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**COMPLICAÇÕES E ACOMETIMENTOS NEUROLÓGICOS DA COVID-19: UMA  
REVISÃO NARRATIVA DE LITERATURA**

MOSSORÓ

2022

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Monografia apresentada à Universidade Federal Rural do Semi-Árido como requisito para obtenção do título de Bacharel em Medicina.

Orientadora: Samila Marissa Pinheiro Gomes,  
Professora Especialista.

MOSSORÓ

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*Aos meus pais, a quem devo a vida  
e todas as oportunidades que nela tive, e  
que espero um dia poder lhes retribuir.*

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Agradeço aos meus colegas de classe e amigos, que me aconselham e motivam em todos os momentos.

A prática da medicina é uma arte, não um comércio, um chamado, não um negócio, um chamado em que seu coração será exercitado igualmente a sua cabeça.

William Osler

## RESUMO

A infecção pelo SARS-CoV-2 pode causar uma série de manifestações em vários sistemas do corpo humano, sendo o sistema respiratório o mais afetado. Contudo, devido ao enorme número de infectados no mundo todo, mesmo sistemas com um menor índice de acometimento acabam por ser de grande relevância, como o sistema neurológico. Dentre as várias manifestações neurológicas possíveis na Covid-19, algumas têm um alto potencial de danos e de risco à vida do indivíduo, como o Acidente Vascular Cerebral, a Hemorragia Intracraniana e a Síndrome de Guillain-Barré, sendo assim importante a identificação de tais acometimentos. Este trabalho visou a identificar quais as manifestações neurológicas que podem ocorrer devido à Covid-19. Para tal fim, foi realizado na forma de uma revisão narrativa de literatura. A busca por trabalhos foi realizada nas bases de dados MEDLINE/PubMed (via National Library of Medicine) e SciELO (Scientific Electronic Library Online), valendo-se de uma série de descritores. Após a busca, os resultados foram filtrados e selecionados com base em critérios de inclusão e exclusão, que definiram quais os artigos a serem usados para responder à questão central deste trabalho, que é: “Quais as principais complicações e acometimentos neurológicos da Covid-19? ”. Desta forma, o presente trabalho servirá para guiar a profissionais da saúde diante de quadros neurológicos na Covid-19, bem como auxiliar na elaboração de trabalhos posteriores que possam se valer do conteúdo aqui exposto.

**Palavras-chave:** SARS-CoV-2. Covid-19. Manifestações neurológicas.

## **ABSTRACT**

SARS-CoV-2 infection can cause a series of manifestations in several systems of the human body, the respiratory system being the most affected. However, due to the enormous number of people infected worldwide, even systems with a lower rate of involvement end up being of great relevance, such as the neurological system. Among the various possible neurological manifestations in Covid-19, some have a high potential for damage and risk to the individual's life, such as stroke, intracranial hemorrhage, and Guillain-Barré Syndrome, and it is therefore important to identify these disorders. This study aimed to identify which neurological manifestations may occur due to Covid-19. To this end, it was performed in the form of a narrative review of literature. The search for papers was performed in the MEDLINE/PubMed (via the National Library of Medicine) and SciELO (Scientific Electronic Library Online) databases, using a series of descriptors. After the search, the results were filtered and selected based on inclusion and exclusion criteria, which defined which articles would be used to answer the central question of this paper, which is: "What are the main complications and neurological involvement of Covid-19? ". Thus, this paper will serve to guide health professionals in the face of neurological conditions in Covid-19, as well as assist in the development of further work that may draw on the content presented here.

**Keywords:** SARS-CoV-2. Covid-19. Neurological manifestations.

## LISTA DE FIGURAS

|           |                                                                                                      |    |
|-----------|------------------------------------------------------------------------------------------------------|----|
| Figura 1  | – Fisiopatologia do SARS-CoV-2 .....                                                                 | 15 |
| Figura 2  | – Fluxograma de processamento dos trabalhos .....                                                    | 21 |
| Figura 3  | – Tomografias de crânio em AVEs do parênquima cerebral .....                                         | 47 |
| Figura 4  | – Tomografias de crânio em AVE cerebelar. ....                                                       | 47 |
| Figura 5  | – Ressonância magnética em DWI de AVE isquêmico .....                                                | 48 |
| Figura 6  | – Exames de imagem em caso de hemorragia intraparenquimatosa .....                                   | 49 |
| Figura 7  | – Tomografia computadorizada de crânio com trombose venosa em seio transversal distal esquerdo ..... | 49 |
| Figura 8  | – Ressonância magnética de crânio mostrando regiões de hiperintensidade .....                        | 50 |
| Figura 9  | – Tomografia e angiotomografia de crânio na PRES .....                                               | 52 |
| Figura 10 | – Ressonância magnética em FLAIR da Encefalopatia Necrosante Aguda .....                             | 53 |
| Figura 11 | – Ressonância magnética da coluna na mielite transversa aguda .....                                  | 54 |
| Figura 12 | – Estudo de condução motora dos nervos fibulares .....                                               | 55 |

## LISTA DE TABELAS

|          |                                                                                                                              |    |
|----------|------------------------------------------------------------------------------------------------------------------------------|----|
| Tabela 1 | – Artigos incluídos na revisão .....                                                                                         | 22 |
| Tabela 2 | – Artigos excluídos da revisão, segundo critérios: Fuga ao tema, texto completo<br>não disponível e tipo de literatura ..... | 35 |

## LISTA DE ABREVIATURAS E SIGLAS

|            |                                                                             |
|------------|-----------------------------------------------------------------------------|
| Prof (a)   | Professor (a)                                                               |
| Dr (a)     | Doutor (a)                                                                  |
| SciELO     | Scientific Electronic Library Online                                        |
| SARS-CoV-2 | Síndrome Respiratória Aguda Grave Coronavírus 2                             |
| OMS        | Organização Mundial da Saúde                                                |
| SARS-CoV   | Síndrome Respiratória Aguda Grave                                           |
| MERS-CoV   | Síndrome Respiratória do Oriente Médio                                      |
| RT-PCR     | Reação da transcriptase reversa seguida pela reação em cadeia da polimerase |
| ACE2       | Receptor da enzima conversora de angiotensina 2                             |
| SNC        | Sistema Nervoso Central                                                     |
| SNP        | Sistema Nervoso Periférico                                                  |
| AVE        | Acidente Vascular Encefálico                                                |
| SRAA       | Sistema-Renina-Angiotensina-Aldosterona                                     |
| ENMG       | Eletroneuromiografia                                                        |
| LCR        | Líquido Céfalo Raquidiano                                                   |
| PRES       | Síndrome de Encefalopatia Posterior Reversível                              |
| SGB        | Síndrome de Guillain-Barré                                                  |
| ENMG       | Eletroneuromiografia                                                        |
| MG         | Miastenia gravis                                                            |
| LDH        | Lactato desidrogenase                                                       |
| AST        | Aspartato aminotransferase                                                  |
| CK         | Creatina quinase                                                            |

## SUMÁRIO

|            |                                                      |           |
|------------|------------------------------------------------------|-----------|
| <b>1</b>   | <b>INTRODUÇÃO .....</b>                              | <b>13</b> |
| <b>2</b>   | <b>REFERENCIAL TEÓRICO .....</b>                     | <b>14</b> |
| <b>2.1</b> | <b>COVID-19 .....</b>                                | <b>14</b> |
| 2.1.1      | O vírus .....                                        | 14        |
| 2.1.2      | Fisiopatologia .....                                 | 14        |
| 2.1.3      | Epidemiologia .....                                  | 15        |
| 2.1.4      | Clínica .....                                        | 15        |
| <b>3</b>   | <b>JUSTIFICATIVA .....</b>                           | <b>17</b> |
| <b>4</b>   | <b>OBJETIVOS .....</b>                               | <b>18</b> |
| <b>4.1</b> | <b>Objetivo Geral .....</b>                          | <b>18</b> |
| <b>4.2</b> | <b>Objetivos Específicos .....</b>                   | <b>18</b> |
| <b>5</b>   | <b>MÉTODOS .....</b>                                 | <b>19</b> |
| <b>5.1</b> | <b>Etapas da Pesquisa .....</b>                      | <b>19</b> |
| 5.1.1      | Questão central .....                                | 19        |
| 5.1.2      | Descritores e bancos de dados .....                  | 19        |
| 5.1.3      | Critérios de inclusão e de exclusão .....            | 20        |
| 5.1.4      | Avaliação dos trabalhos .....                        | 20        |
| <b>5.2</b> | <b>Produtos da pesquisa .....</b>                    | <b>20</b> |
| <b>6</b>   | <b>RESULTADOS E DISCUSSÃO .....</b>                  | <b>46</b> |
| <b>6.1</b> | <b>Doenças Cerebrovasculares .....</b>               | <b>46</b> |
| 6.1.1      | Acidente Vascular Encefálico isquêmico .....         | 46        |
| 6.1.2      | Hemorragia Intracraniana .....                       | 48        |
| 6.1.3      | Trombose de seio venoso .....                        | 49        |
| 6.1.4      | Outras .....                                         | 50        |
| <b>6.2</b> | <b>Encefalite e Meningoencefalite .....</b>          | <b>50</b> |
| <b>6.3</b> | <b>Cerebelite aguda .....</b>                        | <b>51</b> |
| <b>6.4</b> | <b>Outras Encefalopatias .....</b>                   | <b>51</b> |
| 6.4.1      | Síndrome de Encefalopatia Posterior Reversível ..... | 51        |
| 6.4.2      | Encefalopatia Necrosante Aguda .....                 | 52        |
| <b>6.5</b> | <b>Mielite transversa aguda .....</b>                | <b>53</b> |
| <b>6.6</b> | <b>Síndrome de Guillain-Barré .....</b>              | <b>54</b> |

|            |                                                         |    |
|------------|---------------------------------------------------------|----|
| 6.6.1      | Polineuropatia Inflamatória Desmielinizante Aguda ..... | 55 |
| 6.6.2      | Síndrome de Miller Fisher .....                         | 56 |
| 6.6.3      | Outras variantes .....                                  | 56 |
| <b>6.7</b> | <b>Miastenia gravis</b> .....                           | 56 |
| <b>6.8</b> | <b>Rabdomiólise</b> .....                               | 57 |
| <b>7</b>   | <b>CONSIDERAÇÕES FINAIS</b> .....                       | 58 |
|            | <b>REFERÊNCIAS</b> .....                                | 59 |

## 1 INTRODUÇÃO

No final do ano de 2019, na cidade chinesa de Wuhan, iniciou-se um surto de uma doença respiratória causada por um novo coronavírus, que viria a ser chamado de síndrome respiratória aguda grave coronavírus 2 (SARS-CoV-2). Essa doença foi então batizada de Covid-19. Tal vírus se disseminou rapidamente pelo mundo, e em 11 de março de 2020, a Organização Mundial da Saúde (OMS) declarou a pandemia mundial da Covid-19.

As principais manifestações da Covid-19 são pulmonares, e vêm sendo arduamente pesquisadas. Apesar disso, manifestações extrapulmonares vêm sendo relatadas e melhor estudadas. Assim, identificou-se que podem ocorrer manifestações em vários sistemas, dentre elas, destacam-se: manifestações neurológicas, hematológicas, cardiovasculares, renais, gastrointestinais, endocrinológicas e hepatobiliares (GUPTA, A et al., 2020).

Além disso, paralelos com outros coronavírus, como a Síndrome Respiratória Aguda Grave (SARS-CoV) e a Síndrome Respiratória do Oriente Médio (MERS-CoV), já indicavam a possibilidade de acometimento neurológico pelo SARS-CoV-2, dada a semelhança em estrutura e mecanismos de infecção, visto que o SARS-CoV já foi detectado no líquido cefalorraquidiano por reação da transcriptase reversa seguida pela reação em cadeia da polimerase (RT-PCR) (MONTALVAN et al., 2020; ELLUL et al., 2020).

BAIG et al. (2020) propôs duas formas pelas quais o vírus da Covid-19 poderia chegar ao Sistema Nervoso Central (SNC), sendo essas: por meio da circulação sistêmica ou através da lâmina cribiforme do osso etmóide. Após a passagem do vírus para a circulação cerebral, o movimento mais lento do sangue facilita a ligação da proteína *spike* viral com o receptor da enzima conversora de angiotensina 2 (ACE2), presente no endotélio capilar, permitindo a entrada do vírus na célula.

As manifestações neurológicas podem atingir tanto o Sistema Nervoso Central (SNC) quanto o Sistema Nervoso Periférico (SNP). No SNC podemos encontrar: encefalite, encefalomielite aguda disseminada, mielite, ageusia, anosmia, cefaleia e doenças cerebrovasculares, como o Acidente Vascular Encefálico (AVE) isquêmico, hemorragia intracraniana e trombose de seio venoso. Já no SNP podemos encontrar: síndrome de Guillain-Barré e outras neuropatias periféricas (MONTALVAN et al., 2020; ELLUL et al., 2020; WHITTAKER et al., 2020; ASADI-POOYA et al., 2020).

## **2 REFERENCIAL TEÓRICO**

### **2.1 COVID-19**

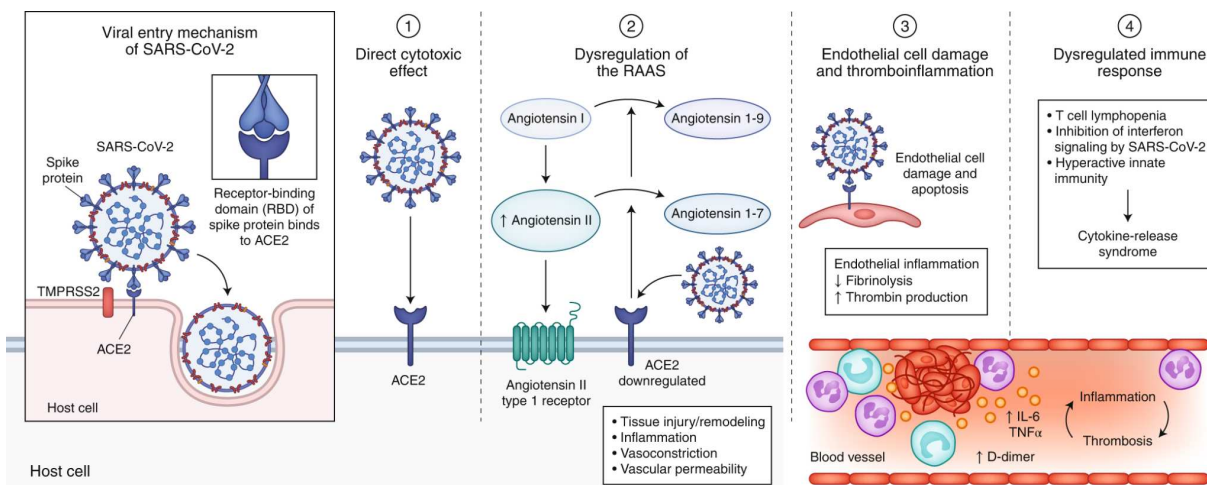
#### **2.1.1 O vírus**

O SARS-Cov-2 pertence à família dos coronavírus, que são vírus de RNA de fita positiva e envelopados, pertencendo ao subgênero dos betacoronavírus, o mesmo do vírus SARS-CoV. Assim como outros vírus de RNA, o SARS-CoV-2 tem uma grande capacidade mutagênica, o que se traduz no surgimento de variantes, cuja maioria não tem grande impacto na função viral. Contudo, algumas dessas variantes possuem um maior grau de relevância, como: omicron, alfa, beta, gama e delta, que apresentam alterações no grau de transmissibilidade e risco de doença grave (MCINTOSH et al., 2022a).

