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MOHS Microsurgery as a Treatment for Eyelid Tumors

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ABSTRACT

Introduction: Malignant tumors of the eyelid are typically elevated, firm lesions with small blood vessels on the surface and, when they affect the eyelid margin, there is usually loss of eyelashes. This tumor is locally invasive and metastasis is not common. However, when not treated correctly, it can invade the eyeball and orbit. Objective: to perform a literature review study presenting the stages that make up the eyelid tumors (SCC and BCC) treated by the Mohs microsurgical technique (MMS) combined with the use of radio frequency scalpel, comparing the results found in the world literature. Material and Methods: The present article is a systematic review, which sought to identify the benefits of Mohs microsurgery as a form of treatment of eyelid tumors. A search strategy was developed based on the evaluation of an objective about the theme in question, which is configured as the basis of the study.

Keywords: malignant eyelid tumors; Mohs micrographic surgery; Merkel cells.

INTRODUCTION

Malignant eyelid tumors usually affect older patients and can be caused by ultraviolet damage from sunlight and HPV virus infection, as well as genetic diseases such as xeroderma pigmentosum. They are different types of cancer and are also more common in immunosuppressed patients (SOARES et.al, 2021).

Schellini et.al (2023) describe that malignant eyelid tumors are typically elevated, firm lesions with small blood vessels in the eyelid. surface and, when the eyelid edge is affected, eyelash loss usually occurs. This tumor is locally invasive and metastasis is not common. However, when not treated correctly, it can invade the eyeball and orbit.

The eyelids can have several types of tumor lesions, benign or malignant. The diagnosis is made by the ophthalmologist in a routine examination. The earlier the treatment, the greater the chances of cure (ISHI et.al 2019).

The causes are numerous, but the genetic factor and solar radiation are the main risk factors. In addition, dietary factors and smoking also contribute to the development of eyelid tumors (AMELINE-AUDELAN et.al, 2020).

According to Arias Soto et.al (2019), the main symptom of eyelid tumor is the appearance of a lump, a wart or an elevation in the region around the eyes.

One can perceive only one change, whether visible or felt only by touch. One should be alert when noticing loss of eyelashes, distortion of the eyelid margin, change in skin color and texture, bleeding, swelling, sores that do not heal, or a stye that does not improve (HIRT et.al, 2022).

Benign eyelid tumors are slow growing and do not ulcerate or bleed. The most common types are: papillomas, cysts, nevi (spots), hemangiomas, molluscum contagiosum, xanthelasma (HIRT et.al, 2022).

Carneiro et.al (2019) cites that squamous papilloma (wart) is the most common benign tumor of the eyelid. The skin of the eyelids can be affected by malignant tumors such as basal cell carcinoma, squamous cell carcinoma, sebaceous cell carcinoma and melanoma.

These tumors are faster growing, affect older people, present with ulcerations, vessels and local deformities, as well as loss of eyelashes. They can present as wounds that never heal (CARNEIRO et.al, 2019).

Veras et.al (2020) cite that basal cell carcinoma is the most common malignant eyelid tumor and accounts for 90% of all eyelid malignancies. It affects more light-skinned individuals, with a history of sun exposure and in the age group of 50-80 years.

Gomes, M., & Silva, S. C. M. (2020) define that the lower eyelid is the most affected (52%), followed by the medial corner (27%), upper eyelid (15%) and lateral corner (6%). They are typically elevated, firm lesions with small blood vessels on the surface and, when it affects the eyelid margin, there is usually loss of eyelashes.

This tumor is locally invasive and metastasis is not common. However, when not treated correctly, it can invade the eyeball and orbit. In these cases, more radical surgery is required, exenteration of the orbit (CARNEIRO et.al, 2019).

The diagnosis is made on clinical examination. According to the characteristics of the lesion, size, appearance, shape, color, it is possible to define the type of tumor and whether malignancy is suspected. The certainty of the diagnosis is made by analyzing the lesion in the laboratory, after its surgical removal (HIRT et.al, 2022).

In benign lesions, clinical treatment is indicated. When there is aesthetic or functional impairment, surgical removal may be chosen (SOARES et.al, 2021).

In cases of suspected malignancy, treatment is almost always surgical and, the earlier, the less chance of functional and aesthetic sequelae in the eyelids (da SILVA et.al, 2020).

The removal must be done with a safety margin and the anatomopathological examination that confirms the diagnosis and demonstrates whether the lesion has been completely removed (CONTE, 2022).

