Annals of R.S.C.B., ISSN:1583-6258, Vol. 24, Issue 2, 2020, Pages. 856 - 863
Received 24 October 2020; Accepted 15 December 2020

A comparative study of maxillary canine retraction with friction versus non-friction mechanics

Dr Ravindra Manerikar[1], Dr Sumeet Mishra[2],Dr NG Toshniwal[3],Dr Shubhangi Mani[4]
[1,3,4] Professor,Department OAnnals of R.S.C.B., ISSN:1583-6258, Vol. 24, Issue 2, 2020, Pages. 850 - 855
Received 24 October 2020; Accepted 15 December 2020

f Orthodontics,Rural Dental College,Loni
[2],Assistant Professor,Department Of Orthodontics,Rural Dental College,Loni
[1] docravi.m@gmail.com

ABSTRACT

Canine retraction after first premolar extraction is a very common orthodontic procedure. Retraction equipment can be divided into two categories, friction and without friction. It is desirable for the canine to lose weight quickly. The purpose of the current study was to compare the rate of withdraw, degree of tipping , rotation of maxillary canine and to compare mesial molar movement during canine retraction with friction and non friction mechanics. Objective of the study was to establish an efficient method of canine retraction so as to have a consistent force with minimal unwanted movements such as tipping , rotations and mesial molar movement.
Methodology- The study sample comprised twenty subjects. In this treatment the two upper first premolars were removed. The maxillary canines were moved distally into the extraction spaces .The forces withdrawal for canine with friction mechanics was derived from an Niti coil spring & For non friction mechanics TMA segmented T-loop Measurements were made on cephalograms and on images of Dental casts.
Conclusion-. The canine is withdrawn quickly and with less distal tipping and spring than the sliding mechanics. The canine retrieval spring did not pass for sliding mechanics in controlling canine rotation during retraction.

Keywords:
Canine retraction, Niti coil spring , T-loop springs

1. Introduction

Canine retraction mechanics can be divided in two categories, friction and frictionless. It is desirable to have a faster bodily retraction of canine. In friction or sliding mechanics, an Niti coil spring is attached to the tooth attachement and archwire is placed. The force application is not through the center of resistance of the tooth. A moment is needed to fight the rotation of the teeth and tipping of the crown. Wire-bracket interaction produces the moment. However friction and binding of the tooth cause loss of anchorage and delay in tooth movement The effect of the sliding technique can be prevented theoretically with a frictionless system . Retraction is done with loops as well as springs, which offer more controlled tooth movement than sliding mechanics. Scientifically moment can be adjusted to lead to translation on both planes. This is not always done in practice due to the presence of unknown factors such as, the location of the resistance center, anatomy of tooth, marginal bone level, periodontal support, and placement of the bracket. The objective of the study was to establish an efficient method of canine retraction so as to have a consistent force with minimal unwanted movements such as tipping, rotations and mesial molar movement

2. Material And Methods

The study sample consisted of twenty subjects regardless of gender. The minimum dental age of 12 years and all mesial teeth in the second molars had to erupt completely before the start of the

Annals of R.S.C.B., ISSN:1583-6258, Vol. 24, Issue 2, 2020, Pages. 856 - 863
Received 24 October 2020; Accepted 15 December 2020

study. A canine draw of at least 3 mm may be required. All patients reported high levels of oral hygiene. Restoration procedures where necessary were completed prior to the start of Orthodontic treatment. As part of this treatment, the first two upper premolars were removed. Reversal was initiated simultaneously on both sides and simultaneously after premolar discharge in all cases. The upper molars are tied and second premolars, canines, and incisors are attached to the Pre adjusted edgewise brackets. The brackets were Roth's doctor's note with a 0.022-inch slot. Anchorage was reinforced with the use of a standard head attached to the original molars. The hat was worn for 10 to 14 hours a day during the exam period. With the canal of the canine with the collision equipment, the labial arch is made of 0.45-mm (0.018-inch) stainless steel round. Arch thread was inserted into the first molars, second premolars, canines, and incisors on both sides. Care was taken to align the labial arch with the balance of the incisors. The canine regenerative force with the opposing mechanism is taken from the spring of the Niti coil stretched between the hook on the surface of the molar belt band and the canine bracket. After the spring placement of the Niti coil, the canine was again protected from the labial arch with a ligature tie to reduce rotation during movement. Forcing into the input area was 300 gms. The amount of power in the installation was measured with a Dontrix power gauge.

