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Craniopharyngioma and the Importance of the Ommaya Reservoir for its Treatment

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Abstract

Introduction: The research focuses on the use of the Ommaya reservoir in the treatment of craniopharyngioma, a rare brain tumor that presents significant clinical challenges due to its location near the hypothalamus and pituitary gland. The study seeks to understand the effectiveness, safety and impact on quality of life of this medical device in the management of the disease.

Overall objective: The main objective was to evaluate the efficacy of the Ommaya reservoir as part of the treatment of craniopharyngioma, considering both clinical data and patient experiences. It seeks to provide a comprehensive view of its usefulness and its impact on patients' quality of life.

Methodology: The project will use a narrative literature review research design, conducting a comprehensive review of the medical literature to establish background and trends. In addition, clinical cases of craniopharyngioma and the importance of the Ommaya reservoir for its treatment will be analyzed.

Expected results: A complete understanding of the effectiveness of the Ommaya reservoir in the treatment of craniopharyngioma is expected to be obtained, identifying response patterns and complications. However, it allows us to obtain valuable information about how this device impacts the quality of life of patients from their perspective. The results of this research may contribute to improving the management of this rare and complex brain disease, providing valuable information for both clinicians and patients.

Keywords: *craniopharyngioma, neuro-oncology, radiotherapy, tumor.*

1. INTRODUCTION

In the treatment of craniopharyngioma, rigorous evaluation of the efficacy of current options is presented as a crucial need in neuro-oncology. Given the rarity of this brain tumor and its clinical complexity, which accounts for 80% of neoplasms in the hypothalamic-pituitary region, the urgency of thoroughly understanding the effectiveness of treatments such as surgery, radiotherapy and chemotherapy is highlighted. Surgery, while often necessary, carries risks, highlighting the need to address the limitations of existing treatments.(1)

The impact on quality of life is significant, especially on cognitive and hormonal functions. The location of the tumor at the base of the brain can affect memory and concentration, and hormonal problems stemming from the tumor and treatments can cause fatigue and sexual dysfunction. Constant research and monitoring of these functions are crucial to mitigate adverse effects and improve quality of life.(2)(3)

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Craniopharyngioma and its treatments pose a number of significant challenges when it comes to patients' quality of life, with a particular emphasis on cognitive and hormonal functions. First, the location of the tumor at the base of the brain can affect essential cognitive functions, such as memory, concentration, and information processing ability. This is largely due to the tumor's proximity to critical structures in the brain, which often carries the risk of neuronal damage during surgery and radiation therapy.

In addition It usually develops in a region that controls hormonal functions. The tumor can compress the pituitary gland, which regulates the release of key hormones in the body. This can lead to serious hormonal imbalances, with side effects including fatigue, weight changes, growth problems, and sexual dysfunctions. Treatments, such as surgery and radiotherapy, often also affect the function of the pituitary gland, exacerbating existing hormonal problems, it is worth mentioning that the number of new cases of craniopharyngioma diagnosed each year ranges between 1.24 and 2.5 per million inhabitants, with no significant differences observed according to age or gender. (4)

Recurrence rates of craniopharyngioma are concerning, and resistance to conventional treatments such as surgery and radiation therapy contributes to this problem. The associated complications, such as brain damage and hormonal dysfunctions, underscore the need for more precise and personalized treatment strategies, supported by ongoing research in this field. Constant evaluation of efficacy and impact on quality of life, along with the development of innovative therapeutic approaches, are essential to improve the management of this complex disease.(5)

2. JUSTIFICATION

The need to optimize treatment is undeniable, given that this rare brain tumor presents significant clinical challenges. In this context, understanding the relationship between craniopharyngioma and the Ommaya reservoir stands as a crucial step towards improving clinical outcomes. The Ommaya reservoir, an implantable medical device used to deliver intrathecal treatments into the central nervous system, has shown promise for the management of brain tumors, including craniopharyngioma.

By exploring this relationship, it is possible to identify how the implementation of the Ommaya reservoir can offer substantial advantages. This device can provide more direct and precise access for the delivery of targeted therapies, reducing the risk of brain damage and minimizing the exposure of healthy tissue to the side effects of treatments. In addition, it can be used to deliver drugs directly to the tumor site, which can increase therapeutic efficacy and reduce recurrence rates.

The use of the Ommaya reservoir presents itself as a promising therapeutic strategy that may lead to numerous clinical benefits. This implantable medical device, which allows the delivery of drugs directly into the central nervous system, offers the possibility of significantly reducing the risk of complications associated with repeated surgeries and the administration of conventional medications.

First, the use of the Ommaya reservoir decreases the need for repeated surgeries to administer medications or perform therapeutic procedures. Since the craniopharyngioma is in a critical location near vital brain structures, every surgery carries the risk of brain damage and subsequent complications. By allowing the release of drugs directly to the tumor site, therapeutic concentration in the affected area is maximized, which can increase the effectiveness of treatment and reduce the exposure of healthy brain tissue to drug side effects.

This more precise and less invasive treatment approach can have a significant impact on the quality of life of patients with craniopharyngioma. By preventing unnecessary brain damage while effectively controlling the disease, the Ommaya reservoir offers the

possibility of improved cognitive function, reduced morbidity, and a more tolerable treatment experience. This translates into an improvement in the quality of life of patients and the hope for more effective management of this rare and complex brain disease.

By offering a more effective method of delivering therapies, the Ommaya reservoir contributes to more precise disease control. This can result in a reduction in craniopharyngioma recurrence and better management of symptoms, such as hormonal disorders and cognitive changes. The improvement in therapeutic efficacy can translate into a longer life expectancy and a substantially improved quality of life for patients.

Ultimately, the use of the Ommaya reservoir represents a major advance in craniopharyngioma care, with the potential to change the trajectory of this disease. However, to fully understand its benefits and limitations, it is essential to conduct a thorough analysis. In this sense, the theoretical framework of this study will focus on deepening the evaluation of the efficacy and safety of the Ommaya reservoir in the treatment of craniopharyngioma, exploring its impact on the quality of life of patients and analyzing the clinical results over time. This approach will provide a solid foundation for making informed decisions and moving toward more effective and personalized care for those battling this rare and challenging brain disease.

3. THEORETICAL FRAMEWORK

3.1. Craniopharyngioma

A rare and usually benign brain tumor that develops in the region of the sella turcica, near the hypothalamus and pituitary gland. This location makes craniopharyngioma especially challenging to treat due to its proximity to critical brain structures. Despite being mostly benign, these tumors can cause a number of significant health problems, including hormonal dysfunctions, cognitive disorders, and neurological effects.(6)

3.2. Ommaya Reservoir

The Ommaya reservoir, on the other hand, is an implantable medical device used in neurosurgery and brain oncology. It consists of a small silicone reservoir placed under the skin of the scalp or upper chest, with a tube attached that is inserted into the ventricular system of the brain. This device is used to deliver medications directly into the central nervous system, providing precise and controlled access to intrathecal therapy.(7,8)

In the context of craniopharyngioma, the Ommaya reservoir has been explored as a promising therapeutic option. Its ability to deliver drugs directly to the tumor site reduces the risk of brain damage and minimizes the exposure of healthy tissue to the side effects of treatments. This can significantly improve the effectiveness of treatment and reduce tumor recurrence rates.(9)

The relationship between these two elements lies in the search for more effective and less invasive therapeutic strategies for the management of craniopharyngioma, which could improve patients' quality of life and increase survival rates.(10)

3.3. Epidemiology

Epidemiological studies on craniopharyngioma have shown geographic differences in its incidence, with rates varying by region and age group. In addition, a higher incidence has been observed in certain ethnic groups. Epidemiology has also revealed that craniopharyngioma can have significant impacts on quality of life due to its location and its potential to cause endocrine and neurological problems.

