

Review Article

The effect of jaw joint structural differences and problems on violin and viola performance and suggestions for solutions

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Abstract

A member of the string instrument family, the chinrest, which allows the violin and viola to be held more comfortably, was designed by Louis Spohr, a violinist, composer, conductor and musicologist who lived in 1784-1859. It was invented in the 19th century. It has been observed that the invention of the chinrest had significant effects on the performance technique of violin and viola performers. The chinrest has reached our days by changing its shape and diversity in the historical process. With repetitive movements performed by violin and viola performers during their many years of work, Temporomandibular joint disorders occur due to excessive use of the jaw in an inappropriate position. This condition becomes chronic and affects the performance and health of people. It has also been found that most of those with temporomandibular disorders have a habit of squeezing teeth called bruxism. In this research, the effect of structural differences of the jaw joint on performance in violin and viola performers will be discussed. Considering the physiological problems of the performers during the performance, in order to reduce the problems in the jaw discs and bone caused by squeezing the jawbone, the need to develop a chinrest design created with ergonomic materials has emerged. Within this context, based on all previous exemplary ergonomic model studies, methods of softening the chinrest material are presented. It is thought that improving the chinrest design by softening it with a material that takes a personalized shape will enable the performer to perform in a healthier and more comfortable way.

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Introduction

Since the Middle Ages, the violin, which has been a topic of interest among music people with its construction, education and performance to the present day, has been one of the instruments on which many studies have been conducted. The first appearance of the present-day form of the violin was realized with the instrument whose origin was based on an instrument played with a bow in the Middle Ages and known as the 'Rebec' in Asia (Ilyasoğlu, 2009: 41).

The violin's emergence around 1550 was after a small child was seen playing a small-stringed, small-bodied instrument in the painter Gaudenzio Ferrari's painting 'La Madonna delgi aranci'.

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Image 1

Gaudenzio Ferrari's Painting "La Madonna Pierce Aranci" Shows a Little Boy Playing a 3-String, Small-Bodied Instrument.
https://it.wikipedia.org/wiki/File:La_Madonna_degli_aranci.jpg

The development and changes of the instrument can be observed in the artist's paintings made chronologically over time. For this reason, paintings and frescoes can prove that the first violin type appeared in 1529-1530, and the viola and cello, which are other members of the string family, were invented in 1535-1536. Documents found by research show that the violin was first used in the 14th century by producers in Brescia or Cremona near Milan in northern Italy (Erdal, 2010: 5).

Aslı Erdal said, "The violin has no single ancestor. It can be said that the instrument in many different forms is the ancestor of the violin. These instruments; The renaissance fiddle, especially the lira, is braccio, along with the rebek seen in the early 16th century. It can be said that all three instruments contributed greatly to the violin's current form." she said, adding that the violin was formed by combining the characteristics of instruments consisting of different techniques, tones and structures (Erdal, 2010: 7).

In parallel with the development of Western music, the violin has developed over the centuries. The violin technique, which developed with the 18th century, improved the sound volume of the violin and the double-voiced violin technique compared to the previous centuries.

Tendency towards the accuracy of music forms has provided the appearance of certain forms such as the suite, sonata, concerto, concerto grosso, fugue, aria, recitativo over time (Selanik, 1996:68). This period is more commonly known as a period in which sonata and concerto forms came to the fore. J.S. Bach's solo sonatas and Partitas have emerged as the most obvious examples of progress in this field. In the 19th century, with the importance of virtuosity, the concerto form, which enabled the development of violin technique and interpreting, continued to develop in different dimensions.

In this context, the inability to develop a fixed grip technique for violin and viola and limited position transitions made the discovery of jaw and shoulder support necessary in the future. From the 19th century to the present day, the most suitable jaw positioning position was found and materials were produced to support the violin from the top and bottom.

Looking back to today, the jawpiece, which has become an integral part of the violin, has an important place in performing smoothly together with medical problems that may be caused by joint disorders. However, some virtuoso artists do not like to use the jaw plug-in with the idea of getting a better sound. Today, since it is known that fixing the violin positively affects performance in music education, an instrument without jaw support is not preferred (Uçar ve Tanınmış, 2020: 12).