Mohs micrographic surgery or Mohs surgery is the surgical method considered the most effective and thorough for the treatment of skin cancer, especially for basal cell carcinoma and squamous cell carcinoma. Still little known in Brazil, but widely used in developed countries such as the United States, Canada and European countries, its high effectiveness is observed in several studies, reaching more than 99% chance of cure in some situations (RAMACHANDRAN, V., & PHAN, K., 2022).

Its main advantage over other methods is that it can map skin cancer through microscopic analysis of 100% of surgical margins, thus ensuring complete removal of neoplastic cells and maximum preservation of healthy skin, resulting in the smallest possible scar (LERNER et.al, 2013).

OBJECTIVES

To perform a literature review study presenting the stages that make up the eyelid tumors (SCC and BCC) treated by the Mohs microsurgical technique (MMS) combined with the use of radio frequency scalpel, comparing the results found in the world literature.

MATERIAL AND METHODS

The present article is a systematic review, which sought to identify the benefits of Mohs microsurgery as a form of treatment for eyelid tumors.

A search strategy was developed based on the evaluation of an objective about the theme in question, which is configured as the basis of the study.

RESULTS AND DISCUSSION

Frederic Mohs developed the first concepts of micrographic surgery in 1930, studying the potential curative effect of injecting various substances into diferente various substances into different neoplasms (SHRINER et.al, 1998).

During one experiment, a 20% zinc chloride solution was used, which, when injected into the skin, was which, injected into the skin, caused tissue necrosis. Microscopically, the analysis showed that the tissue retained its microscopic structure, as if it had been excised and processed for routine histological examination (BOETTLER et.al, 2023).

With this, Dr. Mohs observed that in situ fixation was effective, making it possible to develop a surgical develop a surgical technique in which he removed the tumor in stages. After in situ fixation, he performed the tumor excision and then tangential sections, enabling tangential sections, allowing the analysis of both the epidermis and the depth of the tumor (SHRINER et.al, 1998).

By using horizontal sections, this technique allowed analysis of 100% of the sample margins, unlike the of the sample margins, unlike traditional sectioning, which evaluates only 0.001% of the total sample surface (BOETTLER et.al, 2023).

History of Mohs surgery

Mohs tested numerous substances for in situ fixation, and zinc chloride was chosen because it preserved the microscopic characteristics for analysis and had good tissue penetration with precise control of fixation depth, did not interfere with subsequent healing by second intention of the excision site, did not cause systemic toxicity, was safe to use and had no odor (BOETTLER et.al, 2023).

Initially, Mohs decided to name the technique microsurgery, but this term was already used to describe the dissection of small structures using a microscope; he then chose the term chemosurgery, as skin tumors were chemically fixed in situ before being excised (SHRINER et.al, 1998).

Although this technique had a higher cure rate than the traditional excision technique, it had some drawbacks: it could take days to complete, it could cause pain, fever, lymphadenopathy in large diameter tumors, and the detachment of the fixed tissue could take days to complete, which delayed the reconstruction of the surgical wound (BOETTLER et.al, 2023).

Because of these drawbacks, in situ fixation was gradually replaced by the fresh tissue technique, using freezing after tumor excision. The fresh tissue technique eliminated the need for zinc chloride, allowing tumor removal and reconstruction to be performed on the same day without waiting for the eschar caused by zinc chloride to peel off and separate from the viable underlying tissue. Thus, in situ fixation (chemosurgery) fell into disuse and currently the technique with fresh tissue (Mohs micrographic surgery - MMS) is used (GOLDA & HRUZA, 2023).

In conventional excision, a margin of 3 to 6 mm is usually left beyond the tumor. The histological margins are evaluated by the pathologist by sampling, which can lead to failures in the evaluation. In MMS, the superficial and deep margins are fully assessed (BOETTLER et.al, 2023).

The five-year recurrence rate of primary and recurrent basal cell carcinomas (BCCs) treated with conventional surgery is 10% and 17%, respectively. When treated by MMS, this rate drops to 1% and 6%; another major advantage is that the technique allows more conservation of normal tissue (GOLDA & HRUZA, 2023).

To perform MMS, surgical materials are needed for dieresis, hemostasis and synthesis (the same ones used for conventional excision), pen for marking surgical margins, histological dye, material for processing the specimen, cryostat, microscope and the help of a laboratory technician to stain and cut the specimen (SHRINER et.al, 1998).

