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Observing Anterior Crowding In a Population Living a Century Ago

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Abstract

Purpose: To observe the frequency of mandibular anterior crowding in a population who lived during the nineteenth century and compare the rate of occurrence in the current population, which is claimed to be two-thirds of adults experiencing crowding by early adulthood. **Materials and Methods:** The School of Dental Medicine at the University of Pittsburgh possesses a collection of skulls of individual's likely living in the northeast United States during the late 19th century and early 20th century. Of this skull collection, 29 skulls were evaluated for the presence of mandibular anterior crowding. **Results:** 55% of the evaluated mandibular anterior arches were positive for mandibular anterior crowding. 57% of the male specimens were positive for anterior crowding, while 50% of the females were recorded to have anterior crowding. These frequencies are lower than the one suggested for the current live population in the United States. **Conclusion:** From this sample of the population living a century ago, there was a lower prevalence of anterior crowding (55%) than the research suggested two-thirds of adults.

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Introduction

Orthodontic treatment has become very common in the modern model of dental treatment. It has been recorded that 80% of U.S. teenagers have completed or are currently undergoing orthodontic treatment according to the American Association of Orthodontists (AAO; https://www.aaoinfo.org/). It can be contemplated that in the near future orthodontic treatment may eventually become the standard of care, if it has not already.

One key to understanding orthodontic treatment is the idea that the oral cavity is dynamic, consisting of many interacting components including pressures from soft tissue, musculature, function, and normal growth. This dynamic environment is understood by orthodontics and is combated with the use of removable or permanent retainers after treatment to prevent the alteration of the established occlusion (orthodontic regression).

Mandibular incisor crowding is a phenomenon that is observed in both patients that have received orthodontic treatment and those who have not. As the aging process occurs, the smile line tends to shift exposing more mandibular teeth when a patient smiles or opens their mouth in normal conversation. Patients who had previous orthodontic treatment notice that their once straight teeth become "crooked" or "crowded" and point towards their mandibular incisors. Research suggests that, without orthodontic treatment, approximately 2/3 of adolescents with good alignment and "normal" occlusions will develop incisor irregularity by early adulthood [1].

The School of Dental Medicine at the University of Pittsburgh possesses a collection of skulls that is made up of individuals living in the Northeastern United States during the late 19th and early 20th century [2]. This population living a century ago would not have undergone modern day orthodontic treatment and from this, anterior crowding can be observed whether or not two-thirds of adolescents have crowding in their mandibular anterior teeth. This information would yield use-

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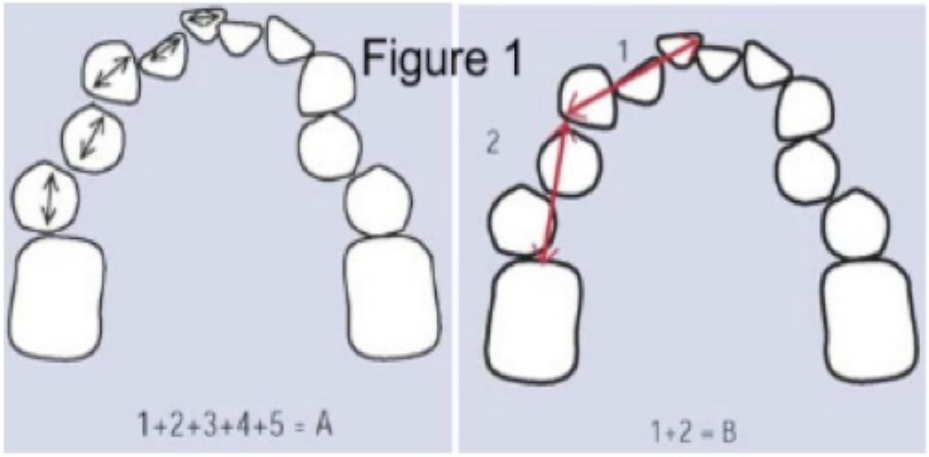

Figure 1. Arch length necessary to accommodate all teeth (A) versus actual space (B).

ful data in understanding the complex process of anterior crowding and the prevalence in a population that was not exposed to modern dentistry and orthodontic practices.

Methods

At the University of Pittsburgh School of Dental Medicine there is a collection of skulls. Most of them were acquired from a seller in New York City around the 1930's indicating that these individuals lived in the east coast of the United States [2]. The skulls have previous tagged displaying gender, estimated age (>40 years, <40 years; unless a known age was indicated), as well as ethnicity.

