CASE REPORT

GAP ARTHROPLASTY WITH TEMPORALIS FASCIA INTERPOSITION FOR THE TREATMENT OF TEMPOROMANDIBULAR JOINT ANKYLOSIS: CASE REPORT

ARTROPLASTIA EM GAP COM INTERPOSIÇÃO DE FÁSCIA DE TEMPORAL PARA O TRATAMENTO DE ANQUILOSE DE ARTICULAÇÃO TEMPOROMANDIBULAR: RELATO DE CASO

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ABSTRACT

Ankylosis of the temporomandibular joint (TMJ) is characterized by the intracapsular union of the condyle-disc complex to the surface of the temporal bone, which can cause restriction of the mandibular movements and a limitation of a mouth opening. Alterations are also described as a restriction of masticatory capacity, difficulty in phonation and suitable oral hygiene, as well as difficulty in social interaction. A 27-year-old female patient with a bilateral history of parasymphysis and mandibular condyle fracture after a trauma in 2014, which evolved to an ankylosis of the right TMJ, with a maximum mouth opening of 13.27 mm. For the treatment of the described case, it was used the Al-Kayat approach, ipsilateral coronoidectomy and resection of the ankylotic mass in gap with interposition of temporalis muscle fascia flap on the right side. After six months of the surgical procedure, it was made a new computed tomography of the face in which it was possible to notice the absence of lesions and signs of recurrence of the ankylosis. It was also observed the maintenance of the gap space made by the bone resection. The satisfactory result of the technique was attributed to the achievement and stabilization of an adequate mouth opening, improved chewing ability and phonation. Besides the clinical success, an advantage of the technique used was the low cost of the procedure by using only temporal muscle interposition without the use of alloplastic materials. In addition, the associated ipsilateral coronoidectomy was sufficient to help maintaining the achieved mouth opening, and the contralateral coronoidectomy was not necessary, as a result it was minimized the surgical time and morbidity of one more accessed surgical site.

Keywords: Arthroplasty, Ankylosis, Temporomandibular Joint, Traumatology, Condyle, Pathology.

RESUMO

A anquilose da articulação temporomandibular (ATM) é caracterizada pela união intracapsular do complexo disco-côndilo à superfície do osso temporal, podendo gerar restrição dos movimentos mandibulares e limitação de abertura bucal. São descritas ainda alterações como restrição da capacidade mastigatória, dificuldade de fonação e de uma adequada higiene bucal, além de dificuldade de interação social. O presente caso retrata um paciente feminino, 27 anos, com histórico de fratura de parassínfise e côndilo mandibular bilateral após trauma em 2014, evoluindo com anquilose da ATM direita, com abertura máxima de 13,27 mm. Para o tratamento do caso descrito, foi utilizado o acesso de Al-Kayat, coronoidectomia ipsilateral e ressecção de massa anquilótica em gap com interposição de retalho da fáscia do músculo temporal no lado direito. Após seis meses do procedimento cirúrgico, foi realizada uma nova tomografia da face na qual se observa ausência de lesões e de sinais de recidiva da anquilose e também foi observada a manutenção do espaço de lacuna feita pela ressecção óssea. O resultado satisfatório da técnica foi atribuído pela obtenção e estabilização de uma abertura bucal adequada, melhora da capacidade mastigatória e da fonação. Além do sucesso clínico, uma vantagem da técnica utilizada foi o baixo custo do procedimento por utilizar apenas interposição do músculo temporal sem uso de materiais aloplásticos. Além disso, a coronoidectomia ipsilateral associada foi suficiente para auxiliar na manutenção da abertura alcançada, não sendo necessária a coronoidectomia contralateral, o que minimizou o tempo operatório e a morbidade de mais um sítio cirúrgico acessado.

Palavras-chave: Artroplastia, Anquilose, Articulação Temporomandibular, Traumatologia, Côndilo, Patologia

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INTRODUCTION

The ankylosis of the temporomandibular joint (TMJ) refers to the intracapsular union of the condyle-disc complex to the surface of the temporal bone, with restriction of mandibular movements, which causes limitation of mouth opening, restriction of the masticatory capacity, poor oral hygiene and difficulty in phonation, as well as difficulty in social interaction, among other psychological disorders (1,2).

