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The Final thesis

Methods of Reconstruction (Plastic) of Medium Size Skin Defects: Indications, Contraindications, Advantages and Disadvantages and the Importance of Defect Localization

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Abstract:

This thesis delves into the nuanced realm of reconstructing medium-sized skin defects, focusing on the efficacy and strategic application of primary closure, local skin flaps, and regional or local pedicled flaps. By meticulously excluding microsurgical techniques and free flaps, the study offers a detailed exploration of alternatives suitable for defects that are too complex for simple suturing yet do not demand the intricate procedures required for more extensive or severe injuries. It aims to shed light on the critical decisions plastic surgeons face, emphasizing the key roles that the size and depth of the defect, and particularly location, play in the success of reconstructive outcomes.

Given the unique challenges presented by medium-sized defects, especially when underlying critical structures are exposed or when the wound is situated in areas where high aesthetic or functional integrity is essential, such as the face and hands, this work is particularly relevant. For each specific location—whether it is the trunk, with its relatively more accessible closure possibilities due to the availability of soft tissue; the extremities, where the strategic placement of scars is crucial not to impede movement; the hands, which are vital for daily function and thus require a careful approach to preserve their underlying structures; or the face, where aesthetic considerations are paramount—this thesis discusses the different strategies which may be used and those that may be more obsolete.

The study highlights the importance of a tailored approach by emphasizing the role of primary closure alongside local skin flaps and regional or local pedicled flaps. It asserts that understanding the intricate dynamics between the reconstruction method and the defect's specific location is crucial for optimizing both the healing process and the patient's overall satisfaction. The presented study, based on a literature review, humbly proposes that focusing on local skin flaps and regional or local pedicled flaps could offer insights into the most appropriate reconstructive strategies when considering medium-sized defects, balancing functional preservation and aesthetic outcomes.

Finally, by examining the indications and contraindications, as well as the advantages and disadvantages of various methods, this study aspires to contribute to the plastic surgery field. It seeks to provide a nuanced perspective on achieving optimal results for patients facing medium-

sized skin defects, emphasizing the importance of tailoring the surgical approach to the specific requirements of each defect's location and characteristics.

Chapter 1: Introduction

The Evolution and Impact of Plastic and Reconstructive Surgery on Medium-Sized Skin Defects:

Plastic and reconstructive surgery, a field marked by continuous evolution and innovation, plays a pivotal role in addressing the complexities associated with medium-sized skin defects. These are typically defined as defects measuring between 2 cm to 10 cm and may result from a diverse array of causes, including but not limited to trauma, burns, infections, and surgical resections, particularly within oncological contexts. The challenge in treating medium-sized defects lies in their complexity, as they often involve not only the skin but also subcutaneous tissue, muscles, or even deeper structures. Addressing these defects requires a strategic approach that balances aesthetic and functional restoration, with treatment options varying based on the defect's size, depth, location, and the patient's overall health and aesthetic goals [1].

Historical Context and Surgical Philosophy:

The history of plastic surgery is rich and storied, with its roots embedded in ancient civilizations. The Edwin Smith Papyrus, dating back to around 1600 BC in Egypt, is one of the earliest documented references to procedures that would today be recognized as reconstructive surgery. The term "plastic surgery" was officially coined in 1838 by Eduard Zeis, drawing from the Greek word "Plastikós," meaning to mold or re-shape. This terminology reflects the discipline's foundational aim to restore form and function to the human body [2, 3].

Significant advancements in the field have been made possible through pioneers such as Sir Harold Gillies, Sir Archibald McIndoe, Stephen Mathes, and Foad Nahai, who have refined surgical techniques and expanded the boundaries of reconstructive possibilities. Integrating modern technology and surgical innovations has further enhanced the capability to address complex defects with greater precision and improved outcomes.

Surgical Approach and Decision-Making:

Plastic surgery encompasses both reconstructive and cosmetic branches, with a significant portion of the field dedicated to correcting defects that require sophisticated tissue relocation techniques. Unlike other surgical specialties, plastic surgery is not confined to a specific anatomical area, allowing for a broad application across the body. The decision-making process in reconstructive surgery is nuanced, demanding careful consideration of patient-specific factors, available healthcare resources, and the desired surgical outcomes.

Historically, the reconstructive ladder has served as a guiding principle, advocating for a stepwise escalation in the complexity of reconstructive options. However, the more contemporary reconstructive elevator concept encourages selecting the most appropriate technique from the outset, emphasizing the importance of achieving the best possible outcome for the patient right from the beginning. As stated by De Francesco et al. [3]. "It is not the technique that solves the problem, but the problem that calls for a particular type of technique depending on the site, function, aesthetic considerations, and morbidity."

Study Objectives:

This thesis, entitled "Methods of Reconstruction (Plastic) of Medium Size Skin Defects: Indications, Contraindications, Advantages, and Disadvantages. Importance of Defect Localization," seeks to conduct a broad examination of the surgical repertoire available for the reconstruction of medium-sized skin defects according to newly posted literature. Its primary goal is to delineate the most effective reconstructive strategies according to defect localization to pave the way for superior patient outcomes in the realm of reconstructive surgery.

Scope of the Research:

We will focus on medium-sized defects amenable to closure through local skin flaps or regional and local pedicled flaps. Given the array of reconstructive options, this research will not cover techniques such as microsurgical free skin flaps, which are predominantly employed for more extensive defects, to maintain a concentrated scope of study.

Significance of Defect Localization:

A pivotal aspect of our investigation is the critical role of defect localization in determining the most suitable reconstructive technique. The location of a skin defect, whether in areas

demanding high aesthetic consideration like the face or regions crucial for function like the hands, significantly dictates the surgical approach.

Research Significance:

This research endeavors to present various modalities that facilitate the physical reconstruction of medium-sized skin defects and ensure the preservation of aesthetics and functionality. Based on the literature examined, this study's findings aim to serve as a valuable guide for plastic surgeons, aiding them in making informed, evidence-based decisions that enhance patient satisfaction and surgical success.

Thesis Structure:

Organized methodically, the thesis thoroughly reviews the principles underlying plastic and reconstructive surgery, delves into the details of various reconstructive options, and introduces a systematic approach to choosing the most appropriate technique. The subsequent chapters will explore the philosophical foundations of plastic surgery, scrutinize the nuances of different reconstructive methods, and present a strategic framework based on an extensive analysis of the defect characteristics, patient-specific considerations, and overarching surgical goals.