Control visits were made every 3 to 4 weeks during canine Retraction. During this control visit, dental movements were monitored, spring recovery was restored, and the Niti coil was replaced. For non-cross-cutting equipment, 0.017 ´ 0.025-inch TMA sources separated by T-loop sources (Ormco Corp.) were used for this study. Some design methods were available

(1) production of equal and opposite times of alpha and beta at full performance (6 mm),

(2) the 6 to 7 temporary enforcement rate is fully operational,

(3) the gradually rolling down of the starting curve, and

(4) A neutral position with vertical spring legs touching the heart. All the pre-operative bends were “bent over” to remove the remaining pressure on the wire, and research was done to check the stability of the spring-shaped laboratory was centered between the molar tube and the canine bracket.

(5) Spring is activated 6 mm. With distal force at the beginning of the withdrawal of about 200 Gm

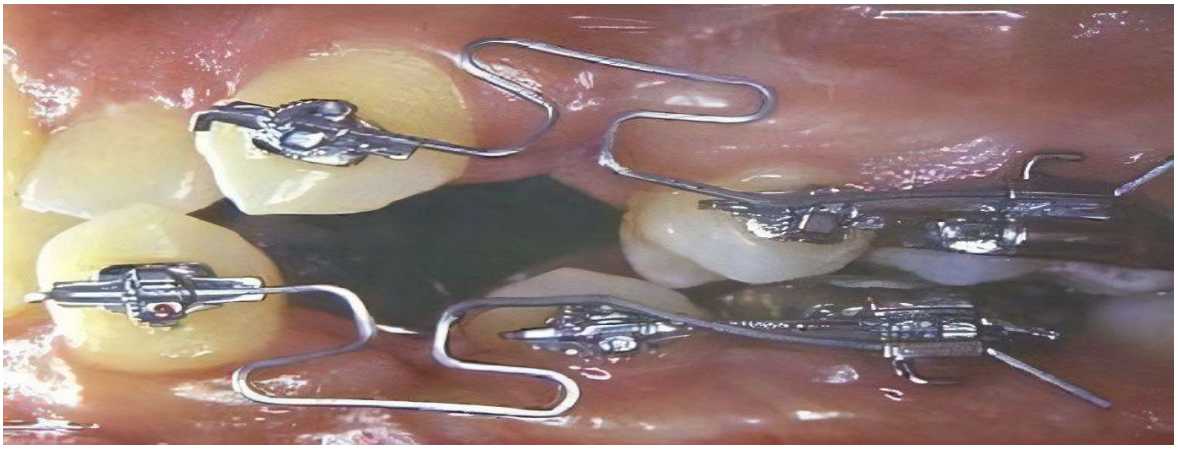

Fig 1- Retraction Using Segmented T-Loop mechanics

3. Methodology-

Lateral Cephalograms were taken normally before the start of orthodontic treatment and after the completion of orthodontic treatment. They were followed in an acceptable way with established

Annals of R.S.C.B., ISSN:1583-6258, Vol. 24, Issue 2, 2020, Pages. 856 - 863
Received 24 October 2020; Accepted 15 December 2020

historical, clearly defined symbols. The comprehension in the ANS-PNS is drawn in the deepest part of the message frame for the first permanent molar crown (point UM). The line measurements taken from this point to Ptm vertical. The success of the anchorage management has been evaluated by comparison: Distance before and after treatment between these two points to the nearest 0.5 mm.Canine tipping was calculated by measuring angle formed by a line passing through the long axis of the canine to SN plane. Canine tipping Per mm Movement was the difference in angle before and after treatment divided by the total canine movement.

Fig 2- Retraction using NiTi Coil Spring

Canine retraction was measured at 0.1 mm nearby using the mesial surface of the mesial wing on the premolar brackets and the distal surface of the distal wing of the canine bracket as target areas. Estimates were taken three times and definitions were recorded. These measurements were performed at intervals of 3 weeks until the canine withdrawal was completed. The withdrawal rate is defined as the distance traveled by the canine, separated by the time required to complete the closure. Dental implants and photographs were used to test the canine's circulation. The angle between the median raphe and the line on the canal and distal edge of the canine is measured in the figure. Angles are measured with a protractor up to the nearest 0.5 °