Basically, there are three relevant factors in the etiology of ankylosis, which are orofacial infection, trauma, and systemic/genetic conditions. In adults, condyle fractures are more frequent causes of ankylosis, followed by previous TMJ interventions, such as tumor excision, discopexy, and eminectomy. Other etiologies would be systemic diseases, such as ankylosing spondylitis, psoriasis, osteoarthritis and juvenile rheumatoid arthritis (2-6).

Intra-articular hematoma alongside scar tissue and excessive bone formation are responsible for the restriction of the mandibular movement, in cases in which trauma is the etiological cause (3). TMJ ankylosis treatment seeks essentially to reestablish the mouth opening preventing future recurrence. Its handling is surgical, under general anesthesia. Besides, during the preoperative period, it should be discussed with the anesthesiologist how the patient's intubation will be performed, with the options of nasofibroscopy or elective tracheotomy. The preferred one is the Intubation with bronchofibroscopy assistance (7-9).

Surgical treatment can be performed according to techniques based on a complete excision of the ankylotic mass, or in the creation of a gap between the condyle and the temporal ankylosed bone, which imitates a new joint. Among these, the most recommended techniques today are: TMJ reconstruction with alloplastic materials, the use of autogenous grafts, such as those of costochondral origin, and interpositional arthroplasty, in which a gap is formed and a material is placed in it, such as the fascia of the temporal muscle, and auricular cartilage (8-10).

When ankylosis is already established for a long period, coronoid hyperplasia and muscle fibrosis often occur. Thus, in the perioperative period, in cases of mouth opening smaller than 35 mm, afterwards ankylosis treatment with ipsilateral coronoidectomy, it is recommended to perform a contralateral coronoidectomy by the intraoral approach. In the postoperative period, intermaxillary blockade is indicated for approximately 10 days, to avoid cicatricial fibrosis in the joint. After patient's release, a strict physiotherapy protocol alongside speech therapy should be followed (4,10,11).

The present study aims to report the treatment of TMJ ankylosis through the surgical technique of ipsilateral coronoidectomy and resection of ankylotic mass in patients with gap, alongside flap interposition of the temporal muscle fascia.

CASE REPORT

A 27-year-old female patient was treated at Hospital Adão Pereira Nunes (HMAPN) in Duque de Caxias - Rio de Janeiro - RJ, Brazil. She reported a severe mandibular hypomobility after a trauma in 2014. In her previous medical history, there was a bilateral parasymphyseal and mandibular condyle fracture, which evolved to a right TMJ ankylosis and a maximum mouth opening of 13.27 mm (Figure 1). The patient did not know when symptoms started exactly, however she reported worsening in the last two years. In face computed tomography (CT), it is seen, in the coronal, sagittal sections, and in the 3D reconstruction (Figure 2A, 2B, 3), a hyperdense image, which shows the union of the fractured condyle to the glenoid fossa.