Chapter 2: Literature Review

The journey of skin reconstruction is as ancient as it is fascinating; the earliest known reference to procedures resembling plastic surgery comes from the Edwin Smith Papyrus, around 1600 BC in ancient Egypt, highlighting the specialty's longstanding role in addressing physical injuries. Historical records suggest that skin grafting techniques were known to ancient Indian and Egyptian civilizations, signifying the longstanding human quest to mend skin defects. The Renaissance marked significant advancements with the introduction of local flaps and the innovative use of arm skin in nasal reconstructions, as famously described by Gaspare Tagliacozzi. The 19th and 20th centuries witnessed exponential growth in reconstructive techniques, influenced by the need to treat war injuries. This era introduced the classification of flaps based on their blood supply, the differentiation between full-thickness and split-thickness

skin grafts, and the advent of microsurgery, revolutionizing the ability to transfer tissue with its blood supply [4].

Throughout history, plastic surgery has been influenced by significant figures and milestones, such as the pioneering work of Sir Harold Gillies, Sir Archibald McIndoe, Stephen Mathes, and Foad Nahai in the 20th century, who have all contributed to refining reconstructive methods and philosophies. This field, one of the oldest surgical specialties, has its roots in addressing external injuries and wounds, with historical practices like nasal reconstructions in ancient India and cleft lip repairs in ancient Rome laying the groundwork for modern techniques.

The evolution of plastic surgery from an apprenticeship-based practice to an academically driven discipline in the 18th century marked a pivotal shift, leading to the division into distinct subspecialties and elevating the status of surgeons. Gaspare Tagliacozzi's systematic approach to nasal reconstruction in the late 16th century is often credited with founding the field as a distinct medical science [3]. Despite the temporary decline in favor of prosthetics, these early reconstructive procedures experienced a resurgence, aligning with surgery's broader evolution.

The term "plastic surgery" has endured through the ages, carrying profound philosophical implications of transformation and malleability from its Greek origins. This rich history underscores the specialty's fundamental goal of restoring form and function, a principle that continues to guide the field as it incorporates advancements in technology and surgical techniques.

Overview of Skin Reconstruction Methods:

Skin reconstruction methods have evolved to address the complexity of skin defects, categorized broadly into grafts, flaps, and more advanced techniques like free flap transfers and composite tissue allotransplantation. Grafts, including split-thickness and full-thickness variants, are the cornerstone for covering defects when the wound bed is well-vascularized. Flaps, endowed with their own blood supply, offer a more versatile solution capable of covering larger or more complex defects. They are classified based on composition (cutaneous, musculocutaneous), location (local, regional, distant), and vascularization (random, axial) and are further distinguished by movement (rotation, transposition). The innovation of microsurgery has enabled

the transfer of free flaps, allowing for the reconstruction of extensive and complex defects with tissue from distant sites [17].

Significance of Defect Localization in Reconstruction:

Defect localization plays a pivotal role in determining the most suitable reconstruction method. The location not only dictates the aesthetic and functional requirements but also influences the choice between local and distant reconstructive options. For instance, defects on the face demand a meticulous approach to preserve aesthetic integrity and functional aspects such as facial expression and orifice contours. Conversely, the trunk, with its more generous soft tissue availability, often permits primary closure or the use of simpler flap techniques. Extremities, especially around joints like the elbow or popliteal regions, require strategies that ensure scar placement that does not hinder movement. The hands, critical for daily functioning, necessitate preserving underlying structures with precision, emphasizing the need for tailored reconstructive strategies that prioritize function and appearance.

Current Trends in Plastic Reconstruction:

Plastic reconstruction is continually evolving, with current trends emphasizing personalized approaches, minimally invasive techniques, and the integration of technological advancements. Bioengineering promises future innovations, such as lab-grown skin for grafting, while robotics and 3D printing offer new tools for planning and executing complex reconstructions. Additionally, the growing understanding of the importance of aesthetics and patient-specific outcomes has led to refined techniques that improve the quality of life for individuals undergoing reconstruction. These advancements, combined with a deepened understanding of wound healing and vascular anatomy, steer the field towards more effective, patient-centered reconstructive solutions.

In conclusion, the dynamic nature of skin reconstruction highlights the progression from rudimentary grafting techniques to sophisticated microsurgical procedures. It emphasizes the critical role of defect localization in selecting the appropriate reconstructive method. It points to a future where technological innovations and personalized approaches could redefine the possibilities in skin reconstruction.

The extensive literature review on reconstructive methods reveals that the domain of reconstruction is continuously advancing and transforming. The evolution from basic grafting techniques to intricate microsurgical and tailored patient procedures is evident. This evolution underscores the importance of thoroughly assessing and localizing defects to accurately choose the most suitable reconstructive technique. As we move forward, the field is poised to embrace more innovations and customized strategies that could revolutionize the approaches to skin reconstruction.

Chapter 3: methods

The literature search for this thesis was meticulously designed to ensure a comprehensive and systematic review of existing research and publications pertinent to medium-size skin defect reconstruction. The strategy encompassed several vital steps to ensure the breadth and depth of the information gathered.

Database Selection: Various academic and clinical databases were selected for the literature search. These included PubMed, sciencedirect.com, Ovid, The Journal of Craniofacial Surgery, Annals of Plastic Surgery, Plastic and Reconstructive Surgery, JAMA Facial Plastic Surgery, clinicalkey.com, and Google Scholar. These databases were chosen for their extensive medical and surgical literature repositories, encompassing peer-reviewed articles, clinical trials, case studies, reviews, and meta-analyses.

Keyword Formulation: A set of specific keywords and phrases was developed to guide the search. These included "plastic surgery," "reconstructive surgery," "skin defect reconstruction," "medium-size skin defects," " skin defects reconstruction," "reconstructive ladder," "surgical techniques," "aesthetic outcomes," "functional outcomes," and "patient satisfaction," "Surgical Decision-Making," Functional Outcomes in Reconstruction," "Clinical Case Review," "Reconstruction Strategies."

Boolean operators (AND, OR, NOT) were used to refine the search. For instance, " reconstructive surgery AND medium-size skin defects" or " medium-sized skin defects AND trunk/lower limb/head and neck."

Inclusion and Exclusion Criteria: Criteria for inclusion and exclusion were established to streamline the selection of relevant literature. Inclusion criteria comprised publications from 1959 to January 2024, articles in English, studies focusing on medium-size skin defects, and those comparing or discussing various reconstructive approaches across different body regions. Exclusion criteria included non-peer-reviewed articles, studies focusing exclusively on small or large skin defects, and literature not related to reconstructive surgery techniques.

Screening Process: The initial search yielded a substantial number of publications, which were first screened based on their titles and abstracts. The full texts of potentially relevant articles were then reviewed to determine their suitability based on the inclusion and exclusion criteria.

Data Extraction and Management: Pertinent data from the selected articles were extracted and organized, which included author information, year of publication, study design, sample size, surgical techniques evaluated, outcomes measured, and key findings. Reference management software (e.g., EndNote or Mendeley) was employed to organize the references and facilitate easy retrieval during the writing process.

The PubMed and Hospital Databases were used for the literature search. Randomized controlled trials, systematic reviews, and review articles were searched specifically from 1959 to the end of November 2024.