#### **2.1.2 Fisiopatologia**

Assim como o SARS-CoV, o SARS-CoV-2 possui uma proteína spike que se liga ao receptor da enzima conversora de angiotensina 2 (ACE2), possuindo uma eficiência de ligação maior do que o seu antecessor, o que pode ser um dos fatores que contribuíram para sua maior transmissibilidade (GUPTA, A et al., 2020).

Após se ligar ao ACE2, o vírus apresenta alguns mecanismos principais de lesão, como a toxicidade viral direta, dano às células endoteliais e consequente tromboinflamação, desregulação do Sistema-Renina-Angiotensina-Aldosterona (SRAA) e desregulação da resposta imune, como mostrado a seguir na Figura 1 (GUPTA, A et al., 2020).

**Figura 1 - Fisiopatologia do SARS-CoV-2.**

Fonte: (GUPTA, A et al., 2020).

### 2.1.3 Epidemiologia

Segundo a Organização Mundial da Saúde (2022), em 8 de maio de 2022 o número de casos confirmados de COVID-19 no mundo é superior a 514 milhões, e há mais de seis milhões de mortes confirmadas. Contudo, a contagem de casos é subestimada, já que parte das infecções não chega a ser diagnosticada ou relatada. BARBER et al. (2022) estimou que a soroprevalência mundial, em novembro de 2021, era de mais de 3 bilhões de indivíduos, cerca de 44% da população.

A principal via de transmissão do SARS-CoV-2 é a respiratória direta, de pessoa para pessoa, principalmente a curtas distâncias, por meio de gotículas e aerossóis. Contudo, também pode ocorrer transmissão a distâncias maiores, devido a partículas que podem permanecer no ar por períodos prolongados, ainda que sua importância para a disseminação da doença não seja certa. Por fim, vale ressaltar que mesmo indivíduos assintomáticos podem transmitir o vírus. (MCINTOSH et al., 2022a).

### 2.1.4 Clínica

O espectro clínico da COVID-19 pode variar desde casos assintomáticos ou leves, até casos graves ou críticos, possuindo uma taxa geral de mortalidade de 2,3%, sendo as mortes registradas unicamente em pacientes críticos. Estudos apontam que cerca de 33% dos infectados irão ser assintomáticos, enquanto nos sintomáticos, 81% desenvolverá a forma leve da doença, 14% a forma grave e 5% a forma crítica (MCINTOSH et al., 2022b).

O período de incubação do vírus é de aproximadamente 14 dias, mas a maioria dos casos ocorre de quatro a cinco dias após a exposição. Após isso, a apresentação inicial da doença é semelhante a outras infecções de vias aéreas, podendo apresentar: tosse, mialgia, cefaleia, dor de garganta e congestão nasal. Outras manifestações possíveis são: ageusia, anosmia, diarreia e exantema. Em casos leves, esses sintomas costumam não progredir e apresentarem resolução espontânea em até duas semanas (MCINTOSH et al., 2022b).

Já os casos graves cursam com dispneia, hipóxia ou envolvimento pulmonar maior que 50% em exames de imagem. Dentre os fatores de risco para o desenvolvimento da forma grave estão: aumento da idade, comorbidades, anormalidades laboratoriais, fatores virais e fatores genéticos do indivíduo. Os indivíduos com essa forma da doença podem levar de dois a três meses para ter sua recuperação (MCINTOSH et al., 2022b).

Por fim, a doença crítica cursa com complicações variadas, como insuficiência respiratória, choque ou disfunção de múltiplos órgãos. Contudo, várias outras complicações vêm sendo relatadas em diversos sistemas, como: complicações cardiovasculares, tromboembólicas, inflamatórias, infecções secundárias e as complicações neurológicas (MCINTOSH et al., 2022b).

Essas complicações neurológicas são mais comuns em pacientes críticos, como a encefalopatia, acidente vascular encefálico (AVE), crises epiléticas, entre outros. Apesar disso, algumas podem ocorrer mesmo em formas mais leves da doença, como a síndrome de Guillain-Barré (MCINTOSH et al., 2022b).

### **3 JUSTIFICATIVA**

Dada a prevalência e importância da Covid-19 em âmbito mundial, e suas variadas manifestações neurológicas, faz-se importante sintetizar as informações provenientes de diversos estudos em revisões, de forma a tornar mais objetivo e acessível o conhecimento por parte dos profissionais da saúde e em especial os profissionais médicos, que podem vir a encontrar tais manifestações e devem ter a competência de relacioná-las com a infecção pelo Sars-CoV-2.

## **4 OBJETIVOS**

### **4.1 Objetivo geral**

Realizar uma revisão narrativa sobre quais manifestações neurológicas podem ser causadas pela infecção do SARS-CoV-2.

### **4.2 Objetivos específicos**

- Buscar trabalhos, nas bases de dados selecionadas, que tragam informações sobre as complicações e manifestações neurológicas decorrentes da Covid-19;
- Selecionar as publicações que sejam pertinentes à realização do trabalho, utilizando os critérios estabelecidos;
- Compilar os dados obtidos na pesquisa e com isso estabelecer quais as afecções neurológicas da Covid-19;

## 5 MÉTODOS

O presente trabalho será realizado na forma de uma revisão narrativa de literatura. Tal forma de pesquisa visa analisar e interpretar as informações provenientes de fontes científicas sobre um tema selecionado, realizando, para tal fim, pesquisas em bases de dados e a avaliação da literatura disponível. Assim, a revisão disponibiliza um compilado dos dados de vários estudos, permitindo assim, uma visão mais clara e abrangente do tema, bem como o acesso rápido e fácil a uma série de informações. Tal forma de revisão, apesar de não necessitar de critérios metodológicos rígidos, pode se valer de sistematização da pesquisa, incorporando aspectos de outras modalidades de revisões, como a sistemática. (ROTHER, 2007).

Para este objetivo, foram organizadas as seguintes etapas: 1) definição da questão central que norteará a pesquisa; 2) busca por dados em bases de dados digitais, valendo-se de um vocabulário hierárquico para localização dos descritores (Mesh/DeCS); 3) seleção de estudos, aplicando-se critérios de inclusão e exclusão; 4); avaliação da qualidade metodológica dos trabalhos selecionados; e 5) análise e compilação dos dados, tendo os critérios PRISMA como norteadores para a organização das etapas acima descritas. (SAMPAIO e MANCINI, 2007; PEREIRA, 2014).

### 5.1 Etapas da Pesquisa

#### 5.1.1 Questão central

A pesquisa foi norteada pela seguinte pergunta: “Quais as principais complicações e acometimentos neurológicos da Covid-19?”.

#### 5.1.2 Descritores e bancos de dados

Foi realizada a busca de trabalhos publicados nas bases de dados PubMed e SciELO, fazendo uso dos seguintes descritores: COVID-19, SARS-CoV-2 ou coronavírus em associação com: neurological disorders, nervous system, encephalitis, encephalopathy, seizure, ataxia, myelopathy, Guillain- Barré syndrome, myopathy, peripheral neuropathy, cerebrovascular ou neuromuscular.

### 5.1.3 Critérios de inclusão e de exclusão

Os artigos selecionados pela estratégia de busca foram avaliados pelo autor, conforme os critérios de inclusão: 1) trabalhos de relato de caso e série de casos; 2) escritos em inglês, português ou espanhol; e 3) publicados no ano de 2020.

Aplicaram-se também os seguintes critérios de exclusão: 1) artigos que não abordam especificamente o tema deste trabalho; e 2) artigos cujos textos completos não estiverem disponíveis.

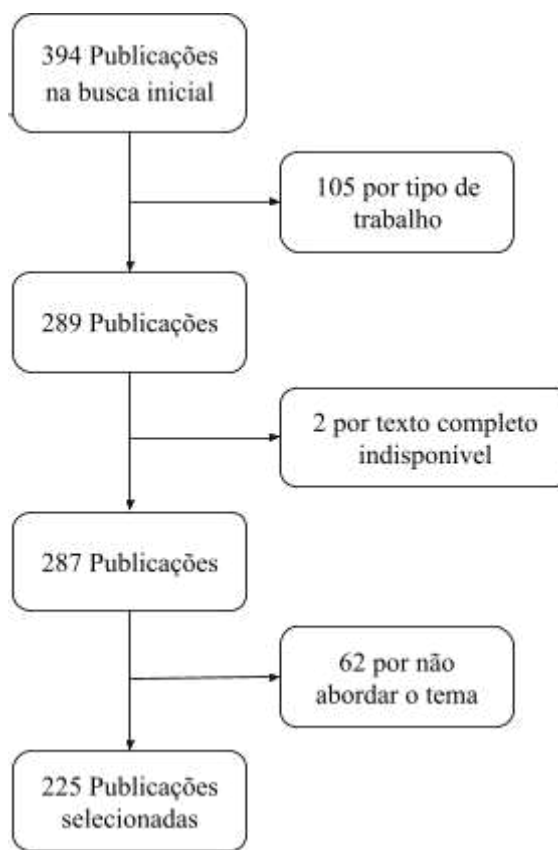
### 5.1.4 Avaliação dos trabalhos

A avaliação dos trabalhos foi feita utilizando a ferramenta QUADAS-2 (WHITING, 2011), que é composta por quatro domínios-chave que são: seleção de pacientes, teste índice, padrão de referência e fluxo e tempo. Então, cada domínio é avaliado quanto ao risco de viés e os três primeiros são avaliados também quanto à aplicabilidade.

## 5.2 Produtos da pesquisa

Somados os resultados de duas bases de dados, foram obtidos 394 trabalhos científicos. Desses, foram selecionados 289 trabalhos após aplicação do critério de tipo de estudo. Foram removidos 2 trabalhos, por não contarem com o texto completo disponível. Finalmente, 62 foram removidos por não abordarem o tema proposto nesta pesquisa, culminando em 225 trabalhos incluídos nesta revisão (Figura 2).

**Figura 2** - Fluxograma de processamento dos trabalhos.



Fonte: Elaboração própria

Os artigos incluídos e os excluídos foram organizados nas Tabelas 1 e 2, respectivamente, que detalham autor(es), título do artigo, periódico e para os excluídos há ainda o critério de exclusão usado.

**Tabela 1** - Artigos incluídos na revisão.

| <b>Autor(es)</b>                                          | <b>Título do artigo</b>                                                                      | <b>Periódico</b>                         |
|-----------------------------------------------------------|----------------------------------------------------------------------------------------------|------------------------------------------|
| ABDELHADY, Mohamed et al.                                 | Acute flaccid myelitis in COVID-19.                                                          | BJR case reports                         |
| ABDULKADIR, T. U. N. Ç. et al.                            | Coexistence of COVID-19 and acute ischemic stroke report of four cases.                      | Journal of Clinical Neuroscience         |
| ABEL, Dori et al.                                         | Encephalopathy and bilateral thalamic lesions in a child with MIS-C associated with [...]    | Neurology                                |
| ABOLMAALI, Meysam et al.                                  | Guillain-Barré syndrome as a parainfectious manifestation of SARS-CoV-2 infection: [...]     | Journal of Clinical Neuroscience         |
| ABRAMS, Rory et al.                                       | Severe rapidly progressive Guillain-Barré syndrome in the setting of acute COVID-19 [...]    | Journal of neurovirology                 |
| AFSHAR, Hale et al.                                       | Evolution and resolution of brain involvement associated with SARS-CoV2 infection: a [...]   | Multiple sclerosis and related disorders |
| AGARWAL, Amit et al.                                      | Neurological emergencies associated with COVID-19: stroke and beyond.                        | Emergency radiology                      |
| AGARWAL, Nivedita et al.                                  | Unusual lesion in the splenium of the corpus callosum and coronavirus infectious [...]       | BJR case reports                         |
| AGOSTI, Edoardo et al.                                    | Is Guillain-Barré syndrome triggered by SARS-CoV-2? Case report and literature review.       | Neurological Sciences                    |
| ÁGUILA-GORDO, Daniel et al.                               | Acute myelitis and SARS-CoV-2 infection. A new etiology of myelitis?.                        | Journal of Clinical Neuroscience         |
| AL MAZROUEI, Safaa Saeed et al.                           | COVID-19-associated encephalopathy: neurological manifestation of COVID-19.                  | Radiology Case Reports                   |
| ALKETBI, Reem et al.                                      | Acute myelitis as a neurological complication of Covid-19: a case report and MRI findings.   | Radiology case reports                   |
| ÁLVAREZ MORENO, Yadira et al.                             | Internal carotid artery thrombosis in COVID 19.                                              | Colombia Médica                          |
| AMEER, Nasir; SHEKHDA, Kalyan Mansukhbhai; CHEESMAN, Ann. | Guillain-Barré syndrome presenting with COVID-19 infection.                                  | BMJ Case Reports CP                      |
| ANAND, Pria et al.                                        | Posterior reversible encephalopathy syndrome in patients with coronavirus disease 2019 [...] | J of Stroke and Cerebrovascular Diseases |
| ANKLESARIA, Zafia et al.                                  | Fatal rhabdomyolysis in a COVID-19 patient on rosuvastatin.                                  | Cureus                                   |
| ASHRAF, Muddasir; SAJED, Sulaiman.                        | Seizures related to coronavirus disease (COVID-19): case series and literature review.       | Cureus                                   |