Figure 1 - *Maximum preoperative mouth opening at 13.27 mm.*

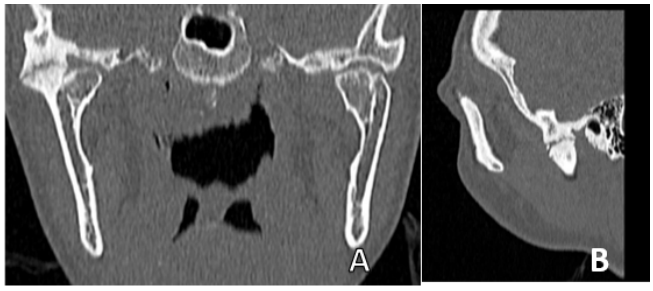

Figure 2 - *Coronal (A) and sagittal (B) sections of the face CT scan.*

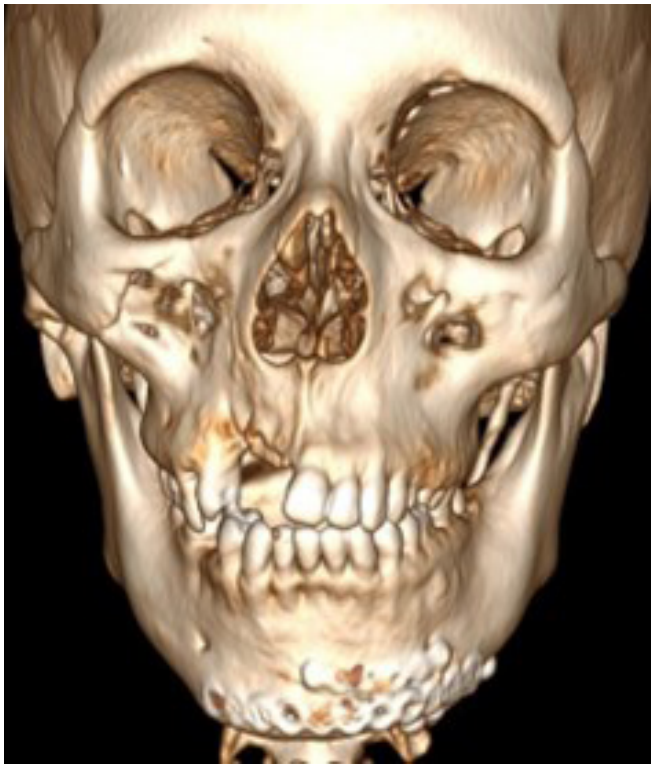

Figure 3 - *Three-dimensional reconstruction of face CT scan displaying osteosynthesis in the left mandibular parasymphysis region.*

The treatment selected for this case was the ipsilateral coronoidectomy and the resection of the ankylotic mass in a gap, alongside flap interposition of the temporal muscle fascia on the right side. The patient was informed about the risks and benefits of the treatment and signed an informed consent form. The Research Ethics Committee of Carlos Chagas Institute approved the present case under protocol number: 68933223.8.0000.0251.

In the surgery, Al-Kayat and intraoral access in the base of the mandibular vestibule were used to perform coronoidectomy. The procedure was performed with the patient under general anesthesia with nasotracheal intubation. After the establishment of anterior and posterior limits of the ankylosed mandibular condyle, resection of the bone segment, and the preparation of the gap started. In this process were used: burs 701 and 702 (Razek, São Carlos, SP, Brazil), oscillating saw, alongside the tools and Stryker TPS motor (40,000 rotations per minute), hammer, and chisel (Figure 4). Segments irregular edges were smoothed by the bur, and the branch was completely separated from the upper bone block. For this technique, the minimum of 10 mm interval is created between the mandibular branch and the base of the skull, also known as temporal bone (glenoid fossa) (1).

After the anky losed block removal, it is expected the passive mouth opening to be around 35 mm. As a result of the opening limitation, after the creation of the gap, ipsilateral coronoidectomy was performed. If the problem continues, it is recommended to perform a contralateral coronoidectomy (Figure 5). Based on the creation of this interval, that completely separated the bone blocks, the temporal fascia graft was done, and this regional flap bypassed the zygomatic arch to fill in the gap. After establishing and anchoring with a 1.9 mm orthopedic anchor, it was done a flat suture and the installation of a drain to prevent the formation of a “dead space” and an edema (1,2,4).

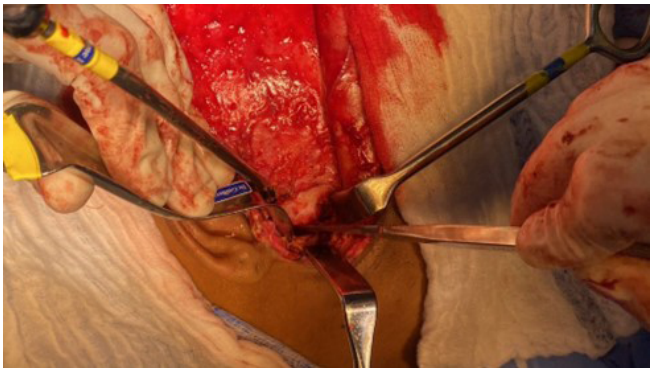

Figure 4- *Perioperative photography showing the moment of making the gap with the use of burs, hammer and chisel.*

Figure 5 - *Mouth opening of 32 mm, during perioperative.*

The beginning of speech therapy monitoring and physiotherapy exercises started at the hospital bed fourteen days after surgery. Speech therapy, peri-

and intraoral massages, myofunctional exercises and bandage application were maintained. Twenty sessions were performed, three per week in the first month and two per week in the subsequent month (4,12).

During the clinical control in the postoperative period, eleven days after the surgical procedure, the patient presented a good mouth opening, with maintenance of more than 30 mm, which allows the recovery of masticatory and speech functions normally (Figure 6). Figure 7 presents the tomographic control after 6 months. It was possible to observe local healing without any bone formation and ossification that could indicate relapse of treatment. The mouth opening approach and the recovered functions are the parameters that can be analyzed so far.