Table 1

The search strategy summary

Items	Specification
Databases and other sources searched	PubMed, Ovid, Hospital Database
Search terms used	Please see *Table 2*
Timeframe	From 1959 to January 2024
Inclusion criteria	Free or institutional full text availability English written
Selection process	By unanimous author agreement

Table 1 summarizes the used search strategy.

Table 2

Database	Search terms	Article type	Results by year	No. of hits	tot. no. results
PubMed	plastic surgery AND reconstructive surgery	Systematic Review	1980–2023	2	4180
	plastic surgery AND reconstructive surgery AND skin defects reconstruction	All	1980–2023	5	72
	reconstructive surgery AND medium-size skin defects	All	1980–2023	8	36
	medium size skin defects AND limb	All	1977–2024	13	109
	medium-sized skin defects AND leg/lower limb	CT, RCT, MA	1992-2024	8	28
	medium-sized skin defects AND trunk	All	1992- 2024	3	7
	limb reconstruction AND medium size skin defects	All	1976–2022	10	370
	graft AND ankle reconstruction	All	1959–2024	4	2524
	ankle and flap	All	1990-2024	3	1901
Hospital Database	Reconstruction of soft tissue defects in the hand	Systematic Review	–	0	

Ovid	canthal area	all	1980-2024	2	2449
	Canthal area AND medium-sized defects	all	2000-2024	13	28
	face AND medium-sized defects	all	2000-2024	26	310

Table 2 confers a detailed tracking sheet. For this narrative review, we included articles written in English with free or institutional full-text availability. The authors conducted the final article selection process to screen the relevant articles for this topic.

Chapter 4: Surgical Techniques for Medium Size Skin Defects

This thesis explores the breadth of reconstructive methods available for medium-sized skin defects and underscores the critical role of defect localization. This chapter aims to distill concrete recommendations from our comprehensive review, setting the stage for informed surgical decisions.

Selecting the optimal approach to address tissue loss, whether through grafts, flaps, or microsurgery, requires a profound understanding of tissue biology, wound healing mechanisms, and anatomical considerations. Additionally, the surgeon's clinical intuition plays a crucial role, encompassing an understanding not only of the variables influencing wound healing but also their own surgical proficiency. The primary objectives of reconstruction include "wound coverage" and "infection management," which are fundamental in resolving the patient's condition and possible complications, while "anatomical restoration" and "functional preservation" significantly enhance the patient's quality of life. Anatomical restoration is intrinsically linked to achieving favorable functional and aesthetic outcomes [5]. Naturally, the surgeon selects the most suitable reconstructive approach based on factors such as the location of the defect, the degree of functional impairment, and the complexity of reconstruction, drawing upon both the reconstructive ladder paradigm and their own expertise.

The importance of defect localization emerges as a critical factor influencing the success of reconstructive outcomes. The precise anatomical location of the defect plays a pivotal role in

guiding the selection of appropriate reconstructive techniques. Our findings underscore the significance of considering not only the size and depth of the defect but also its specific location on the body. For instance, defects on cosmetically sensitive areas like the face necessitate meticulous attention to aesthetic outcomes, highlighting the importance of techniques that minimize scarring and preserve natural contours. Conversely, defects on functional areas such as the hands or feet require approaches prioritizing functional restoration while ensuring adequate tissue coverage.

Furthermore, consideration of the underlying structures affected, such as bone, muscle, or nerves, is essential to achieving optimal functional and aesthetic outcomes. By precisely localizing the defect and understanding its anatomical implications, reconstructive surgeons can tailor their approach to address each patient's unique needs, ultimately leading to more successful outcomes. This discussion emphasizes the critical role of defect localization in guiding surgical decision-making and highlights the need for a personalized approach to reconstructive surgery.

Localization goes beyond mere identification; it involves a comprehensive understanding of the defect's dimensions, its relationship with surrounding anatomical structures, and the specific demands it places on the reconstructive process. This level of detail forms the foundation upon which decisions are made, guiding the surgeon through a labyrinth of options toward the most fitting solution. It is a testament to the personalized nature of reconstructive surgery, where no two defects are the same, and thus, no two approaches are universally applicable.

Local flaps play a pivotal role in reconstructing medium-sized skin defects, offering the advantage of using tissue that closely matches the original in color, texture, and thickness. The selection of a flap, whether advancement, rotation, or transposition—is guided by the nature of the defect; it is generally accepted that advancement flaps are suited for linear defects, rotation flaps for round or oval defects, and transposition flaps for irregular or angular defects. However, these flaps carry risks such as compromised blood supply and potential for local tissue deformities, especially in patients with vascular issues. The necessity for flap transfer arises when direct closure or healing by secondary intention is not feasible, often due to significant tissue loss from trauma or an oncologic resection. Despite their benefits, flap transfers are contraindicated in cases where defects can be closed primarily or when skin grafts are a better

selection. The use of soft tissue flaps is also debatable in the presence of active infection and is avoided where residual malignancy is detected.

Regional and local pedicled flaps are invaluable for defects requiring tissue with similar functional and aesthetic properties. Their success hinges on intact blood supply transfers, making them suitable for areas with compromised vascularity. However, their application demands extensive anatomical knowledge and meticulous planning to ensure the flap's viability [6].

Complications from flap transfers can affect both the donor and recipient sites, presenting as acute issues like bleeding and infection or chronic problems like scarring and functional impairments.

Tissue expansion is a technique used to manipulate tissue growth through the controlled application of mechanical overstretch. This method is particularly useful for medium-sized defects when adjacent skin has similar characteristics and the least possible donor site morbidity is desired. Tissue expansion allows for the reconstruction of defects with skin that matches color and texture, minimizing scarring and achieving optimal aesthetic results. However, it requires a patient's commitment to the process, which can be lengthy and involves the temporary implantation of an expander with its temporary effect on the patient’s comfort and quality of life.

Autologous skin grafting is a technique where skin is transplanted from one area of the patient's body to another to cover a defect. This can be implemented when local or regional flaps are not feasible or when the defect's size or location necessitates skin coverage without significant bulk. Split-thickness and full-thickness grafts are the two main types used, selected based on the defect's depth and the desired outcome. Split-thickness grafts are beneficial for larger defects requiring less aesthetic consideration. In contrast, full-thickness grafts are used for smaller, more visible areas where a better match to the surrounding skin is critical. Skin grafting is especially useful in cases where tissue conservation is important and when the defect's characteristics allow for successful graft take and integration.

Defect Localization and Surgical Approach:

Successful reconstruction across various body regions hinges on ensuring a clean wound bed through meticulous excision of non-viable or tumorous tissue. This foundational step, emphasized by both Lee et al. (2018) and Simman (2009) in the context of hand reconstruction,

underscores the universal principle applicable across all anatomical areas. Directed antimicrobial therapy following tissue cultures, as advocated by Cherubino et al. (2013) [7] for scalp defects, further exemplifies the need for a comprehensive approach that might benefit from an infectious disease specialist's input in complex cases. Preliminary goals extend beyond establishing a clean wound bed to include stable skeletal fixation and re-establishing patent vascularity, prerequisites for more definitive goals such as tendon and nerve repair and coverage- which can be particularly critical in areas like the elbow as discussed by Kahramangil, Pires, and Ghaznavi.

