



## A Case report:-Unraveling the palatally impacted canine by use of ballista spring

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**ABSTRACT:-** Impacted canine teeth are commonly reported to Orthodontic clinic. Maxillary canine teeth are the most commonly impacted teeth next to third molars, with palatal impaction being greater than labial impaction. Many etiological factors can be attributed for canine impaction. Proper diagnosis and interception provide a better management of impacted canine. There are several orthodontic auxiliaries used for disimpaction of canine. Ballista spring is a simplified orthodontic auxiliary spring developed by Harry Jacoby used for repositioning impacted teeth. It delivers light force, biomechanical excellence, design simplicity, patient compliance and esthetics. This case report presents a case of Orthodontic repositioning of palatally impacted canine in a 16-year-old using ballista's spring.

### I. INTRODUCTION:

Canine is the most commonly impacted teeth after third molars, as it is last to erupt among all other teeth in the arch.

A canine is considered as being impacted if it is interrupted after complete root development or if the contralateral tooth is erupted for at least 6 months with complete root formation.<sup>1</sup>

Its impaction prevalence has been reported in the range 0.8– 2.8%.<sup>2,4</sup> A high incidence of maxillary canine impaction has been reported in Turkish population to the rate of 3.29%.<sup>5</sup> The lowest incidence has been reported in Japanese population.<sup>6</sup>

Etiology of canine impaction can be classified into four distinct groups. (a) Tooth size-arch length discrepancies, (b) prolonged retention or early loss of the deciduous canine, (c) abnormal position of the tooth bud, (d) the presence of an alveolar cleft, (e) ankylosis, (f) cystic or neoplastic formation, (g) dilaceration of the root, (h) iatrogenic origin, and (i) idiopathic condition with no apparent cause.<sup>7</sup> Early diagnosis and timely interception provide conservative clinical

management of impacted canine with minimal or no adverse side effects.

Localization of position and its relation of impacted canine with its adjacent structures are foremost important before planning orthodontic management.<sup>8</sup> Many radiographic techniques and analysis help us to locate canine. Cone-beam computed tomography imaging technique gives us a clear and precise position of palatally displaced canine in both linear and angular position.<sup>8</sup> Two most commonly used methods for exposing impacted canine are (1) surgical exposure, allowing natural eruption, and (2) surgical exposure with placement of an auxiliary attachment<sup>1</sup>. Various surgical techniques for exposing palatally impacted canines exist: 1. technique of open eruption; 2. Technique of closed eruption; 3. Open eruption through tunnel<sup>9</sup>

Several methods have been described to orthodontically guide a canine into position, a variety of spring and attachments described, which includes, elastic traction, lasso wires, and Kilroy spring designed by Bowman and Carano<sup>10</sup>, K-9 spring by Kalra,<sup>11</sup> eruption of impacted canine with an Australian helical archwire by Christine Hausen,<sup>12</sup> active palatal arch by Becker,<sup>13</sup> Ballista spring designed by Jacoby.<sup>14</sup> These springs exert a light continuous force from being twisted on its long axis.

This case report describes the use of ballista spring to extrude a palatally placed canine.

### II. CASE REPORT:-

A 16-year-old reported to the Orthodontic clinic with chief complaint of mobility of deciduous canine. On examination, it was found that her deciduous canine 63 was retained and 23 palatally impacted, visible on palatal aspect of the maxillary arch.

Patient had class I molar and canine relation, overjet of 2 mm, and overbite of 2 mm. Radiographic examination revealed that maxillary left permanent canine was palatally placed. The left maxillary canine was mesially inclined toward the

midline with angulation to the midline of  $31^{\circ}$ . It was overlapping, the mesial third of the maxillary lateral incisor and as per the sector classification<sup>3</sup> was in sector IV<sup>15</sup>. The CBCT evaluation of impacted canines was done in relation to adjacent teeth.

On final diagnosis, patient planned for extraction of retained deciduous tooth, leveling and aligning, followed by orthodontic traction of impacted canine using ballista spring..