In evaluation of anterior crowding, a set of criteria was established to determine if the skull was eligible. The first condition was that the skull had to have full adult dentition, which excluded the six pediatric skulls found in the museum. The second condition was that the specimen had to have present all six of the mandibular anterior teeth. The last criteria was evaluating the condition of the crowns on the anterior teeth which eliminated specimens that had more than one full crown missing or that had crowns that were unable to be evaluated for crowding (missing contacts, fractured crowns etc). After the selection process was completed there were 29 qualified mandibular arches evaluated, 23 males and six females.

Since the intent is not to measure the severity of crowding, a different method of evaluating crowding was applied in determining whether or not the subject has crowding present. Crowding was evaluated by proximal tooth contact-point displacement, which was observed by visualizing irregularity, flaring, or protrusion of the mandibular incisors [4]. For an arch to qualified as a "yes or positive" response to crowding, two or more teeth in the anterior arch must have improper bilateral proximal contact or must display excessive flaring, retrusion or protrusion due to insufficient intercanine distance. For example, Figure 2a would have recorded as positive for anterior crowding, while Figure 2b would have been negative for anterior crowding since there is ideal proximal tooth contact and no excessive malposition of the anterior teeth due to lack of arch space.

There are multiple methods to determining whether anterior crowding exists besides the mere clinical presentation of misaligned teeth. One method to determine the severity of anterior crowding to determine appropriate treatment is the widths of all the teeth anterior to the molars are measured and subtracted from the sum of two measurements (mesial of the lower incisor to the distal of the lower canine, plus distal of lower canine to the mesial of

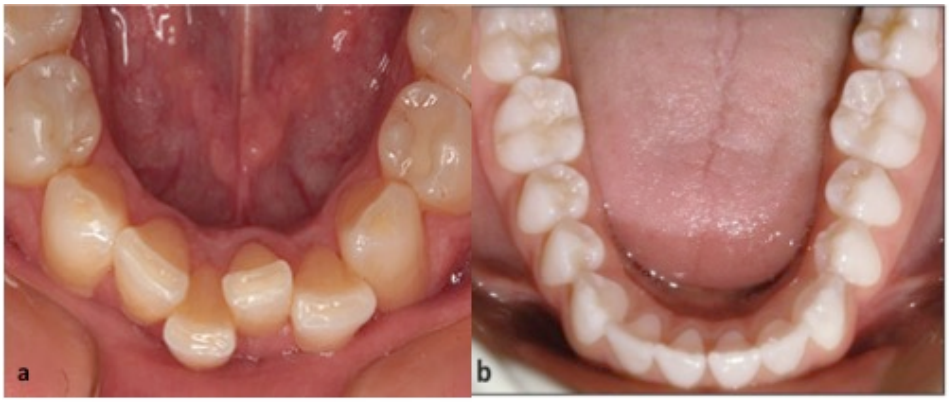

Figure 2. a = dental crowding; b = normal alignment.

the first molar) to give the degree of crowding [3]. This method is described in Figure 1.

Results

From Table 1, it can be observed that out of the 29 subjects that were eligible for evaluation, 16 (55%) presented with anterior crowding, while 13 of the specimens had normal spacing and proximal contacts between all six of the mandibular anterior teeth.

Table 1. Prevalence of anterior crowding found in the observed population

Specimens positive for anterior crowding	**16**
Specimens negative for anterior crowding	**13**
Percent of specimens positive for anterior crowding	**55%**

Table 2 shows a comparison between male and female museum specimens. These data show that males were at a slightly higher rate of 56.5% occurrence of anterior crowding in comparison with 50% of the female subjects being positive for anterior crowding.

Table 2. Comparison of crowding by sex.

	Specimens positive for anterior crowding	Specimens negative for anterior crowding	Percent of specimens positive for anterior crowding
Males	**13**	**10**	**56.5%**
Female	**3**	**3**	**50%**

Table 3 shows a comparison between age groups and sexes that were recorded in the museum records. These data show that males had nearly the same prevalence for anterior crowding in both age groups, 57% for males below the age of 40 and 56% for males above the age of 40. While the females below the age of 40 only showed 25% positive for anterior crowding and both of the two specimens above the age of 40 being positive for anterior crowding.

Discussion

The physiology behind anterior crowding is understood as combination between mesial movement of posterior teeth and lingual movement of anterior teeth. Essentially, both of these processes shorten the arch length, which leads to the crowding process. The mesial movement of posterior teeth theory has been more or less discounted as the source of crowding and has been used as justification for surgical removal of third molars. Studies have shown that there is no clinically reduced level of crowding due to third molar extraction as well as crowding affecting people with congenitally missing third molars the same as those who have retained molars [5].. Anterior lingual movement is discussed through the equilibrium theory of tooth position, with evidence from the differential mandibular growth theory. Anterior crowding is most definitely a multifactorial process and evidence seems to lean towards a combination of the equilibrium theory and relapse from orthodontic treatment.