When planning reconstruction, the size, location, and depth of the soft tissue defect take precedence. The relative size of a defect is contextual, with what is considered medium or large in one area, such as the finger, being deemed small on the trunk, reflecting observations by Nordback et al. in their treatment algorithm for hand reconstruction [8]. This variability necessitates a flexible approach to reconstruction, one that incorporates both objective measurements and a thorough understanding of the defect's impact on function and aesthetics. This approach emphasizes the objective definition of defect size and its implications on surgical strategy, the mechanism of injury and the extent of the injury zone which are critical considerations, guiding the principle of achieving a "like with like" tissue match.

Both patient and surgeon factors play a pivotal role in the reconstructive plan. Patient characteristics, including age, comorbidities, smoking status, and hand dominance, influence the choice of reconstruction method, mirroring the individualized treatment plans for composite tissue reconstruction highlighted by Lethaus et al. (2020) [9]. Surgeon-related factors delve into the technical repertoire, questioning whether all levels of the reconstructive ladder are available for optimal defect coverage. Planning surgical incisions and coverage to minimize scarring is especially critical in areas requiring significant motion such as joints and web spaces [7].

The decision-making process is nuanced, ranging from allowing minor defects to heal by secondary intention to employing advanced microsurgical procedures for significant exposure of critical structures, as seen in the diverse methodologies for trunk reconstruction discussed by Gao et al. [10]. For example, The utility of negative pressure wound therapy (NPWT) as a bridge to definitive coverage is akin to its application in the reconstruction process before more complex options, illustrating the adaptability of reconstruction strategies across body regions.

The treatment strategies must be adapted to the specific challenges posed by different body regions.

As mentioned before, the trunk and abdomen offer more generous options for direct closure or local flaps, whereas the hands and feet, areas critical for daily functioning, require more intricate approaches to preserve function and appearance. Similarly, defects on the face demand meticulous attention to aesthetic outcomes, often necessitating highly specialized flaps or grafts to match the surrounding tissue in texture, color, and thickness.

As we pivot to the discussion, it is crucial to acknowledge the vast array of reconstructive methods reviewed and the intricate decision-making process that underpins their selection—the core of our discussion on the pivotal role of defect localization in selecting the optimal treatment strategy. Localization does not merely guide the choice of technique; it influences outcomes, dictating the balance between aesthetic considerations and functional recovery. With this understanding, we aim to provide concrete recommendations, distilling the essence of our findings into actionable insights.

This chapter seeks to illuminate the path towards achieving the best possible outcomes for patients by navigating the complex interplay between various reconstructive options and the specific demands of different body regions. The ensuing sections will offer a detailed exploration of surgical techniques tailored to specific anatomical areas, grounded in the principles that have emerged from our rigorous review.

HEAD AND SCALP:

Scalp and forehead reconstructions aim to restore both the aesthetic and functional integrity of these areas, facing challenges from trauma, tumor resections, burns, or congenital defects. Russo's "1-2-3 Rule" provides a structured approach for moderate-sized defects (1-4cm), suggesting that the number of relaxation incisions needed can be determined by the defect's minimum distance between edges. This rule offers a straightforward method for selecting the appropriate reconstruction technique, avoiding the need for microsurgical approaches [11].

Brawley and Sidle emphasize the application of the reconstructive ladder, focusing on local flap consideration for scalp reconstruction [12]. The unique vascular structure of the scalp, combined with the galea's inelastic nature, necessitates a tailored approach for each defect. Primary closure

serves as the initial option for small defects, while local flaps are indispensable for larger ones, ensuring tissue characteristics similar to the original site are used to achieve optimal aesthetic outcomes.

Krishna et al. provide an extensive review of various reconstructive options, from primary closure and skin grafting to complex local and regional flaps. Their retrospective analysis highlights the versatility of local flaps in achieving aesthetically pleasing results with minimal donor site morbidity, especially for defects up to 50 cm^2. For larger defects, local and regional flaps are emphasized as essential when the periosteum is absent or when there is a significant calvarial defect [13].

The rich vascularity and distinct scalp anatomy require a comprehensive understanding of available reconstructive techniques. Russo's rule simplifies decision-making for moderate-sized defects, while Brawley Sidle and Krishna et al.'s practical recommendations provide a clear pathway for managing varying sizes of scalp and forehead defects. They advocate for local flaps for medium-sized defects and emphasize the use of skin grafts and local tissue rearrangements for larger areas [13,11,12].

In conclusion, the successful reconstruction of scalp and forehead defects relies on a nuanced approach that considers the defect's size, location, and depth, without the need for microsurgical methods. Local flaps, offer a versatile and effective solution for moderate-sized defects. The principles outlined by the studies mentioned above guide the use of local and regional flaps for larger defects, ensuring optimal restoration with minimal morbidity and avoiding the complexities associated with microsurgical techniques [11].

FACE:

The treatment of medium-sized skin defects on the face presents a multifaceted challenge that involves restoring both its aesthetic and functional aspects. The face is comprised of numerous areas that serve different purposes, including the eyes, nose, mouth, and ears. Each of these areas plays a vital role in our appearance and overall quality of life.

According to Dr. Kirwan's research on aesthetic units and zones of adherence, understanding the specific areas of the face is crucial in surgical planning for facial reconstruction. These aesthetic units refer to the different regions of the face that are aesthetically distinct, such as the forehead,

cheeks, and chin. On the other hand, Zones of adherence are areas where the skin adheres tightly to the underlying structures, making surgical intervention more complex [14].

Facial reconstruction is a highly intricate procedure due to the anatomical complexity. The face contains a delicate network of muscles, nerves, blood vessels, and other structures that must be carefully manipulated during surgery. Additionally, the face is highly visible, making any imperfections or asymmetry more noticeable. Therefore, surgeons must deeply understand facial anatomy and surgical techniques to achieve optimal results.

When reconstructing the face, special attention must be given to preserving or restoring important functions such as breathing, eating, speaking, and facial expressions. Surgeons must also consider the psychological impact of facial disfigurement on the patient's self-esteem and overall well-being. Furthermore, specific conditions, such as facial paralysis or trauma, require additional expertise and consideration during reconstruction.

One prominent approach highlighted across studies is employing primary closure when applicable. This technique is particularly favored for small to medium-sized defects on the cheek, as it leverages the redundancy of nearby tissues to achieve minimal scarring. For instance, the eMedicine article suggests that primary closure is preferred for small to medium cheek defects, especially in areas with skin laxity. This method capitalizes on the skin's natural elasticity, resulting in aesthetically pleasing outcomes. Additionally, Lee et al. (2011) discuss the use of local island pedicles and horizontal advancement cheek flaps for medial canthal reconstruction, which also involve primary closure techniques to restore the concave contour of the region [15].