History and Importance of Jawline Add-on

The violinist, composer, conductor and musicologist Louis Spohr, who lived in 1784-1859, invented the jawline add-on in 1820 to better support the violin during the performance and fix it under the chin with the collarbone (Zeytinci & Aytekin, 2017:334).

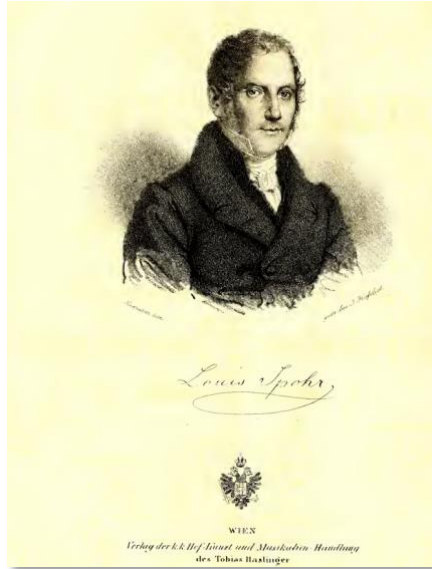


Image 2

Louis Spohr Violinschule Book

In the *Violinschule*, written by Louis Spohr for violin training, it is known that he talks about how to use the jaw and jaw brace he produces to fix the violin during play and prevent any muscle tensions that may occur.

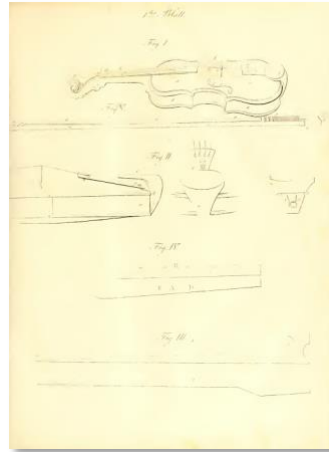


Image 3

Louis Spohr Violinschule Book. (Jaw add-on has been seen for the first time in this book)

So, what did people fix the violin with before? The violin was played by fixing it by hand without the help of a jaw, and when it was placed in a closed position, the thumb was left in the first position (Uçar-Tanırnıç, 2021: 12). For this reason, the addition to the instrument was important for people who played the violin or viola to be able to perform more comfortably and evenly. For this reason, there were many studies about the jaw attachment in violin methods and research in the 19th century.

For this reason, many studies were carried out on jawline add-ons in violin methods and studies in the 19th century. "Just as we try to choose shoes that fit our feet and clothes that fit our body, violinists should try to find jaws that fit their jawlines" (Frisch and Denig, 2007:1). Just as the violin player chooses the size of his instrument according to his own physical characteristics, he must also choose his own jaw joint and jaw size, which is suitable for the length of the neck.

Muscle tensions may occur as a result of the postures necessary to support an instrument. These are known as chronic neck pain consisting of cervical disc herniation, cervical spondylosis, myofascial pain, posture disorder and related strains due to problems that may occur in the cervical region (Akbey, 2019: 11).

As a violinist and a pedagogue, Yehudi Menuhin said, the instrument is supported by the body of the player. When we examine the link between the performer and his performance, it is also determined that the instrument itself has an important factor in producing muscle tension. According to A. Marla Okner et al, experts in music

medicine have said that improving harmony between the performer and his violin can reduce physical injuries and tension (Okner et al. 1997:113).

Materials that physically interact with the performer on the violin are shoulder pads next to the jaw support. These materials are designed to facilitate technical performance by ensuring harmony between the violinist and his instrument. Some violinists argued that the pillow adversely affected the resonance on the violin back and therefore should not be used. However, they argued that shoulder support facilitates access to high levels of technical applications in the modern violin repertoire (Erdal, 2010:136).

Problems Concerning Posture and Those During Performance in String Players

The pain threshold of musicians is quite high and pain is widely felt in a profession where physical load is high.

"According to the International Association for the Study of Pain; IASP), pain is an unpleasant sentimental and emotional experience that exists or accompanies possible tissue damage. In addition, it can be described as unconsciously noticing the damage to the tissue" (Akbeý, 2019: 12).

Usually pain complaints occur during or mostly after performance. This can be encountered even when the instrument is not played in the future. How the body is used in performance-based art fields is the main factor affecting performance quality.