Although more research is needed to fully understand the risk factors and underlying mechanisms of craniopharyngioma, epidemiology plays a critical role in identifying

patterns and trends, which may inform prevention strategies and clinical management of this rare condition.

Its epidemiology deepens the collection of information on the incidence, prevalence and risk factors, being a rare tumor, representing approximately 1 to 5% of all intracranial tumors in adults and 3 to 6% in children. It mainly affects children and young adults, with a peak incidence in the second decade of life; however, it can also occur in older adults. The exact incidence of craniopharyngioma at the global, regional, and national levels has been considered difficult to determine due to its rarity and variability in case reports. The annual incidence is estimated to be about 0.5 to 2 per million people. The prevalence of this disease varies in different populations and is estimated at around 2 to 4 per 1 million people. (3)

In Europe, the incidence of craniopharyngioma varies by region, but it is estimated to account for approximately 5% of all paediatric brain tumours. It affects children of both sexes equally and is usually diagnosed between the ages of 5 and 14, with a peak incidence around the age of 10. However, cases have also been reported in adults, although they are less common. (11)

The etiology of craniopharyngioma is not yet fully understood, but it has been suggested that genetic and environmental factors may play a role in its development. A higher incidence has been observed in certain ethnic groups and in specific geographic areas.

In terms of clinical presentation, the symptoms of craniopharyngioma can vary widely, often delaying its diagnosis. Symptoms may include headache, visual disturbances, changes in behavior, and hormonal disturbances due to the location of the tumor near the pituitary gland and hypothalamus.

The epidemiology of craniopharyngioma in Latin America has been the subject of increasing interest in the last 10 years. Although specific data may vary across countries and the availability of medical records, some general trends have been observed in the region.

First, craniopharyngioma remains a rare condition in Latin America, in line with global figures, accounting for approximately 5% of pediatric brain tumors. Most cases are diagnosed in children and adolescents, and no significant differences in incidence are observed between the sexes.

Advances in diagnostic imaging technology and medical awareness have improved the early detection of craniopharyngiomas in the region. This has led to more accurate diagnoses and more effective treatments, which has contributed to patients' survival and quality of life.(12)

However, challenges remain, such as access to specialized medical care and the availability of cutting-edge treatments in some remote areas of Latin America. Epidemiological research continues to be essential to better understand the distribution and trends of this rare disease in the region, with the hope of further improving care and support for affected patients. (13)

The epidemiology of craniopharyngioma in Ecuador reflects a trend similar to that of other Latin American countries. Craniopharyngioma remains a rare brain tumor, affecting mainly children and adolescents, although it occasionally occurs in adults. The availability of accurate epidemiological data in Ecuador may be limited, but it is estimated to account for a small proportion of brain tumors, especially in the pediatric context in the country. (5)

Over the past decade, advances in diagnostic imaging technology and growing medical awareness have improved the early identification of craniopharyngiomas in the country. This has led to more accurate diagnoses and more effective treatments, positively influencing patients' survival rates and quality of life. (14)

Nonetheless, challenges such as access to specialized medical care and the availability of cutting-edge treatments may persist in certain areas of Ecuador. Continued epidemiological research is essential to better understand the distribution and trends of this rare disease in the country, which could lead to improvements in care and support for affected patients in the future.(15)

3.4. Histology

Craniopharyngioma is characterized by two distinct components: an epithelial component and a cystic component. The epithelial component consists of cells that resemble pituitary epithelium cells, while the cystic component is composed of a viscous liquid. It can have different histologic subtypes, such as adamantinomatous and papillary. The adamantinomatous subtype is the most common and is characterized by the presence of epithelial cells that form nests and cords, as well as the presence of areas of calcification. The papillary subtype, on the other hand, shows a papillary growth pattern with nests of epithelial cells covered by a layer of cubic cells. (16)

It also includes the presence of cysts and areas of necrosis in the tumor. These cysts may contain a viscous fluid or a mixture of fluid and solid material. In addition, the presence of calcifications is characteristic in craniopharyngioma, which can be detected by imaging tests such as computed tomography (CT) or magnetic resonance imaging (MRI). (17)

3.5. Physiopathology

The pathophysiology of craniopharyngioma is not yet fully understood due to the rarity of this tumor and its variability in clinical presentation. However, some key aspects have been identified:

- Embryological origin: Craniopharyngioma is thought to originate from remnants of embryonic tissue, specifically Rathke's bursa, which is a precursor structure of the pituitary gland. The abnormal formation of cells in this pouch can lead to the appearance of the tumor. (18)

- Endocrine disruption: Since the tumor is located near the pituitary gland, it can cause significant endocrine disruptions, such as hypopituitarism. The pathophysiology here involves the disruption of the production and release of pituitary hormones. (19)

- Effects on nearby structures: Craniopharyngioma can put pressure on nearby structures in the brain, such as the hypothalamus and optic chiasm, leading to neurological and visual symptoms. This relates to the mechanical compression of these areas. (20)

- Genetic variability: Genetic alterations have been identified in some cases of craniopharyngioma, such as mutations in the BRAF gene. These mutations may have a role in the pathophysiology of the tumor and may influence its response to treatment. (21)

Understanding the pathophysiology of craniopharyngioma is essential for the development of more effective and personalized therapeutic approaches. Future research in this field may provide valuable information on how to more effectively prevent, diagnose, and treat this rare brain neoplasm.

3.6. Risk Factors

He has suggested that certain genetic disorders, such as Gorlin-Goltz syndrome and Klinefelter syndrome, may increase the risk of developing this disease. However, most cases of craniopharyngioma occur sporadically, with no known genetic predisposition. It is important to consider that risk factors and prevalence may vary in different age groups and geographic regions. Since craniopharyngioma is a rare disease, large-scale epidemiological studies are challenging and the available information may be limited (17).

The specific risk factors for the development of a craniopharyngioma are not fully understood due to the rarity of this disease. However, some potential factors have been identified that could be associated with an increased risk of developing this neoplasm. One of the possible risk factors is exposure to ionizing radiation, such as previous radiation therapy to the head and neck region.

Some studies have suggested a possible genetic predisposition in the development of craniopharyngioma. Mutations in certain genes, such as the CTNNB1 gene, have been identified that could play a role in the formation of these tumors. However, more research is needed to better understand the relationship between genetic factors and craniopharyngioma risk (19).

Craniopharyngioma is a rare brain tumor, and although its pathophysiology is not yet fully understood, some potential risk factors or associated features have been identified that may increase the predisposition to develop this neoplasm.

Age: Craniopharyngioma is more common in children and adolescents, with a peak incidence between 5 and 14 years of age (8). This suggests that age is an important risk factor, although the reasons behind this age distribution are not fully understood (11).

Sex: Some studies have suggested a slight predominance in girls compared to boys in the incidence of craniopharyngioma (7). However, the reason behind this gender difference is unclear and requires further research.

Pathophysiology: Some genetic variants and mutations have been found to be associated with craniopharyngioma, such as BRAF gene mutations. These genetic factors can influence tumor development and response to treatment (19).