The technique has five steps: 1) Marking the area to be excised: delimit the clinical margins of the tumor with a pen and then the surgical margins with a distance from the clinical margins varying from 2 to 5mm. Make transverse markings to the incision line, which will allow locating the position of the removed fragments in the tissue around the operative wound. 2) Excision of the tumor: it is performed using a scalpel positioned at 45° degrees, which allows the epidermis and dermis to be subsequently cut in a straight line in the cryostat, allowing microscopic analysis in the same plane. 3) Mapping of the specimen: can be done on a sheet of paper or digitally on devices that allow photo and drawing on the photo (such as tablets). The surgical specimen and its location in the area of the surgical defect should be drawn, as well as the divisions and their marking with ink.

The surgical specimen and its location in the area of the surgical defect should be drawn, as well as the divisions and their marking with ink. This map is essential for the dermatological surgeon to orient himself during tissue analysis under the microscope and for the exeresis of areas compromised with tumor. 4) Processing and histological analysis of the specimen: in this phase, the specimen must be marked with ink, flattened, frozen, cut and then stained. 5) Selective excision of areas with residual tumor: this step occurs if any margin is compromised. If the lateral margin is compromised, a 1-2 mm excision should be performed at that site. If the deep margin is compromised, excision should be made along the inside of the defect, removing tissue from the depth (MOHS, 1989).

The division of the piece, when necessary, and the marking with ink should always be indicated on the map. The most commonly used ink for marking the part is India ink, which has several colors, allowing each region to be highlighted (BOETTLER et.al, 2023).

Planing of the surgical specimen can be performed with mechanical pressure on it, and in some cases cuts with a scalpel are necessary. Flattening on the blade is essential to be able to cut the entire epidermis and dermis in a single plane in the cryostat (BOETTLER et.al, 2023).

The tissue is then frozen and sectioned in the cryostat, and the slides are prepared with hematoxylin-eosin for histological evaluation. The surgeon assesses the slides to determine if the margins are involved. If the tumor is completely excised, the surgical defect can now be reconstructed; however, if the tumor is still present, the corresponding site on the map is marked (MOHS, 1989).

Tissues from the compromised areas must undergo histologic analysis. These steps are repeated until the margins are considered tumor-free and reconstruction can be performed (GOLDA & HRUZA, 2023).

Benefits of Mohs microsurgery

Mohs Micrographic Surgery (MMS) is a technique for the removal of skin tumors that, through a mapping of the surgical margins, provides a more complete histological evaluation. A total resection of the tumor is then obtained, with better cure rates, while allowing greater preservation of normal tissue (BOETTLER et.al, 2023).

The procedure consists of removing the cancer from the skin, layer by layer, and examining each of them under a microscope, until a free margin is obtained, that is, until the tumor is completely removed (the level of precision and accuracy can reach 98%) (BOETTLER et.al, 2023).

This technique has been used with encouraging results for the excision of nail neoplasms such as squamous cell carcinomas, with cure rates of around 96%.

The great advantage is oncologic safety, maintaining the preservation of adjacent normal tissues, with evident aesthetic and functional benefit (SHRINER et.al, 1998).

Mohs micrographic surgery (MMS) is a technique used to treat non-melanoma malignant skin neoplasms, which offers the best cure rates and is now considered the gold standard. In this procedure, the dermatological surgeon performs the mapping of the neoplasm, removal and histological analysis of the tumor and its margins (BOETTLER et.al, 2023).

Mohs micrographic surgery avoids arbitrary removal of normal skin, as it removes the maximum of tumor and the minimum of healthy skin. The technique maximizes the effectiveness of surgery and minimizes the removal of normal tissue and therefore also offers the best aesthetic results (GOLDA & HRUZA, 2023).

Malignant tumors of the eyelid

For Wong et.al (2019), Merkel cell carcinoma (MCC) is a rare and aggressive cutaneous neuroendocrine neoplasm. Most cases occur in the head and neck region, in areas intensely exposed to the sun, of elderly and white people. MCC is lethal in 33% of cases, showing a worse prognosis than melanoma. To improve the prognosis of patients with MCC, early diagnosis and treatment with appropriate use of lymph node clearance, chemotherapy and radiotherapy should be performed.

The eyelids are the most common sites for tumors in the eye region. A number of benign tumors and cancers can affect this part of the body. The damage caused by sun exposure throughout life is an important risk factor for the appearance of eyelid tumors, especially the so-called carcinomas (SHRINER et.al, 1998).