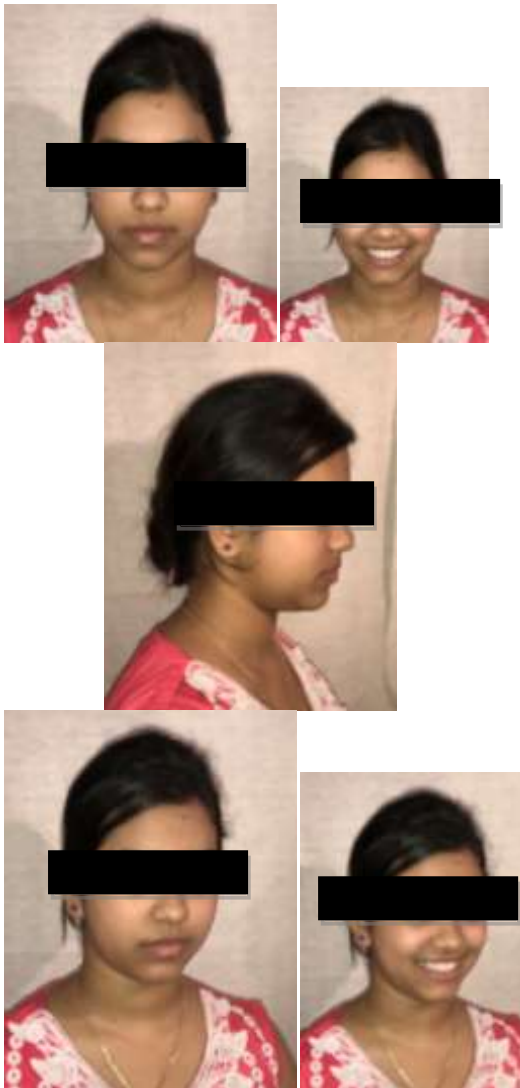


Figure 1:-Extraoral photographs pre treatment



Figure 2:-Intraoral photographs pre-treatment

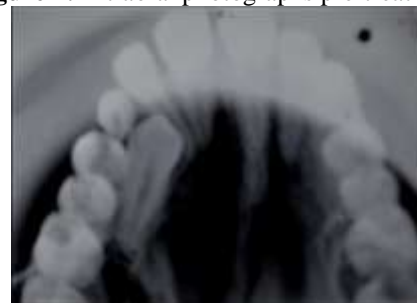


Figure 3:-Occlusal view radiograph pre-treatment



Figure 4:-Orthopantomogram pre-treatment

#### Treatment plan

1. Leveling and aligning of upper and lower arch
2. Extraction of deciduous canine
3. Surgical exposure of impacted canine followed by orthodontic traction and alignment of canine
4. Final finishing of the repositioned canine
5. Retention of results achieved.

#### Ballista Spring

The ballista spring is a 0.014, 0.016 0.018 inch round wil cock special plus wire, which accumulates its energy by being twisted on its long axis. Its anchorage extremity penetrates in both headgear edgewise (or PEA) vestibular tubes of the first or second maxillary molar

In this way, the wire cannot rotate in the tubes. The horizontal part of the wire accumulates the energy.

This part of the wire is attached by a ligature wire on the first premolar, which allows it to rotate in the slot of the bracket as a hinge axis. The last part of the spring is bent down vertically and ends in a loop shape to which ligature elastomeric thread can be attached. When the vertical portion spring is raised toward the impacted tooth, the horizontal part accumulates the energy.<sup>16</sup>



Figure 5:-Ballista spring incorporated in the arch

#### Treatment Progress:

Bonding is done in the upper and lower arch with 0.022 MBT versatile. Leveling and alignment of teeth in the upper and lower dental arch by means of fixed appliance with 0.014, 0.016, 0.018, 0.017x0.025 Niti archwire sequence. Standard procedure for surgical uncovering and autonomous eruption was followed for all teeth:

Incision of palatal mucosa and periosteum apically to the gingival sulcus on premolars and ipsilateral incisors, and then following the midline; elevation of a mucoperiosteal flap; removal of bone overlying the canine's crown from its tip down to the level of the cemento-enamel junction by means of a curette or a hand piece and bur<sup>17</sup>

After leveling and alignment, 19 × 25 SS base archwire was inserted on which ballista spring was placed as an auxiliary wire for the forced eruption of permanent canine. After about 5 months of forced traction with ballista spring, the maxillary left impacted canine had erupted sufficiently into occlusal direction sufficiently, the MBT bracket was bonded on the labial surface and the lateral movement of the canine was started with a 0.014 Niti auxiliary archwire along with the 0.017x0.025ss base archwire.

Finishing and detailing were carried out with 17 × 25 TMA wire for about 4 months. Class I canine relation, molar Class 1 molar relation was maintained, overbite 2 mm, overjet 2 mm with esthetically pleasing and functionally well-balanced occlusion had been achieved at the end of the 18 months of treatment.



Figure 6:-Posttreatment extraoral photographs

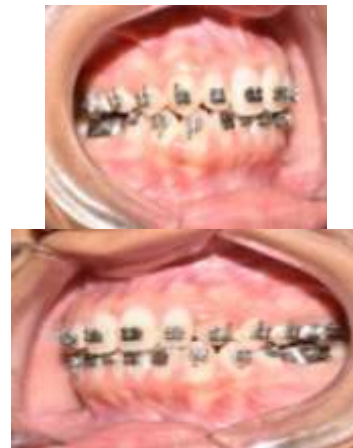


Figure 7:Posttreatment intraoral photographs



Figure 8-Orthopantomogram post treatment

### III. DISCUSSION:-

Canines are considered to be the cornerstone of dental arch, contribute to the esthetics in anterior region and also important in canine guided occlusion. Ballista spring was given by Jacoby because it has an added advantage over other methods that it could be used before and during leveling and alignment phase<sup>14</sup>. As the patient wanted the treatment to get finished early we used ballista spring. For construction of ballista spring 0.016" round Australian wilcock wire was used. Horizontal arm was placed in the slot of premo-lar and molar headgear tube. It stores its energy by being twisted on its long axis.

The advantages of the ballista spring:-

1. The Ballista spring system uses a spring which creates a vertical traction on the impacted tooth along its long axis thus separating the impacted tooth from the roots
2. The Ballista spring is easily inserted, provides a force of 60 to 100 grams, ligated and is independent of other parts of appliance.
3. In general most systems require full bonded arches at the beginning of the treatment while the Ballista spring does not require any bonding of



anterior teeth till the crown of the impacted tooth erupts completely.

4.The surgical procedure is less traumatic compared to other techniques

#### IV. CONCLUSION:-

Canines being most important teeth in smile esthetics ,aim should always be to diagnose and intervene at the earliest of any possibilities in the displacement of the canine. Relevant and planned orthodontic mechanotherapy helps in reducing the duration of treatment and detrimental effects to the adjacent structures.

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