BRUXISM TREATMENT IN CHILDREN WITH SILICON OCCLUSAL BOARD: COMPARATIVE STUDY OF TWO CLINICAL CASES

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ABSTRACT

The changes that occurred daily in children contributed to the increase in cases of childhood bruxism. The objective is to report two cases of bruxism in children 11 years old and discuss the forms of treatment. Inclusion criteria were headache, myofascial pain and grinding of teeth nightly for more than 6 months. We used the questionnaire to the temporomandibular disorders diagnostic criteria (axis I and II of the RDC / TMD), the Sleep Assessment Questionnaire (SAQ), which were applied before and after 60 days of use of the occlusal splints from silicone and Pain Calendar. The proposed treatment was the use of silicone in the jaw plates with complete coverage of the occlusal surfaces. After two months there has been verified that the absence of nocturnal grinding report indicating a decrease in the intensity of nocturnal bruxism and improvement in reporting pain in muscles of the face and headaches. Treatment with the silicone in occlusal splints, used by children, were efficient to the bruxism control. There is need for a correct diagnosis and treatment plan as well as a multidisciplinary monitoring due to multifactorial etiology of bruxism.

KEYWORDS: Sleep bruxism, tension-type headache, child, occlusal splints

1. INTRODUCTION

Bruxism is a condition characterized as a pathological activity of the stomatognathic system, which involves milling (grinding) and clenching of the teeth during mandibular parafunctional movements can happen during the day or night (day or night bruxism), usually performed in order unconscious[1].

The sounds and movements made during the nocturnal bruxism usually are not reproducible for an agreed individual, probably by the absence of protective reflex of the masticatory system overnight, allowing the action of extremely harmful forces to the stomatognathic system. The daytime bruxism, however, can occur in conjunction with other parafunctional habits, such as excessive use of chewing gum, biting pencil or pen, nail biting, and biting his lips. Such habits may occur at an early age, persist lifelong occurring with greater intensity during periods of crisis in association with an increase in muscle tone and stress. However, the most frequent nocturnal bruxism is, varies with each individual and related to physical or emotional stress[2].

Bruxism in children is common, due to the immaturity of the masticatory neuromuscular because it relates to the growth and development of jaws and teeth, because their upper teeth and lower occlude not correct and comfortably when they are erupting[2].

The prevalence of bruxism in children and adolescents, ranging from 13.5% to 33%, with females more likely to temporomandibular disorders (TMD) including bruxism, at all ages compared to males[3].

The TMD signs and symptoms increase with advancing age, so the diagnosis and early treatment of bruxism is important to prevent its progression, preserving the permanent dentition and the stomatognathic system. Although, the etiology of bruxism not be fully elucidated. The favorable conditions are: systemic (affecting the entire body or just body system); psychosocial (interaction of psychological and social variables); neurophysiological (cellular processes and metabolic neuromuscular system); structural (occlusion, musculoskeletal, joint and developmental abnormalities); heredity and physical and emotional stress (aggression, anxiety and hyperactivity. Taken together its condition demonstrating that its multifactorial etiology occurs due to the interaction of various factors that can trigger bruxism[4].

In addition, children with bruxism during sleep have a higher index of excitement (micro arousals) and an increased incidence of attention and behavioral problems[5]. The micro awakenings are short-lived, with pe-

riods of nocturnal bruxism, lasting around 3-15 seconds with the cortical activation associated with an increase in the activity of the sympathetic nervous system and muscle activity and serious bodily movements, including involuntary movements of the legs (restless legs syndrome), increased heart rate and breathing disorders during sleep[4].

Bruxism has several signs and symptoms of which the main findings are: wear of tooth surfaces (mainly upper canine and molars); orofacial pain; dental hypersensitivity due to dental wear; pain and fatigue of facial muscles and joints; headaches (especially morning); mandibular dislocation; damage to teeth enamel leading to dentin or pulp exposure may result in pulpitis and/ or pulp necrosis. In addition, popping appearance or clicks in the temporomandibular joint (TMJ) are related, as well as lacerations in the language, jugal damage to the mucosa, temporomandibular disorders, dental fractures and/ or restoration. The muscle hypertrophy; tooth mobility causing injuries in the periodontal ligament; hypercementosis; loss of vertical dimension (because of tooth wear); limitation of mouth opening and/ or lockjaw, and behavioral changes such as hyperactivity, cognitive problems and daytime behavior – with aggressive behavior, lack of focus and poor school performance[1,3].