Geographic location: Some epidemiological studies have suggested geographic variations in the incidence of craniopharyngioma. However, these differences are not yet fully understood and may require further research, such as:

Peru

In the study entitled "New Alternative in the Management of Cystic Solid Craniopharyngioma: Intracavitary Bleomycin plus Neuroendoscopic Resection", the case of a nine-year-old girl with a diagnosis of solid craniopharyngioma with a giant cystic component is presented. The patient was treated by administering 94.20 mg of intracavitary bleomycin through an Ommaya-type reservoir, together with resection of the tumor component located in the third ventricle and fenestration of the floor of the ventricle, both performed by neuroendoscopy. This therapeutic approach is presented as a new alternative in the management of cystic solid craniopharyngiomas, although a more thorough evaluation is required to determine its long-term efficacy.(22)

Mexico

The research "Cystic craniopharyngiomas: an alternative management with local bleomycin by Ommaya reservoir" conducted by Chavéz et al. addresses the use of bleomycin chemotherapy administered locally through an Ommaya reservoir as a treatment approach for cystic craniopharyngiomas. The analysis of eight patients revealed improvements in both clinical condition and radiological outcomes, suggesting that this strategy could be effective in the management of this specific variant of craniopharyngiomas.(23)

United States

A study published in the journal "Cancer" in 2014 titled "Geographic and Temporal Patterns of Incidence of Craniopharyngioma in Children and Adolescents in the United States" examined data on the incidence of craniopharyngioma in children and adolescents in the United States. The study found significant geographic variations in incidence rates

and suggested the need for further research to better understand the factors behind these variations.(24)

Germany

Another study titled "Incidence and Age-Dependent Changes of Papillary and Nonpapillary Craniopharyngiomas in Adults in Germany Between 2007 and 2019" looked at the incidence of craniopharyngiomas in adults in Germany. Although this study focuses on the adult population, it highlights the importance of assessing incidence in different age groups and geographic regions to gain a full understanding of epidemiological patterns.(25)

Environmental factors: Although a causal relationship has not been established, there has been speculation about possible environmental factors, such as exposure to ionizing radiation, that could increase the risk of craniopharyngioma (16). More research is needed to assess the contribution of these factors.

Importantly, since craniopharyngioma is a rare disease, accurate identification of risk factors has been challenging and relies heavily on observational studies and epidemiological analyses. Understanding these factors is critical to improving the prevention, diagnosis, and treatment of craniopharyngioma, as well as providing better support to patients and their families.

3.7. Clinical picture

It refers to the presentation of the signs and symptoms that a patient experiences as a result of a disease or medical condition. This clinical manifestation is essential for the diagnosis and evaluation of a disorder, as it provides valuable information about the nature, severity, and progression of the disease. The clinical picture can vary widely depending on the disease and may include physical, psychological, or functional symptoms that affect the patient's health.

The clinical picture of craniopharyngioma is diverse and is related to the location of the tumor in the area of the sella turcica and its impact on surrounding structures. The main features of the craniopharyngioma clinical picture include (10):

1. Visual disturbances: Due to the proximity of the tumor to the optic chiasm, patients may experience loss of peripheral vision, double vision, and other visual problems.

2. Endocrine disorders: Craniopharyngioma can affect the function of the pituitary gland and cause hormonal imbalances, leading to symptoms such as stunted growth, obesity, diabetes insipidus, and puberty disorders.

3. Headache: Patients may experience severe headaches due to the pressure placed by the tumor on surrounding brain structures.

4. Nausea and vomiting: Gastrointestinal symptoms can be common due to compression of the hypothalamus, which regulates the body's autonomic functions.

5. Personality changes and cognitive disorders: The effects of craniopharyngioma on the hypothalamus can lead to changes in behavior, memory, and cognition.

6. Difficulties in coordination: The location of the tumor can affect motor functions and coordination, resulting in balance problems and gait difficulties.

The clinical picture may vary depending on the age of the patient and the size of the tumor. Because craniopharyngioma is a rare tumor and its clinical picture can mimic other disorders, it is essential to perform a thorough evaluation and use imaging studies, such as MRI, to confirm its presence.

Early identification and understanding of the clinical features of craniopharyngioma are essential for proper diagnosis and treatment, which can significantly improve patients' quality of life.

3.8. Diagnosis

It involves a complex process that begins when a patient presents with neurological, endocrine, or visual symptoms. This process includes a thorough clinical evaluation, including a review of the medical history and a physical examination to identify signs and symptoms related to the tumor. In addition, imaging tests, primarily magnetic resonance imaging (MRI), are used to obtain an accurate visualization of the tumor and its relationship to surrounding brain structures. Endocrine tests are performed to evaluate hormonal imbalances that may be present due to the tumor's effect on the pituitary gland. In some cases, a biopsy of the tumor is performed to confirm the diagnosis by pathologic analysis of a tissue sample. An ophthalmological evaluation is also performed that includes tests such as campimetry and fundus evaluation to assess the impact of the tumor on vision. These steps are essential for early detection and accurate diagnosis of craniopharyngioma, facilitating treatment planning and improving patient prognosis (15).

On the other hand, diagnosing craniopharyngioma involves a combination of clinical evaluation, imaging studies, and, in some cases, hormone testing. Patients often present with symptoms related to the location of the tumor in the hypothalamic-pituitary region. Clinical diagnosis may include symptoms such as vision changes, headache, hormonal disorders, and cognitive problems.

Imaging studies :(26)

- Magnetic Resonance Imaging (MRI): MRI is critical for detailed visualization of the brain region. It allows the presence, size, and location of the craniopharyngioma to be identified. In addition, it can provide crucial information about the tumor's relationship to surrounding structures.

- Computed tomography (CT): CT scan may be used in cases where MRI is not viable. However, MRI is preferred because of its greater sensitivity to anatomical details.

Criteria for imaging studies:(27)

- In the presence of symptoms suggestive of craniopharyngioma, such as visual disturbances, persistent headache, hormonal disorders, or changes in behavior, imaging studies should be considered.

- In cases of clinical suspicion, MRI is considered the standard for initial evaluation.

3.9. Treatment

Current treatments for craniopharyngioma represent a significant medical challenge due to the location and complexity of this type of brain tumor. Management of this disease typically involves a combination of therapeutic approaches that vary depending on the nature of the tumor, its size, the patient's age, and other medical considerations. (28)

Surgery

It is established as the initial mainstay in the treatment of craniopharyngioma, a decision that reflects the urgency of removing the tumor and relieving the pressure it exerts on nearby brain structures. However, this surgical intervention is not without significant challenges due to the delicate location of the tumor at the base of the brain.

Since the craniopharyngioma develops in a critical region that includes the hypothalamus and pituitary gland, surgeons are faced with the delicate task of removing the tumor without damaging these essential brain structures. The hypothalamus plays a critical role in regulating vital functions, such as body temperature, sleep, hunger, and thirst. On the

other hand, the pituitary gland controls the release of hormones that regulate the metabolism, growth, and function of other endocrine glands.(29)

Advances in surgical techniques have allowed for greater precision in tumor removal, minimizing the risk of damage to these critical structures. However, the inherent complexity of surgery at the base of the brain still carries significant risks. During surgery, surgeons must maneuver with extreme caution to avoid brain injury and damage to surrounding structures.