Instrumentalists are constantly faced with the challenge of repetitive, limited, fast and complex movements throughout their performance lives. Instruments cause the body to fall into an unusual position for the performer, causing mechanical stress in the body. At the same time, when the anatomical structures of the performer and instrument are not physically compatible, this stress can increase, causing pain and tissue damage in the musculoskeletal system (Akbeý, 2019: 13). For this reason, injuries that may occur need to be analyzed well.

Instrumentalists who play violins and violas complain mostly about their neck, shoulder, back and lower back pain due to asymmetrical posture. Left-locked tilt of the head; it can cause permanent locks, restriction of mobility, serious headaches and nerve compressions in long-lasting performance and studies. In order to minimize these complaints, it is recommended to carry out pre-study warm-ups, stretching movements and support with manual therapy. Therefore, excessive muscle tension is seen as an important causal factor in musician injuries.

"The flexibility capacity in the neck in violin and viola performers is very important and expected.

According to Jameson, the flexibility of the neck is very important in every instrument, especially in violin and cello." (Akbeý, 2019: 17).

When playing the violin or viola, it is very important to adjust the instrument in grip, the pillow and the jaw in the most natural position of our neck. During performance, the teeth can be tightened quite a lot to stabilize the lower jawbone (to prevent right slipping). Thus, the performer supports compression by raising the shoulders when the shoulder pad is low, which he uses unwittingly - if he is using it. Since this condition is continuous in the preparation process before the performance, it causes damage, pain and problems in the bony soft tissues in the lower jaw and upper jaw joint.

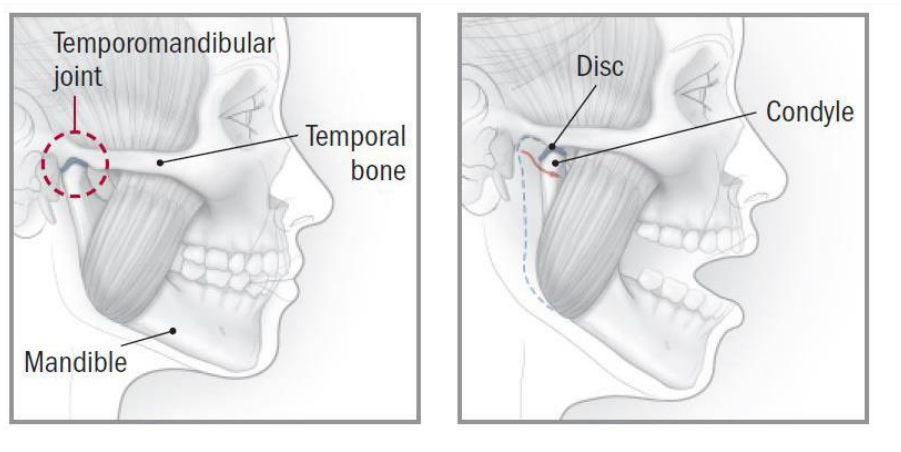


Image 4

Temporomandibular Joint Disorder

<https://www.health.harvard.edu/temporomandibular-joint-dysfunction>

Jaw joint disorders show some symptoms; these are the sounds of the jaw when eating, the locking, the sound of 'click' when opening the jaw, the snagging of the jaw while yawning, the pain that may occur in the ear area when eating. The way to minimize these problems has been jaws that are produced and designed according to different jaw structures.



Image 5

Jaw Models Used Today (<https://alexviolinstudio.wordpress.com/category/techniques/>)

However, the existing and widely-used on chin-cap models (*Guarneri, Dresden, Kaufmann, Morawetz, Flesch*) are shown by long-term studies to cause problems by pressuring the jaw joint and by triggering jaw pain as a result of the inconsistencies that may occur in the joint tissue in the temporomandibular joint disk.

According to the clinical study, it was also found that most of the performers who play different instruments with temporomandibular disorders have a habit of teething called bruxism, and it was observed that the performers show a high prevalence of temporomandibular. It is known that this condition is often observed in instrument performers who keep their head muscles tense, especially due to physical needs and psychological reasons (Jang et al. 2015: 88).

