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MOHS SURGERY: NARRATIVE REVIEW

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ABSTRACT

Technique widely used in dermatology for the treatment of skin cancer. The historical perspective highlights the evolution of Mohs surgery since its development by Dr. Frederic Mohs in the 1930s, emphasizing its focus on basal cell carcinoma and subsequent refinements in instrumentation, anesthesia, and tissue processing methods. Mohs surgery, which involves stepwise removal of cancerous tissue layers with immediate microscopic examination to ensure complete tumor removal while preserving healthy tissue. The advantages of Mohs surgery include high cure rates, tissue preservation, real-time margin assessment, and precise mapping. However, the procedure is time-consuming, requires specialized training, and may have higher costs compared to alternative treatments. Perioperative management considerations, including preoperative assessment, anesthesia techniques, surgical procedure, wound care, and follow-up, are discussed to ensure optimal outcomes and patient satisfaction. Understanding the historical context, surgical technique, advantages, and disadvantages of Mohs surgery is crucial for healthcare professionals involved in the management of skin cancer patients.

KEYWORDS : Mohs surgery, Skin cancer, Tissue preservation, High cure rates, Microscopic examination.

INTRODUCTION

Skin cancer is one of the most prevalent forms of cancer worldwide, with its incidence increasing steadily over the past few decades. Among the various treatment modalities available, Mohs surgery has emerged as a highly effective and precise technique for the management of skin cancers, particularly those in cosmetically sensitive or functionally critical areas. This narrative review aims to provide a comprehensive overview of Mohs surgery, its evolution, indications, advantages, and outcomes. Mohs surgery, named after its inventor Dr. Frederic Mohs in the 1930s, is a microscopically controlled procedure that offers the highest cure rates while preserving the maximum amount of healthy tissue. It is primarily used for non-melanoma skin cancers, such as basal cell carcinoma (BCC) and squamous cell carcinoma (SCC), which account for the majority of skin cancer cases (1).

The key principle of Mohs surgery involves the systematic removal of thin layers of cancerous tissue and immediate microscopic examination of the excised margins. This iterative process continues until no residual tumor cells are detected, ensuring the complete eradication of cancer while minimizing tissue loss. By meticulously examining 100% of the surgical margins, Mohs surgery achieves cure rates as high as 99% for primary BCC and SCC, and 94-97% for recurrent cases (2).

METHODS

This narrative review is based on an exhaustive literature search conducted with the aim of gathering relevant information on Mohs surgery and its application in the treatment of skin cancer. The search strategy was carried out across various medical databases, including PubMed, Scopus, and Web of Science, using terms related to "Mohs surgery," "skin cancer," and other related terms.

Searches were performed using combinations of keywords such as "Mohs surgery," "skin cancer," "basal cell carcinoma," "squamous cell carcinoma," "Mohs micrographic surgery," among others. Boolean operators, such as AND and OR, were also employed to combine the search terms and enhance result precision. Original studies, systematic reviews, meta-analyses, clinical practice guidelines, and other relevant documents published in the English language were included. The following inclusion criteria were applied: studies describing the technique of Mohs surgery, its indications, clinical outcomes, advantages and disadvantages, as well as those exploring the latest innovations and advances in the field.

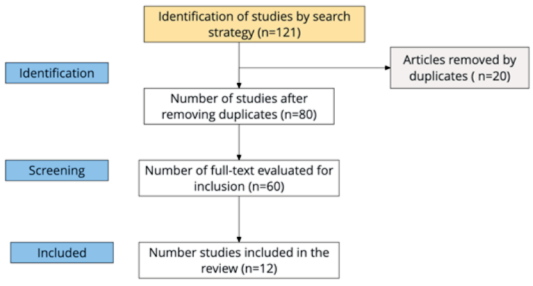

Figure 1. PRISMA

Historical Perspective

The historical perspective of Mohs surgery in the field of dermatology showcases its significant evolution over time. Developed by Dr. Frederic Mohs in the 1930s, the technique initially focused on the treatment of skin cancer, particularly basal cell carcinoma. Over the years, Mohs surgery has undergone refinements in instrumentation, anesthesia, and tissue processing methods, leading to improved outcomes and increased application for various skin cancer types. Its success in achieving high cure rates while preserving healthy tissue has positioned Mohs surgery as a gold standard in dermatologic oncology. Understanding the historical context provides valuable insights into the development and advancements of this innovative surgical approach (3).

Surgical Technique

Mohs surgery is a specialized surgical technique renowned for its meticulous precision and high cure rates in the treatment of skin cancer. This surgical approach involves the stepwise removal of cancerous tissue layers, combined with immediate microscopic examination, to ensure complete tumor removal while preserving healthy surrounding tissue. The surgical procedure typically begins with the administration of local anesthesia to ensure patient comfort. The first stage involves the excision of the visible tumor, along with a thin margin of clinically normal-appearing skin. The excised tissue is then mapped and carefully labeled to maintain orientation during subsequent processing and microscopic analysis (4).

Following excision, the surgeon processes the tissue by

flattening and freezing it, creating thin horizontal sections known as Mohs layers. Each layer is sequentially sectioned and stained, allowing for microscopic evaluation by the surgeon. The objective is to precisely identify tumor cells at the surgical margins. Under the microscope, the surgeon analyzes the tissue margins, examining for the presence of tumor cells. If tumor cells are detected, their location is noted on the mapped tissue specimen. The surgeon then returns to the specific site where the tumor cells were found and removes another layer of tissue only from that area. This selective removal is guided by the precise mapping and microscopic examination, ensuring that only the remaining cancerous tissue is removed while preserving healthy tissue (5).