Figure 6 - *Mouth opening maintained in the period of 11 days after the surgical procedure.*

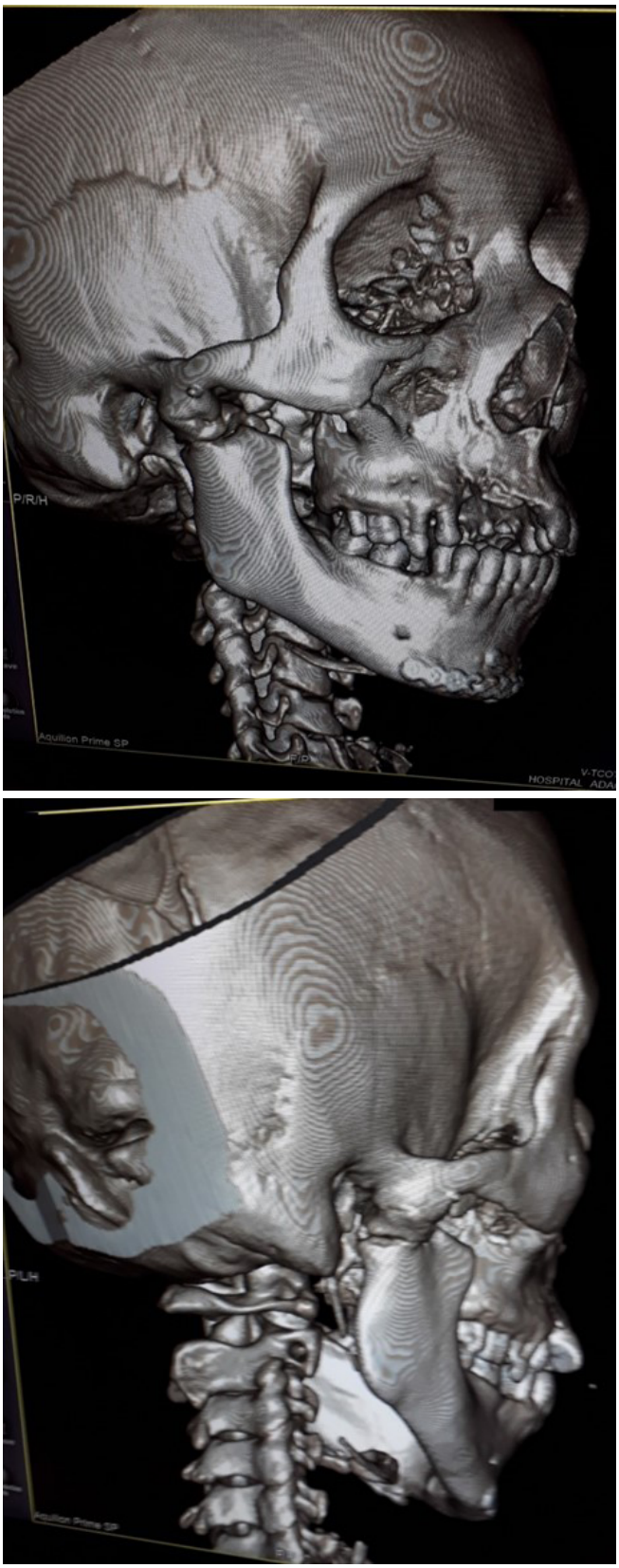

Figure 7 - *Face CT scan. 6 months postoperative period.*

DISCUSSION

TMJ ankylosis should be treated as soon as the condition is diagnosed. The treatment aims to remove the ankylotic block and return the function

of the TMJ, preventing ankylosis of coming back. Thereby, surgical procedures have been described for this purpose (12,13).

Arthroplasty in gap without interposition needs a greater amount of bone resection, when compared with the material interposition. For this technique, a wide material variety has been discussed, such as auricular cartilage, costochondral graft, silicone, various metals, muscle, and temporal fascia (2,9).

Total arthroplasty, with the interposition of material, has the option of self-curing the methacrylate, with the surgical proposal of two convex articular surfaces (14). If alloplastic materials are chosen as the interpositional material type, the chance of site rejection and morbidity increases (12,15). In more severe cases, extensive bone erosion was found in the glenoid fossa area. Another complication reported was alloplastic fragmentation material and progressive wear, which can cause loosening and fracture of the prosthesis (16). Despite of the fact that the use of interposition with alloplastic and autogenous material presents similar mouth opening values, ankylosis recurrence was higher in patients treated with alloplastic material, highlighting which one showed the worst performance in interposition (11).