In practice, when facing complex medium-sized skin defects, one would want to ensure the lengthening of the skin in a desired direction (e.g., to release scar contractures); this is commonly produced by Z-plasties. Multiple small Z-plasties can be designed in series to release a contracture or to break up the appearance of a straight line. This technique is especially useful in aesthetically important areas such as the face where large Z-plasties are unfavorable [16].

The literature is abundant with studies focusing on the intricate anatomical regions of the face. Each area commands attention from various specialties, employing a multitude of methods and approaches tailored to its unique challenges. The forthcoming review will consolidate insights

across these diverse facial regions, presenting an integrated perspective on the multifaceted techniques and strategies deployed in facial reconstruction.

The periorbital region has a complex anatomy and necessitates a detailed approach to maintain both functional and aesthetic integrity. The surgical technique to be selected varies according to the defect zone, [17] the percent of the structure affected and the layers damaged. Commonly used techniques to reconstruct medium sized defects of the eyebrow include primary closure and when not feasible local flaps are employed [18]. When considering the eyelids. Skin grafts, local flaps including lid switch flap and larger regional flaps are employed to maintain this intricate and functionally important structure. The reconstruction of the deeper and more complex ligaments and muscles that maintain lid functionality is beyond the scope of this thesis.

The eyebrows are important cosmetically [19] and the most conspicuous aspect of the brow is the direction of the hair follicles. Therefore, an effort must be made to preserve and repair the structure with minimal disruption. When possible, primary closure and approximation of layers should be employed carefully to prevent distortion. Areas up to 1 cm of full thickness brow loss can be repaired by local advancement flaps including; Burow's wedge advancement flap, double advancement flap and o to Z repair [20,21,22] . Larger defects can be repaired by scalp pedicled flaps or grafts including follicle hair transplant.

The eyelids serve a vital function in protecting the globe and therefore preservation of their function is critical. These intricate structures are lamellar in general and each layer should be repaired individually. When considering both upper and lower eyelids, defects under 25% are generally treated by primary closure while those that are larger and up to 50% of the eyelid can be treated by primary closure with cantholysis or a more complex flap [23]. Reconstructive modalities include skin grafting, Tenzel rotation flaps, lid switch flaps, Cutler-Beard flaps, Forehead flaps, glabellar flaps, Hughes flap, Tripier, Mustardes, nasolabial and other various local flaps [24,25]. The rectangular flap [26] modified by Tan et al and the Tessier flap can be employed to both upper and lower eyelids to reconstruct subtotal or total defects. When the posterior lamella is damaged, buccal mucosa or skin grafts are used [27]. Total defects that include damage to all layers can also be repaired using the nasal chondromucosal flap which transposes viable cartilage from the nasal region to the eyelid to repair the lost tarsus [28] . In the upper eyelid the a bipedicled myocutaneous flap with skin graft to cover donor site can also be

used, yet this includes more than one donor site scars [29]. The larger defects may necessitate the use of larger locoregional flaps yet these may be thick and carry a higher morbidity.

The lower eyelid can be repaired by other flaps described- including, the mucochondrocutaneous flap [30] for total lid loss, the orbicularis muscle skin flap and the cross upper eyelid combined with cartilage [31,32] . The famous Mustarde cheek flap is a well-known method for wide lower eyelid defect reconstruction and may be combined with skin grafts for inner lining. Partial thickness defects are amenable to treatment by use of Tripier or V-Y flaps.

Various studies reviewed the results of periorbital reconstructive options and most treatment algorithms depend on the wideness of the defect and layers involved. In order to maintain functionality, the tissues preferred for reconstruction of this region need to be well vascularized, thin and flexible. In conclusion, when considering medium sized defects of the eyelids, choice of reconstructive modality must be tailored per case presented. Reviewed literature suggests that when feasible, treatment by primary closure with or without cantholysis is acceptable. When these are not feasible, local flaps as mentioned above, combined with skin or cartilage grafts when necessary are preferred.

The lips are the prominent structure of the lower third of the face and are significantly important both functionally and aesthetically. Subtle changes and impairment of the subunits can have profound effect on patients' self-image. The laminar structure composed of skin, muscle and mucosa necessitate intricate and detailed analysis for selection of the best reconstructive modality. The surgical technique to be selected varies according to the area of the defect, the percent of the structure affected and the layers damaged. The major goal of reconstruction is to maintain function. The first choice when feasible is primary closure, this can be done when defects are up to 25% and 30% of the upper and lower lips respectively. Other current approaches for reconstruction of medium sized defects up to two thirds of the upper and lower lips are the use of local flaps from adjacent lip components or the opposite lip and when this is not applicable tissue from nearby cheek, nasolabial region or neck are used. For larger defects regional or free flaps can be employed.

For reconstruction of defects of the vermilion, advancement of the buccal mucosa can be used to reconstruct the mucocutaneous junction. Other techniques include mucosal V-Y advancement, cross lip mucosal flaps and other transposition flaps from buccal or tongue mucosa These may

sometimes result in a certain color mismatch and some techniques necessitate as second procedure [33,34,35].

Lip switch flaps such as the abbe flap replaces tissue with like and can reconstruct all three layers of both lips [36]. Although there are some advantages to these lip switch flaps, disadvantages include both lips becoming smaller, the intermediate patient disability and the need for a second surgery. The Estlander flap is a similar flap that is brought around the commissure, although this technique does not need a second surgery, there may be blunting of the commissure. The fan flap described by Gillies and Millard [37] utilized inferiorly based nasolabial flaps that rotate around the commissure, this can be uni- or bilateral. The major disadvantage is microstomia, vermilion deficiency and denervation of the orbicularis oris which may lead to oral incompetence [38]. The Webster-Bernard flap can reconstruct lower lip defects by advancement of tissue from the cheek, this technique can minimize microstomia due to ample tissue recruited and the flap can be combined with other reconstruction methods of the vermilion. The disadvantages include notching of the incisions and effacement of gingivobuccal sulcus (5), the adynamic nature of the flap and in patients with previous facial surgery, vascular reliability should be considered.

The circumoral advancement rotation flap described by von Burns employs full thickness flaps yet resulted in extensive muscle denervation and were later modified by Karapandzic [39] who used flaps that were not full thickness and maintained neurovascular supply via meticulous dissection. This technique can also result in microstomia and blunting of the commissure, (7) yet due to the superior functional results it is the flap chosen when larger intermediate full thickness defects are encountered.

The stair-step advancement flap proposed by Johanson et al. can reconstruct up to two-thirds of the lower lip [40,41].

Various techniques have been described for reconstructing medium-sized lips defects. Many lip reconstructions will require a revision procedure after a certain time period [42].