4. Results:

Age, mesial movement of the first molar, total amount of canine retraction per thirty Days of treatment and amount of tipping and rotation of the canines in degrees/millimeter of retraction with sliding mechanics and with T spring are given in Tables 1and 2 respectively. Mean age for group A was 14 with minimum of 12 years and maximum of 15. For group B mean age was 14.3 with minimum of 12 and maximum of 16 years .The difference in age was not statistically significant . Mean anterior molar movement in Group A was 1.6mm with Std Dev of 0.516. For group B Mean anterior molar movement was 1.8mm with Std Dev of 0.632. Degree of variation in comparsion of this two groups was not statistically significant (Pvalue > 0.05) Mean canine retraction (mm)per 30Days of treatment on Right side (SRT) for Group A was 1.2mm with and Std Dev 0.422. Mean canine retraction per 30Days of treatment (mm)on Right side (SRT) for Group B was 2mm Std Dev 0.471 The difference was highly significant (p-value<0.01). Mean canine retraction per 30Days of treatment (mm)with T spring was greater than with Niti coil spring.mean Canine retraction Left side per 30Days (SLT) for Group A was 1. and Std Dev 0.422. For Group B it was 2.1mm ,Std Dev 0.316. Difference was statistically significant

Annals of R.S.C.B., ISSN:1583-6258, Vol. 24, Issue 2, 2020, Pages. 856 - 863
Received 24 October 2020; Accepted 15 December 2020

($p<0.01$). Mean canine retraction per 30Days of treatment (mm)with T spring was greater than with Nitiicoil spring .

Mean tipping for in Group A was 1.2 with Std Dev of 0.422 . For group B Mean tipping was 0.5 with Std Dev of 0. Degree of The difference between the two groups was statistically significant ($p <0.05$) The photographs were less pronounced when the canine was withdrawn in the spring than on moving mechanics.

Mean rotation of the canines on Right side (RRT) for Group A was 5.8 ,Std Dev 0.789 Mean rotation of the canines on Right side (RRT) for Group B was 6.0 and Std Dev 0.876. The difference is not statistically significant ($p>0.05$). Mean rotation of the canines with T spring was greater than with Niti coil spring.

Mean rotation of the canines Left side (RLT) for Group A was 5.98mm , Std Dev 0.813 for Group B it was 5.99mm ,Std Dev 1.08.Difference is not statistically significant with($p>0.05$).

Table 1. Age movement of the first molar message, canine retraction rate by 1 month of treatment (mm) and canine reduction and rotation rate of canines by degrees per millimeter of deferred -modification equipment.

SubjectNo	Age	Anterior Molar Movement	Total Canine Retraction		Canine retraction Per 30 days		Tipping Per mm Movement	Rotation per mm Movement	
			Rt	Lt	Rt	Lt		Rt	Lt
1	14 yr	1.2	5.8	5.7	1.6	1.5	0.6	5.2	4.8.
2	14	1.5	5.5	5.2	1.4	1.3	1.8	5.9	6.4
3	15	1.6	5.4	5.6	1.2	1.3	0.6	6.2	6.0
4	12	1.3	5.7	5.6	1.3	1.4	1.0	6.5	6.2
5	14	1.9	5.2	5.1	1.4	1.3	0.8	6.2	5.2
6	15	1.4	5.4	5.3	1.2	1.1	1.0	5.2	7.4
7	14	2.1	4.9	5.1	1.3	1.3	1.4	6.6	6.8
8	15	1.6	5.1	4.8	1.6	1.5	0.8	5.9	6.2
9	14	1.5	5.4	5.5	1.2	1.3	1.8	5.4	5.8
10	13	.8	5.2	5	1.3	1.2	0.8	5.3	5.0

Table 2. Age, first molar mesial movement, canine retraction rate by 1 month of treatment and canine and rotation rate of canine degrees by one millimeter for withdrawal arch Sectional

Subject No	Age	Molar Movement	Total Canine Retraction		Canine retraction Per 30 days		Tipping Per mm Movement	Rotation per mm Movement	
			Rt	Lt	Rt	Lt	Lt	Rt	Lt
1	15	1.2	5.8	5.6	2.3	2.2	0.3	4.6	4.8.
2	15	1.5	5.3	5.4	1.5	1.7	0.3	5.7	6.4
3	13	2.6	4.4	4.6	1.8	1.9	0.7	6.2	6.0
4	13	1.2	5.6	5.5	1.6	1.7	1.2	6.5	6.2
5	15	2.1	4.2	4.3	1.4	1.9	0.3	6.9	6.8
6	16	1.7	5.4	5.2	2.5	2.7	0.2	7.2	7.4

7	14	2.3	4.9	5.1	2.3	2.1	.6	6.6	6.8
8	15	2.2	4.8	5.1	2.1	2.2	0.2	4.5	3.9
9	15	2.3	4.7	4.8	1.9	1.7	1.3	6.4	6.6
10	14	.8	6.1	6.2	1.9	1.8	0.5	5.3	5.0

5. Discussion

Canine retraction into extraction space is an important orthodontic procedure. Either sliding (friction) mechanics or Frictionless Mechanics are used to retract the canine. It is important for a clinician to know the type of technique best suited for a particular patient. Right force levels and patient comfort should be given due consideration.

