

A META-ANALYSIS STUDY OF THE DIFFERENT TECHNIQUES OF MANAGEMENT OF POST-BURN MICROSTOMIA

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ABSTRACT:

Background: Post-burn microstomia, often caused by commissure injury, can result in functional and aesthetic challenges. Scar tissue and constriction around the mouth can impede oral activities and development, necessitating surgical intervention. The use of pressure garments and splints poses concerns, and while mucosal flap techniques are common, optimal management remains debated. Addressing psychological and physical impacts is crucial in developing comprehensive treatments for post-burn microstomia.

Aim of the Work: This work presents a meta-analysis study on the different techniques used for the management of post-burn microstomia.

Methods: This study adheres to MOOSE and PRISMA-P guidelines, focusing on "Microstomia" management techniques. Searches are conducted in various databases using relevant keywords. Inclusion criteria cover post-burn oral complication management studies, including cross-sectional, prospective, and experimental designs. The review process involves independent assessment by reviewers and data extraction. Meta-analysis using Comprehensive Meta-Analysis software includes odds ratios with confidence intervals, random effects model, sensitivity analysis, and examination of publication bias indicators. We have collected information from papers published between 1990 and 2022. This data was collected in the period between 2022-2023.

Results: The study found that commissuroplasty was the main intervention technique (68.97%), with positive outcomes in the functional improvement and oral competence, while complications such as necrosis, drooling, and sensory issues improved over time, and patient satisfaction varied by technique.

Conclusion: The study provides a comprehensive analysis of microstomia management, covering demographics, interventions, complications, outcomes, and satisfaction. While certain techniques show promise, further research is required to optimize strategies and improve long-term results.

Keywords: post-burn microstomia, surgical techniques, outcomes, patient satisfaction, complications

INTRODUCTION:

Post-burn microstomia is one of the most common complications encountered as a result of peri-oral burns and reconstruct-

ing the oral commissure in microstomia is one of the challenging procedures in plastic surgery ⁽¹⁾.

Most cases of microstomia are acquired and can be attributed to various factors, including the ingestion of caustic substances, trauma, oral-facial burns, or previous lip reconstruction procedures ⁽²⁾.

The commonest cause of microstomia is commissure injury resulting from children biting electrical wires during electrical burns ⁽³⁾.

Burned lips are rarely an isolated injury; instead, they often occur as part of a broader burn affecting the face and neck. Peri-oral burns can inflict damage to the tissues, and if scar tissue around the mouth is not adequately addressed, it can result in a reduction of the oral opening. This constriction can hinder breathing, speaking, eating, and maintaining proper dental hygiene. In children, such burns can hinder mandibular and dental development, potentially leading to bone deformities, abnormal dentition, and speech difficulties ⁽¹⁾.

The utilization of a pressure garment around the lips can pose challenges. Scarring in men's beard and mustache areas can contribute to recurrent folliculitis, an inflammation of the hair follicles. Moreover, employing compression garments in children has been linked to malocclusion (misalignment of the teeth) and hindered mandibular growth. These factors should be considered when determining the suitable treatment approach ⁽⁴⁾.

Despite significant advancements in treating commissure injuries, there is still debate regarding the initial management and subsequent reconstruction. Some suggest conservative care using mouth splints for 10-14 days following the injury before deciding on the appropriate surgical procedures. However, it's important to note that splinting can't fully reverse the skin loss and partial orbicularis oris loss associated with full-thickness injuries, nor can it correct the resulting abnormalities ⁽⁵⁾.

The wounds are often managed using Y-V flap or various mucosal flap techniques. The concept of early excision and resurfacing of the peri-oral defect with a skin graft has gained importance in preventing post-burn scar issues ⁽⁴⁾.

Based on the results of the study conducted by Convers and Smith, which involved over 300 patients with post-burn microstomia undergoing surgery, it was found that the "excision" of the scar in the angle zone and the use of mucosal flaps to cover the wound resulted in deformities of the oral angles during reconstruction. Furthermore, the mucosa frequently remained visible in the commissural zone, which is aesthetically undesirable. Taking into account the anatomical characteristics of oral angle contractures, a more successful method has been developed ⁽⁶⁾.

Due to their significant role as a facial feature, the lips play a crucial part in expressing emotions and facial expressions. They are often considered to enhance beauty, particularly in women. When addressing the treatment of microstomia, achieving a good functional and aesthetically pleasing outcome becomes the most crucial factor to consider ⁽⁷⁾.