From the reviewed literature, it can be seen that the use of local flaps is a time-honored approach for lip reconstruction, and the use of dynamic flaps using remaining lip tissue yields superior results. The flap selection depends on the defect's wideness and the layers involved. The best

outcomes can be achieved by proper assessment as per the case, reconstruction of the subtle subunits, all layers, and maintaining functionality.

In conclusion, effective reconstruction of medium-sized skin defects on the face demands a strategic selection of surgical techniques that balance aesthetic restoration with functional preservation Primary closure stands out as the method of choice for such defects, particularly for its efficacy in areas like the cheek where skin elasticity can be leveraged to achieve aesthetically pleasing and minimally scarring outcomes. This technique is ideal for straightforward, linear defects that can be neatly closed without tension.

Advanced reconstructive strategies are required for more complex defects, particularly around critical functional areas like the eyes and mouth. Techniques such as Z-plasty are particularly useful in these regions to alleviate tension and improve the aesthetic appearance of scars by reorienting them along natural skin lines. Local flaps, such as island pedicle and horizontal advancement flaps, offer valuable options for restoring the intricate anatomy of the periorbital area, effectively matching the texture and color of the surrounding skin while maintaining crucial functions like eyelid movement.

In cases where primary closure is not feasible, such as with larger defects or those with irregular shapes, local flaps become indispensable. They allow for the meticulous reconstruction of the affected area, ensuring that the tissue dynamics and aesthetic contours of the face are preserved. For the most challenging defects, especially those impacting the aesthetic units of the face, combining different techniques—like using a combination of flaps and grafting—can provide the best functional and cosmetic outcomes.

Trunk:

Managing medium-sized trunk defects presents a myriad of complexities that necessitate careful consideration in reconstructive surgery. These complexities stem from factors such as the size and depth of the defect, its location on the trunk, and the aesthetic and functional implications of reconstruction. Additionally, underlying medical conditions in patients, such as diabetes or vascular disease, can complicate surgical approaches and affect postoperative outcomes. Patient preferences and goals, along with the availability of local tissue for reconstruction, further influence decision-making. Moreover, the risk of complications, including wound dehiscence

and flap necrosis, underscores the importance of selecting the most appropriate reconstructive technique.

The comparison of various methods for the reconstruction of medium-sized skin defects of the trunk, as discussed in the referenced articles, reveals a diverse array of approaches each tailored to the specific needs and challenges presented by different types of defects. From the comprehensive coverage of principles and techniques by PlasticsFella, focusing on respecting anatomy and ensuring vascularized coverage, to the innovative use of perforator flaps as discussed by Yao et al., the spectrum of methodologies underscores the importance of a flexible, patient-specific approach [10,43,44].

The principles of chest wall reconstruction by PlasticsFella provide essential insights into evaluating the different methods of chest wall reconstruction presented here. This document emphasizes the significance of anatomy, stability, and vascularized coverage in chest wall reconstruction. Muscle flaps, such as the Latissimus Dorsi and Pectoralis Major, offer versatile options for soft tissue coverage, essential for aesthetic and functional recovery.

The adjacent horn-shaped perforator fasciocutaneous flap technique, as described by Yao et al., presents a novel approach by utilizing the anatomical distribution of blood vessels to design flaps for medium trunk defects. This method exemplifies the innovative use of the body's own resources to achieve closure with minimal donor site morbidity and excellent aesthetic and functional outcomes [44,45] .

In summary, when comparing the effectiveness and applicability of these various reconstruction methods for medium-sized skin defects of the trunk, it becomes evident that no single approach is universally superior. Each method has its own set of advantages and ideal use cases. For example, muscle flaps provide a highly adaptable solution for covering defects with robust blood supply and minimal functional disruption, demonstrated by their application in covering anterolateral and medial chest wall defects, respectively. The adjacent horn-shaped perforator fasciocutaneous flap further exemplifies the tailored use of anatomical knowledge to address complex defects, offering a reliable method with the advantage of direct donor site closure.

Ultimately, the best method for reconstructing medium-sized skin defects of the trunk is determined by a combination of defect characteristics, patient-specific factors, and the surgical

team's expertise. A multidisciplinary approach that considers the unique advantages of each method will yield the most favorable outcomes, underscoring the importance of personalized treatment planning in achieving optimal functional and aesthetic results.

Hand:

The intricate task of reconstructing medium-sized skin defects of the hand and upper limb demands a nuanced understanding of the available surgical options, each with its specific advantages and limitations. The articles reviewed offer a broad spectrum of reconstructive strategies, from the precision of flap selection based on defect characteristics to innovative techniques designed for specific challenges.

The comparison of various methods for the reconstruction of medium-sized skin defects of the upper limb, reveals a diverse array of approaches each tailored to the specific needs and challenges presented by the different types of defects. Commonly used in daily practice are local flaps and skin grafts, including FTSG and STSG. The flap selection depends on the defect's location and exposure of critical structures.

Das De and Sebastin meticulously outlines the strategic considerations in flap selection, emphasizing the critical balance between functional and aesthetic outcomes. For example, the use of Dorsal Metacarpal Artery (DMA) and First Dorsal Metacarpal Artery (FDMA) flaps are recommended for their thin, pliable skin, which is ideal for matching the dorsal hand and thumb defects, respectively [46].

Nordback et al.'s narrative review complements this by offering a treatment algorithm that integrates the anatomical and physiological nuances of hand reconstruction. The mention of axial pattern pedicled flaps and the strategic use of skin laxity along the proximal and longitudinal axes of the upper extremity highlight the meticulous planning required to optimize reconstructive outcomes [47].

When considering medium sized defects, some may select for distant and free flaps for complex defects. Yet, the morbidity and complexity of these modalities should be weighed carefully. Kostopoulos et al. introduce the Bridged Digital Artery Perforator Flap, a technique that showcases innovation in addressing dorsal digital defects [48]. By utilizing the adipofascial tissue as a bridge, this method offers a promising alternative that minimizes hypertrophic

scarring and postoperative morbidity. Its successful application in reconstructing defects on the proximal and middle phalanges without compromising joint mobility is a compelling example of how specialized techniques can effectively address specific reconstructive challenges.

In drawing conclusions from these comprehensive analyses, it is evident that the choice of reconstructive method should be bespoke, tailored to the individual patient's needs, defect characteristics, and the specific challenges posed by the location and size of the defect. As seen in the reviewed literature the use of local flaps, with their capacity for thin, precise coverage, may be ideal for superficial dorsal hand defects, offering excellent aesthetic and functional outcomes. Conversely, for more complex or larger defects, especially those requiring significant volume or specialized tissue characteristics, Perforator flaps could provide superior results, combining the need for effective coverage with the preservation of hand functionality and appearance.