This iterative process of tissue removal, mapping, and microscopic examination is repeated until no tumor cells are observed at the margins. The technique allows for real-time assessment of the surgical margins, ensuring the highest precision in tumor removal. Once the surgical margins are free of tumor cells, the wound is assessed for repair. Depending on the size and location of the defect, reconstructive options may include primary closure, grafting, or flap reconstruction. The goal is to achieve optimal functional and cosmetic outcomes while maintaining the highest standards of tumor clearance (6).

The advantages of Mohs surgery lie in its tissue-sparing nature and high cure rates. By systematically examining 100% of the surgical margins, Mohs surgery achieves cure rates as high as 99% for primary basal cell carcinoma (BCC) and squamous cell carcinoma (SCC). Additionally, its precision makes it particularly suitable for tumors located in cosmetically sensitive or functionally critical areas, such as the face, ears, nose, and eyelids (7).

Advantages and Disadvantages of Mohs Surgery

Advantages

High Cure Rates: One of the primary advantages of Mohs surgery is its remarkable cure rates. By systematically examining 100% of the surgical margins, Mohs surgery achieves cure rates as high as 99% for primary basal cell carcinoma (BCC) and squamous cell carcinoma (SCC). This high success rate ensures optimal patient outcomes and reduces the need for additional treatments (8,9).

Tissue Preservation: Mohs surgery is renowned for its tissue-sparing nature. By precisely targeting and removing only the cancerous tissue, it minimizes damage to healthy surrounding tissue, resulting in superior cosmetic and functional outcomes, especially in cosmetically sensitive areas such as the face, ears, and eyelids (9).

Real-time Margin Assessment: Mohs surgery allows for immediate microscopic examination of the excised tissue, enabling the surgeon to assess the margins in real-time. This ensures accurate identification and removal of tumor cells, reducing the likelihood of leaving residual cancerous tissue behind (9).

Precise Mapping: Mohs surgery utilizes precise mapping techniques, which aid in identifying the exact location of tumor cells. This facilitates selective tissue removal, minimizing the size of the surgical defect and optimizing reconstructive options (9,10).

Disadvantages

Time-Consuming: Mohs surgery is a meticulous and time-consuming procedure. The process of tissue removal, mapping, and microscopic examination can take several hours or even a full day, depending on the complexity and size of the tumor. This can result in prolonged operating room time and patient discomfort (10).

Specialized Training: Performing Mohs surgery requires specialized training and expertise. Surgeons must possess advanced skills in dermatologic surgery and interpretation of microscopic findings. The need for highly trained personnel limits the availability of this technique in certain regions or healthcare settings (10).

Cost: Mohs surgery can be costlier compared to other treatment modalities for skin cancer. The extensive resources required for the procedure, including specialized equipment, trained personnel, and laboratory support, contribute to its higher cost (10).

Surgical Expertise and Experience: The success of Mohs surgery heavily relies on the surgeon's expertise and experience. Skilled interpretation of microscopic findings and decision-making regarding tissue removal are crucial for achieving optimal outcomes. Lack of experience or proficiency may compromise the effectiveness of the procedure (10).

Perioperative Management

A thorough preoperative assessment is essential to identify patient-specific factors that may influence the surgical procedure and outcomes. This assessment involves a detailed medical history, including any underlying medical conditions, medications, and allergies. Special attention should be given to bleeding disorders, anticoagulant use, and history of adverse reactions to anesthesia or surgical procedures. Additionally, it is important to assess the patient's expectations, provide informed consent, and address any concerns or questions they may have. Mohs surgery is most commonly performed under local anesthesia. The choice of anesthesia technique depends on patient factors, tumor location, and surgeon preference. Local anesthesia with lidocaine is typically used, often supplemented with epinephrine to minimize bleeding. The anesthesiologist or surgeon should carefully evaluate the patient's medical history and consider any potential drug interactions or contraindications (10,11).

During the surgical procedure, the surgeon follows a meticulous stepwise approach, removing the tumor and examining the margins. The surgical technique involves excising the visible tumor, mapping and labeling the tissue, and processing it for microscopic analysis. The surgeon performs additional tissue removal only in areas where tumor cells are identified, guided by real-time margin assessment. Intraoperative collaboration between the surgeon and pathologist is essential to ensure accurate identification and removal of tumor cells (11).

After the surgical procedure, meticulous wound care is essential to promote optimal healing and minimize complications. The wound is typically dressed with sterile dressings, and specific postoperative instructions are provided to the patient. These instructions may include guidance on wound care, activity restrictions, and the management of postoperative pain. The patient should be educated on signs of infection, hematoma formation, or other potential complications, and instructed to report any concerns to their healthcare provider (11,12).

Regular follow-up visits are essential to monitor wound healing, assess cosmetic outcomes, and detect any signs of recurrence. The frequency and duration of follow-up visits may vary depending on the individual patient's risk factors and tumor characteristics. Long-term surveillance is critical to ensure early detection of recurrent or new skin cancers and provide appropriate interventions if needed (12).

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