The child may experiences: respiratory disorders and sleep disturbances related to bruxism, such as snoring, mouth breathing; wheezing and choking during sleep, increased levels of exhaled carbon dioxide, sleep problems and restless sleep (restless leg syndrome). A small percentage of bruxists exhibits excessive daytime sleepiness, nocturnal enuresis (bed-wetting), excessive sweating during sleep, hormonal and metabolic problems, failure to thrive (weight loss or weight gain) and night drool[3].

A number of different therapies, either alone or combined, have been suggested in the literature for treating bruxism, among them we can mention local, systemic, and additional psychological treatments.

Local treatments are restorative treatments, orthodontic treatment, occlusal adjustment and bite plates. Systemic medication and medical treatment are others possibilities to the systemic treatments. There are also psychological treatments with the advice and / or psychotherapy for emotional nature of disorders. The proposed complementary treatments are physical therapy and acupuncture.

Nowadays the most common treatment for bruxism is the use of occlusal splint acrylic or silicone by its reversible character, which is especially valuable in dentistry, not to change the processes of growth and development of jaws[2]. However, the use of an occlusal splint should be given at an early stage of therapy, because according Solberg *et al.* (1975)[6], the use of long-term occlusal splint does not cure nocturnal bruxism habit. Okeson (1987) also reported that following the plaque removal in patients with bruxism, nocturnal activity in electromyography of the masseter muscle increases to the level of pretreatment[7].

Recently, there has been the introduction of the occlusal splint with Vibratory Stimulation (VibOS) for the management of pain related to TMD. The vibration circuit activation threshold is 4 $kg.cm^{-2}$. This device has vibratory activation only during abnormal teeth clenching, founding that vibratory stimulation temporarily reduces chronic muscle pain by elevating muscular pain threshold, and invokes the opening reflections of the jaw and thus decrease the strength and/ or frequency of masticatory muscle activity, relieving the painful symptoms related to TMD after a period of 15 days[8].

Therefore, the dental professional must be careful to observe the dental and medical history before using any therapeutic measure, particularly because the etiology of bruxism may be multifactorial.

It describes two cases of bruxism in children of the same age and with different life stories in order to discuss the possible factors that could have triggered this parafunctional condition and verify the effectiveness of treatment with occlusal splint silicone front of soreness and the change in quality of sleep.

2. MATERIAL AND METHODS

This study was approved by the Ethics Committee of the Faculty Inga - CAAE 47352815.6.0000.5220, held between June and August 2015.

They attended the clinic of pediatric dentistry Inga Faculty, two children of both genders, aged 11 years, presenting chief complaint of headache, myofascial pain, nocturnal gnashing of teeth, for at least one year. Then those responsible, made reading the Informed Consent and Informed and after all doubts are resolved signed the document.

When performing anamnesis, the absence of systemic, joint and respiratory diseases.

He held the extra clinical and intra oral, by a single examiner.

The extra oral examination includes the application of Axis I RDC / TMD (question 1-7), containing:

1. palpation in the TMJ region, in some muscles responsible for chewing as masseter and temporal, and other neck muscles and cervical powders, to check for muscle pain and/ or joint or not.
2. Measurement of the maximum aperture of voluntary mouth free of pain and with aid being with or without pain (vertical range of motion);
3. It was the pattern of opening and closing to find clicks and / or crackling in TMJ and deviations or deflections in the opening and/ or closing,

4. Auscultation (stethoscope) to observe unusual sounds like popping and crackling in the TMJ,
5. Tours and left and right side protrusive motion, to check if their presence or absence of muscle pain and/ or articulate.

All of these tests aimed to lead to diagnose TMD of muscular origin or joint.

In intra-oral exam if found that both had already been submitted to the dental clinical treatment and had no active carious lesions, absence of periodontal disease or occlusal problem, but also, there were no wear of dental facets of canines and molars, despite being one of the most common indicators of bruxism in children. On examination showed mixed dentition, with the presence of second deciduous molars. There was no indication for orthodontic treatment.