ELBOW:

Reconstruction of the posterior elbow and olecranon region post-wound formation stands as such a challenge within plastic reconstructive surgery, demanding an exhaustive comprehension of soft tissue coverage options and thorough preoperative planning to secure positive outcomes. Patel and Higgins (2013) underscore the essence of prompt and thorough wound preparation and safeguarding the ulnar nerve to avert injury in subsequent surgeries [49].

The reconstruction of medium-sized soft tissue defects in the elbow region exemplifies a confluence of surgical precision, innovative techniques, and a deep anatomical understanding, crucial for addressing the complex challenges inherent in post-traumatic and postsurgical scenarios. In navigating these complexities, the surgical community has leaned towards the utilization of pedicled muscle flaps and propeller flap modifications, both of which stand out for their adaptability, efficacy, and minimal donor site morbidity.

The Brachioradialis (BR) Muscle Flap, as expounded by Zampeli et al. (2019), capitalizes on the radial recurrent artery for vascularization, offering a straightforward, single-stage solution for small to medium-sized elbow defects. This method, requiring no microvascular anastomosis, ensures stable and functional soft tissue coverage, even in the face of postoperative infections,

thereby presenting a harmonious balance between ease of procedure and effective defect management [51].

Conversely, the "Namaste" flap—a novel modification of the subcutaneous pedicle propeller flap—emerges as a compelling technique for the reconstruction of postburn axillary and elbow contractures. Karki et al. (2019) introduced this method, inspired by the traditional Indian greeting "Namaste," to circumvent the limitations posed by split skin grafting. By employing unburnt skin from the axillary or cubital fossa, the Namaste flap allows for comprehensive contracture release and coverage, eschewing the need for preoperative perforator identification and embracing the principle of "like with like" tissue replacement. This approach not only offers aesthetically and functionally superior outcomes but also highlights the flap's versatility and reduced morbidity through primary closure of donor sites or minimal use of split-thickness grafts [52, 53].

When synthesizing the collective insights from the literature, including the detailed examinations by Patel and Higgins (2013) and the systematic review by Kahramangil, Pires, and Ghaznavi (2022), it becomes evident that successful reconstruction in the elbow region demands a multifaceted strategy. This encompasses meticulous wound management, the safeguarding of crucial nerves, and the strategic selection of flap options tailored to each patient's unique needs and defect. The ongoing dialogue within the surgical community, underscored by the efficacy of the BR muscle flap and the innovative "Namaste" flap, emphasizes the significance of adaptability, reliability, and a tailored approach to flap selection. Such strategies aim to optimize functional and aesthetic outcomes while minimizing the potential for complications and adverse effects on donor sites, thereby setting a foundation for further innovation in reconstructive surgery.

LOWER LIMB:

The reconstruction of medium-sized skin defects on the lower limb demands a careful evaluation of various surgical methods and approaches, each offering distinct advantages and considerations. Several studies have shed light on different techniques, outcomes, and factors influencing the choice of reconstructive methods.

The Keystone Flap technique, pioneered by Behan and further refined by Moncrieff, stands out as a promising alternative for closing defects, particularly on the legs. Aragón-Miguel et al. (2018) emphasize its efficacy in achieving satisfactory outcomes with lower complication rates compared to conventional flaps and skin grafts. This method harnesses vascular perforators to ensure adequate and early wound healing, with Moncrieff's modification showing enhanced vascularization and reduced complication rates, making it particularly suitable for medium-sized leg defects [54] .

In contrast, Dixon AJ and Dixon JB (2006) advocate for Reduced Opposed Multilobed (ROM) flaps, which have demonstrated superiority over traditional closure techniques in terms of complication rates. They especially reduce the incidence of end flap necrosis in medium-sized leg defects post skin tumor excision. The ROM flaps offer a reliable option for defect closure, albeit with considerations regarding flap design and execution [55].

Furthermore, Nanda et al. (2018) shed light on perforator-based adipofascial flaps, highlighting their minimal donor-site morbidity and superior aesthetic outcomes for small-to-medium soft-tissue defects on the leg. These flaps leverage the vascular supply from major axial vessels, offering versatility and favorable functional outcomes, particularly around delicate areas like the malleolus and lower leg [56] .

Muscle flaps, such as the adductor magnus and peroneus brevis, as discussed by Melissinos et al. (2021) and Bui PV, Rizzo DA (2020), respectively, offer reliable alternatives for soft tissue coverage. These flaps provide ample tissue volume and vascular supply, making them suitable for small to medium-sized defects, with considerations regarding donor site morbidity and postoperative care [57,58].

Comparative studies, like that by Kneser U et al. (2011), suggest that while donor-site morbidity and functional outcomes may vary between flap options, careful consideration of defect size, location, and patient factors is paramount in selecting the most appropriate method for reconstruction [59].

Various studies emphasize the reconstructive approaches to lower limb utilizing skin grafts, local flaps, muscle based flaps and perforator flaps. The advances in anatomical studies and

further utilization of muscle sparing techniques are bridging the gap, shifting old reconstructive approaches based on larger muscle flaps towards more selective and less traumatic donor sites.

According to the reviewed articles above the Keystone Flap technique, ROM flaps, perforator-based adipofascial flaps, and muscle flaps each offer unique advantages, highlighting the importance of a comprehensive approach tailored to individual patient needs and surgical expertise.

ANKLE:

The reconstruction of medium-sized skin defects around the ankle, a particularly challenging and critical area of the lower limb due to its complex anatomy, limited soft tissue coverage, and the necessity for durable and functional repair, involves various surgical approaches and considerations. The ankle's importance in weight-bearing and mobility necessitates careful planning and execution of reconstructive procedures to ensure not only the closure of defects but also the preservation of function and aesthetic appearance.

The ankle is a specialized area, where anatomical structures are closely arranged in a sophisticated functionality based manner. It is hard to reconstruct more complicated medium sized defects especially when there is exposure of deep fasciaeas and critical structures. Reconstruction of such defects may necessitate the use of microsurgical instrumentation if one wants to achieve the best possible outcome.

The less complicated medium sized defects of the ankle region without exposure of deeper structures will be treated preferably by meshed skin grafts for defects of split thickness dermis exposure (lesions involving only the reticular layer of the dermis). The more complicated defects may require FTSG and muscle based local flaps that allow for coverage of deeper defects with exposure of critical structures. This may improve patient outcome especially in terms of functionality [60].

In the pursuit of optimal strategies for reconstructing medium-sized skin defects of the ankle, recent advancements highlight the essential role of perforator flaps, notably eschewing the complexities of microsurgical techniques in favor of more accessible, versatile, reliable and equally effective methods.

The reverse sural flap, as detailed by Ciofu et al. (2017), exemplifies the innovative use of the medial calf's vascular resources, presenting a formidable option for covering defects in the lower extremity's distal third. Despite its association with complications such as venous congestion, the flap's versatility and its ability to yield satisfactory functional and aesthetic results, even among patients with significant comorbidities, have cemented its status as a preferred choice for ankle and heel reconstructions (Ciofu et al., 2017) [60,61].