Mesial movement of first molar during canine retraction is a very important aspect of orthodontic treatment. A clinician should have control over anchorage so that the extraction space can be utilized for the purpose it is meant. In the present study mesial movement of molar was more with non-friction mechanics as compared to friction mechanics .Degree of variation between the two groups was not statistically significant. The findings of the present study differ from the one conducted by Paulson, Speidel, and Isaacson [1] in cuspid retardation compared to anchorage loss. In their study, there was absolutely no movement of the first maxillary molar during canine withdrawal in all cases and distant molar movement in one of the six patients. The reason for the movement of the molars away should be the continued use of headgear during treatment. In patients with a spring-loaded T, compliance with headgear wear was not good. This could explain the reason for the loss of the top anchor in the group. Examination of the mesial molar movement was performed similar to that used by Baker, Guay, Peterson [2] who used cephalometric tracking before and after treatment by comparing the anteroposterior position of the first permanent molar. They found that the loss of the anchor with non-friction equipment was high. The results of the present study compare well with their findings.

The position of the T loop was similar to that described by Andrew & Burstone [3].

a) A production-focused T-loop produces equal and opposite times with vertical force.

b) The position of the center of the T-loop indicates the variance times. Direct control of tooth movement during the closure of three-dimensional extraction gaps includes control of stabilizing units, stationary strength, root positions, and rotation. The use of separation time between teeth is an effective way to achieve the desired tooth movement. These times are called the alpha and beta periods of the front and back teeth, respectively. Short-term use of ‘b’ can lead to better anchorage savings. The moment increase was not made in the current study to maintain the standard test format.

It is clear that the amount and rate of canine withdrawal was reported in this study and the values of the other researchers mentioned here describe the canine crown movement. Due to the simultaneous reduction of distal at the same time, the canine root will move slowly. Withdrawal of canine discharge by 30Days of treatment (mm) by T spring was greater than spring of the Niti coil.The variance was statistically significant ($p < 0.01$) .The extraction capacity used in the present study with the opposing Mechanics was 300 gms. withdrawal is 100 gms. Kuster, Ingervall and Bürgin, [4] found that the initial strength of about 300 g from spring in Nitiil dropped to 200 g after 8 hours and reached 140 to 150 g (constant length) after 4 weeks. . Some are used for brackets and wires. The canine's retrospective velocity is very similar to the values found in Huffman and Way, [5] 1.4 mm and 1.2 mm when withdrawing canillary and mandibular canines with a range of 0.016- and 0.020-inch arches respectively. However, the power source

differs from the two investigations. Huffman and Way used a Pletcher spring that works at 200 gms every second week. The spring of the Niti coil was used in the current study. The chain was changed every three weeks and in some cases every fourth week. 0.018-inch circular arch was used for 0.022-inch bracket slots. This does not seem to lead to improper arrest. According to the results Boester and Johnston [6] reported a small canine withdrawal with about 55 g of potency.

The wire used in this study was round to reduce friction. Rectangular cables produce more friction than round cables, and larger cables are better than smaller cables [7]. Cords with very low friction (small, circular, stainless steel) are not the best equipment for moving equipment. For example, a .014 "or .016" round wire can be twisted by a stretch force, causing excessive twisting and rotation of the withdrawal phase and the suspension phase. Rope .018 "or .017" ´ .025 "does not interfere with the deviation of the curve. Round thread was used in this study to reduce friction. -canine.The reasons for this could be the delivery of more power during the control period and / or the absence of binding.

The use of mechanical devices means the risk of binding and permanent or permanent standing in the movement of teeth caused by flexibility and inconsistency of the denture. In some cases the withdrawal was different left and right. Findings but not statistically significant. This may be due to variations in the biologic response, the Reitan [8,9]. The findings of this study harmonize with the view of John & McLachlan [10], who has suggested that continuous force produces faster tooth movement than elevation. The spring T produces more continuous energy than the spring of the Niti coil. It therefore seems reasonable to assume that the duration of the dental implant could play a significant role in regulating the rate of tooth movement. Burstone noted that the moment is determined by the configuration of the fence and the presence of the activation or rolling of the gable, which produces the opening moment. In general, the additional gingival of the wire in brackets, allows for a moment of activation, and as a result improves the M / F ratio. In the present study the T spring used and the activation rate were similar to those used by Burstone.