Autogenous materials can be used as another option to form this interposition, resulting in benefits that converge when they achieve an early mobilization after the surgical procedure. As a consequence of the physical barrier created with the use of interpositional material, the presence of pluripotent cells was minimized and fibrosis and heterotopic ossification (HO) prevented. Costochondral grafting is a technique used due to its growth potential and its biocompatibility and functional adaptation. However, its growth can be unpredictable and cause unsatisfactory results (4,17).

The comparison of the arthroplasty in gap and the use of the interpositional graft showed significantly lower recurrence events of temporomandibular ankylosis with interposition, when studies with less than two years of follow-up are evaluated. Nonetheless, over a longer period of time, including studies that evaluated follow-up over then two years, similar rates of relapse were observed between them. Relapses over long follow-up periods, longer than two years, were observed less frequently in patients treated with interposition of material (11,18).

The use of regional flap, with the muscle and temporal fascia, maintains the advantages of being an autogenous material, having resilience and proximity to the joint. The muscle included in the flap results in a greater thickness above the zygomatic arch. Most because the material is shaped when placed in the gap created, which is its biggest disadvantage (3).

Mittal *et al.* found that temporomandibular fascia is the most common material for arthroplasty (11). Regardless the aspects of providing vascularization, an autogenous tissue with adequate blood supply, and resistance, the temporal fascia is superior. In our case, we chose only the temporal fascia and there were no complications in the largest projection on the face (3,19). Rodrigues *et al.* (2021) also chose the use of the of temporal muscle fascia with the interposition of the material in the gap, which was created by removing the ankylotic block. In this case, the choroid was removed from both sides. Mouth opening was in 27 mm on the first postoperative day, but there was an increase to 30 mm on the 20th day, and 32 mm about two months after the surgical procedure (20).

The temporal muscle can form the induction of a scar, which causes recurrence of ankylosis at the surgical site. However, the knowledge of the current literature is insufficient to prove that the type of autogenous material can favor recurrence (7). Dimitroulis (2004) published a relapse after a follow-up of 15 months in a case initially treated with adipose graft. In this case, it was necessary to reapproach the patient for a costochondral graft (7). For an efficient treatment, the risk factors are the patient's age, duration of the process, previous surgery in the TMJ area, and the associated systemic impairment. Thus, the types of graft or flap properties have influence in the process, but are not able to determine absolutely the treatment's longevity (1).

The technique of choice for the treatment of this case performance was due to its conservative style, since condylar prostheses have an expectation of 20 years, requiring replacement after this period (21). Therefore, since the patient was young, ipsilateral coronoidectomy and resection of the ankylotic mass in gap were chosen alongside the interposition of the flap of the temporal muscle fascia. In case of symptoms recurrence, the placement of grafts or prostheses in the area will be indicated.

The results of previous studies have highlighted the importance of immediate exercise and physiotherapy for relapse prevention (20). Surgery to release TMJ ankylosis, besides increasing mouth opening, results in decreased action potentials during maximal isometric voluntary contraction for the masseter muscle on both sides, resulting in less pain to the patient and release of the joint for functional activities (22). According to Karamesi *et al. (*2013), the early application of exercises, under the supervision of physiotherapists and speech therapists, supported interincisal opening, which went from 20mm to 29.5mm (4).

CONCLUSION

The satisfactory result of the arthroplasty technique in gap with temporalis fascia interposition

for the treatment of TMJ ankylosis was attributed to the achievement and stabilization of mouth opening in 32 mm. This consequently resulted in an improvement of the masticatory capacity and phonation. Early mobilization, physiotherapy and a close follow-up were also decisive for the occurrence of a successful outcome so far. In outpatient follow-up, six months after the surgical procedure, a new CT of the face was performed, in which it was observed absence of lesions and maintenance of the gap space made by bone resection. Another advantage of the technique used was the low cost of the procedure, since only the temporal muscle interposition was used, without the use of alloplastic materials. In addition, the associated ipsilateral coronoidectomy was sufficient to help maintaining the achieved opening, and the contralateral coronoidectomy was not necessary. As a result, the surgical time and morbidity of one more accessed surgical site were minimized.

The authors declare no conflicts of interest.

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