Similarly, the efficacy of the posterior tibial artery perforator-based propeller flap in covering defects of the lower leg and ankle has been illuminated by Dhar et al. (2019). This approach, which avoids the need for microvascular anastomosis, has shown promising outcomes with a high survival rate of the flaps and minimal complications, thus underscoring its value in addressing a wide range of etiologies including trauma and infection (Dhar et al., 2019) [60].

Adding to these advancements, Jian Lin et al. (2020) explored the modified anterior tibial artery perforator-pedicled propeller flap for the repair of soft-tissue defects of the ankle and heel. This flap technique, which also avoids microvascular anastomosis, is particularly beneficial for its reliable texture match and contour with minimal complications. All patients involved in the study could walk and wear normal footwear post-reconstruction, showcasing the functional effectiveness of this flap [62].

These findings collectively underscore a strategic shift towards leveraging the anatomical and functional advantages offered by perforator flaps for ankle reconstruction. The reverse sural flap and posterior tibial artery perforator-based propeller flap emerge as pragmatic solutions that balance surgical complexity with effective outcomes. Such techniques, grounded in a thorough understanding of vascular anatomy and flap design, provide reconstructive surgeons with versatile tools that enhance patient recovery while minimizing procedural invasiveness.

In conclusion, the contemporary landscape of reconstructing medium-sized skin defects of the ankle is characterized by a preference for techniques that prioritize patient outcomes without resorting to the intricacies of microsurgical interventions. The utilization of perforator flaps, exemplifies this approach, offering a harmonious blend of simplicity, efficacy, and patient satisfaction. These flaps provide excellent coverage for medium-sized defects, promoting rapid recovery and excellent functional outcomes, making them preferred choices for complex ankle and heel reconstructions.

Chapter 5: Conclusions

This thesis has embarked on a comprehensive exploration of reconstructive techniques for medium-sized defects, with a particular focus on non-microsurgical methods such as primary closure and local flaps. The exclusion of microsurgical techniques and free flaps from this analysis has allowed for a focused discussion on more commonly applicable and less technically demanding methods that are crucial for the vast majority of clinical settings. Here, we conclude by synthesizing our findings across various body regions—from the nuances of facial reconstruction to the complexities involved in hand and lower limb recovery—highlighting key strategies that inform successful outcomes in reconstructive surgery.

Key Findings and Recommendations

The findings underscore the significance of defect localization in choosing appropriate surgical techniques. Each anatomical region presents unique challenges and requires specific approaches.:

Facial Defects: The aesthetic importance of the face necessitates the use of techniques that blend seamlessly with the surrounding tissues. Primary closure and local flaps are preferred for their ability to minimize scarring and maintain symmetry.

Trunk: The trunk's ample soft tissue often allows for simpler closure techniques, such as skin grafts and local flaps, but care must be taken to manage aesthetic outcomes and minimize donor site morbidity.

Hands and upper limbs: The functional importance of the hands suggests using advanced local flap techniques to preserve dexterity and appearance, avoiding more complex free flap surgeries when possible.

Lower limbs and ankles: Here, the choice of technique must balance functional preservation with cosmetic outcomes, utilizing local flaps to cover defects effectively without compromising mobility.

The exclusion of microsurgical methods has highlighted the versatility and efficacy of simpler reconstructive options, proving that they can offer satisfactory outcomes for medium-sized defects. This approach aligns with the principles of the reconstructive ladder, advocating for the

use of the simplest effective method as a first step to preserve more sophisticated approaches and donor sites in case that they will become necessary.

Limitations and Future Directions

While this thesis provides comprehensive insights, limitations exist primarily due to the exclusion of free and microvascular flaps, which may be necessary for covering extensive or complex defects in high-stake areas. Future research could expand on integrating these methods with traditional techniques to provide a holistic view of all available options. Furthermore, advancements in biomaterials and regenerative medicine promise to enhance outcomes for medium-sized defects, suggesting a potential area for future academic inquiry.

Concluding Thoughts

In summary, the reconstruction of medium-sized skin defects must be approached with a technique sensitive to the defect's location, size, and the patient's specific needs. For most scenarios, local flaps, skin grafts and primary closure provide effective solutions that ensure functional preservation and satisfactory aesthetic results. This thesis advocates for a judicious use of resources, emphasizing that the best outcomes are achieved by tailoring the surgical approach to the defect's specific requirements, thus minimizing unnecessary complexity and focusing on patient-centered care.

Looking forward, the field of reconstructive surgery is poised for significant advancements. By incorporating emerging technologies and novel materials into traditional reconstructive frameworks, future practitioners can enhance their ability to restore form and function with greater precision and less invasiveness. As we refine these techniques, the potential to transform patient outcomes grows, promising a future where reconstruction is not only about healing but also about restoring quality of life to its fullest.

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Glossary of Terms:

1. Advancement Flap: A surgical technique where a section of tissue is moved forward to close a wound without rotation or lateral movement.
2. Bipedicle Flap: A skin flap that maintains two vascular pedicles, enhancing its blood supply for the coverage of large defects.
3. Cantholysis: A surgical procedure that involves cutting the canthal tendons to release eyelid tension, often used in eyelid reconstruction.
4. Dermis: The thick layer of living tissue below the epidermis that forms the true skin, containing sweat glands, hair follicles, and other structures.
5. Epidermis: The outermost layer of skin provides a waterproof barrier and creates our skin tone.
6. Flap Survival: The successful integration and viability of a transplanted flap in reconstructive surgery without necrosis.
7. Free Flap: A piece of tissue that is completely detached from its original blood supply and then reattached to a new blood supply by microvascular anastomosis at the recipient site.
8. Galea Aponeurotica: A tough layer of dense fibrous tissue covering the cranial cavity's upper part and providing a site for muscle attachment.
9. Local Flap: A surgical reconstruction technique using tissue that is adjacent to the wound for closure, maintaining its original blood supply.
10. Microsurgery requires an operating microscope or magnifying equipment to repair or reconnect tiny structures.
11. Periosteum: A dense layer of vascular connective tissue enveloping the bones except at the surfaces of the joints.
12. Primary Closure: Direct suturing of a wound without the need for tissue transfer, often used for smaller wounds that can easily be closed.

13. Rotation Flap: A semi-circular skin flap rotated into a defect to provide coverage, preserving its original blood supply.
14. Skin Graft: A piece of skin transplanted to repair a large wound or burn, lacking its original blood supply and depending on the recipient site for revascularization.
15. Subgaleal Plane: The anatomical space located between the galea aponeurotica and the periosteum of the skull.
16. Transposition Flap: A flap that is elevated and moved laterally to cover an adjacent defect, while still attached at its base to maintain its blood supply.
17. Vascularity: The blood supply to a given area of tissue, crucial for the survival of transferred tissues or flaps in reconstructive surgery.