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|--------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|
| ASHRAF, Muddasir; SAJED, Sulaiman.                     | Acute stroke in a young patient with coronavirus disease 2019 in the presence of patent foramen ovale.                     | Cureus                                         |
| ATAKLA, Hugues Ghislain et al.                         | Acute Guillain-Barré polyradiculoneuritis indicative of COVID-19 infection: a case report.                                 | The Pan African Medical Journal                |
| ATAKLA, Hugues Ghislain et al.                         | Cerebrovascular accidents indicative of COVID-19 infection: about 4 observations in [...]                                  | The Pan African Medical Journal                |
| AVULA, Akshay et al.                                   | Locked-in with COVID-19.                                                                                                   | Journal of Clinical Neuroscience               |
| BAGNATO, Sergio et al.                                 | Critical illness myopathy after COVID-19.                                                                                  | International journal of infectious diseases   |
| BARRETO-ACEVEDO, Elliot et al.                         | Encefalitis aguda en pacientes COVID-19: primer reporte de casos en Perú.                                                  | Revista de Neuro-Psiquiatría                   |
| BARRIOS-LÓPEZ, J. M. et al.                            | Ischaemic stroke and SARS-CoV-2 infection: a causal or incidental association?.                                            | Neurología                                     |
| BEACH, Scott R. et al.                                 | Delirium in COVID-19: a case series and exploration of potential mechanisms for [...]                                      | General hospital psychiatry                    |
| BEKTAŞ, Gonca et al.                                   | Reversible splenial lesion syndrome associated with SARS-CoV-2 infection in two children.                                  | Brain and Development                          |
| BENAMEUR, Karima et al.                                | Encephalopathy and encephalitis associated with cerebrospinal fluid cytokine [...]                                         | Emerging infectious diseases                   |
| BHATTA, Sabita et al.                                  | New-onset seizure as the only presentation in a child with COVID-19.                                                       | Cureus                                         |
| BODRO, Marta et al.                                    | Increased CSF levels of IL-1 $\beta$ , IL-6, and ACE in SARS-CoV-2-associated encephalitis.                                | Neurol Neuroimmunol Neuroinflamm               |
| BONARDEL, Claire et al.                                | Bilateral posterior cerebral artery territory infarction in a SARS-Cov-2 infected patient: [...]                           | J of Stroke and Cerebrovascular Diseases       |
| BRUN, Gilles et al.                                    | COVID-19—white matter and globus pallidum lesions: demyelination or small-vessel [...]                                     | Neurology-Neuroimmunology<br>Neuroinflammation |
| BUESO, T. et al.                                       | Guillain-Barre syndrome and COVID-19: a case report.                                                                       | Clinical Neurology and Neurosurgery            |
| BUREAU, Britta L. et al.                               | Peripheral neuropathy as a complication of SARS-Cov-2                                                                      | Cureus                                         |
| BURKERT, Julia; PATIL, Shashank.                       | Acute cerebrovascular event in a COVID-19 positive patient immediately after [...]                                         | BMJ Case Reports CP                            |
| BURR, Tyler et al.                                     | N-methyl-d-aspartate receptor encephalitis associated with COVID-19 infection in a [...]                                   | Pediatric Neurology                            |
| CAAMAÑO, David Salomón Juliao;<br>BEATO, Rubén Alonso. | Facial diplegia, a possible atypical variant of Guillain-Barré Syndrome as a rare neurological complication of SARS-CoV-2. | Journal of Clinical Neuroscience               |

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|----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|----------------------------------------------|
| CANHAM, L. J. W. et al.                                  | Electroencephalographic (EEG) features of encephalopathy in the setting of Covid-19: [...]                           | Clinical neurophysiology practice            |
| CEZAR-JUNIOR, Auricelio Batista et al.                   | Subarachnoid hemorrhage and COVID-19: Association or coincidence?.                                                   | Medicine                                     |
| CHAKRABORTY, Nilanchal; KUMAR, Hrishikesh.               | Intravenous Immunoglobulin May Reverse Multisystem Inflammation in COVID-19 Pneumonitis and Guillain–Barré Syndrome. | Indian Journal of Critical Care Medicine     |
| CHAKRABORTY, Uddalak et al.                              | COVID-19–associated acute transverse myelitis: a rare entity.                                                        | BMJ Case Reports CP                          |
| CHIA, Kai Xin; POLAKHARE, Sonali; BRUNO, Stefania Dafne. | Possible affective cognitive cerebellar syndrome in a young patient with COVID-19 CNS vasculopathy and stroke.       | BMJ Case Reports CP                          |
| COLONNA, Stefano et al.                                  | Case report: Postacute rehabilitation of Guillain-Barré syndrome and cerebral [...]                                  | Frontiers in neurology                       |
| COTELLI, Maria Sofia et al.                              | Effortful speech with distortion of prosody following SARS-CoV-2 infection.                                          | Neurological Sciences                        |
| DAIA, Cristina et al.                                    | Nerve conduction study and electromyography findings in patients recovering from [...]                               | International Journal of Infectious Diseases |
| DAKAY, Katarina et al.                                   | Cerebral herniation secondary to stroke-associated hemorrhagic transformation, [...]                                 | J of Stroke and Cerebrovascular Diseases     |
| DE MIRANDA HENRIQUES-SOUZA, Adélia Maria et al.          | Acute disseminated encephalomyelitis in a COVID-19 pediatric patient.                                                | Neuroradiology                               |
| DE SOUSA, Gustavo Celeira et al.                         | Vasculitis-related stroke in young as a presenting feature of novel coronavirus disease [...]                        | Journal of Clinical Neuroscience             |
| DE STEFANO, Pia et al.                                   | Focal EEG changes indicating critical illness associated cerebral microbleeds in a [...]                             | Clinical neurophysiology practice            |
| DELIWALA, Smit et al.                                    | Encephalopathy as the sentinel sign of a cortical stroke in a patient infected with [...]                            | Cureus                                       |
| DELORME, Cécile et al.                                   | COVID-19-related encephalopathy: a case series with brain FDG-positron-emission [...]                                | European journal of neurology                |
| DEMIR, Gürkan et al                                      | Fahr’s syndrome presenting with seizures in SARS-CoV-2 (COVID-19) pneumonia [...]                                    | Neurological Sciences                        |
| DHARSANDIYA, Mitkumar et al.                             | SARS-CoV-2 viral sepsis with meningoencephalitis.                                                                    | Indian J Med Microbiol                       |
| DIEZ-PORRAS, Laura et al.                                | Guillain-Barré-Strohl syndrome and COVID-19: case report and literature review.                                      | Neuromuscular Disorders                      |
| DIJKSTRA, Femke et al.                                   | Myoclonus and cerebellar ataxia following COVID-19.                                                                  | Movement disorders clinical practice         |

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| DIXON, Luke et al.                | COVID-19-related acute necrotizing encephalopathy with brain stem involvement in a [...]       | Neurology-Neuroimmunology<br>Neuroinflammation |
| DOGAN, Lerzan et al.              | Plasmapheresis treatment in COVID-19–related autoimmune meningoencephalitis: [...]             | Brain, behavior, and immunity                  |
| DOMINGUES, Renan Barros et al.    | First case of SARS-COV-2 sequencing in cerebrospinal fluid of a patient with [...]             | Journal of neurology                           |
| DONO, Fedele et al.               | New-onset refractory status epilepticus (NORSE) in post SARS-CoV-2 autoimmune [...]            | Neurological Sciences                          |
| DOO, Florence X. et al.           | Rare presentations of COVID-19: PRES-like leukoencephalopathy and carotid thrombosis.          | Clinical imaging                               |
| EFE, Ibrahim E. et al.            | COVID-19– associated encephalitis mimicking glial tumor.                                       | World neurosurgery                             |
| EL NAHAS, Nevine et al.           | A case series of ischemic stroke with coronavirus disease 2019 in two Egyptian centers.        | Egypt J Neurol, Psychiatr Neurosurg            |
| EL-ZEIN, Rayan S. et al.          | COVID-19-associated meningoencephalitis treated with intravenous immunoglobulin.               | BMJ Case Reports CP                            |
| ELGAMASY, Sara et al.             | First case of focal epilepsy associated with SARS-coronavirus-2.                               | Journal of medical virology                    |
| ELKHOULY, Ahmed; KAPLAN, Adam C.  | Noteworthy neurological manifestations associated with COVID-19 infection.                     | Cureus                                         |
| ESPINOSA, Patricio S. et al.      | Neurological complications of coronavirus disease (COVID-19): encephalopathy, MRI [...]        | Cureus                                         |
| ETEMADIFAR, Masoud et al.         | Fulminant encephalitis as a sole manifestation of COVID-19.                                    | Neurological Sciences                          |
| FADAKAR, Nima et al.              | A first case of acute cerebellitis associated with coronavirus disease (COVID-19): a [...]     | The Cerebellum                                 |
| FAQIHI, Fahad et al.              | Peripheral neuropathy in severe COVID-19 resolved with therapeutic plasma exchange.            | Clinical Case Reports                          |
| FARHADIAN, Shelli et al.          | Acute encephalopathy with elevated CSF inflammatory markers as the initial [...]               | BMC neurology                                  |
| FARLEY, Madison; ZUBERI, Jamshed. | COVID-19 precipitating status epilepticus in a pediatric patient.                              | The American Journal of Case Reports           |
| FAROOQUE, Umar et al.             | Coronavirus disease 2019-related acute ischemic stroke: a case report.                         | Cureus                                         |
| FERRARIS, Luciano E. et al.       | Mesenteric artery thrombosis, microvascular intestinal Endotheliitis, and Guillain-Barré [...] | Cureus                                         |
| FILATOV, Asia et al.              | Neurological complications of coronavirus disease (COVID-19): encephalopathy.                  | Cureus                                         |

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| FLORES, Gabriel et al.                                | Spontaneous brainstem hemorrhagic stroke in the setting of novel coronavirus disease [...]                            | Cureus                                   |
| FRAIMAN, Pedro et al.                                 | Hemorrhagic stroke and COVID-19 infection: coincidence or causality?.                                                 | Eneurologicalsci                         |
| FRANCESCHI, Ana M. et al.                             | Hemorrhagic posterior reversible encephalopathy syndrome as a manifestation of [...]                                  | American Journal of Neuroradiology       |
| FREIRE-ÁLVAREZ, Eric et al.                           | COVID-19-associated encephalitis successfully treated with combination therapy.                                       | Clinical infection in practice           |
| FUMERY, Thibault et al.                               | Longitudinally extensive transverse myelitis following acute COVID-19 infection.                                      | Multiple sclerosis and related disorders |
| GALE, Aislinn; SABARETNAM, Suganya; LEWINSOHN, Asher. | Guillain-Barré syndrome and COVID-19: association or coincidence.                                                     | BMJ Case Reports CP                      |
| GANTI, Latha; SERRANO, Enrique; TOKLU, Hale Z.        | Can Neuron Specific Enolase Be a Diagnostic Biomarker for Neuronal Injury in [...]                                    | Cureus                                   |
| GARCÍA-HOWARD, Marcos et al.                          | Case report: benign infantile seizures temporally associated with COVID-19.                                           | Frontiers in pediatrics                  |
| GHIASVAND, Fereshteh et al.                           | Symmetrical polyneuropathy in coronavirus disease 2019 (COVID-19).                                                    | IDCases                                  |
| GHOSH, Ritwik et al.                                  | Autonomic dysfunction heralding acute motor axonal neuropathy in COVID-19.                                            | Journal of neurovirology                 |
| GHOSH, Ritwik et al.                                  | SARS-CoV-2-associated acute hemorrhagic, necrotizing encephalitis (AHNE) [...]                                        | The American journal of case reports     |
| GIGLI, Gian Luigi et al.                              | HLA and immunological features of SARS-CoV-2-induced Guillain-Barré syndrome.                                         | Neurological Sciences                    |
| GOGIA, Bhanu; FANG, Xiang; RAI, Prashant.             | Intracranial hemorrhage in a patient with COVID-19: possible explanations and considerations.                         | Cureus                                   |
| GOLDBERG, Michael F. et al.                           | Cerebrovascular disease in COVID-19.                                                                                  | American Journal of Neuroradiology       |
| GRIMALDI, Stephan et al.                              | Autoimmune encephalitis concomitant with SARS-CoV-2 infection: insight from [...]                                     | Journal of Nuclear Medicine              |
| GUPTA, Nidhi Azad; LIEN, Conway; IV, Michael.         | Critical illness-associated cerebral microbleeds in severe COVID-19 infection.                                        | Clinical Imaging                         |
| HADDAD, S. et al.                                     | Encephalopathy and seizure activity in a COVID-19 well controlled HIV patient.                                        | IDCases                                  |
| HADDADI, Kaveh; GHASEMIAN, Roya; SHAFIZAD, Misagh.    | Basal ganglia involvement and altered mental status: a unique neurological manifestation of coronavirus disease 2019. | Cureus                                   |

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|-------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|--------------------------------------|
| HAFIZI, Fatima; KHERANI, Saleema; SHAMS, Madeeha.                             | Meningoencephalitis from SARS-CoV-2 infection.                                          | IDCases                              |
| HAIDER, Asim et al.                                                           | COVID-19 and the brain: acute encephalitis as a clinical manifestation.                 | Cureus                               |
| HALLAL-PECHE, Fadi et al.                                                     | Utility and prognosis value of the electroencephalogram in COVID-19 and [...]           | Revista de Neurologia                |
| HAMIDI, Ava et al.                                                            | A case of Covid-19 respiratory illness with subsequent seizure and hemiparesis.         | Galen Medical Journal                |
| HANAFI, R. et al.                                                             | COVID-19 neurologic complication with CNS vasculitis-like pattern.                      | American Journal of Neuroradiology   |
| HAROON, Khawaja Hassan et al.                                                 | COVID-19 related cerebrovascular thromboembolic complications in three young patients.  | Case Reports in Neurology            |
| HAYAT, Umar et al.                                                            | Encephalopathy as the presenting symptom of COVID-19.                                   | Kansas journal of medicine           |
| HIRAYAMA, Takehisa et al.                                                     | Guillain-Barré syndrome after COVID-19 in Japan.                                        | BMJ Case Reports CP                  |
| HUSSAIN, Suhail et al.                                                        | A Case of Coronavirus Disease 2019 presenting with seizures secondary to cerebral [...] | Case Reports in Neurology            |
| HUSSEIN, Haitham M.                                                           | Transient global amnesia as a possible first manifestation of COVID-19.                 | The Neurohospitalist                 |
| HUTCHINS, Katherine L. et al.                                                 | COVID-19–associated bifacial weakness with paresthesia subtype of Guillain-Barré [...]  | American Journal of Neuroradiology   |
| HWANG, Sean T. et al.                                                         | Acute seizures occurring in association with SARS-CoV-2.                                | Frontiers in Neurology               |
| JAVIDARABSHAHI, Zahra et al.                                                  | Thrombotic events in COVID-19 patients: a case series and literature review.            | Caspian Journal of Internal Medicine |
| JENAB, Yaser et al.                                                           | Occurrence of acute coronary syndrome, pulmonary thromboembolism, and [...]             | Clinical case reports                |
| JUDGE, Casey et al.                                                           | Facial diplegia as a rare late neurologic manifestation of SARS-CoV-2 infection.        | Journal of Neurology Research        |
| KADONO, Yoshinori et al.                                                      | A case of COVID-19 infection presenting with a seizure following severe brain edema.    | Seizure-European Journal of Epilepsy |
| KAKADIA, Bhavika et al.                                                       | Mild encephalopathy with reversible splenium lesion (MERS) in a patient with COVID-19.  | Journal of Clinical Neuroscience     |
| KAMAL, Yasmine Mohamed; ABDELMAJID, Yasmin; AL MADANI, Abubaker Abdul Rahman. | Cerebrospinal fluid confirmed COVID-19-associated encephalitis treated successfully.    | BMJ Case Reports CP                  |
| KARVIGH, Sanaz Ahmadi et al.                                                  | Ischemic stroke in patients with COVID-19 disease: a report of 10 cases from Iran.      | Cerebrovascular Diseases             |