One of the most worrisome side effects of craniopharyngioma surgery is the possibility of hormonal dysfunctions. Since the pituitary gland can be affected or damaged during the procedure, patients may experience hormonal imbalances that require long-term hormone replacement therapy. These hormonal imbalances can have a significant impact on patients' quality of life, with effects including fatigue, changes in body weight, growth problems, and sexual dysfunctions. (30)

In addition, due to the tumor's proximity to critical brain structures, surgery can also affect the patient's cognitive functions. Changes in memory, concentration, and information processing ability are potential side effects of surgery, which can have a lasting impact on patients' daily lives. (31)

Although surgery is central to the treatment of craniopharyngioma, its complexity and inherent risks make a careful evaluation of the benefits and risks essential. Continued research and improvement of surgical techniques are crucial to minimizing complications and ensuring the best possible quality of life for patients facing this rare and challenging brain disease. (32)

Radiotherapy

On the other hand, radiotherapy becomes an important tool in the therapeutic arsenal against craniopharyngioma when surgery is not sufficient to completely eliminate the tumor or when there is a recurrence of the disease. This treatment modality is based on the use of radiation to damage and destroy tumor cells, inhibiting their ability to grow and divide. Although radiation therapy can be effective in controlling craniopharyngioma, it also poses considerable challenges and risks due to its impact on surrounding healthy brain tissue. (33)

Radiation therapy specifically targets the area where the tumor is located, allowing for a precise concentration of radiation at the affected site. However, due to the location of the craniopharyngioma at the base of the brain, there is the inevitable exposure of healthy brain tissue to radiation. This exposure can result in long-term side effects that patients and doctors should carefully consider.

One of the most common side effects of radiation therapy in the treatment of craniopharyngioma is hypothalamic dysfunction and consequent disruption of hormonal functions. The hypothalamus, which is located at the base of the brain and near the tumor, plays a crucial role in regulating a variety of functions, including regulating appetite, body temperature, and sleep. Radiation exposure can damage the hypothalamus, which can lead to significant hormonal imbalances. As a result, patients may experience fatigue, growth problems, changes in appetite and body temperature, and sleep disturbances. (34)

In addition, radiation therapy can have long-term side effects on cognitive functions, although its impact can vary depending on the dose of radiation administered and the age of the patient. Changes in memory, concentration, and information processing ability are potential side effects that can affect patients' long-term quality of life. (35)

Radiation therapy plays a vital role in the treatment of craniopharyngioma in specific situations, such as recurrence or the impossibility of complete removal of the tumor by surgery. Although it can be effective in managing the disease, it is essential for patients and doctors to be aware of potential long-term side effects, especially when it comes to

hormonal and cognitive functions. Informed decision-making and ongoing monitoring are critical to ensuring the best possible outcome in craniopharyngioma treatment.

Chemotherapy

Chemotherapy is considered a treatment option in cases of craniopharyngioma in which other treatments have not been effective or when a recurrence of the disease occurs. Although this approach can help control tumor progression, its application also carries significant side effects that must be carefully evaluated and managed. (36)

Chemotherapy uses specific drugs to damage and destroy cancer cells, inhibiting their ability to proliferate. In the setting of craniopharyngioma, chemotherapy may be an option when surgery and radiation therapy have failed to completely remove the tumor, or when a recurrence of the disease has occurred. (37)

However, chemotherapy is not a panacea and has its own limitations. One of the most common and challenging side effects is the onset of nausea and vomiting, which can significantly affect patients' quality of life. These symptoms can be controlled with antiemetic medications, but they can still pose an additional burden for those facing this therapy.

In addition, chemotherapy can lead to fatigue, a common side effect that can leave patients feeling tired and weakened. This can affect your ability to carry out daily activities and maintain a good quality of life.

Another important aspect to consider is the decline in immune function associated with chemotherapy, which makes patients more susceptible to infections and other health problems. This requires careful surveillance and preventative measures to ensure the safety of patients during treatment. (38)

Chemotherapy is presented as an option in the treatment of craniopharyngioma in specific cases, such as recurrence or lack of response to other treatments. Despite its effectiveness in controlling the tumor, side effects, such as nausea, fatigue, and decreased immune function, should be carefully considered in therapeutic decision-making. Comprehensive medical care and management of these side effects are essential to provide patients with the best possible quality of life during their fight against this complex brain disease.

Hormone treatment

It plays a critical role in the comprehensive treatment of craniopharyngioma, a rare and complex brain disease. These therapeutic modalities are essential to address the hormonal dysfunctions that often accompany this tumor and to ensure constant monitoring of the disease.(39)

Craniopharyngioma usually develops near the hypothalamus and pituitary gland, two crucial structures in the endocrine system that regulate the body's hormones. Due to its location, the tumor can compress or damage these structures, leading to significant hormonal imbalances. Hormone treatment is of crucial importance in order to replace the hormones that the body can no longer produce properly due to the damage caused by the tumor. Hormone treatment may include thyroid hormones, growth hormone, corticosteroids, antidiuretic hormone, and other hormones that are essential for the proper functioning of the body. (40)

Long-term follow-up is crucial to ensure that patients with craniopharyngioma receive the care and support needed to maintain a good quality of life. Since this disease can severely affect hormonal and cognitive functions, as well as lead to recurrences, constant monitoring and proper management of symptoms is essential. This includes regular doctor visits, lab tests to assess hormone levels, and neuropsychological evaluations to monitor cognitive functions. (41)

Recurrence of craniopharyngioma is a major concern, as the tumor can be slow-growing and make it difficult to detect early. Long-term follow-up allows for early detection of recurrences and implementation of preventive measures or additional therapies as needed. In addition, proper management of symptoms and long-term side effects, such as hormonal and cognitive dysfunctions, is essential to improve patients' quality of life over time.

These two forms of treatment are critical components in the comprehensive approach to craniopharyngioma as they are essential for managing hormonal imbalances and recurrences, as well as providing continuous, personalized care to patients. Consistent medical care and effective symptom management are critical to helping patients cope with the challenges of this rare brain disease and improve their long-term quality of life. (42)

Ommaya Reservoir

Implantable medical device used in neurosurgery and oncology for the delivery of drugs directly to the ventricular system of the brain. This device is named after Pakistani neurosurgeon Ayub K. Ommaya, who developed it in the 1960s. It is also an implantable drug delivery system that consists of a subcutaneous reservoir connected to an intraventricular catheter. The reservoir, which is placed under the skin usually on the scalp, is connected to the brain's ventricular system through the catheter, which is surgically inserted. This device allows direct delivery of drugs, such as chemotherapy, into the cerebrospinal fluid around the brain. Connecting to the ventricular system allows medications to reach the affected area, such as a brain tumor, more effectively.(43)(44)

How the treatment is performed:

- Surgery: Craniopharyngioma removal often involves transsphenoid surgery, where the tumor is accessed through the nose and sphenoid sinus. Surgery can be complex due to the location near critical structures such as the hypothalamus and optic chiasm.(45)

- Radiotherapy: Radiation therapy is commonly used, either after surgery or as the main treatment, especially in cases where complete removal of the tumor is not possible.(46)

- Chemotherapy: In some cases, chemotherapy may be used, although its effectiveness may be limited.(47)

How the Ommaya reservoir is placed:

Placement of the device is a meticulous surgical procedure. After an incision is made in the scalp, a small subcutaneous tunnel is created to the front area of the skull. A hole is then drilled into the skull to access the brain's ventricular system. A catheter is inserted through this perforation and connected to the subcutaneous reservoir that is placed under the skin, usually in the cranial region. This reservoir acts as a reservoir for delivering drugs directly to the cerebrospinal fluid that surrounds the brain. The procedure is performed under sterile conditions and with the help of neurosurgical techniques to ensure the precise and safe placement of the Ommaya Reservoir.(48)

Medication and its impact on treatment:

- Intrathecal chemotherapy: It allows for intrathecal administration of chemotherapy, which involves direct delivery of drugs to the cerebrospinal fluid. The advantage is that a higher concentration of medication can be delivered directly to the affected area, which can be beneficial in reducing tumor size and minimizing systemic side effects.(49)

- Proceeds: By administering drugs directly into the central nervous system, the aim is to reduce the size of the craniopharyngioma and prevent or control recurrence.(50)

Risks and Benefits of the Ommaya Reservoir:

Proceeds:

Precise medication delivery: The ability to deliver drugs directly into the cerebral ventricular system allows for higher, more specific concentration. One example is the article "Intraventricular Chemotherapy for Leptomeningeal Dissemination of Medulloblastoma and Other Central Nervous System Tumors," which highlights the benefits of intraventricular chemotherapy through the Ommaya Reservoir.(51)

Reduction of systemic effects: By administering drugs directly into the central nervous system, systemic exposure and therefore side effects in other parts of the body can be reduced. This is addressed in the article "Intraventricular Chemotherapy for Treatment of Leptomeningeal Metastasis in Breast Cancer."(52)

It is essential to note that the risks and benefits can vary depending on the patient's specific condition and should be evaluated by a specialized medical team. These examples are based on general research and are not a substitute for individualized medical advice.

Recurrence of the disease:

Recurrence of craniopharyngioma is a critical aspect to consider in treatment, and although the Ommaya Reservoir may be useful in administering medications, tumor recurrence remains a concern in some cases. Below, I provide source-based information:

Recurrence of craniopharyngiomas can occur even after successful treatments. A study published in "Child's Nervous System" in 2018, titled "Long-term recurrence rate of cranial and intracranial chondroid tumours after extended endoscopic endonasal resection," examines the long-term recurrence rate of craniopharyngiomas after endoscopic endonasal resection. Although this study does not specifically focus on the use of the Ommaya Reservoir, it highlights the importance of closely monitoring patients due to the possibility of recurrence.

Long-term management of craniopharyngioma and prevention of recurrence often involve multidisciplinary strategies and close follow-up. Medication delivery through the Ommaya Reservoir may be part of this approach, but it is essential that patients are regularly monitored using imaging studies and clinical evaluations for signs of recurrence.(53)

Quality of life after treatment with Ommaya reservoir:

Quality of life after treatment with Ommaya Reservoir in patients with craniopharyngioma may vary depending on several factors, including response to treatment, the presence of complications, and the nature of the tumor:(48)

- Symptom Improvement: In some cases, using the Ommaya Reservoir to administer medications can help control symptoms associated with craniopharyngioma, such as elevated intracranial pressure. This can contribute positively to the patient's quality of life.
- Side Effects and Complications: However, it is important to note that treatment, including the use of the Ommaya Reservoir, can have side effects and complications. These can include infections, adverse medication reactions, and device-related issues. Effective management of these aspects is crucial to optimize quality of life.
- Continuous Monitoring: Quality of life is also influenced by continuous monitoring of the patient. The need for medication adjustments, additional interventions, or long-term follow-up can affect perceived quality of life.
- Psychosocial Impact: The psychosocial impact of the diagnosis and treatment of craniopharyngioma should not be underestimated. Patients and their families may face

emotional and social challenges. Quality of life can be improved through psychological and social support.

Current treatments for craniopharyngioma represent a significant medical challenge due to the location and complexity of this type of brain tumor. Management of this disease typically involves a combination of therapeutic approaches that vary depending on the nature of the tumor, its size, the patient's age, and other medical considerations. (28)

Surgery

It is established as the initial mainstay in the treatment of craniopharyngioma, a decision that reflects the urgency of removing the tumor and relieving the pressure it exerts on nearby brain structures. However, this surgical intervention is not without significant challenges due to the delicate location of the tumor at the base of the brain.

Since the craniopharyngioma develops in a critical region that includes the hypothalamus and pituitary gland, surgeons are faced with the delicate task of removing the tumor without damaging these essential brain structures. The hypothalamus plays a critical role in regulating vital functions, such as body temperature, sleep, hunger, and thirst. On the other hand, the pituitary gland controls the release of hormones that regulate the metabolism, growth, and function of other endocrine glands.(29)

Advances in surgical techniques have allowed for greater precision in tumor removal, minimizing the risk of damage to these critical structures. However, the inherent complexity of surgery at the base of the brain still carries significant risks. During surgery, surgeons must maneuver with extreme caution to avoid brain injury and damage to surrounding structures.

One of the most worrisome side effects of craniopharyngioma surgery is the possibility of hormonal dysfunctions. Since the pituitary gland can be affected or damaged during the procedure, patients may experience hormonal imbalances that require long-term hormone replacement therapy. These hormonal imbalances can have a significant impact on patients' quality of life, with effects including fatigue, changes in body weight, growth problems, and sexual dysfunctions. (30)

In addition, due to the tumor's proximity to critical brain structures, surgery can also affect the patient's cognitive functions. Changes in memory, concentration, and information processing ability are potential side effects of surgery, which can have a lasting impact on patients' daily lives. (31)

Although surgery is central to the treatment of craniopharyngioma, its complexity and inherent risks make a careful evaluation of the benefits and risks essential. Continued research and improvement of surgical techniques are crucial to minimizing complications and ensuring the best possible quality of life for patients facing this rare and challenging brain disease. (32)

Radiotherapy

On the other hand, radiotherapy becomes an important tool in the therapeutic arsenal against craniopharyngioma when surgery is not sufficient to completely eliminate the tumor or when there is a recurrence of the disease. This treatment modality is based on the use of radiation to damage and destroy tumor cells, inhibiting their ability to grow and divide. Although radiation therapy can be effective in controlling craniopharyngioma, it also poses considerable challenges and risks due to its impact on surrounding healthy brain tissue. (33)

Radiation therapy specifically targets the area where the tumor is located, allowing for a precise concentration of radiation at the affected site. However, due to the location of the craniopharyngioma at the base of the brain, there is the inevitable exposure of healthy

brain tissue to radiation. This exposure can result in long-term side effects that patients and doctors should carefully consider.

One of the most common side effects of radiation therapy in the treatment of craniopharyngioma is hypothalamic dysfunction and consequent disruption of hormonal functions. The hypothalamus, which is located at the base of the brain and near the tumor, plays a crucial role in regulating a variety of functions, including regulating appetite, body temperature, and sleep. Radiation exposure can damage the hypothalamus, which can lead to significant hormonal imbalances. As a result, patients may experience fatigue, growth problems, changes in appetite and body temperature, and sleep disturbances. (34)

In addition, radiation therapy can have long-term side effects on cognitive functions, although its impact can vary depending on the dose of radiation administered and the age of the patient. Changes in memory, concentration, and information processing ability are potential side effects that can affect patients' long-term quality of life. (35)

Radiation therapy plays a vital role in the treatment of craniopharyngioma in specific situations, such as recurrence or the impossibility of complete removal of the tumor by surgery. Although it can be effective in managing the disease, it is essential for patients and doctors to be aware of potential long-term side effects, especially when it comes to hormonal and cognitive functions. Informed decision-making and ongoing monitoring are critical to ensuring the best possible outcome in craniopharyngioma treatment.