Research on the Elimination of Ailments

In order to reduce the effects of temporomandibular joint discomfort problems on violin or viola performers, an ergonomic material other than physical therapy is required. As a method in a study conducted in Korea, a protocol of a study with a questionnaire, clinical radiographic examination was designed. Yonsei University Dental Hospital has recruited 70 volunteers to conduct oral clinical and radiation tests and make a personal diagnosis. In the surveys conducted, 58.6% of the 70 patients reported that the subjective symptoms they reported were november complaints, while the rate of myofascial pain increased to 82.9% during the clinical examination. Compared with the control group with the results of the survey examination, clinical examination and radiographic examination, it was observed that the violinist had pain at the maximum mouth opening. Therefore, it has been observed that instrument performers cannot notice november muscle aches on their own. It is expected that this condition is a factor that aggravates the temporomandibular disorder due to appropriate treatment or delay in treatment (Jang et al. 2015: 91).

In Japan, in a study conducted by P. Obata and H. Kinoshita, the pressure exerted by violin performers on the jaw during performance was studied. In this study, a force-sensing jaw was developed. The force generated between the left lower jaw of violinists and the jaw of the violin was evaluated by measuring it with a force sensor jaw and analyzing it as a result of statistical tests. Professional and amateur violinists of 15 people perform works containing different period music and different techniques; the performances of technical position shift transitions, gamut and chord playing, using/not using vibrato technique have been studied. It has been observed that with music from the Romantic era of music during the Baroque period there is significant difference between jaw and applied pressure to perform (Obata and Kinoshita, 2012: 2091).

According to Okner et al., in their experimental study, they argue that when performing works by different, contrasting composers, the jaw pressure will also vary, as well as the variability of the task constraints during performance for each of them. He says that his special support made by Cliff Johnson produces force with less pressure, the jaw attached to the tailpiece -the middle jaw- is associated with less temporomandibular disorder. The

participants in the study were asked to play two different musical sections over and over again by trying three different jaw styles (Wolf Maestro, Guarneri, Cliff Johnson) with their own violins and using the same type of duatets from all of the participants. The first musical work was the violin concerto in d minor by Max Bruch, and the second work was by G.F. Haendel's score for violin and piano in L.a. major was No.1 is the last. In the results obtained regarding the jaw support pressures, it was noted that the highest pressure was obtained when the Bruch concerto was performed with the Guarneri model jaw (in the left region of the tail), less power was generated when the Haendel was performed, and the highest pressure was obtained because the Haendel was played with the Cliff Johnson model jaw. According to another hypothesis, they found that shoulder widths also make a difference. (Okner et al. 1997: 115-118).

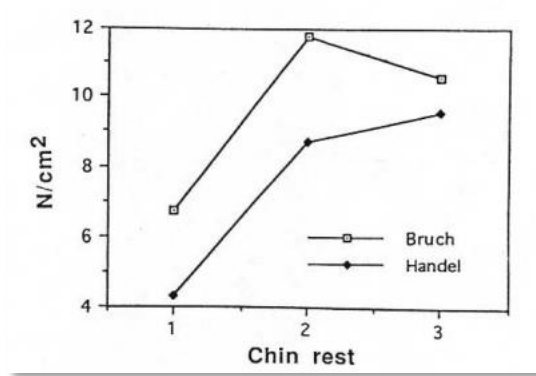


Image 6

Comparison of the Pressure Produced in Different Model Jaws (Okner et al. 1997: 119).

Conclusion and Recommendations

It is known that the jaw joint structurally differs from person to person. Violin and viola performers are required to work long hours of instrument work at intervals every day. It is known that the technical difficulties of the period music they will perform, the stress, anxiety and psychological conditions that occur during the stage performances they perform cause serious suppression of the jaw joint and related jaw joint problems.

Changing the chin support and shoulder pad can be considered the most ideal way to change the violin to fit the person. It is known that the jaws designed to eliminate the problems of violin and viola performers are sufficient to a certain extent due to the fact that they are not custom-made. In this context, it is envisaged that the use of a custom-made mandible made of ergonomic materials simultaneously with the treatment of the jaw joint can minimize these problems. It can be observed that bruises formed in the soft tissues of the neck, jaw and collarbone will decrease with the use of a personal, ergonomic, correct-height chin and pillow. Since it is thought that jaw joint problems will reduce the quality of life of viola and violin performers depending on performance and long-term work, it is necessary to do more instrument-specific work in the field of 'musician health'. For performers who perform improperly for a long time with different types of work and grip techniques, individual treatment methods should be applied and physiotherapist-assisted work should be performed at intervals.

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