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|----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|------------------------------------------------|
| KHAIR, Abdulhafeez M. et al.                             | Convulsive status epilepticus in a child with controlled epilepsy and concurrent [...]                          | Clinical Medicine Insights: Case Reports       |
| KHAJA, Misbahuddin et al.                                | A 44-year-old hispanic man with loss of taste and bilateral facial weakness diagnosed [...]                     | The American journal of case reports           |
| KHALIFA, Maher et al.                                    | Guillain-Barré syndrome associated with severe acute respiratory syndrome [...]                                 | J of the Pediatric Infectious Diseases Society |
| KHAN, Zohaib et al.                                      | A 30-year-old male with COVID-19 presenting with seizures and leukoencephalopathy.                              | SAGE Open Medical Case Reports                 |
| KHEDR, Eman M.; KARIM, Ahmed A.; SOLIMAN, Radwa K.       | Case report: acute spinal cord myelopathy in patients with COVID-19.                                            | Frontiers in Neurology                         |
| KILINC, Duygu et al.                                     | Guillain-Barré syndrome after SARS-CoV-2 infection.                                                             | European journal of neurology                  |
| KLEIN, David E. et al.                                   | Cerebral venous thrombosis: atypical presentation of COVID-19 in the young.                                     | J of Stroke and Cerebrovascular Diseases       |
| KOHLI, Anoop et al.                                      | Changes in stroke presentation in neo-Covid patients: A case study.                                             | Interdisciplinary Neurosurgery                 |
| KONG, Zhaohong et al.                                    | 2019 novel coronavirus pneumonia with onset of dizziness: a case report.                                        | Annals of Translational Medicine               |
| KOREM, Sindhuja; GANDHI, Haresh; DAYAG, Decerie Baculi.  | Guillain-Barré syndrome associated with COVID-19 disease.                                                       | BMJ Case Reports CP                            |
| KRZYSTANEK, Ewa; GAWRYLUK, Justyna; ARKUSZEWSKI, Michal. | Fatal intracranial haemorrhage in a hypertensive patient with atrial fibrillation and coronavirus disease 2019. | The Neuroradiology Journal                     |
| KUMAR, Neeraj et al.                                     | Acute necrotizing encephalitis as a probable association of covid-19.                                           | Indian Journal of Critical Care Medicine       |
| LANDA, N. Azpaiazu et al.                                | Ischemic-hemorrhagic stroke in patients with Covid-19.                                                          | Rev Española de Anestesiología y Reanimación   |
| LASCANO, Agustina M. et al.                              | SARS-CoV-2 and Guillain-Barré syndrome: AIDP variant with a favourable outcome.                                 | European journal of neurology                  |
| LIN, J. et al.                                           | Cytotoxic lesion of the corpus callosum in an adolescent with multisystem[...]                                  | American Journal of Neuroradiology             |
| LOWERY, Megan M. et al.                                  | Atypical variant of Guillain Barre syndrome in a patient with COVID-19.                                         | The Journal of Critical Care Medicine          |
| LU, Shaojia et al.                                       | First report of manic-like symptoms in a COVID-19 patient with no previous history of [...]                     | Journal of affective disorders                 |
| MALAYALA, Srikrishna V.; RAZA, Ambreen.                  | A case of COVID-19-induced vestibular neuritis.                                                                 | Cureus                                         |

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| MALEKMOHAMMAD, Majid et al.                           | Neurological Manifestations of COVID-19: A Case Report.                                     | Tanaffos                                      |
| MANGANOTTI, Paolo et al.                              | Clinical neurophysiology and cerebrospinal liquor analysis to detect Guillain-Barré [...]   | Journal of medical virology                   |
| MANJI, Hussein Karim et al.                           | Guillain-Barré syndrome associated with COVID-19 infection.                                 | The Pan African Medical Journal               |
| MCDONNELL, Erin P. et al.                             | COVID-19 as a trigger of recurrent Guillain-Barré syndrome.                                 | Pathogens                                     |
| MEEGADA, Sreenath et al.                              | Coronavirus disease 2019-induced rhabdomyolysis.                                            | Cureus                                        |
| MEHRA, Bharat et al.                                  | COVID-19-associated severe multisystem inflammatory syndrome in children with [...]         | Indian Journal of Critical Care Medicine      |
| MIRZAEI, Seyed Mohammad<br>Mousavi et al.             | Focal cerebral arteriopathy in a pediatric patient with COVID-19.                           | Radiology                                     |
| MONTAUT, Victor et al.                                | Corticosteroid Responsive Encephalopathy: Prolonged Coma in Patients Late in the [...]      | Critical Care Explorations                    |
| MONTI, Giulia et al.                                  | Anti-NMDA receptor encephalitis presenting as new onset refractory status epilepticus [...] | Seizure-European Journal of Epilepsy          |
| MOORE, Lisa; GHANNAM, Malik;<br>MANOUSAKIS, Georgios. | A first presentation of multiple sclerosis with concurrent COVID-19 infection.              | Eneurologicalsci                              |
| MORASSI, Mauro et al.                                 | Stroke in patients with SARS-CoV-2 infection: case series.                                  | Journal of neurology                          |
| MORIGUCHI, Takeshi et al.                             | A first case of meningitis/encephalitis associated with SARS-Coronavirus-2                  | International journal of infectious diseases  |
| MORRISON, Nathan et al.                               | Stuttering and Word-Finding Difficulties in a Patient With COVID-19 Presenting to the [...] | Cureus                                        |
| MUCCIOLI, Lorenzo et al.                              | COVID-19-related encephalopathy presenting with aphasia resolving following [...]           | Journal of neuroimmunology                    |
| MURCHISON, Ann P. et al.                              | Monocular visual loss as the presenting symptom of COVID-19 infection.                      | Clinical Neurology and Neurosurgery           |
| NANDA, Satyan et al.                                  | Covid-19 associated Guillain-Barre Syndrome: contrasting tale of four patients from a [...] | The American journal of emergency<br>medicine |
| NASER MOGHADASI, Abdorreza.                           | Encephalopathy associated with COVID-19 in a patient with multiple sclerosis.               | Journal of neurovirology                      |
| NATARAJAN, Suresh et al.                              | SARS-CoV-2 encephalitis in an adolescent girl.                                              | Indian Pediatrics                             |
| NATEGHIAN, Alireza; ANVARI,                           | Partial seizure due to COVID19 infection in an infant.                                      | Iranian Journal of Child Neurology            |

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| Saeed.                                            |                                                                                                                                 |                                                            |
| NAZ, Sidra et al.                                 | Meningitis as an initial presentation of COVID-19: a case report.                                                               | Frontiers in public health                                 |
| OTTAVIANI, Donatella et al.                       | Early Guillain-Barré syndrome in coronavirus disease 2019 (COVID-19): a case report [...]                                       | Neurological sciences                                      |
| PALAO, M. et al.                                  | Multiple sclerosis following SARS-CoV-2 infection.                                                                              | Multiple sclerosis and related disorders                   |
| PATEL, Hiren N. et al.                            | Cerebellar infarction requiring surgical decompression in patient with COVID 19 [...]                                           | Interdisciplinary Neurosurgery                             |
| PAYBAST, Sepideh; GORJI, Reza; MAVANDADI, Shirin. | Guillain-Barré syndrome as a neurological complication of novel COVID-19 infection: a case report and review of the literature. | The neurologist                                            |
| PELEA, Teodor et al.                              | SARS-CoV-2 associated Guillain-Barré syndrome.                                                                                  | Journal of neurology                                       |
| PENSATO, Umberto et al.                           | Encephalopathy in COVID-19 presenting with acute aphasia mimicking stroke.                                                      | Frontiers in neurology                                     |
| PÉREZ, V. López et al.                            | Postpartum consciousness disturbance: can covid-19 cause posterior reversible [...]                                             | Rev Española de Anestesiología y Reanimación               |
| PIRAU, Letitia et al.                             | Case Series: Evidence of Borderzone Ischemia in Critically-Ill COVID-19 Patients [...]                                          | Frontiers in Neurology                                     |
| POVLOW, Adriana; AUERBACH, Andrew J.              | Acute cerebellar ataxia in COVID-19 infection: a case report.                                                                   | The Journal of Emergency Medicine                          |
| POYIADJI, Neo et al.                              | COVID-19-associated acute hemorrhagic necrotizing encephalopathy: imaging features.                                             | Radiology                                                  |
| PRASAD, Apoorv et al.                             | Multiple embolic stroke on magnetic resonance imaging of the brain in a COVID-19 [...]                                          | Clinical Imaging                                           |
| PRINCIOTTA CARIDDI, Lucia et al.                  | Reversible encephalopathy syndrome (PRES) in a COVID-19 patient.                                                                | Journal of Neurology                                       |
| RADMANESH, Farid et al.                           | Severe cerebral involvement in adult-onset hemophagocytic lymphohistiocytosis.                                                  | Journal of Clinical Neuroscience                           |
| RADNIS, Caitlin et al.                            | Radiographic and clinical neurologic manifestations of COVID-19 related hypoxemia.                                              | Journal of the neurological sciences                       |
| RAJDEV, Kartikeya et al.                          | A case of Guillain-Barré syndrome associated with COVID-19.                                                                     | Journal of investigative medicine high impact case reports |
| RANA, Sandeep et al.                              | Novel coronavirus (COVID-19)-associated Guillain-Barré Syndrome: case report.                                                   | Journal of clinical neuromuscular disease                  |
| RASCÓN-RAMÍREZ, Fernando J. et                    | Supra and infratentorial massive strokes in previously healthy young patients with                                              | Neurocirugía                                               |

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|--------------------------------------------|--------------------------------------------------------------------------------------------------|-------------------------------------------|
| al.                                        | SARS-CoV-2. The role of neurosurgery.                                                            |                                           |
| RAY, Amanda.                               | Miller Fisher syndrome and COVID-19: is there a link?.                                           | BMJ Case Reports CP                       |
| REBEIZ, Tania et al.                       | Behavioral changes without respiratory symptoms as a presenting sign of COVID-19 [...]           | Cureus                                    |
| REDDY, Sujan T. et al.                     | Cerebrovascular disease in patients with COVID-19: a review of the literature and case [...]     | Case reports in neurology                 |
| REICHARD, R. Ross et al.                   | Neuropathology of COVID-19: a spectrum of vascular and acute disseminated [...]                  | Acta neuropathologica                     |
| REIN, Netaniel et al.                      | Description of 3 patients with myasthenia gravis and COVID-19.                                   | Journal of the Neurological Sciences      |
| REMING, Katie et al.                       | Late-onset encephalopathy associated with SARS-CoV-2 infection.                                  | Journal of Neurology Research             |
| REYES-BUENO, José Antonio et al.           | Miller-Fisher syndrome after SARS-CoV-2 infection.                                               | European journal of neurology             |
| RODRÍGUEZ-PORTILLA, Ricardo Enrique et al. | Taponamiento cardiaco y hemorragia intracerebral en un niño con la Covid-19: Reporte de un caso. | Revista de la Facultad de Medicina Humana |
| ROGG, Jeffrey; BAKER, Amanda; TUNG, Glenn. | Posterior reversible encephalopathy syndrome (PRES): another imaging manifestation of COVID-19.  | Interdisciplinary Neurosurgery            |
| ROSATO, Chiara et al.                      | Clinical, electromyographical, histopathological characteristics of COVID-19 related [...]       | SAGE Open Medical Case Reports            |
| SAEED, Amir; SHORAF, Eslam.                | Status epilepticus as a first presentation of COVID-19 infection in a 3 years old boy; [...]     | IDCases                                   |
| SAGGESE, Carlo Emanuele et al.             | COVID-19 and stroke: casual or causal role?.                                                     | Cerebrovascular Diseases                  |
| SAITTA, Laura et al.                       | Brain microvascular occlusive disorder in COVID-19: a case report.                               | Neurological Sciences                     |
| SANCHO-SALDAÑA, Agustín et al.             | Guillain-Barré syndrome associated with leptomeningeal enhancement following [...]               | Clinical Medicine                         |
| SANGARE, Aude et al.                       | Neuroprognostication of consciousness recovery in a patient with COVID-19 related [...]          | Brain sciences                            |
| SARTORETTI, Elisabeth et al.               | Long-segment arterial cerebral vessel thrombosis after mild COVID-19.                            | BMJ Case Reports CP                       |
| SATTAR, Saud Bin Abdul et al.              | Locked-in syndrome in a young patient due to SARS-CoV-2: a case report.                          | Frontiers in Medicine                     |
| SATTAR, Saud Bin Abdul et al.              | Clinical, radiological, and molecular findings of acute encephalitis in a COVID-19 [...]         | Cureus                                    |

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|---------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|------------------------------------------------|
| SATTLER, Ross; EKANAYAKE, Lakmal S.; RICHARDSON, Amber. | A Rare Presentation of Cerebrovascular Accident in a COVID-19 Patient: A Case Report.                        | Cureus                                         |
| SCHEIDL, Erika et al.                                   | Guillain-Barré syndrome during SARS-CoV-2 pandemic: A case report and review of [...]                        | Journal of the Peripheral Nervous System       |
| SCHELLEKENS, Mijntje MI et al.                          | Reversible myoclonus-ataxia as a postinfectious manifestation of COVID-19.                                   | Movement disorders clinical practice           |
| SEDAGHAT, Zahra; KARIMI, Narges                         | Guillain Barre syndrome associated with COVID-19 infection: A case report                                    | Journal of Clinical Neuroscience               |
| SELVARAJ, Vijairam et al.                               | Acute vision loss in a patient with COVID-19.                                                                | R I Med J                                      |
| SENEL, Makbule et al.                                   | Miller-Fisher syndrome after COVID-19: neurochemical markers as an early sign of [...]                       | European journal of neurology                  |
| SETH, Vaibhav; KUSHWAHA, Suman.                         | Headache Due to COVID-19: A Disabling Combination.                                                           | Headache                                       |
| SHAWKAT, Ahmed et al.                                   | Multiple thrombotic events in a 67-year-old man 2 weeks after testing positive for [...]                     | The American journal of case reports           |
| SHER, Yelizaveta et al.                                 | COVID-19–associated hyperactive intensive care unit delirium with proposed [...]                             | Psychosomatics                                 |
| SHOSKES, Aaron et al.                                   | Cerebral microhemorrhage and purpuric rash in COVID-19: the case for a secondary [...]                       | Journal of Stroke and Cerebrovascular Diseases |
| SHOUKRY, Andrew; KITE, Thomas A.                        | Large-vessel thrombotic stroke despite concurrent therapeutic anticoagulation in COVID-19-positive patient.  | Oxford Medical Case Reports                    |
| SIA, Jacky.                                             | Dizziness can be an early sole clinical manifestation for COVID-19 infection: a case report.                 | J Am Coll of Emergency Physicians Open         |
| SIROUS, Reza et al.                                     | COVID-19-associated encephalopathy with fulminant cerebral vasoconstriction: CT [...]                        | Radiology Case Reports                         |
| SOHAL, Sandeep; MANSUR, Mossammat.                      | COVID-19 presenting with seizures.                                                                           | IDCases                                        |
| SOKOLOV, Elisaveta et al.                               | Non-convulsive status epilepticus: COVID-19 or clozapine induced?.                                           | BMJ Case Reports CP                            |
| SOLDATELLI, Matheus Dorigatti et al.                    | Neurovascular and perfusion imaging findings in coronavirus disease 2019: Case report and literature review. | The Neuroradiology Journal                     |
| SOLIMAN, Steven B. et al.                               | Peripheral polyneuropathy associated with COVID-19 in two patients: A [...]                                  | Journal of medical ultrasound                  |