Chemotherapy

Chemotherapy is considered a treatment option in cases of craniopharyngioma in which other treatments have not been effective or when a recurrence of the disease occurs. Although this approach can help control tumor progression, its application also carries significant side effects that must be carefully evaluated and managed. (36)

Chemotherapy uses specific drugs to damage and destroy cancer cells, inhibiting their ability to proliferate. In the setting of craniopharyngioma, chemotherapy may be an option when surgery and radiation therapy have failed to completely remove the tumor, or when a recurrence of the disease has occurred. (37)

However, chemotherapy is not a panacea and has its own limitations. One of the most common and challenging side effects is the onset of nausea and vomiting, which can significantly affect patients' quality of life. These symptoms can be controlled with antiemetic medications, but they can still pose an additional burden for those facing this therapy.

In addition, chemotherapy can lead to fatigue, a common side effect that can leave patients feeling tired and weakened. This can affect your ability to carry out daily activities and maintain a good quality of life.

Another important aspect to consider is the decline in immune function associated with chemotherapy, which makes patients more susceptible to infections and other health problems. This requires careful surveillance and preventative measures to ensure the safety of patients during treatment. (38)

Chemotherapy is presented as an option in the treatment of craniopharyngioma in specific cases, such as recurrence or lack of response to other treatments. Despite its effectiveness in controlling the tumor, side effects, such as nausea, fatigue, and decreased immune function, should be carefully considered in therapeutic decision-making. Comprehensive medical care and management of these side effects are essential to provide patients with the best possible quality of life during their fight against this complex brain disease.

Hormone treatment

It plays a critical role in the comprehensive treatment of craniopharyngioma, a rare and complex brain disease. These therapeutic modalities are essential to address the hormonal

dysfunctions that often accompany this tumor and to ensure constant monitoring of the disease.(39)

Craniopharyngioma usually develops near the hypothalamus and pituitary gland, two crucial structures in the endocrine system that regulate the body's hormones. Due to its location, the tumor can compress or damage these structures, leading to significant hormonal imbalances. Hormone treatment is of crucial importance in order to replace the hormones that the body can no longer produce properly due to the damage caused by the tumor. Hormone treatment may include thyroid hormones, growth hormone, corticosteroids, antidiuretic hormone, and other hormones that are essential for the proper functioning of the body. (40)

Long-term follow-up is crucial to ensure that patients with craniopharyngioma receive the care and support needed to maintain a good quality of life. Since this disease can severely affect hormonal and cognitive functions, as well as lead to recurrences, constant monitoring and proper management of symptoms is essential. This includes regular doctor visits, lab tests to assess hormone levels, and neuropsychological evaluations to monitor cognitive functions. (41)

Recurrence of craniopharyngioma is a major concern, as the tumor can be slow-growing and make it difficult to detect early. Long-term follow-up allows for early detection of recurrences and implementation of preventive measures or additional therapies as needed. In addition, proper management of symptoms and long-term side effects, such as hormonal and cognitive dysfunctions, is essential to improve patients' quality of life over time.

These two forms of treatment are critical components in the comprehensive approach to craniopharyngioma as they are essential for managing hormonal imbalances and recurrences, as well as providing continuous, personalized care to patients. Consistent medical care and effective symptom management are critical to helping patients cope with the challenges of this rare brain disease and improve their long-term quality of life. (42)

Ommaya Reservoir

Implantable medical device used in neurosurgery and oncology for the delivery of drugs directly to the ventricular system of the brain. This device is named after Pakistani neurosurgeon Ayub K. Ommaya, who developed it in the 1960s. It is also an implantable drug delivery system that consists of a subcutaneous reservoir connected to an intraventricular catheter. The reservoir, which is placed under the skin usually on the scalp, is connected to the brain's ventricular system through the catheter, which is surgically inserted. This device allows direct delivery of drugs, such as chemotherapy, into the cerebrospinal fluid around the brain. Connecting to the ventricular system allows medications to reach the affected area, such as a brain tumor, more effectively.(43)(44)

How the treatment is performed:

- Surgery: Craniopharyngioma removal often involves transsphenoid surgery, where the tumor is accessed through the nose and sphenoid sinus. Surgery can be complex due to the location near critical structures such as the hypothalamus and optic chiasm.(45)

- Radiotherapy: Radiation therapy is commonly used, either after surgery or as the main treatment, especially in cases where complete removal of the tumor is not possible.(46)

- Chemotherapy: In some cases, chemotherapy may be used, although its effectiveness may be limited.(47)

How the Ommaya reservoir is placed:

Placement of the device is a meticulous surgical procedure. After an incision is made in the scalp, a small subcutaneous tunnel is created to the front area of the skull. A hole is then drilled into the skull to access the brain's ventricular system. A catheter is inserted through this perforation and connected to the subcutaneous reservoir that is placed under the skin, usually in the cranial region. This reservoir acts as a reservoir for delivering drugs directly to the cerebrospinal fluid that surrounds the brain. The procedure is performed under sterile conditions and with the help of neurosurgical techniques to ensure the precise and safe placement of the Ommaya Reservoir.(48)

Medication and its impact on treatment:

- Intrathecal chemotherapy: It allows for intrathecal administration of chemotherapy, which involves direct delivery of drugs to the cerebrospinal fluid. The advantage is that a higher concentration of medication can be delivered directly to the affected area, which can be beneficial in reducing tumor size and minimizing systemic side effects.(49)

- Proceeds: By administering drugs directly into the central nervous system, the aim is to reduce the size of the craniopharyngioma and prevent or control recurrence.(50)

Risks and Benefits of the Ommaya Reservoir:

Proceeds:

Precise medication delivery: The ability to deliver drugs directly into the cerebral ventricular system allows for higher, more specific concentration. One example is the article "Intraventricular Chemotherapy for Leptomeningeal Dissemination of Medulloblastoma and Other Central Nervous System Tumors," which highlights the benefits of intraventricular chemotherapy through the Ommaya Reservoir.(51)

Reduction of systemic effects: By administering drugs directly into the central nervous system, systemic exposure and therefore side effects in other parts of the body can be reduced. This is addressed in the article "Intraventricular Chemotherapy for Treatment of Leptomeningeal Metastasis in Breast Cancer."(52)

It is essential to note that the risks and benefits can vary depending on the patient's specific condition and should be evaluated by a specialized medical team. These examples are based on general research and are not a substitute for individualized medical advice.

Recurrence of the disease:

Recurrence of craniopharyngioma is a critical aspect to consider in treatment, and although the Ommaya Reservoir may be useful in administering medications, tumor recurrence remains a concern in some cases. Below, I provide source-based information:

Recurrence of craniopharyngiomas can occur even after successful treatments. A study published in "Child's Nervous System" in 2018, titled "Long-term recurrence rate of cranial and intracranial chondroid tumours after extended endoscopic endonasal resection," examines the long-term recurrence rate of craniopharyngiomas after endoscopic endonasal resection. Although this study does not specifically focus on the use of the Ommaya Reservoir, it highlights the importance of closely monitoring patients due to the possibility of recurrence.

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- Continuous Monitoring: Quality of life is also influenced by continuous monitoring of the patient. The need for medication adjustments, additional interventions, or long-term follow-up can affect perceived quality of life.
- Psychosocial Impact: The psychosocial impact of the diagnosis and treatment of craniopharyngioma should not be underestimated. Patients and their families may face emotional and social challenges. Quality of life can be improved through psychological and social support.

4. OBJECTIVES OF THE REVIEW

Objective: To determine the importance of the Ommaya reservoir as a treatment for craniopharyngioma

Specific objectives:

- To identify the clinical picture in patients with craniopharyngioma and its correct medical approach
- To determine the efficacy of the Ommaya reservoir as a treatment for craniopharyngioma

5. METHODOLOGY

Study design: Narrative literature review.