In addition, patients with the help of those responsible answered a questionnaire to research diagnostic criteria for temporomandibular disorders RDC/ TMD, containing demographic, socioeconomic, behavioral, psychosocial, and sleep-related.

The application of Axis II of the RDC/ TMD was used to assess behavioral and psychosocial factors relevant to the treatment of patients with TMD. The shaft includes a scale graduated chronic pain, depression measurements and number of non-specific physical symptoms as well as a limitation evaluation of jaw movement ability[9].

Sleep Assessment Questionnaire (SAQ): presents 19 questions that allow answers with scores 0-4, which together classifies the individual for the presence or absence of sleep disorder. The chosen cut-off point was 16, being the highest sensitivity (0.73) and specificity (0.80). Therefore, individuals with a total score up to 16 points are classified "without sleep disorder" and above that "with sleep disorder" [10].

The aim of this study was to evaluate the signs and symptoms before and after the use of occlusal silicone plate in two children with bruxism in a short-term study (2 months). A silicone-based material chosen to protect the primary teeth, covering the occlusal surfaces of all teeth and for being a flexible material so as not to impede the mandibular growth. Furthermore, the thickness (3 mm) is sufficient to prevent drilling and increase the impact resistance.

3. RESULTS

Case 1: A male patient, 11 years old, brought to the pediatric dentistry clinic Faculty Ingá School by his mother, who reported that his son grinds his teeth at night, which reported recurrent facial pain in the morning, along 6 years. Such episodes began after the separation from parents when he was just three years old. No previous treatment for bruxism was performed. He observed their behavior and found that it is a very emotional child, because guilt is the things that happen and that is far-mind worried about everything.

Figure 1. Maxillary arch.

Figure 2. Lower dental árcade.

Figure 3. Silicone occlusal plate in the lower arch.

Case 2: Female patient, 11 years old, was brought to the pediatric dentistry clinic Faculty Ingá by his mother, who revealed that her daughter, grinds his teeth at night, and reported recurrent facial pain in the morning, the over 2 years. By observing their behavior it was found that this is an extremely worried child. They had sought medical help for treatment of headaches, however without success.

Figure 4. Maxillary arch.

Figure 5. Lower dental árcade.

Figure 6. Silicone occlusal plate in the lower arch.

The treatment plan of the patient after the diagnosis of nocturnal bruxism was the installation of a silicon plate with complete coverage of the occlusal surfaces to use in the mandible. To create the silicon plate held on the lower arch molding with Hydrogum alginate, for preparation of plaster models. The silicon film used consists of polyvinyl chloride in a thickness of 3 mm. The plates were fabricated by vacuum laminator, a manual press, which the sheet heated and sucked through the lower model. After making the board was necessary to make adjustments along the gingival margin to prevent tissue injuries.

Case 1 patient, with premolars erupt, it created a space on the board to allow normal eruption.

In both cases, instructed the patients to use the card every day, removing it only for cleaning and for meals, emphasizing the importance of nighttime use, for 2 months. Around this period, fortnightly adjustments were made and when necessary, the plates were modified and rebuilt to allow for proper bone growth and eruption of permanent teeth.

In order to study the pattern and intensity of the signs and symptoms of bruxism, was distributed to patients a timetable for playful note of soreness for two months containing the day, the location and intensity of pain (rated on a scale 5 degrees: no pain, mild pain, moderate pain, severe pain and maximal pain).

The signs and symptoms prior to treatment with the occlusal silicone plate:

Case 1:

During palpation examination, the patient reported severe pain in the muscles in the anterior temporal beam and the masseter muscle motor end plate from both sides. There was no crackles and pops during opening and closing movements. In the extension of the vertical movement, the patient experienced pain in the TMJ and the masseter muscle (pain in the front of the ear) on both sides; the maximum mouth opening, with or without assistance. Also demonstrated muscle pain, right lateral excursion. Reported pain in the left masseter region and left lateral excursion, pain in masseter region right. Already in the sleep questionnaire, the patient reported no trouble sleeping, but had a restless sleep or disturbed for a long move his legs and arms during sleep, although not snore during sleep, the patient's mother reported that he felt difficulty breathe at night because it is mouth breathing. According to the answers of Annex B - 20 of the RDC/ TMD questionnaire.