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| SPARR, Steven A.; BIERI, Phyllis L.                   | Infarction of the splenium of the corpus callosum in the age of COVID-19: a snapshot [...]                     | Stroke                                         |
| SRIPADMA, P. V.; RAI, Ashish; WADHWA, Chetan.         | Postpartum atypical posterior reversible encephalopathy syndrome in a COVID-19 patient—an obstetric emergency. | Journal of Stroke and Cerebrovascular Diseases |
| SRIWASTAVA, Shitiz et al.                             | New onset of ocular myasthenia gravis in a patient with COVID-19: a novel case report [...]                    | Journal of neurology                           |
| TIET, May Yung; ALSHAIKH, Nazar.                      | Guillain-Barré syndrome associated with COVID-19 infection: a case from the UK.                                | BMJ Case Reports CP                            |
| URCIUOLI, Luigi; GUERRIERO, Elvira; MUSTO, Lanfranco. | Acute Ischemic Hemorrhagic Stroke in Two COVID-19 patients.                                                    | J. infect. Dis                                 |
| VAN DEN ENDEN, Antoon JM et al.                       | Fulminant cerebral edema as a lethal manifestation of COVID-19.                                                | Radiology case reports                         |
| VARGAS-GANDICA, Jair et al.                           | Ageusia and anosmia, a common sign of COVID-19? A case series from four countries.                             | Journal of neurovirology                       |
| VASCHETTO, Rosanna et al.                             | Cerebral nervous system vasculitis in a Covid-19 patient with pneumonia.                                       | Journal of clinical neuroscience               |
| VIRANI, Ahmed et al.                                  | Guillain-Barré syndrome associated with SARS-CoV-2 infection.                                                  | IDCases                                        |
| VIRHAMMAR, Johan et al.                               | Acute necrotizing encephalopathy with SARS-CoV-2 RNA confirmed in cerebrospinal [...]                          | Neurology                                      |
| VOLLONO, Catello et al.                               | Focal status epilepticus as unique clinical feature of COVID-19: a case report.                                | Seizure                                        |
| WADA, Shinichi et al.                                 | Neurological disorders identified during treatment of a SARS-CoV-2 infection.                                  | Internal Medicine                              |
| WANG, Maomao et al.                                   | Coronavirus disease 2019 associated with aggressive neurological and mental [...]                              | Medicine                                       |
| WEBB, Silas et al.                                    | Guillain-Barré syndrome following COVID-19: a newly emerging post-infectious [...]                             | BMJ Case Reports CP                            |
| WETTERVIK, Teodor Svedung et al.                      | Intracranial pressure dynamics and cerebral vasomotor reactivity in coronavirus disease [...]                  | Critical care explorations                     |
| WIJERATNE, Tissa et al.                               | Case report: posterior reversible leukoencephalopathy syndrome (PRES) as a [...]                               | Frontiers in Neurology                         |
| WOLDIE, Indryas L. et al.                             | Autoimmune hemolytic anemia in a 24-year-old patient with COVID-19 complicated [...]                           | Journal of Medical Cases                       |
| WRIGHT, Dominic et al.                                | Abnormal saccadic oscillations associated with severe acute respiratory syndrome [...]                         | Movement disorders clinical practice           |
| YAVARI, Fatemeh et al.                                | Demyelinating changes alike to multiple sclerosis: a case report of rare manifestations [...]                  | Case reports in neurological medicine          |

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| ZAHID, Muhammad J. et al. | Hemorrhagic stroke in setting of severe COVID-19 infection requiring Extracorporeal [...] | J of Stroke and Cerebrovascular Diseases |
| ZAYET, Souheil et al.     | Encephalopathy in patients with COVID-19:" Causality or coincidence?".                    | Journal of medical virology              |
| ZHANG, Qian et al.        | A rare presentation of coronavirus disease 2019 (COVID-19) induced viral myositis [...]   | Cureus                                   |
| ZHANG, Tianshu et al.     | COVID-19-Associated acute multi-infarct encephalopathy in an asymptomatic [...]           | Neurocritical care                       |
| ZITO, Antonio et al.      | COVID-19 and Guillain–Barré syndrome: a case report and review of literature.             | Frontiers in neurology                   |
| ZOMBORI, Luca et al.      | Severe cortical damage associated with COVID-19 case report.                              | Seizure                                  |

Fonte: Elaboração própria.

**Tabela 2** - Artigos excluídos da revisão, segundo critérios: Fuga ao tema, texto completo não disponível e tipo de literatura.

| Autor(es)                                                          | Título do Artigo                                                                                                                | Periódico                                                     | Exclusão |
|--------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|----------|
| ABDELNOUR, Loay;<br>ABDALLA, Mohammed<br>Eltahir; BABIKER, Saleem. | COVID 19 infection presenting as motor peripheral neuropathy.                                                                   | Journal of the Formosan Medical Association                   | Tipo     |
| ABDI, Siamak; GHORBANI, Askar; FATEHI, Farzad.                     | The association of SARS-CoV-2 infection and acute disseminated encephalomyelitis without prominent clinical pulmonary symptoms. | Journal of the neurological sciences                          | Tipo     |
| ABDOU, Hossam et al.                                               | A cautionary tale of an emergency cerebrovascular procedure in the [...]                                                        | Journal of Vascular Surgery Cases, Innovations and Techniques | Tema     |
| ABENZA-ABILDÚA, María José et al.                                  | Encephalopathy in severe SARS-CoV2 infection: Inflammatory or infectious?.                                                      | International Journal of Infectious Diseases                  | Tipo     |
| ABILDÚA, MJ Abenza et al.                                          | Myopathy associated with severe SARS-CoV-2 infection.                                                                           | Neurología                                                    | Tipo     |
| ABRAHAM, Roshini S. et al.                                         | Severe SARS-CoV-2 disease in the context of a NF- $\kappa$ B2 loss-of-function [...]                                            | J of Allergy and Clinical Immunology                          | Tema     |
| ADAMCZYK-SOWA, Monika et al.                                       | SARS-CoV-2/COVID-19 in multiple sclerosis patients receiving disease-modifying therapy.                                         | Clinical Neurology and Neurosurgery                           | Tema     |
| AL-MUFTI, Fawaz et al.                                             | Acute cerebrovascular disorders and vasculopathies associated with [...]                                                        | J of Stroke and Cerebrovascular Diseases                      | Tipo     |
| ALBERTI, Paola et al.                                              | Guillain-Barré syndrome related to COVID-19 infection.                                                                          | Neurol-Neuroimmunol & Neuroinflamm                            | Tipo     |
| ALKHATEEB, Mohammad H. et al.                                      | Bilateral foot-drop secondary to axonal neuropathy in a tuberculosis patient with co-infection of COVID-19: a case report.      | Cureus                                                        | Tema     |
| ANDRIUTA, Daniela et al.                                           | COVID-19 encephalopathy: detection of antibodies against SARS-CoV-2 in CSF.                                                     | Journal of neurology                                          | Tipo     |
| ARNAUD, Souraya et al.                                             | Post SARS-CoV-2 Guillain-Barré syndrome.                                                                                        | Clinical Neurophysiology                                      | Tipo     |
| ASSINI, Andrea et al.                                              | New clinical manifestation of COVID-19 related Guillain-Barré syndrome [...]                                                    | Neurological Sciences                                         | Tipo     |
| ATA, Fateen et al.                                                 | A 28-year-old man from India with SARS-Cov-2 and pulmonary tuberculosis [...]                                                   | The American journal of case reports                          | Tema     |
| ATAKLA, Hugues Ghislain et                                         | COVID-19 infection in known epileptic and non-epileptic children: what is the                                                   | The Pan African Medical Journal                               | Tema     |

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| al.                                                                   | place of chloroquine sulfate?(a case report).                                                                             |                                           |       |
| ATERE, Muhammed et al.                                                | COVID-19: The Case of Three Patients with the Same Diagnosis but Different Clinical and Laboratory Features.              | Case Reports in Medicine                  | Tema  |
| AVULA, Akshay et al.                                                  | COVID-19 presenting as stroke                                                                                             | Brain, behavior, and immunity             | Tipo  |
| AYATOLLAHI, Parisa;<br>TARAZI, Apameh;<br>WENNERBERG, Richard.        | Possible autoimmune encephalitis with claustrum sign in case of acute SARS-CoV-2 infection.                               | Canadian Journal of Neurological Sciences | Tipo  |
| BALESTRINO, R. et al.                                                 | Onset of Covid-19 with impaired consciousness and ataxia: a case report.                                                  | Journal of Neurology                      | Tipo  |
| BALLOY, Gaëlle et al.                                                 | Non-lesional status epilepticus in a patient with coronavirus disease 2019.                                               | Clinical Neurophysiology                  | Tipo  |
| BARRACHINA-ESTEVE, O.<br>et al.                                       | Guillain–Barré syndrome as the first manifestation of SARS-CoV-2 infection.                                               | Neurología                                | Tipo  |
| BATRA, Ayush et al.                                                   | Transcranial doppler ultrasound evidence of active cerebral embolization in [...]                                         | J of Stroke and Cerebrovascular Diseases  | Tipo  |
| BIGAUT, Kévin et al.                                                  | Guillain-Barré syndrome related to SARS-CoV-2 infection.                                                                  | Neurol-Neuroimmunol & Neuroinflamm        | Tipo  |
| BOLIG, Thomas C.;<br>ABDULAZIZ, Nada;<br>SCHIOPU, Elena.              | Complete recovery from COVID-19 bilateral pneumonia in an immunosuppressed man with immune-mediated necrotizing myopathy. | Case Reports in Rheumatology              | Tema  |
| BRACAGLIA, Martina et al.                                             | Acute inflammatory demyelinating polyneuritis in association with an [...]                                                | Journal of Neurology                      | Tipo  |
| BRAVO, G. Alvarez; I<br>TORRENTÀ, L. Ramió.                           | Anti-NMDA receptor encephalitis secondary to SARS-CoV-2 infection.                                                        | Neurología                                | Tipo  |
| Bulfamante, Gaetano et al.                                            | First ultrastructural autaptic findings of SARS -Cov-2 in olfactory pathways [...]                                        | Minerva anestesologica                    | Texto |
| BYRNE, Matthew; KLER,<br>Prabhjot; NAGESWAR<br>BANDLA, Timothy Scott. | Persevering With Prone Ventilation in Coronavirus Disease 2019 Pneumonia.                                                 | Critical Care Explorations                | Tema  |
| BYRNES, Sean et al.                                                   | COVID-19 encephalopathy masquerading as substance withdrawal.                                                             | Journal of Medical Virology               | Tipo  |
| CAMPANA, Pasquale et al.                                              | Can aldosterone increase interleukin-6 levels in Covid-19 pneumonia?.                                                     | Journal of Medical Virology               | Tema  |

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|--------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------|------|
| CANI, Ilaria et al.                                    | Frontal encephalopathy related to hyperinflammation in COVID-19.                  | Journal of neurology                           | Tipo |
| CANTERO, V. Romero et al.                              | COVID-19 and concomitant neurological infections.                                 | Neurología                                     | Tipo |
| CARAI, Andrea; LOCATELLI, Franco; MASTRONUZZI, Angela. | Delayed referral of pediatric brain tumors during COVID-19 pandemic.              | Neuro-oncology                                 | Tema |
| CAROTHERS, Chancey; BIRRER, Kara; VO, Mai.             | Acetylcysteine for the Treatment of Suspected Remdesivir-Associated Acute [...]   | Pharmacotherapy                                | Tema |
| CHACÓN-AGUILAR, Rocío et al.                           | COVID-19: fever syndrome and neurological symptoms in a neonate.                  | Anales de pediatria.                           | Tema |
| CHAI, Peter R. et al.                                  | Intentional hydroxychloroquine overdose treated with high-dose diazepam: an [...] | Journal of Medical Toxicology                  | Tema |
| CHAN, Jason L.; EBADI, Hamid; SARNA, Justyna R.        | Guillain-Barré syndrome with facial diplegia related to SARS-CoV-2 infection.     | Canadian Journal of Neurological Sciences      | Tipo |
| CHANG, Philip et al.                                   | A Post-Infectious Steroid-Responsive Brainstem Lesion Associated With [...]       | The Neurohospitalist                           | Tipo |
| CHAUMONT, H. et al.                                    | Mixed central and peripheral nervous system disorders in severe [...]             | Journal of Neurology                           | Tipo |
| CHIRAKKAL, Pramod et al.                               | COVID-19 and Tinnitus.                                                            | Ear, Nose & Throat Journal                     | Tema |
| CLINE, Trevor E.; SANGHA, Navdeep.                     | The case of a 69-year-old man with COVID-19 and encephalopathy.                   | Annals of Clinical and Translational Neurology | Tipo |
| COEN, Matteo et al.                                    | Guillain-Barré syndrome as a complication of SARS-CoV-2 infection.                | Brain, behavior, and immunity                  | Tipo |
| CONTE, G. et al.                                       | COVID-19–Associated PRES–like encephalopathy with perivascular [...].             | AJNR                                           | Tipo |
| COOPER, Jared B. et al.                                | In defense of our patients: indirect negative neurological consequences of [...]  | Journal of Stroke and Cerebrovascular Diseases | Tema |
| CUBAS, J. et al.                                       | Maternal mortality in pregnant woman with positive sars-cov-2 antibodies [...]    | Rev Peru Obstet                                | Tema |
| DALAKAS, Marinos C.                                    | Guillain-Barré syndrome: The first documented COVID-19–triggered [...]            | Neurol-Neuroimmunol Neuroinflamm               | Tipo |
| DEFABIO, Alexandria C. et al.                          | Guillain-Barré syndrome in a patient previously diagnosed with COVID-19.          | Am J of emergency medicine                     | Tipo |