A narrative literature review will be carried out to collect, analyze and synthesize relevant information on the use of the Ommaya reservoir in the treatment of craniopharyngioma. This narrative review will allow us to gain a comprehensive understanding of the relationship between the device and the disease, as well as evaluate the effectiveness and safety in the management of this rare brain condition.

Methodology: To carry out a narrative literature review on the importance of the Ommaya reservoir in the treatment of craniopharyngioma, the following scheme will be followed:

Structure of the literature review:

1. Abstract: Description of the purpose of the research.
2. Introduction:
3. Research problem: It arises from the question about the importance of the ommaya reservoir for its treatment in craniopharyngioma.
4. Justification: Presentation of the reason for the research.

5. Objectives: The specific objectives of the review will be established, such as analysing previous studies on the use of the Ommaya reservoir in the treatment of craniopharyngioma to assess efficacy in tumour control and prevention of complications.

6. Methodology: The methodology used will be described, including inclusion and exclusion criteria, keywords and search terms, and selected databases.

7. Results: The findings of the selected studies will be presented according to the specific objectives. Tables will be used to summarise relevant data, such as the efficacy of the Ommaya reservoir and complication rates.

8. Discussion: The results will be discussed in light of the existing medical literature and the advantages and limitations of the use of the Ommaya reservoir in the treatment of craniopharyngioma will be highlighted.

9. Conclusions: The main conclusions of the review will be summarized and the clinical importance of the Ommaya reservoir in the management of this disease will be highlighted.

10. Recommendations: Recommendations for future research and appropriate implementation of the Ommaya reservoir in clinical practice will be offered.

Tables and graphs will be used to organize and present in a clear and concise manner the key data obtained from the literature review. These tools will be used to summarize information on the effectiveness of the Ommaya reservoir in the treatment of craniopharyngioma, as well as to highlight relevant clinical outcomes and trends.

The analysis of the information will be carried out by extracting relevant data from the selected studies, including clinical outcomes, success rates, and complications associated with the use of the Ommaya reservoir in patients with craniopharyngioma.

Inclusion criteria:

- Languages: Studies in English and Spanish will be included.

- Years: Studies published from 2019 to the current date will be considered.

- Types of articles: Clinical studies, systematic reviews, and meta-analyses related to the use of the Ommaya reservoir in the treatment of craniopharyngioma will be included.

Exclusion Criteria:

- Studies published before 2019.

- Studies in languages other than English and Spanish.

- Studies that do not specifically address the use of the Ommaya reservoir in the treatment of craniopharyngioma, as editorials, letters to the editor, and conferences are excluded due to their lower relevance to this review.

Keywords and search terms:

-Craniopharyngioma

- Ommaya Reservoir

-Treatment

-Efficiency

-Safety

-Complications

- Quality of life

- Neuro oncology

Boolean operators (AND, OR) will be used to combine the keywords and refine the search.

Databases to be included in the search:

1. PubMed/MEDLINE
2. Scopus
3. Web of Science
4. Base Plate
5. Cochrane Library

6. HUMAN AND MATERIAL RESOURCES

The development and execution of the research will be carried out by the author, so at the level of human capital, no additional resources will be needed. Regarding the study material, academic information available in various online academic resources will be used, as well as published case reports that include information on the use of the Ommaya reservoir for the treatment of craniopharyngioma.

7. RESULTS

At the level of Gómez Rony's study in 2021, he examined a series of 23 patients with craniopharyngioma between the years 2016-2020, observing a predominance in women (73.9%) and a concentration in the age group of 5 to 10 years. The prevalence of neurological symptoms in all ages, especially headache (86.96%), and endocrinological symptoms such as diabetes insipidus (26.09%) and partial hypopituitarism (17.39%) was highlighted. (54)

The series showed that cystic craniopharyngiomas are more common in the pediatric population and are related to visual disturbances and endocrine symptoms. The importance of early diagnosis was discussed, given that slow tumor growth can delay the onset of symptoms. Challenges in diagnosis in mestizo populations were mentioned. (54)

The study highlighted the predominance of adamantinomatous craniopharyngioma and its relationship with hypothalamic obesity. The efficacy of different treatments, such as Ommaya reservoir placement and surgical resection, was discussed, highlighting the importance of preserving hypothalamic function. Different periods of treatment with bleomycin, interferon alfa and radiotherapy were presented, and it was noted that decompressive treatments showed higher rates of recurrence and complications compared to resective treatments. In addition, the need to unify criteria to evaluate surgical outcomes was proposed, considering factors such as quality of life and neurological and endocrinological aspects. The study concluded that changing the management philosophy could improve the quality of life of pediatric patients with craniopharyngioma.(54)

On the other hand, in the study "Clinical and surgical outcomes of the treatment of craniopharyngiomas in pediatrics" by Amparo et al. in year 20, 52 patients with suspected craniopharyngioma were identified, of which 6 were excluded due to incomplete data, 2 due to diagnosis of prolactinoma and 4 due to loss of follow-up. They were divided into two groups: 33 who underwent surgical excision and 7 who underwent Ommaya placement. (55)

In the surgical group, composed of 48.5% women and 51.5% men with a median age of 8 years, preoperative imaging revealed variety in tumor composition. Hydrocephalus prior to surgery occurred in 51.5% of cases. The majority (63.6%) underwent complete excision, and at one year, 51.5% showed no growth or recurrence, while 48.5% did,

requiring additional treatment. Postoperative evaluations indicated a general deterioration, with complications such as diabetes insipidus (69.7% vs. 18.1%), obesity (36.4% vs. 12.1%), and short stature (57.6% vs. 33.3%) being statistically significant. It also presents the following table:

Board 1. Preoperative and postoperative evaluation of patients undergoing surgical removal.

Evaluation	Presurgical (n=33)	Postoperative (n=33)	P value
Impaired visual acuity (n and %)	66.7% (22)	75.8% (25)	0.25
Altered endocrinological laboratory (n and %)	45.5% (15)	90.9% (30)	0.10
Hormone replacement requirement (n and %)	45.5% (15)	90.9% (30)	0.10
Diabetes insipidus (n and %)	18.2% (6)	69.7% (23)	**0.04**
Obesity (n and %)	12.1% (4)	36.4% (12)	**0.005**
Short stature (n and %)	33.3% (11)	57.6% (19)	**0.0006**

Source: Amparo et al., 2021

In addition, the outcomes of 7 patients treated with Ommaya and Interferon during 12 sessions were examined. The group comprised 42.9% females and 57.1% males, with a median age of 5 years. On preoperative imaging, 57.1% had solid/cystic tumors with a single cyst, while 42.9% had solid/multicystic tumors, with 57.1% experiencing hydrocephalus prior to surgery. After one year of treatment, 28.6% of the cysts showed reduction or remained stable, while 71.4% had increased cyst size, requiring additional treatment. Table 2 summarizes the preoperative and postoperative evaluations of patients who received tumor cyst treatment with Ommaya and Interferon.

Board 2. Preoperative and postoperative evaluation of patients who have been treated with Ommaya and Interferon.