There are a number of theories attempting to explain mesial acting force; pressure from erupting third molars, inherent mesial migration or drifting, maturation and contraction of periodontal soft tissue and fibers, occlusal forces on anterior teeth, and loss of arch length due to incisor overbite. It is illogical to assume that there is a single cause of late mandibular anterior crowding and more realistically understood as a complex and multifactorial process. Like other multifactorial processes, there is always an interaction between genetics and the environment. Most of the researched processes tend to be considered environmental instead of making links to genetic susceptibility. From a genetic approach, there may be certain susceptibilities that can be observed to help predict the severity of future anterior crowding besides observing familial trends. This could lead to creating personalized treatment plants to prevent relapse in patients who have undergone orthodontic treatment and are interested in persevering their inter-arch length.

Table 3. Comparison of crowding by age and sex.

	Specimens positive for anterior crowding	Specimens negative for anterior crowding	Percent of specimens positive for anterior crowding
Males <40	4	3	57.1
Males >40	9	7	56.3
Females <40	1	3	25
Females >40	2	0	-

The common understanding with mandibular incisor crowding is that without orthodontic treatment, approximately two-thirds of adolescents will develop incisor irregularity by early adulthood. This hypothesis might be observable in modern day adults in which have had a mosaic of modern orthodontic, surgical, and restorative treatment, all of which may affect late mandibular incisor movement ultimately resulting in crowding. Observing a population almost a century apart in which these more modern approaches to occlusion and comprehensive orthodontic treatment were not available could contest this dogma. With the understanding that orthodontics is in place to correct original malocclusion and does not play a role in later life developmental processes that lead to crowding, it is very interesting to observe see if we are better off now that we were a century ago in relation to anterior crowding in adults.

From the data present in Table 1, it was observed that in the population living on the eastern coast of the United States nearly a century ago (1930s) represented in the museum, there was observable anterior crowding in 55% of the subjects. This is an interesting number because it is actually lower than the expected two-thirds (66%) that research suggests.

The data presented in Table 3 compares age and gender and shows that the male specimens that were eligible for analysis showed a relatively consistent percentage of anterior crowding, but the data collected from the few female specimens told a different story. Only 25% of the females under the age of 40 showed anterior crowding while both of the specimens aged above 40 were positive for anterior crowding. Though the sample size was very small for the females, it is consistent with the modern observation in which correlates incisor crowding and thickness of the mandibular symphysis, cancellous bone thickness [6].

One drawback of this observation is the lack of sample size; of the 100 specimens found in the museum only 29 were found to be qualified for the data collection, which means that this small sample size might not be representative of the whole population. Thus, it must be taken into consideration that if a larger sample size were analyzed, then the percentage of anterior crowding might be closer to the suggested two-thirds. It must also be taken into consideration that a skull collection sold as a museum might have been selective and not an accurate representation of the population.

In conclusion, from the small sample size of a population living a century ago it was determined that anterior crowding was present in 55% of the population (56% in males and 50% in females), which is comparable to the research suggested two-thirds (66%).

References

1. Late mandibular incisor crowding. American Association of Orthodontics: Orthodontic Dialogue. 1999;11(1).

2. Caries and periodontal disease: insight from two US populations living a century apart. Rose E, Vieira AR. Oral Health Prev Dent. 2008;6(1):23–8. PMID:18399304

3. Orthodontics. Part 3: Patient assessment and examination II. Roberts-Harry D, Sandy J. Br

Dent J. 2003 Nov 22;195(10):563–5. PMID:14631426

4. Goldberg AI. An evaluation of mandibular anterior crowding as it relates to facial divergence in treated and untreated subjects. 2012; A thesis presented to the Graduate Faculty of Saint Louis University in partial fulfillment of the requirements for the degree of Master of Science in Dentistry.

5. The effect of extraction of third molars on late lower incisor crowding: a randomized controlled trial. Harradine NW, Pearson MH, Toth B. Br J Orthod. 1998 May;25(2):117-22. PMID:9668994

6. Mandibular anterior bony support and incisor crowding: Is there a relationship? Uysal T, Yagci A, Ozer T, Veli I, Ozturk A. Am J Orthod Dentofacial Orthop. 2012 Nov;142(5):645–53. PMID:23116505