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| DEKOSKY, Steven T. et al.                                                             | Blood biomarkers for detection of brain injury in COVID-19 patients               | Journal of neurotrauma                               | Tipo |
| DELAMARRE, Louis et al.                                                               | COVID-19–associated acute necrotising encephalopathy successfully treated [...]   | J of Neurol, Neurosurg & Psychiatry                  | Tipo |
| DELIWALA, Smit S. et al.                                                              | A 29-year-old male with a fatal case of COVID-19 acute respiratory distress [...] | The American Journal of Case Reports                 | Tema |
| DEPACE, Nicholas L. et al.                                                            | Unexpected SARS-CoV-2 cardiorespiratory arrest in a myopathy patient [...]        | Medicine                                             | Tema |
| DICKINSON, Peter J. et al.                                                            | Antiviral treatment using the adenosine nucleoside analogue GS-441524 in [...]    | Journal of veterinary internal medicine              | Tema |
| DIEZMA-MARTÍN, A. M. et al.                                                           | Tremor and ataxia in COVID-19                                                     | Neurología                                           | Tipo |
| DOMINGO-CHIVA, Esther;<br>MONSALVE-NAHARRO, José<br>Ángel; GERÓNIMO-PARDO,<br>Manuel. | Myopathy, residual effect of rocuronium, or both? A possible [...]                | Journal of Anaesthesiology, Clinical<br>Pharmacology | Tema |
| ESHAK, Nouran et al.                                                                  | Dysautonomia: an overlooked neurological manifestation in a critically ill [...]  | American journal of the medical sciences             | Tipo |
| ESLAMI, Pegah et al.                                                                  | Lethal outcome of Covid-19 pneumonia in a new liver recipient with [...]          | Gastroenterol and Hepatol Bed to Bench               | Tema |
| FABER, Ingrid et al.                                                                  | Coronavirus disease 2019 and parkinsonism: a non-post-encephalitic case.          | Mov Disord                                           | Tipo |
| FASANO, Antonio et al.                                                                | First motor seizure as presenting symptom of SARS-CoV-2 infection.                | Neurological Sciences                                | Tipo |
| FINSTERER, Josef; SCORZA,<br>Fulvio A.                                                | SARS-CoV-2 myopathy.                                                              | Journal of medical virology                          | Tipo |
| FRANCESCHI, Ana M. et al.                                                             | Incidental PET/CT Findings of Suspected COVID-19 in a Region of High [...]        | Cureus                                               | Tema |
| FREIJ, Bishara J. et al.                                                              | Fatal central nervous system co-infection with SARS-CoV-2 and tuberculosis [...]  | BMC pediatrics                                       | Tema |
| GALÁN, A. Velayos et al.                                                              | Síndrome de Guillain-Barré asociado a infección por SARS-CoV-2.                   | Neurologia                                           | Tipo |
| GARCÍA-MANZANEDO,<br>Sofía et al.                                                     | Guillain-barre syndrome after Covid-19 infection.                                 | Medicina Clinica                                     | Tipo |
| GILANI, Sapideh; RODITI,<br>Rachel; NARAGHI, Mohsen.                                  | COVID-19 and anosmia in Tehran, Iran.                                             | Medical hypotheses                                   | Tipo |

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|-----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|------|
| GOETTE, Andreas et al.                                    | COVID-19-induced cytokine release syndrome associated with pulmonary [...]                                                                    | TH Open                                 | Tema |
| GÓMEZ-ENJUTO, Sara et al.                                 | Verapamil as treatment for refractory status epilepticus secondary to PRES [...]                                                              | Seizure-European Journal of Epilepsy    | Tipo |
| GUIJARRO-CASTRO, C. et al.                                | Guillain-Barré syndrome associated with SARS-CoV-2 infection. Comments [...]                                                                  | Neurología                              | Tipo |
| HAINES, Seline et al.                                     | Practical considerations when performing neurodiagnostic studies on patients [...]                                                            | The Neurodiagnostic Journal             | Tema |
| HAYASHI, Misayo et al.                                    | COVID-19-associated mild encephalitis/encephalopathy with a reversible [...]                                                                  | Journal of the neurological sciences    | Tipo |
| HELBOK, Raimund et al.                                    | Guillain-Barré syndrome in a patient with antibodies against SARS-COV-2.                                                                      | European journal of neurology           | Tipo |
| HIRAMATSU, Mariko et al.                                  | Anesthetic and surgical management of tracheostomy in a patient with [...]                                                                    | Auris Nasus Larynx                      | Tema |
| HOSHIJIMA, H. et al.                                      | Rocuronium priming for tracheal intubation in COVID-19 patients.                                                                              | Anaesthesia Report                      | Tema |
| HOSSEINI, Akram A. et al.                                 | Delirium as a presenting feature in COVID-19: Neuroinvasive infection or [...]                                                                | Brain, behavior, and immunity           | Tipo |
| HUA, Hong-Uyen;<br>PIERAMICI, Dante J.;<br>BAGHERI, Nika. | Understanding seizure risk with wide field fundus photography: Implications for screening guidelines in the era of COVID-19 and telemedicine. | Am J of Ophthalmol Case Rep.            | Tema |
| HUSSEIN, Omar; ABD<br>ELAZIM, Ahmed; TORBEY,<br>Michel T. | Covid-19 systemic infection exacerbates pre-existing acute disseminated encephalomyelitis (ADEM).                                             | Journal of Neuroimmunology              | Tema |
| JANG, Kristine; KHATRI,<br>Akshay; MAJURE, David T.       | COVID-19 leading to acute encephalopathy in a patient with heart transplant.                                                                  | The J of Heart and Lung Transplantation | Tipo |
| JANJUA, Tariq;<br>MOSCOTE-SALAZAR, Luis<br>Rafael.        | Acute Cerebellar Strokes with Anoxic Brain Injury After a Cardiopulmonary Arrest in SARS-CoV-2 Patient.                                       | Acta Medica Indonesiana                 | Tipo |
| JAUNMUKTANE, Zane et al.                                  | Microvascular injury and hypoxic damage: emerging neuropathological [...]                                                                     | Acta neuropathologica,                  | Tipo |
| KABASHNEH, Sohaip; ALI,<br>Hammad; ALKASSIS, Samer.       | Multi-organ failure in a patient with diabetes due to COVID-19 with clear lungs.                                                              | Cureus                                  | Tema |
| KIM, Michael G. et al.                                    | Fatal cerebral edema in a child with COVID-19.                                                                                                | Pediatric Neurology                     | Tipo |

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| KIRSCHENBAUM, Daniel et al.                              | Inflammatory olfactory neuropathy in two patients with COVID-19.                    | The Lancet                                            | Tipo |
| KUMAR, Arooshi et al.                                    | Delayed SARS-COV-2 leukoencephalopathy without severe hypoxia.                      | Journal of the neurological sciences                  | Tipo |
| LAD, Sagar S. et al.                                     | Neurological Manifestations in Pediatric Inflammatory Multisystem [...]             | The Indian Journal of Pediatrics                      | Tipo |
| LAFATIE, Ludovic et al.                                  | Recurrence or relapse of COVID-19 in older patients: a description of three cases.  | Journal of the American Geriatrics Society            | Tema |
| LANTOS, Joshua E.; STRAUSS, S. B.; LIN, E.               | COVID-19–associated miller fisher syndrome: MRI findings.                           | American Journal of Neuroradiology                    | Tipo |
| LAPOLLA, Pierfrancesco et al.                            | First-in-man craniectomy and asportation of solitary cerebellar metastasis in [...] | International Journal of Surgery Case Reports         | Tema |
| LE GUENNEC, Loïc et al.                                  | Orbitofrontal involvement in a neuroCOVID-19 patient.                               | Epilepsia                                             | Tipo |
| LI, Jingwen et al.                                       | Management of a Parkinson's disease patient with severe COVID-19 pneumonia.         | Therapeutic Advances in Chronic Disease               | Tema |
| LIBERATORE, Giuseppe et al.                              | Clinical Reasoning: A case of COVID-19–associated [...]                             | Neurology                                             | Tipo |
| LIER, Audun J. et al.                                    | Case report: disseminated strongyloidiasis in a patient with COVID-19.              | The American journal of tropical medicine and hygiene | Tema |
| LIM, Dong-Ju.                                            | Intoxication by hand sanitizer due to delirium after infectious spondylitis [...]   | International J of surgery case reports               | Tema |
| LÓPEZ-BLANCO, R. et al.                                  | Neurological infections during the COVID-19 epidemic.                               | Neurología                                            | Tema |
| LOVATI, Carlo; OSIO, Maurizio; PANTONI, Leonardo.        | Diagnosing herpes simplex-1 encephalitis at the time of COVID-19 pandemic.          | Neurological Sciences                                 | Tema |
| LYONS, Shane et al.                                      | Seizure with CSF lymphocytosis as a presenting feature of COVID-19 in an [...]      | Seizure-European Journal of Epilepsy                  | Tipo |
| MAKAREM, Jalil et al.                                    | A Case Report of Progressive Liver Failure Inappropriate to Decompensated [...]     | Cureus                                                | Tipo |
| MALLICK, Taha et al.                                     | Successful Use of Veno-Venous Extracorporeal Membrane Oxygenation in a [...]        | Cureus                                                | Tema |
| MANZANO, Giovanna S.; WOODS, Jared K.; AMATO, Anthony A. | Covid-19–associated myopathy caused by type I interferonopathy.                     | New England Journal of Medicine                       | Tipo |

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| MARTA-ENGUITA, J.;<br>RUBIO-BAINES, I.;<br>GASTÓN-ZUBIMENDI, I. | Fatal Guillain-Barre syndrome after infection with SARS-CoV-2.                                                                    | Neurología                                | Tipo |
| MASLOV, Diana V. et al.                                         | COVID-19 and cold agglutinin hemolytic anemia.                                                                                    | TH Open                                   | Tema |
| MASUCCIO, Fabio Giuseppe<br>et al.                              | A rare case of acute motor axonal neuropathy and myelitis related to SARS-CoV-2 infection.                                        | Journal of neurology                      | Tipo |
| MATOS, Ana R. et al.                                            | COVID-19 associated central nervous system vasculopathy.                                                                          | Canadian Journal of Neurological Sciences | Tipo |
| MCABEE, Gary N. et al.                                          | Encephalitis associated with COVID-19 infection in an 11-year-old child.                                                          | Pediatric neurology                       | Tipo |
| MELQUIST, Stephanie et al.                                      | COVID-19 presenting as fulminant hepatic failure: a case report.                                                                  | Medicine                                  | Tema |
| MEMAR, E. Haji Esmaeil et al.                                   | Fulminant hepatic failure: a rare and devastating manifestation of [...]                                                          | Archives de Pédiatrie                     | Tema |
| MITTAL, Abhinav et al.                                          | Refractory acute respiratory distress syndrome secondary to COVID-19 [...]                                                        | Cureus                                    | Tema |
| MOLINA, A. Esteban et al.                                       | [Guillain-Barré syndrome associated with SARS-CoV-2 infection.]                                                                   | Medicina intensiva                        | Tipo |
| MONTALVAN, V. et al.                                            | Neurological manifestations of COVID-19 and other coronavirus infections: [...]                                                   | Clinical Neurology and Neurosurgery       | Tipo |
| MOTTA, Juan Camilo;<br>GÓMEZ, Carmen Cecilia.                   | Adenovirus and novel coronavirus (SARS-Cov2) coinfection: A case report.                                                          | IDCases                                   | Tema |
| NAARAAYAN, Ashutossh;<br>PANT, Sushil; JESMAJIAN,<br>Stephen.   | Severe hyponatremic encephalopathy in a patient with COVID-19.                                                                    | Mayo Clinic Proceedings                   | Tipo |
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| NAJJAR, Souhel et al.                                           | Central nervous system complications associated with SARS-CoV-2 infection [...]                                                   | Journal of neuroinflammation              | Tipo |
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| NESSLER, Jasmin et al.                                         | Meningoencephalomyelitis of Unknown Origin in Cats: A Case Series [...]                                                 | Frontiers in veterinary science                | Tema  |
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| NWAJEL, Felix et al.                                           | Cerebral venous sinus thromboses in patients with SARS-CoV-2 infection: [...]                                           | J of Stroke and Cerebrovascular Diseases       | Tipo  |
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| PALKA, Sydney; SU, Xiaowei; CAMBI, Franca                      | SARS-CoV-2 Associated Guillain-Barré Syndrome with Dysautonomia                                                         | Wiley Public Health Emergency Collection       | Tipo  |
| PANARIELLO, Adelaide et al.                                    | Anti-NMDA receptor encephalitis in a psychiatric Covid-19 patient: a case report.                                       | Brain, behavior, and immunity                  | Tipo  |
| PANCERA, Simone et al.                                         | Feasibility and efficacy of the pulmonary rehabilitation program in a [...]                                             | J Cardiopul rehabilitat prevent                | Tema  |
| PANIZ-MONDOLFI, Alberto et al.                                 | Central nervous system involvement by severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2)                      | Journal of medical virology                    | Texto |
| PARSONS, Timothy et al.                                        | COVID-19-associated acute disseminated encephalomyelitis (ADEM)                                                         | Journal of neurology                           | Tipo  |
| PATEL, Smit D. et al.                                          | Malignant cerebral ischemia in a COVID-19 infected patient: case review and [...]                                       | Journal of Stroke and Cerebrovascular Diseases | Tipo  |
| PAUDEL, Vikash; CHUDAL, Deepa.                                 | Carbamazepine-induced toxic epidermal necrolysis managed by mobile teledermatology in COVID-19 pandemic in rural Nepal. | Case Reports in Dermatological Medicine        | Tema  |
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| SERENO, María et al.                                                 | A favorable outcome of pneumonia COVID 19 in an advanced lung cancer [...]                                                    | Lung Cancer                                                | Tema  |
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| SHAHBAZNEJAD, Leila et al.                                           | Clinical characteristics of 10 children with a pediatric inflammatory [...]                                                   | BMC pediatrics                                             | Tema  |

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| TAKAGI, Yoshie et al.                          | Neurogenic pulmonary edema following febrile status epilepticus in a [...]                                                     | BMC infectious diseases             | Tema |
| TANKISI, H. et al.                             | Critical illness myopathy as a consequence of Covid-19 infection.                                                              | Clinical Neurophysiology            | Tipo |
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| TIWARI, Lokesh et al.                          | COVID-19 with dengue shock syndrome in a child: coinfection or [...]                                                           | BMJ Case Reports CP                 | Tema |
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| WINN, Soe P. et al.                            | Diabetic Ketoacidosis in Coronavirus Disease Patients With Type 2 Diabetes [...]                                               | Cureus                              | Tema |
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| YIN, Rong et al.                                             | Concomitant neurological symptoms observed in a patient diagnosed with [...]          | Journal of medical virology  | Tipo |
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Fonte: Elaboração própria.