Evaluation	Presurgical (n=7)	Postoperative (n=7)	P value
Impaired visual acuity (n and %)	42.86% (3)	42.86% (3)	0,6
Altered endocrinological laboratory (n and %)	14.29% (1)	57.14% (4)	0,5
Hormone replacement requirement (n and %)	14.29% (1)	71.43% (5)	0,7
Diabetes insipidus (n and %)	28.57% (2)	42.86% (3)	0,1
Obesity (n and %)	14.29% (1)	28.57% (2)	0,5
Short stature (n and %)	14.29% (1)	28.57% (2)	0,2

Source: Amparo et al., 2021

8. DISCUSSION

In Gómez Rony's study conducted in 2021, 23 patients with craniopharyngioma were examined between 2016 and 2020, observing a predominance in women (73.9%) and an age group concentrated between 5 and 10 years. The prevalence of neurological symptoms, especially headache (86.96%), and endocrinological symptoms such as diabetes insipidus (26.09%) and partial hypopituitarism (17.39%) were highlighted. The study highlighted the importance of early diagnosis given the slow-growing nature of the tumor, with cystic craniopharyngiomas being more common in the pediatric population and associated with visual disturbances and endocrine symptoms. The challenges in diagnosis in mestizo populations were discussed, and the predominance of matous adamantine craniopharyngioma, linked to hypothalamic obesity, was emphasized. (54)

In addition, different treatments were explored, such as Ommaya reservoir placement and surgical resection, underlining the importance of preserving hypothalamic function and proposing the need for unified criteria to evaluate surgical outcomes, considering neurological, endocrinological and quality of life aspects.

On the other hand, the study by Amparo et al. in 2021 identified 52 patients with suspected craniopharyngioma, excluding 12 due to incomplete data, diagnosis of prolactinoma, or loss of follow-up. They were divided into two groups: 33 who underwent surgical excision and 7 who underwent Ommaya placement. (55)

In the surgical group, with a predominance of women (48.5%) and a median age of 8 years, a variety in tumor composition was observed in the preoperative images. Most experienced complete excision (63.6%), and at one year, 51.5% did not show growth or recurrence, while 48.5% did, requiring additional treatment. Postoperative evaluations indicated an overall deterioration, with complications such as diabetes insipidus, obesity, and short stature being statistically significant. In addition, the results of 7 patients undergoing treatment with Ommaya and Interferon were examined, highlighting that 28.6% of the cysts showed reduction or remained stable, while 71.4% presented increased cyst size, requiring additional treatment.(55)

Craniopharyngiomas represent one of the most significant tumors in the pediatric population. According to the Central Brain Tumor Registry of the United States, the incidence of craniopharyngiomas in children is 0.13 per 100,000 annually, with a peak observed between the ages of 5 and 9, reaching an annual incidence of 0.20 per 100,000 children. According to the records of the National Cancer Institute in Argentina, between 2000 and 2020, 292 cases of craniopharyngioma were diagnosed in pediatric patients in the country, of which 140 received care at the Juan P. Garrahan Pediatric Hospital. During the selected study period (2013-2018), 86 craniopharyngiomas were diagnosed in pediatric patients in Argentina, and of these, 52 were treated at the aforementioned hospital. These data underscore the relevance of craniopharyngiomas as a notable clinical entity in pediatric care. At the Juan P. Garrahan Pediatric Hospital, approximately half of the cases diagnosed with craniopharyngiomas in Argentina are treated, which is equivalent to about 10 cases per year. (56)

The treatment of craniopharyngiomas remains controversial globally. Complete surgical excision is considered to be the ideal approach, as it provides better control of the disease. However, given the location in the sellar region and the complex relationships with surrounding structures, such as the chiasm, hypothalamic-pituitary axis, and arteries of the polygon of Willis, achieving complete excision without damaging these structures represents a significant challenge (see Figure 1).(57)(58)(59)

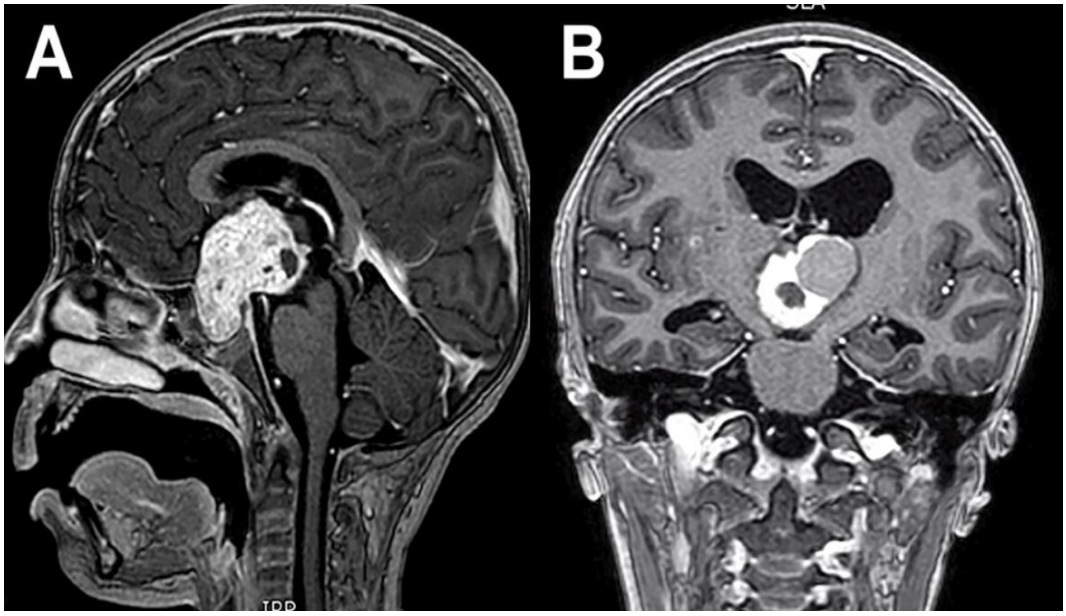

Figure 1. Magnetic resonance imaging of the brain with contrast, showing in the sagittal (A) and coronal (B) sections a tumor with solid-cystic features in the suprasellar sellar region, which is indicative of craniopharyngioma.

9. CONCLUSIONS

Gómez Rony's study in the period 2016-2020 revealed a prominent prevalence of craniopharyngioma in women (73.9%) and a concentration in the age group of 5 to 10 years. Neurological symptoms, mainly headache, were prevalent at all ages, and endocrinological symptoms such as diabetes insipidus and partial hypopituitarism were observed. In addition, the importance of early diagnosis was emphasized, given the slow growth of the tumor and specific challenges in mixed-race populations were noted.

The predominance of the adamantinomatous subtype of craniopharyngioma and its association with hypothalamic obesity were highlighted. The efficacy of various treatments, including Ommaya reservoir placement and surgical resection, was discussed. Different therapeutic approaches, such as the use of bleomycin, interferon alfa and radiotherapy, were presented. It was shown that decompressive treatments showed higher rates of recurrence and complications compared to resective treatments.

In the 2021 study by Amparo et al., 52 patients with suspected craniopharyngioma were examined, and different clinical and surgical outcomes were identified. In the surgical group, a variety in tumor composition was observed on preoperative imaging. Although most experienced complete excision, one-year follow-up revealed that approximately half of the cases had growth or recurrence, requiring additional treatment. Postoperative evaluations indicated significant complications, such as diabetes insipidus, obesity, and short stature.

In addition, the outcomes of 7 patients treated with Ommaya and Interferon during 12 sessions were evaluated. It was observed that a significant percentage of the cysts showed reduction or remained stable after one year, although a considerable number experienced an increase in cyst size, requiring additional treatment.

Both studies underline the need to unify criteria to evaluate surgical outcomes, taking into account neurological, endocrinological and quality of life aspects. The importance of preserving hypothalamic function during surgery is also highlighted.

Despite the advances, controversy in the management of craniopharyngiomas persists worldwide. The challenges in achieving complete excision without damaging the surrounding structures indicate the continued need for research and development in this field.

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