Case 2:

During palpation examination, the patient reported severe pain in the temporal muscles in the previous bundle and the endplate of the masseter muscle of both sides, showed the presence of fine crackles in the TMJ right during opening and closing movements, indicating the beginning of the previous disk displacement Right. Vertical range of motion, the patient developed pain in the right masseter and TMJ pain (pain in the front of the ear) on both sides, the maximum mouth opening without aid and assistance, but did not show muscle and joint pain in movements lateral excursion right and left lateral excursion. Already in the sleep questionnaire, the patient reported no trouble sleeping, but sometimes presents an agitated or disturbed sleep a move his legs and arms during sleep. Although sometimes snore during sleep, the mother of the patient reported that it had difficulty breathing during the night because it is oral breather. According to the answers of Annex B - 20 of the RDC/

TMD questionnaire.

For the scoring protocol for graduation from chronic pain, both patients had grade II: high pain intensity, pain intensity feature> 50, and less than 3 inability of points.

For the scores of items in Annex B-20 scale, the results were nil for depression measures and the number of non-specific physical symptoms (including pain items) and (excluding pain of items) the results are less than the reference value scale, both for patients not suffering from depression and non-specific physical symptoms.

For Sleep Evaluation Questionnaire (SAQ) the two patients had "sleep disorder" because they have cut point above the 16, being the highest sensitivity (0.73) and specificity (0.80). However the case of the first patient had higher sleep disorder that the patient GS B, with respectively 48 and 29.

The signs and symptoms after treatment with the silicone occlusal plate:

Case 1:

After daily use and full board for 50 days, there was (pain calendar) a great improvement of the headache by decreasing the frequency and intensity of pain (Figure 7).The disappearance of the sounds of grinding teeth, reported by the mother, indicating elimination or reduction in the intensity of nocturnal bruxism. However, there was a necessity to change the occlusal splint, due to attrition.

According to the notes in the calendar, still reported pain in the masseter muscle, though at a lower intensity to that of when he was not in treatment (Figure 7).

During palpation, in the exams repeated after treatment, the sensitivity in the masseter and temporalis muscle decreased.

According to the Sleep Assessment Questionnaire (SAQ), observed improvements in breathing during sleep.

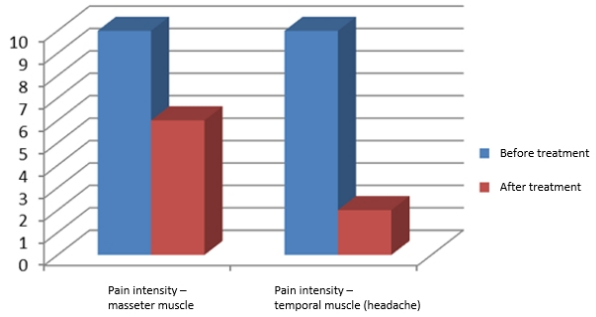

Figure 7. Pain intensity reported by Case 1, before and after the use of occlusal splint.

Case 2:

After the full journal and use of the plate for 65 days, a correction of the start offset of the previous drive with reduction which it had prior to treatment, which points to a possible regeneration of articular tissues. Therefore, there was no fine crackle in the right TMJ during opening and closing movements.

The disappearance of grinding sounds of teeth, reported by parents, indicates a decrease in the intensity of nocturnal bruxism.

According to the notes in the calendar, there were significant improvements regarding pain in masseter muscle reducing pain intensity and frequency (Figure 8).

Despite the frequency of headache have decrease the intensity slightly improved (Figure 8), particularly in the morning, therefore suspended the constant use of the card, using it only to sleep. These results were noted in pain calendar, for about 2 month's use of the silicon plate.

During palpation, exams were repeated after treatment, the sensitivity in the masseter and temporalis muscle decreased.

During the treatment was not observed improvements in sleep disorder, according to the Sleep Assessment Questionnaire (SAQ).

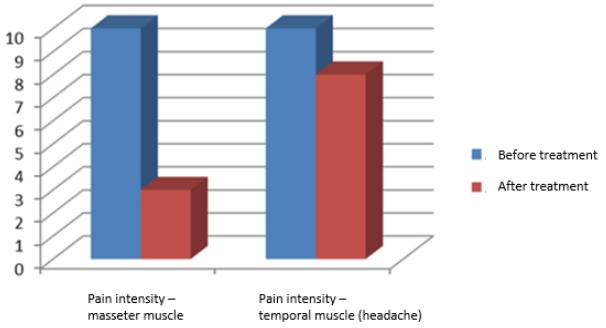

Figure 8. Pain intensity reported by Case 2, before and after the use of occlusal splint.