## **6 RESULTADOS E DISCUSSÃO**

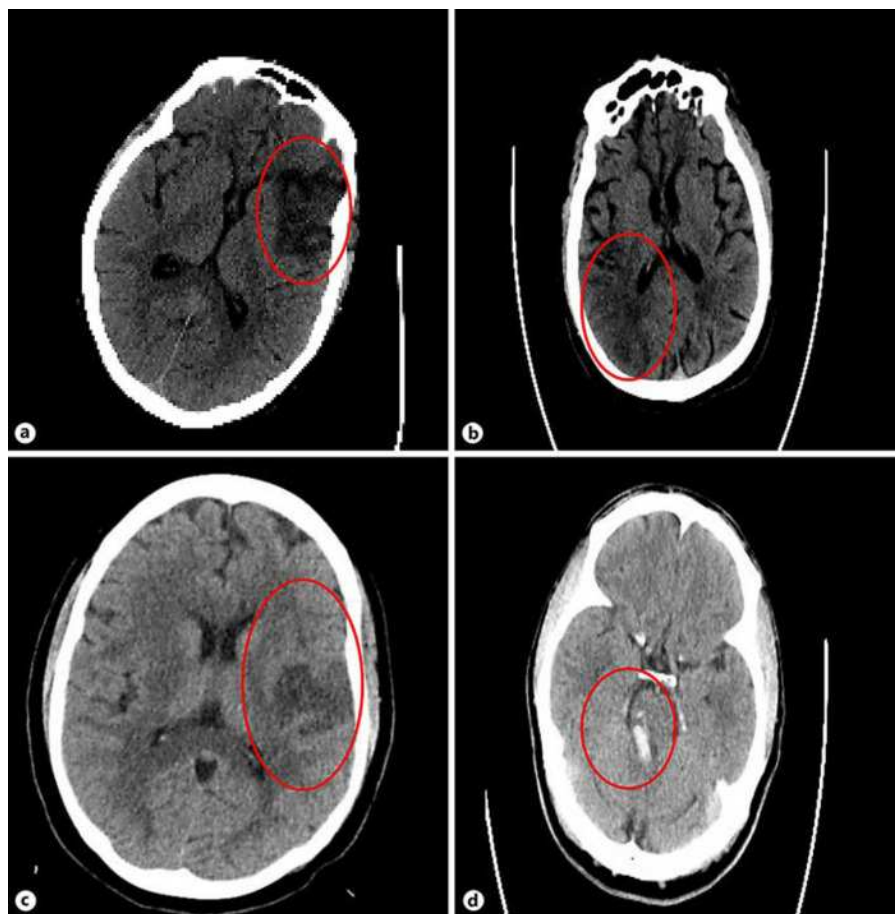
### **6.1 Doenças cerebrovasculares**

#### **6.1.1 Acidente Vascular Encefálico isquêmico**

Os AVEs isquêmicos vêm sendo relatados em casos graves de COVID-19. Os mecanismos exatos que favorecem esses eventos ainda são alvos de estudo, mas a principal hipótese é o estado de hipercoagulabilidade desencadeado pela infecção. Os indivíduos mais suscetíveis a desenvolver essa complicação parecem ser os idosos com múltiplas comorbidades, o que vai de acordo com os fatores de risco para o desenvolvimento da forma grave da COVID-19 (URCIUOLI et al., 2020; GOLDBERG et al., 2020; ).

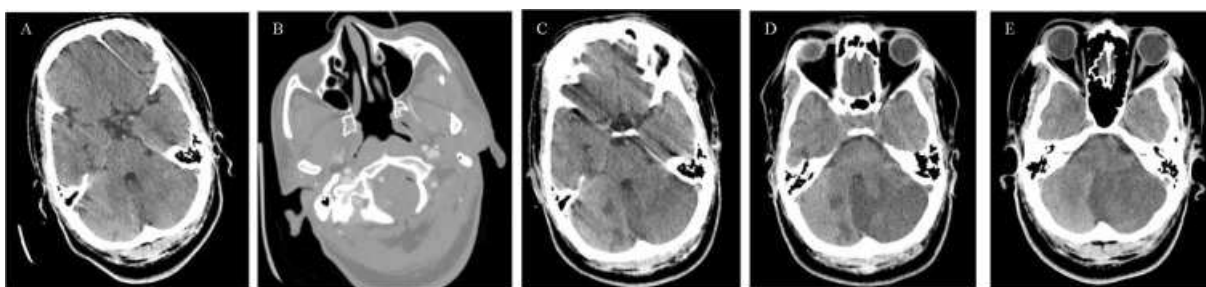
Contudo, como relatado por RASCÓN-RAMÍREZ et al. (2020), REDDY et al. (2020) e SATTLER et al. (2020), mesmo pessoas jovens podem acabar por desenvolver um AVE, ainda que em alguns casos não haja comorbidades prévias conhecidas. AVULA et al. (2020) trouxe ainda um caso de síndrome de encarceramento em uma jovem de 25 anos com história de diabetes mellitus insulino dependente e obesidade. Os locais e artérias envolvidas não parecem ter um padrão, como pode ser visto nas figuras 3, 4 e 5; e a relação entre a forma grave da COVID-19 e o AVE foi mantida.

**Figura 3** - Tomografias de crânio em AVEs do parênquima cerebral.



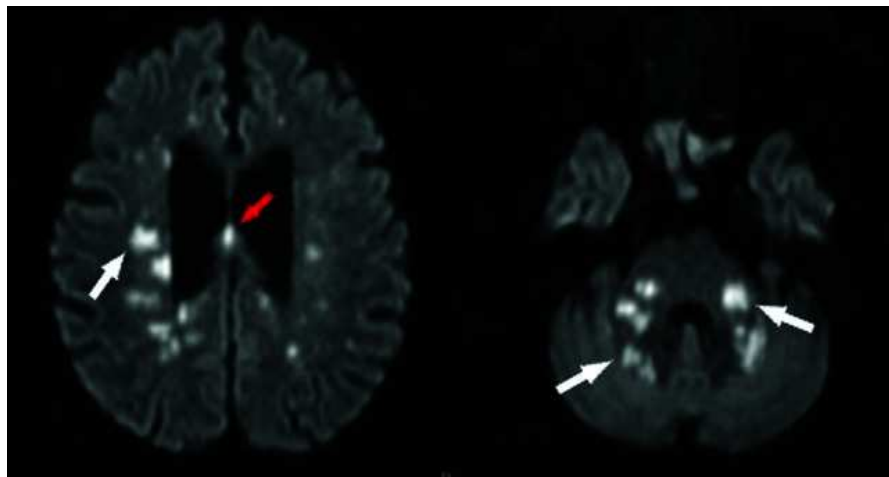
Fonte: (REDDY et al., 2020).

**Figura 4** - Tomografias de crânio em AVE cerebelar.



Fonte: (PATEL et al., 2020).

**Figura 5** - Ressonância magnética em DWI de AVE isquêmico.



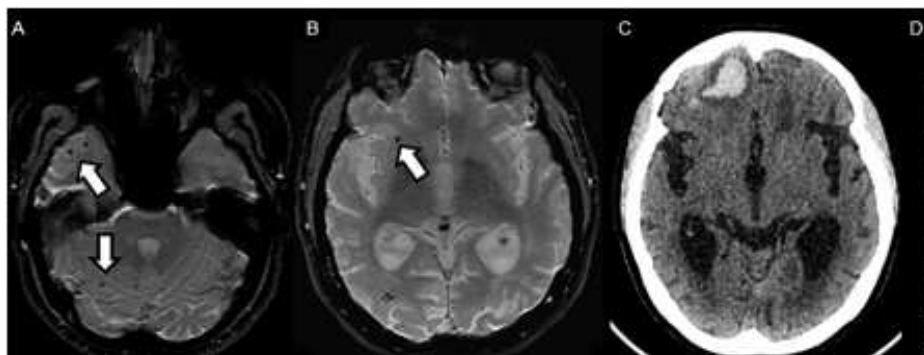
Fonte: (HANAFI et al., 2020).

#### 6.1.2 Hemorragia Intracraniana

GOGIA et al. (2020), ZAHID et al. (2020) e FLORES et al. (2020) relataram casos de hemorragias intracranianas, como hemorragia subaracnóidea, subdural e intraparenquimatosa (AVE hemorrágico). Contudo, não foi possível estabelecer relação direta entre a infecção por SARS-CoV-2 confirmada por RT-PCR e o evento hemorrágico, uma vez que o perfil de pacientes apresentado era o mesmo para casos não covid: com idade avançada, múltiplas comorbidades e uso de anticoagulantes e/ou antiplaquetários. Da mesma forma, uma possível transformação hemorrágica de um AVE isquêmico não pôde ser avaliada, devido a primeira avaliação dos pacientes já evidenciar quadro hemorrágico.

Apenas FRAIMAN et al. (2020) trouxe uma associação forte entre a infecção e o AVE hemorrágico de seu caso, uma vez que a paciente descrita possuía 38 anos e não apresentava fatores de risco cardiovasculares conhecidos. Assim, o evento foi relacionado com uma possível vasculopatia causada pelo vírus. Vide cortes dos exames de imagem na Figura 6.

**Figura 6** - Exames de imagem em caso de hemorragia intraparenquimatosa.



Fonte: (FREIMAN et al., 2020).

### 6.1.3 Trombose de seio venoso

Eventos tromboembólicos já são conhecidos em casos de COVID-19, dado o estado de hipercoagulabilidade causado pela doença. HAROON et al. (2020), KLEIN et al. (2020) e HUSSAIN et al. (2020) trouxeram casos de trombose de seios venosos em pacientes jovens sem história médica pregressa digna de nota e sem comorbidades conhecidas.

Nos casos trazidos por KLEIN et al. (2020) e HUSSAIN et al. (2020) o quadro se iniciou com crises epiléticas tônico-clônicas generalizadas novas, sendo feitos exames de imagem que comprovaram as suspeitas de trombose, como visto na Figura 7, logo abaixo.

**Figura 7** - Tomografia computadorizada de crânio com trombose venosa em seio transversal distal esquerdo.



Fonte: (KLEIN et al., 2020).

#### 6.1.4 Outras

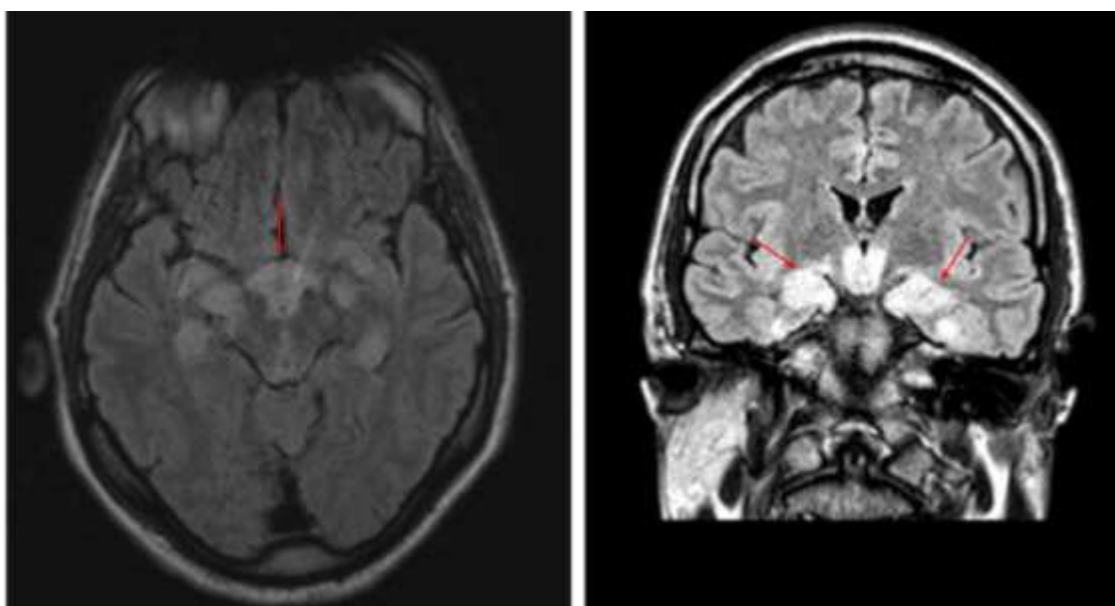
Outras doenças cerebrovasculares que foram encontradas na pesquisa incluem: vasculite (VASCHETTO et al., 2020) e lesão reversível em esplênio do corpo caloso (SPARR et al., 2020; AGARWAL et al., 2020).

### 6.2 Encefalite e Meningoencefalite

A meningoencefalite é uma inflamação das meninges que pode progredir para uma encefalite, que é uma inflamação no parênquima cerebral. Ambas podem ser causadas tanto por etiologia infecciosa quanto imunológica. A apresentação clínica pode variar bastante, desde febre, cefaleia, rigidez de nuca e sinais meníngeos, até alteração do estado mental e crises epiléticas.

O diagnóstico da encefalite normalmente é feito com a clínica associada a evidências de inflamação cerebral, que podem ser obtidas por meio da análise do Líquido Cefalorraquidiano (LCR) ou exames de imagem, como na Figura 8. Enquanto o diagnóstico de meningite costuma ser feito apenas com a clínica e achados no LCR (FREIRE-ÁLVAREZ et al., 2020; HAFIZI et al., 2020).

**Figura 8** - Ressonância magnética de crânio mostrando regiões de hiperintensidade.



Fonte: (FREIRE-ÁLVAREZ et al., 2020).

O provável mecanismo pelo qual o SARS-CoV-2 causa quadros de meningoencefalite e encefalite parece ser a desregulação do sistema imune e invasão tecidual direta pelo vírus, uma vez que o RT-PCR do líquido se apresentou positivo em alguns casos (REBEIZ et al., 2020; HAIDER et al., 2020; KAMAL et al., 2020).

A relação entre a forma grave da COVID-19 e as complicações citadas neste tópico não esteve presente em todos os casos, sugerindo que a meningoencefalite e a encefalite podem ocorrer mesmo em indivíduos sem sintomas respiratórios expressivos.

### **6.3 Cerebelite aguda**

A cerebelite aguda é uma doença rara, ocorrendo normalmente após infecções virais e majoritariamente em crianças. Apesar disso, POVLOW et al. (2020), DIJKSTRA et al. (2020) e SCHELLEKENS et al. (2020) descreveram essa doença em adultos com infecção por SARS-CoV-2 confirmada por RT-PCR e sem outras causas para a ataxia cerebelar.

