

***Force Decay of Orthodontic Elastomeric  
Chains by Using Three Different Mechanisms  
Simulating Canine Retraction  
( An In Vitro Comparative Study)***

A Thesis Submitted to the Council of the College of Dentistry,  
University of Baghdad In Partial Fulfillment of Requirements  
for  
The Degree of Master of Science in Orthodontics

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**Baghdad-Iraq**

**October, 2012**

**Thil .Hijah,1433**

# *Abstract*

This in vitro study was designed to determine the effect of three different mechanical designs for canine retraction : (6-3 , 6-5-3 and chain loop ) on the load relaxation behavior of three types of elastomeric chains : (maximum clear , maximum silver and extreme silver) from the same company (Ortho Technology company) with two different brand configurations: closed loop and open (short filament) chains under effect of time at (zero time, 24hr., 7, 14 , 21 and 28 days) in artificial saliva.

Elastomeric chains with an initial length (19mm) and about 50% extension (29mm) were used for the (6-3) and (6-5-3) mechanisms throughout the study, while for the (chain loop ) mechanism the elastomeric chains used were with an initial length (38 mm) and about 50% extension (58 mm). Three hundred sixty elastomeric chains were tested for load relaxation ; one hundred twenty for each of the three different types of Ortho Technology company products (i.e. maximum clear, maximum silver and extreme silver).Each one of these product types was subdivided according to the brand configuration into two sub-groups (i.e. short and closed) ;each one of them was consisted of sixty specimens . Twenty specimens from each sub-group were used in each one of the three mechanical designs simulating canine retraction (i.e. the 6-5-3,the chain loop and the 6-3) mechanisms.

The results of this study showed that the elastomeric chains were greatly affected by time, the majority of force loss occurred after the first 24hr. then followed by a less steep gradient for the rest of the working period.

Different types of the elastomeric chain had different initial forces with different percentages of force decay over time, therefore from these points of view, extreme power chain was the best, followed by maximum clear and the last one was maximum silver. The closed loop configuration of all the three types of elastomeric chains used in this study appeared to be more efficient than the open configuration (short) .

The results of this study showed that there were differences in the initial and retaining force levels between the colored elastomeric chains ( maximum silver ) and the transparent elastomeric chains (maximum clear ) ,but these differences in force levels were not significant at all the time intervals of the testing periods.

The (6-3) mechanism may be the more efficient mean of closing extraction spaces when using elastomeric chains (compared to the (6-5-3) or (chain loop) mechanisms) according to the significant difference found in the mean percentage force decay of elastomeric chains.