressure side and alveolar bone deposition on the tension side. On the tension side periodontal ligament is stretched (distracted) followed by alveolar bone deposition (osteogenesis). This process of bone metabolism takes a certain amount of time to complete and is therefore a concern as the treatment usually lasts for one to two years, in spite of light continuous forces having being applied. Preservation of anchorage is another major concern to Orthodontists which is critical to ensure predictable and successful treatment. The above mentioned are the two main limitations that an Orthodontist faces during the treatment and there is a constant quest to overcome these.

With the advent of Dental Distraction Osteogenesis the two above-mentioned limitations for the orthodontist are eased off because;
1) Dental distraction is completed in three weeks.
2) There is minimal loss of anchorage.

Dental distraction can be of two types;
1) Periodontal distraction.
2) Alveolar bone distraction

Distraction Osteogenesis is a biologic process of new bone formation between the surfaces of bone segments that are gradually separated by incremental traction. Distraction forces applied to the bone also creates a tension in the surrounding soft tissues, initiating a sequence of adaptive changes termed distraction histiogenesis. Active histiogenesis occurs in different tissues, including gingiva, blood vessels, ligaments, cartilage, muscles and nerves.

Indications
1) Bi-maxillary Dento-alveolar protrusion cases.
2) Anterior crowding (i.e. blocked out laterals/canines) with maximum anchorage cases.
3) Class II Div 1 maloccluded cases.
4) High anchorage adult cases.

Surgical technique for Dento-alveolar Distraction
Surgical technique is performed under local anesthesia as a routine out patient procedure and sometimes sedation may be required.

A horizontal mucosal incision is made parallel to the gingival margin of the canine and the bicuspid beyond the depth of the vestibule. Flap elevation is done so that the canine root is visualized properly. With a round carbide bur buccal cortical holes are made both mesial and distal to canine and are continued 2 to 3 mm beyond the apex of the canine. The holes are then connected with a straight fissure bur. Fine vertical and horizontal osteotomies are performed with straight and curved osteotomes to make canine a bone transport segment. In the next step, first premolar is extracted and the buccal bone is removed from the extraction socket using large round burs and the bony interferences that are in the way of canine are removed right up to second premolar. The transport dentoalveolar segment includes the buccal cortex and the underline spongy bone. The wound is thoroughly irrigated with saline and sutured. The device is then fitted and cemented to the canine and the molar.

Disadvantage
1) Invasive procedure as a lot of bone cutting is required leading to post operative swelling and discomfort. In order to reduce this post operative discomfort some modifications are done in the surgical procedure.

Modified Surgical Technique for Dento-alveolar Distraction:
We have modified the above technique to overcome the
shortcomings of the above mentioned 'Conventional Technique'. After making canine as a bone transport segment, similar buccal cortical holes were made mesial and distal to first premolar and apically continued to same depth as that of canine, the holes were connected with a straight fissure bone and premolar was extracted so the buccal cortical plate came along with the extracted premolar (Fig 2,3,4).

Advantages
1) Buccal cortical plate came along with the extracted tooth, therefore is less traumatic to the alveolar bone and thereby reducing post operative swelling and other complication as well as discomfort.
2) Time saving as cortical plate need not be trimmed.
3) Less chances of injuring the maxillary sinus lining.

Therefore, the modification in the surgical procedure suggested by the authors drastically reduces the discomfort and therefore aids in improving patient compliance. Also we feel that the amount of effort to the surgeon is reduced owing to this modification and could therefore become more popular in the future.

References