Melanoma is a rarer type of eyelid tumor, but extremely malignant due to the risk of metastasis and threat to the patient's life. Melanoma is usually pigmented (brown or black), can arise from healthy skin or from a pre-existing mole. Any eyelid spot should be followed up by an ophthalmologist and should be biopsied in case of doubt or suspicion of melanoma growth. In some cases it may be necessary to do sentinel lymph node research to see if the disease has begun to "spread" through the lymphatic chain. These cases are usually also accompanied by a medical oncologist specialized in melanoma (CARNEIRO et.al, 2019).

Squamous cell carcinoma (SCC)

Although less common than basal cell carcinoma, this type called squamous cell carcinoma is more aggressive, more invasive and has a chance to spread to the rest of the body. In this way it is a more aggressive cancer and needs to be diagnosed as soon as possible to increase the patient's chance of cure. Sometimes it appears as a "bruise" on the eyelid that does not heal, can be ulcerated and even bleed (WONG et.al, 2019).

Cancerous lesions occur more frequently on the skin than on any other part of the body, being partly related to exposure to sunlight or other electromagnetic radiation and also to contact with chemical carcinogens, in addition to genetic predisposition. In tropical countries such as Brazil there is a high incidence of skin lesions due to sun exposure (CARNEIRO et.al, 2019).

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Signs and symptoms that help differentiate benign from malignant lesions (cancers) of the eyelid:

For Cook & Zitelli (1998), some rules help the ophthalmologist to differentiate benign and malignant lesions of the eyelids: malignant lesions usually cause loss of eyelashes, distortion of the eyelid margin, change in skin coloration or texture, and persistent bleeding. Patients presenting with these symptoms should see an ophthalmologist who will assess the need for a biopsy.

Treatment and Indications for Mohs Surgery

The Mohs technique is indicated for cases such as: Recurrent tumor (which return after previously treated) or in high-risk areas (such as eyelids, ears, nose around the mouth, genitals, hands and feet) (BOETTLER et.al, 2023). Tumors larger than 2cm in diameter, with poorly clinically delineated contours; Incompletely removed or histologically more aggressive tumors (in the case of basal cell tumors: micronodular, infiltrative or sclerodermiform) (BOETTLER et.al, 2023).

Main advantages and differences of the procedure

Mohs surgery in relation to the differences to traditional methods that are done with the removal of a margin skin around, which to the naked eye, appears to have better results. One difference between Mohs surgery and conventional surgery (FIGURE 1) is in the histopathologic analysis. In conventional surgery, the pathologist evaluates the lesion removed by sampling, in slices (GOLDA & HRUZA, 2023).

Boettler et.al (2023) report that in this way, only 1% of the peripheral margins is evaluated, unlike the Mohs technique, where 100% of the margin is analyzed by microscope and any tumor remnant is identified and removed.