The results of this study indicate that despite the relatively short evaluation period; the night plate is effective to control bruxism in children but used wisely, only in moments when the masticatory system adaptive capacity is exceeded.

Not much information in the literature regarding the efficacy of long-term treatment for the treatment of bruxism. It is found that this habit is not completely eliminated, but kept under control, although it can be eradicated in very young children with maturity and tooth eruption[2].

4. DISCUSSION

Bruxism as well as the TMJ, are increasingly recurrent in children and adolescents. Thus, early diagnosis and appropriate intervention are vital to reduce and prevent the signs and symptoms of bruxism and temporomandibular dysfunction preventing the progression and subsequent consequences, such as damage to the stomatognathic system, the impact on academic performance, chronic pain or headaches, systemic diseases related to

mandibular growth and among others[11].

Various therapies have been used such as single or combined therapy for the treatment of bruxism.

In the present study it was not used the proposed treatment with restoration of teeth because they did not wear that compromised the vertical dimension or aesthetics or function.

However according to Gupta (2010) of the proposed local treatment may be the restoration of worn teeth using composite resin direct hybrids that allow a better reproduction of the areas that receive the normal occlusal load of returning the vertical dimension lost by wear dental[1]. Ahmad (1986) and Cash (1988) point out that the restorative procedures can be performed in specific cases for recovery of the vertical dimension[12].

In the present study the reports of headaches decreased and mouth breathing underwent significant improvements with the use of occlusal silicone plate in the short term (2 months). Agreeing with orthodontic treatment proposed by Carra (2013) for intervention in bruxism was to use the short term, of a MAD (Mandibular Advancement Device) which indicated a reduction in sleep bruxism, snoring, and reports headache. However, interactions between sleep bruxism, mouth breathing, and headaches have not been well elucidated, and its long-term effectiveness[11].

According to Ahmad (1986) and Carvalho (2003) occlusal adjustment is performed whenever there is occlusal interference that may cause damage to the TMJ, with the removal of premature contacts that interfere with centric occlusion and centric relation. The aim is to improve the occlusion and promote the reduction of premature contacts to prevent any parafunctional eccentric movements of the jaw. However, the occlusal adjustment is an irreversible[12] therapy and second Cash (1988) because of irreversibility should be carefully indicated[13]. According to Attanasio (1991), the adjustment is indicated only in the obvious presence of interference during mandibular motion, and in children aged above three years old[13]. Unlike this proposed therapy, in this study there was no occlusal adjustment, due to the need to preserve tooth structure.

There systemic treatments with the use of medications and medical treatments (device for the chin therapy, physical therapy and surgery)[14]. Some drugs (antidepressants, benzodiazepines, skeletal muscle relaxants and analgesics non-opioid) may be useful for a short period, particularly when there is pain secondary[14]. Gupta (2010)[1] reported that the treatment with clonazepam (benzodiazepines) significantly improved not only bruxism, but also improves the quality of sleep without changes in mood, psychophysiological measures performance and normal waking, suggesting good tolerability of the drug. Systemic medications have not been effective to permanently eliminate the sleep bruxism and is used only in cases of situational anxiety short term. There is a risk in the pharmacological therapy of addiction, but his statement is in cases where the pain is severe and it becomes necessary immediate action[4]. However, it is contraindicated for infant use.

In accordance with the studies of the psychological aspects, the present study demonstrated that there is a need for psychotherapeutic treatment for improvement in the context of anxiety and guilt. According to study by Restrepo (2001), 33 children aged 3-6 years, there are various psychological techniques have been effective in reducing the signs and symptoms of bruxism[15]. According to Funch and Gale (1980), the state of bruxism is correlated with psychological factors, suggesting that the kind of life and the behaviors and habits of the patient exerts great influence on the frequency, duration and severity of the condition[16].