Os sintomas são dor de cabeça, náuseas/vômitos e ataxia, DIJKSTRA et al. (2020) e SCHELLEKENS et al. (2020) trouxeram ainda em seus trabalhos a apresentação de mioclonia reversível associada. O diagnóstico de cerebelite aguda é feito por meio da exclusão de outras causas prováveis, valendo-se de exames de imagem do crânio e análise do LCR para tal.

### **6.4 Outras Encefalopatias**

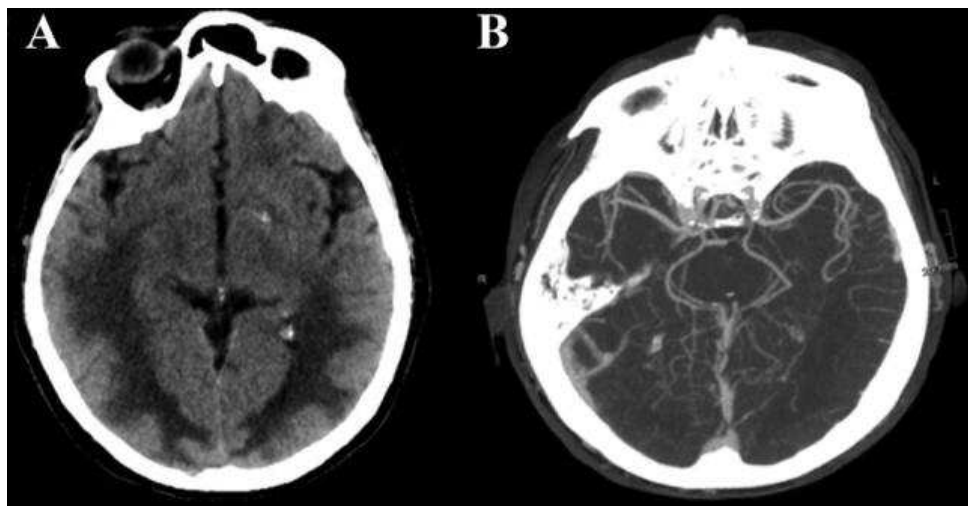
Encefalopatia é um termo genérico para enquadrar patologias que acometem o sistema nervoso central, podendo ter causas metabólicas, tóxicas, imunes, hipóxia ou lesão do parênquima. Assim, as encefalopatias são um conjunto de síndromes que podem apresentar as mais diversas manifestações neurológicas, como tontura, cefaleia, crises epiléticas, alteração de nível de consciência, alterações comportamentais e até déficits neurológicos focais. Tais síndromes parecem estar associadas a casos mais graves de COVID-19 (FARHADIAN et al., 2020; ESPINOSA et al., 2020).

#### **6.4.1 Síndrome de Encefalopatia Posterior Reversível**

A Síndrome de Encefalopatia Posterior Reversível (PRES) é caracterizada por cefaleia, comprometimento agudo do nível de consciência, alterações visuais e crises

epilépticas. Exames de imagem devem ser associados com a clínica do paciente a fim de diagnosticar a síndrome, a qual apresenta como alterações na imagem: edema cortical ou subcortical, que possui origem vasogênica, afetando principalmente as regiões parietal e occipital bilateralmente, como na Figura 9 (CARIDDI et al., 2020; ROGG et al., 2020).

**Figura 9** - Tomografia e angiotomografia de crânio na PRES..

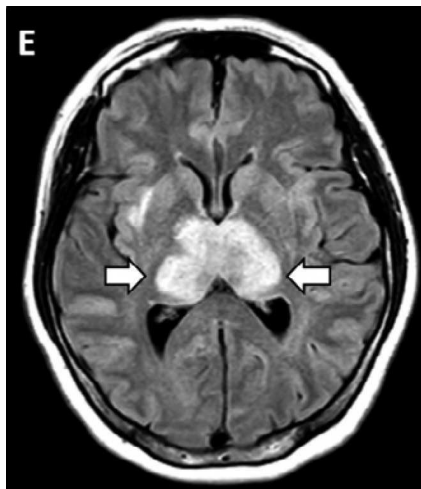


Fonte: Adaptado de (CARIDDI et al., 2020).

#### 6.4.2 Encefalopatia Necrosante Aguda

Essa síndrome é caracterizada pela ruptura da barreira hematoencefálica devido a uma tempestade de citocinas, apresenta sintomas neurológicos inespecíficos e comuns a outras encefalopatias, mas associados a alterações radiológicas típicas, como lesões simétricas, multifocais e envolvimento talâmico obrigatório. Outros locais de acometimento possíveis incluem: substância branca cerebral, tronco cerebral, cerebelo. A Figura 10 traz um exemplo de ressonância magnética característica dessa síndrome (POYIADJI et al., 2020; VIRHAMMAR et al., 2020).

**Figura 10** - Ressonância magnética em FLAIR da Encefalopatia Necrosante Aguda.



Fonte: (POYIADJI et al., 2020).

### 6.5 Mielite transversa aguda

A mielite transversa aguda é uma síndrome desmielinizante que acomete a medula espinhal, normalmente pós-infecciosa e de evolução em poucos dias, que costuma cursar com fraqueza e parestesia dos membros inferiores, associado com lombalgia e/ou cervicalgia e dificuldade para urinar. Em casos mais graves pode haver progressão da doença para uma mielopatia sensoriomotora transversa completa, com paraplegia e redução ou ausência de sensibilidade nos membros inferiores.

O desenvolvimento dessa complicação não parece estar associado com a gravidade dos sintomas respiratórios da COVID-19, ocorrendo mesmo em casos oligossintomáticos. Ainda, não foi possível estabelecer relação entre a idade do indivíduo e o desenvolvimento do quadro. Por fim, o diagnóstico é feito por meio de ressonância magnética da coluna, evidenciando lesões na medula, como mostrado na Figura 11, e análise do LCR, que pode apresentar pleiocitose, pequena elevação de proteínas e elevação do índice de IgG. (ALKETBI et al., 2020; CHAKRABORTY et al., 2020; KHEDR et al., 2020).

**Figura 11** - Ressonância magnética da coluna na mielite transversa aguda.



Fonte: (CHAKRABORTY et al., 2020).

## 6.6 Síndrome de Guillain-Barré

A Síndrome de Guillain-Barré (SGB) é um distúrbio autoimune adquirido caracterizado por polirradiculoneuropatias agudas, que podem possuir um padrão desmielinizante e/ou axonal, a depender da variante, como a Síndrome de Miller-Fisher, a diplegia facial, a AMAN (neuropatia axonal motora aguda) e a AIDP (polineuropatia inflamatória desmielinizante aguda). As variantes descritas anteriormente foram as encontradas na pesquisa e serão abordadas mais adiante. A fisiopatologia da doença é comum nas diversas variantes, iniciando com uma infecção, a qual gera uma resposta imune cruzada que atinge os nervos.

O SARS-CoV-2 parece ser capaz de diferentes padrões temporais de acometimento, como um padrão parainfeccioso de SGB, em que ocorre uma superposição do quadro neurológico com o respiratório (OTTAVIANI et al., 2020; AMEER et al., 2020). Pode ocorrer também um padrão clássico, em que os sintomas se iniciam após a resolução do quadro respiratório da COVID-19 - forma pós-infecciosa (PAYBAST et al., 2020; ATAKLA et al., 2020; HIRAYAMA et al., 2020).

A análise do LCR mostrou um padrão com dissociação proteíno-citológica, contagem normal de glóbulos brancos e RT-PCR para SARS-CoV-2 negativo, embora o RT-PCR por

swab da orofaringe e/ou a sorologia tenham vindo positivos em todos os casos (TIET et al., 2020; BUESO et al., 2020; ABRAMS et al., 2020). Nesse contexto, GIGLI et al. (2020) evidenciou ainda anticorpos IgM e IgG positivos por meio de um teste rápido e IgG positivo por ELISA, ambos utilizando o LCR.

A gravidade da COVID-19 não parece ter grande relação com o surgimento da SGB, a qual ocorreu tanto em indivíduos com a forma crítica da COVID-19, quanto em pessoas oligossintomáticas.

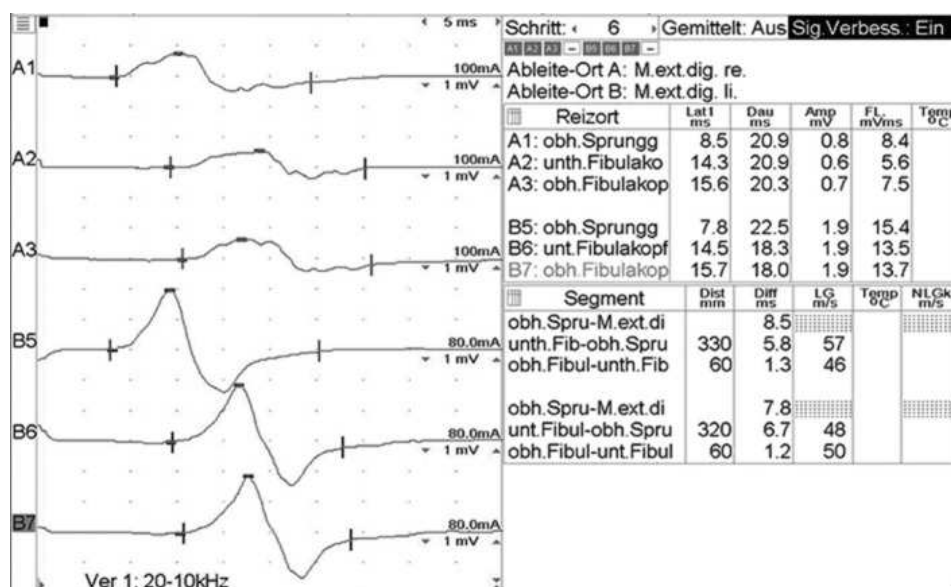
Por fim, KHAJA et al. (2020) trouxe um caso de associação entre a SGB e a paralisia de bell, que é uma paralisia facial unilateral periférica, com fisiopatologia ainda não bem caracterizada, mas que parece ter relação com imunidade após infecções virais.

#### 6.6.1 Polineuropatia Inflamatória Desmielinizante Aguda

Sendo a variante mais comum e rotineiramente chamada apenas de Síndrome de Guillain-Barré, a AIDP possui o quadro clínico caracterizado por uma paralisia flácida ascendente bilateral simétrica, podendo apresentar ainda: hipo ou arreflexia, sintomas sensoriais e acometimento dos nervos cranianos (SCHEIDL et al, 2020).

Os estudos neurofisiológicos por eletroneuromiografia (ENMG) realizados mostraram o padrão típico dessa variante, com dispersão temporal dos potenciais de ação motores, bem como latências motoras distais prolongadas e velocidade de condução motora reduzida na faixa desmielinizante, como mostrado na Figura 12.

**Figura 12** - Estudo de condução motora dos nervos fibulares.



Fonte: (SCHEIDL et al, 2020).

### 6.6.2 Síndrome de Miller-Fisher

Esta variante da SGB é caracterizada pela presença de oftalmoplegia, ataxia e arreflexia, também com dissociação proteíno-citológica na análise do LCR e padrão desmielinizante predominante na ENMG. Em casos de Miller-Fisher não relacionados ao SARS-CoV-2 é comum encontrar o anticorpo anti-gangliosídeos (anti-Gq1b) sérico positivo, o que não foi visto por SENEL et al. (2020) em seu relato de Miller-Fisher associado com o SARS-CoV-2, o que pode sugerir mecanismos imunes diferentes do habitual (REYES-BUENO et al., 2020; ).

### 6.6.3 Outras variantes

Outras duas variantes foram relatadas, sendo essas: a diplegia facial e a neuropatia axonal motora aguda. A diplegia facial apresenta fraqueza simétrica bilateral da face, poupando ombros, pescoço e olhos (JUDGE et al., 2020; CAAMAÑO et al., 2020). Já a neuropatia axonal motora aguda (AMAN) cursa com envolvimento puramente motor, possuindo uma rápida progressão e raro envolvimento dos nervos cranianos. GHOSH et al. (2020a) trouxe como principal alteração na ENMG da forma axonal motora: amplitudes motoras reduzidas, atividade muscular espontânea (desnervação) abundante em músculos proximais e distais dos membros superiores e inferiores com recrutamento reduzido, o que é sugestivo da variante.

## 6.7 Miastenia Gravis

SRIWASTAVA et al. (2020) relatou um caso de Miastenia Gravis (MG) atribuído a infecção pelo SARS-CoV-2, sendo a MG uma doença causada pela produção de autoanticorpos contra os receptores de acetilcolina presentes na junção neuromuscular. O dano causado por essa autoimunidade gera fraqueza com fadigabilidade, que pode ser local ou generalizada, envolvendo principalmente a região dos olhos, caracteristicamente com ptose palpebral e/ou diplopia.

A fisiopatologia exata desta doença ainda não é bem estabelecida. Sabe-se que infecções podem exacerbar quadros de MG conhecidos, como mostrado por REIN et al. (2020), mas sua capacidade de induzir a criação de novos casos ainda é um mistério. O

diagnóstico é feito por meio de testes clínicos (como o teste do gelo), ENMG e exames laboratoriais para identificar os possíveis autoanticorpos.

## **6.8 Rabdomiólise**

A rabdomiólise ocorre devido necrose das células musculares e consequente extravasamento do conteúdo celular para a circulação sistêmica. Ela pode ser causada por traumas, lesões de esmagamento, toxinas, drogas, miosite por infecções, entre outras. Apesar de raramente ser causada por infecções virais, foram descritos casos de rabdomiólise em paciente com COVID-19, sendo que foram excluídas outras causas prováveis da condição (ZHANG et al., 2020; ROSATO et al., 2020; MEEDAGA et al., 2020; ANKLESARIA et al., 2020).

O diagnóstico da rabdomiólise se dá por meio da correlação entre a clínica, com mialgia intensa, e achados laboratoriais, como níveis altos de lactato desidrogenase (LDH), aspartato aminotransferase (AST) e principalmente a creatina quinase (CK). Outros exames podem ser realizados, como biópsia muscular e ENMG.

## **7 CONSIDERAÇÕES FINAIS**

O presente trabalho evidenciou a gama de acometimentos neurológicos possíveis de serem causados pelo SARS-CoV-2, bem como o esforço da comunidade médica global em estudar tal tema. Ainda assim, também foi possível ver a necessidade de elaboração de mais estudos, para que seja obtida uma maior compreensão dos aspectos neurológicos que cercam esse vírus responsável por uma pandemia global. Nesse contexto, espera-se que o conteúdo aqui exposto auxilie os profissionais e pesquisadores da saúde em suas práticas.

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