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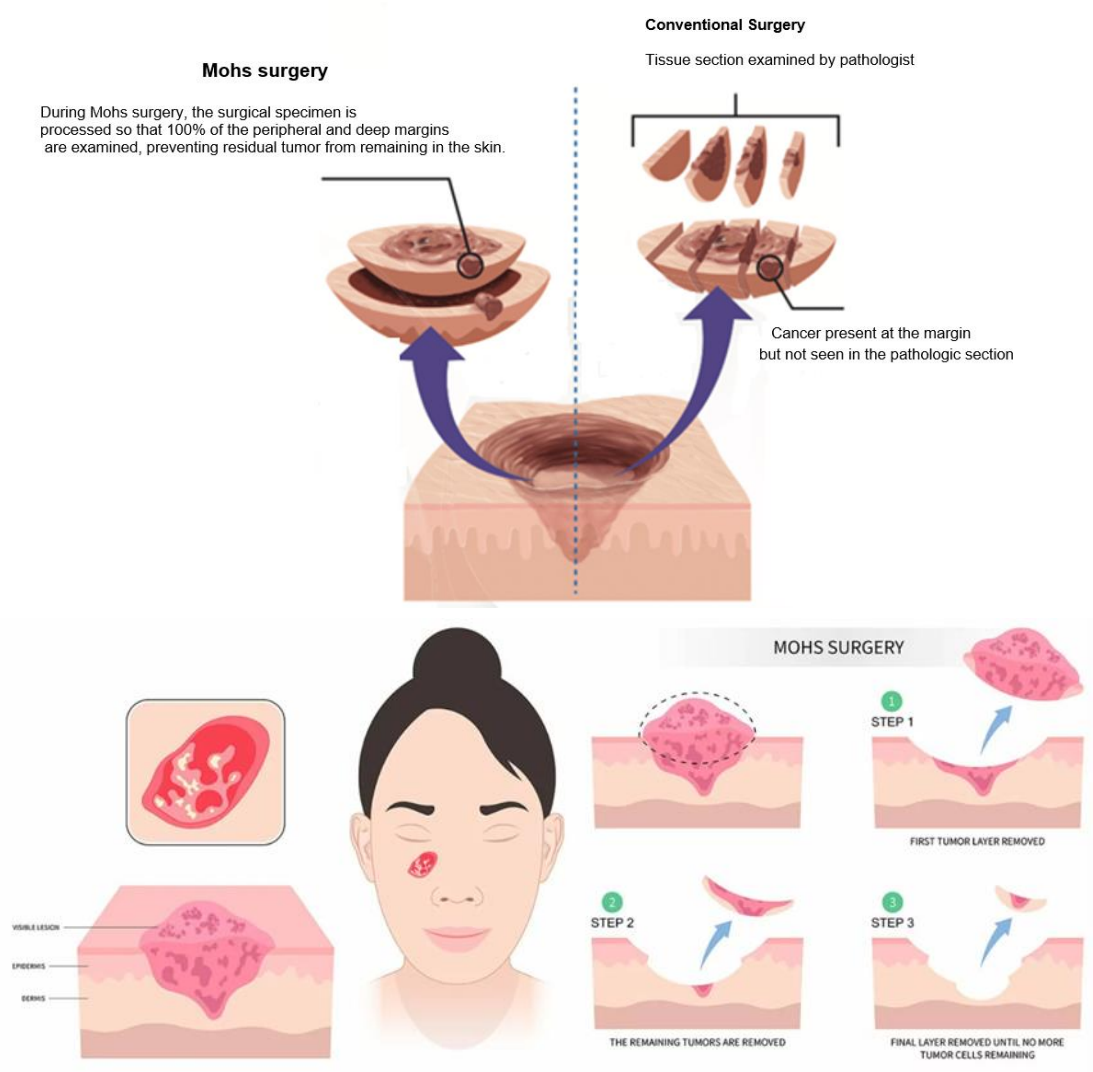

Figure 1 - Mohs surgery technique step compared to traditional surgery. **Source:** conwaymedicalcenter.com.

The treatment for malignant lesions and benign lesions with cosmetic changes is surgical removal. We usually try to remove the entire lesion, but sometimes we do a biopsy and, depending on the result, we schedule the main surgery where the removal is done with a safety margin, to reduce the chance of the tumor returning. The material must be sent for evaluation by the pathologist, who confirms the type of tumor and whether it was removed completely (NOURI, 2012).

Depending on the type and size of cancer we use freezing pathology, when we do the pathology analysis still during surgery. The treatment is with surgical removal that removes the cancer and already performs the reconstruction of the eyelid. We can have confirmation from the pathologist during surgery to ensure that the entire tumor has been removed (SHRINER et.al, 1998).

Benedetto et.al (2011), described that the pathologist should make an immediate assessment and notify the surgeon. In this way increase safety by ensuring that the entire tumor has been removed.

Final Considerations

The treatment for malignant lesions and benign lesions with cosmetic changes is surgical removal. We usually try to remove the entire lesion, but sometimes we do a biopsy and, depending on the result, we schedule the main surgery where the removal is done with a safety margin, to reduce the chance of the tumor returning. The material must be sent for evaluation by the pathologist, who confirms the type of tumor and whether it was removed completely.

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The treatment is with surgical removal that removes the cancer and already performs the reconstruction of the eyelid. We can have confirmation from the pathologist during surgery to ensure that the entire tumor has been removed.

Through the studies analyzed, good results were observed in the treatment of recurrent tumors or in high-risk areas, such as eyelids, ears, nose around the mouth, genitals, hands and feet.

Mohs Micrographic Surgery has gained increasing prominence due to its advantages over traditional methods. In addition to having the highest cure rate, the procedure virtually eliminates the chances of the tumor growing again, or spreading to other areas.

It has also been observed that with this technique, the amount of healthy tissue removed is smaller, thus maximizing functional and aesthetic results.

COMMENTS

The authors declare no conflicts of interest of any kind.

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