It can be seen from the current findings that the T spring produced much smaller reductions than the Niti coil spring. Bracket offset and bracket angulation switching could also reduce shrinkage and rotation during canine withdrawal with mechanical devices [11].

The central T-loop can produce the necessary power systems in the dental net translation and that these power systems can be replicated by various users [12]. In present study however there was no translation of teeth.

Withdrawal spring seems to be less conducive to circulation equipment at the time of withdrawal. The intended benefit of the minute to prevent formation in the spring is therefore not sufficient for clinical use. The reason may be that the minute anti-drug action needed is hard to produce. Another problem is the distinct distance in the shortcut plane between the canine resistance area and the brackets. When the canine is inclined to the brain, the distance between the brace resistance center will be longer than when the canine is properly placed on the denture. The problem of circulatory control during withdrawal has been identified by Burstone [13] He proposes an additional anti-impact band to the side. It is estimated that 50% of the orthodontic energy used is eliminated due to the conflict. [14] Unscrupulous mechanics were more effective than collision Mechanics in reducing extraction and extraction. [15]

Summary and Conclusion

The age difference between the two groups was not statistically significant. There was no significant difference in mean movement of the anterior molar with the moving and T spring. The canine retraction rate for 1 month of T spring treatment was greater than the spring of the Niti

coil. The photography was less visible when the canine was retracted in the spring than on the conveyor mechanics. There were no statistically significant differences in Mean meanings for canines in both mechanics. It was concluded that canine price withdrawals in spring withdrawals were faster compared to counterfeit Mechanics. The retraction in the spring produces a slight decrease in canine. The canine cycle did not show significant variability. It was a little big in the spring. However, these shortcomings are likely to be overshadowed by the fact that post-withdrawal cycle adjustment does not take long. The canine implant was more advanced with sliding mechanics. In this two group canine retraction spring is better than sliding mechanics

References

[1] Paulson RC, Speidel TM, Isaacson RJ: A laminagraphic study of cuspid retraction versus molar anchorage loss. Angle Orthod 1970;40:20-7. 5.

[2] Baker RW, Guay AH, Peterson HW: Current concepts of anchorage management. Angle Orthod 1972;42:129-38

[3] Andrew J. Kuhlberg, , and Charles J. Burstone: T-loop position and anchorage control. 1997 AJO-DO, Volume 1997 Jul (12 - 18):

[4] Kuster R, Ingervall B, Bürgin W: Laboratory and intra-oral tests of the degradation of Niti icoil springs. Eur J Orthod 1986;8:202-8

[5] Huffman DJ, Way DC: A clinical evaluation of tooth movement along arch wires of two different sizes. AM J ORTHOD 1983;83:453-9.

[6] Boester CH, Johnson LE: A clinical investigation of the concepts of differential and optimal force in canine retraction. Angle Orthod 1974;44:113-9.

[7] Riley, J.L.; Garrett, S.G, and Moon, P.C: Frictional forces of ligated plastic and metal edgewise brackets, J. Dent. Res. 58:A21, 1979

[8] Reitan K: Some factors determining the evaluation of forces in orthodontics. Am J Orthod 1957;43:32-45.

[9] Peter Ziegler, and Bengt Ingervall: A clinical study of maxillary canine retraction with a retraction spring and with sliding mechanics. AJO-DO, 1997Volume 1989 Feb (99 - 106).

[10] John Daskalogiannakis, and Kenneth Roy McLachlan: Canine retraction with rare earth magnets: An investigation into the validity of the constant force hypothesis AJO-DO, Volume 1996 May (489 - 495):

[11] John C. Bennett, Richard P. Mclaughlin, D: Controlled Space Closure with a Preadjusted Appliance System - Am J Orthod Volume 1990 Apr(251 - 260)

[12] Hoenigl, Freudenthaler, Marcotte, and Bantleon :1997 AJO-DO, Volume 1995 Aug (149 - 153): A new centered T-loop

[13] Burstone CJ:The segmented arch approach to space losure. Am J Orthod 1982;82:361-78

[14] Proffit WR, Fields HW. Contemporary Orthodontics. 6th ed. St. Louis, MO: Mosby; 2018.

[15] Rhee, J.-N., Chun, Y.-S., & Row, J. (2001). A comparison between friction and frictionless mechanics with a new typodont simulation system. American Journal of Orthodontics and Dentofacial Orthopedics, 119(3), 292–299. doi:10.1067/mod.2001.112452