According Lobbezoo & Naeije (2001), stress level and personality type were included in the etiology of bruxism for many years. However, the exact contribution of psychological factors remains debatable[16]. A study by Antonio (2006) has shown that people with bruxism generally exhibit emotional imbalance and tend to develop psychosomatic diseases[17]. These results were confirmed by Kampe (1997) and other, which also showed the presence of a higher level of anxiety in a group of people with bruxism[16]. Within psychotherapy there is counseling, self-suggestion, hypnosis, relaxation exercises and biofeedback[12]. Cash (1988) report that the advice can lead to a decrease in voltage by an increase of self-awareness, which may result in a greater voluntary control which in turn leads to a decline of dental-functions[12].

The proposed complementary treatments are physical therapy, acupuncture, the sleep hygiene and biofeedback[2]. In physical therapy, there are a number of treatments for the management of the signs and symptoms of TMD, including the electrical stimulation of high blood pressure, nerve stimulation transcutaneous electrical, laser therapy and massage therapy. In the study of Gomes (2014), there was the use of massage therapy with maneuvers in masseter and temporal muscles, but with the combination of an occlusal splint, with reduced pain and improvement in relation to the mandibular range of motion and lateral excursion on both sides of[18]. Consistent with the literature, we found the need for multidisciplinary team with the participation of physiotherapy.

In the study of Öz *et al.* (2010), there was the use of low intensity and occlusal splint laser and complete ram that both interventions were effective in increasing the maximum aperture active mouth, with no statistically significant difference between the two techniques[19] in contrast, in this study there was no significant change in the measurement of maximal mouth opening.

A number of physical therapy techniques have been indicated for the treatment of myofascial pain and dysfunction syndrome, such as massage therapy of deep tissue, muscle stretch/ relaxation, transcutaneous electrical nerve stimulation, injections trigger point and using occlusal splints decompression or myorelaxant plates[18]. Gomes research (2014) treated patients occlusal decompression boards showed decreases in subjective pain and pain on pressure on temporal, masseter and trapezius muscles, as well as greater opening of the mouth after treatment[18].

Acupuncture, considered as an effective alternative therapy for most clinical conditions involving chronic pain. The most common condition treated with acupuncture are the headaches, with positive results in relation to migraine, low back pain and temporomandibular dysfunction. According study Barrero (2012), acupuncture may have beneficial effects on PDS signs and symptoms in the short term[20]. It is considered the possibility of treating acupuncture to the reported cases, but it is noteworthy that the treatment of children must be the less invasive possible.

However, the most common treatment for bruxism, in dentistry is the use of an occlusal splint for its reversible character, which is especially valuable in dentistry, not to change the processes of growth and development of the jaws[2]. However, use of an occlusal splint should be given at an early stage of therapy, because according Solberg *et al.* (1975)[6], the use of long-term occlusal splint does not cure nocturnal bruxism habit. Okeson (1987) also reported that following the plaque removal in patients with bruxism, nocturnal activity in electromyography of the masseter muscle increases to the level of pretreatment[7]. Among the various types of recommended cards, the best known is the plate Michigan, constructed with colorless acrylic resin, usually for the upper arch and covering the occlusal surfaces of all teeth. With the reorganization of neuromuscular activity, reducing the hyperactivity of the muscles, and the restoration of the balanced muscle function. In this study was used by two months an occlusal plate like Michigan, however, made of silicone for the lower arch, showing good results.

According to Jones (1993) in which report the successful relief of headache for a period of 22 months follow-up in a girl five years after the use of an occlusal splint[21]. The neuromuscular balance achieved with an operating system may be responsible for relaxation of temporal muscles, leading to the absence of headache[3].

Agreeing with what was reported in the current job with Case 1 patient, male, 11 years old, where there was improvement in headache with the use of occlusal silicone plate. Noting that the use of silicone occlusal splints was that there was an acceptance for use by children, to be more comfortable and not to change the processes of growth of the jaw and or hinder the tooth eruption.

The silicon plate can be used and presents effects in relieving pain by absorbing bite force, and help prevent future damage to the teeth as a continuous abrasion, delayed eruption and/ or impaction of permanent teeth and malformation of dentin and enamel due to the trauma caused by teeth grinding also helps in changing behavior of patients with hyperactivity, poor school performance and difficult temperament, which have been reported in children with bruxism[3].

5. CONCLUSION

As a reversible treatment method, the occlusal silicone plate proved to be effective in the control of bruxism can be used by children.

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