The process of evaluating, preventing, early diagnosing, and treating post-burn microstomia in both children and adults presents difficulties. It is challenging to control the impact of this deformity on the psychological, physical, and aesthetic well-being of the patient, as well as the duration of the rehabilitation period. This paper aims to develop appropriate treatments for each stage the patient undergoes and create a comprehensive plan to improve the patient's condition in cases of post-burn microstomia.

AIM OF THE WORK:

This study offers a thorough meta-analysis of post-burn microstomia management techniques.

MATERIALS AND METHODS:

Study Overview and Methods

The study follows MOOSE and PRISMA-P guidelines. It's part of a project on "Microstomia" management techniques. Searches include databases like Medline, ProQuest, etc., using relevant keywords. Studies meeting the criteria are included ⁽⁸⁾.

Inclusion and Exclusion Criteria:

Studies on post-burn oral complication management, including cross-sectional, prospective, and experimental designs, will be considered. Qualitative and single-case studies are included. Only studies that provide zero-order associations will be used for meta-analysis which refers to a basic or direct relationship between two variables, without considering the influence of other factors or variables. It's the simplest form of association analysis, where you're examining the relationship between two variables in isolation. Zero-order associations are essential because they establish a foundational understanding of how two variables are related. However, in many real-world scenarios, the relationship between variables is more complex, and other factors may play a role. Language is limited to English, German, French, Danish, Norwegian, and Swedish ⁽⁹⁾.

Review Process:

A librarian and primary investigator will conduct searches, excluding duplicates. Two reviewers independently assessed studies based on criteria. Data extraction includes microstomia management, participant demographics, study details, and other variables ⁽⁸⁾.

Meta-Analysis Approach:

Comprehensive Meta-Analysis software will be used. Odds ratios (OR) with 95% confidence intervals (CI) will be reported. The random effects model will account for

study variations. Heterogeneity was assessed using Qwithin-statistic and I² statistics. Sensitivity analysis for outlier studies. Publication bias indicators examined.

Management Protocols:

Microstomia, a condition where the mouth opening is restricted due to burn scars, can have significant functional and aesthetic impacts. Surgical reconstruction techniques aim to restore lip function and aesthetics, with options like Z-plasty, local flap reconstruction, and nasolabial flaps being employed. Conservative treatments include scar massage, silicone sheets, pressure garments, and physiotherapy exercises. Devices like the Thera-bite system can aid in jaw mobilization. Regular follow-up and adjuvant therapy are crucial for optimal outcomes and complications like oral incompetence, adhesions, recurrent contracture, and carcinoma must be monitored. A combination of treatments and therapies contributes to successful microstomia management.

Ethical consideration:

The study was approved by the Ethical Committee of Ain Shams University on 1/12/2021 NO.FWA 000017585

RESULTS:

In the present study, we searched Medline via PubMed, SCOPUS, Web of Science, Cochrane Central Register of Controlled Trials (CENTRAL), and Science Direct from their inception till 2022 total, of 29 studies were included (No. of patients = 394 patients)

As regards the Assessment of the Age of Patients: Approximately. 35% adults, 35% children, and 30% elderly patients. Age ranges are defined for each group based on paper details.

As regards the Assessment of Intervention Techniques: Commissuroplasty

most common technique (68.97%). Various techniques like scar excision, flaps, and implants are used.

As regards Comparison of Interventions (Oral Contracture Release vs. Z-Plasty and Flap Repair): Both aim to improve mouth opening. Oral contracture release: 8mm to 24mm increase. Z-Plasty and flap repair: Improved inter-commissure distance.

As regards the Assessment of Complications: Mentioned complications include necrosis, drooling, revision, respiratory distress, denervation, etc.

As regards the Assessment of Patient Satisfaction: Techniques ranked by satisfaction: Vermilion-mucosal flaps, Commissuroplasty, ADSC injection, Dynamic commissural appliance.

As regards the Assessment of Time Frame: Studies' time frames vary (1995-2023).

Some papers provided specific time frames, others didn't.

As regards Assessment of Follow-up: Follow-up periods varied (days to 2 years).

Some studies provided detailed follow-up; others shorter.

As regards the Assessment of Outcomes: Positive outcomes were observed for various techniques. Improvement in mouth opening, function, and aesthetics was noted.

DISCUSSION:

Post-burn microstomia is one of the most common complications encountered as a result of peri-oral burns, and reconstructing the oral commissure in microstomia is one of the most challenging procedures in plastic surgery⁽¹⁰⁾.

In the current meta-analysis, twenty-nine studies involving a total of 394 patients who underwent surgical reconstruction for

microstomia were included. The aim was to evaluate functional and aesthetic outcomes, postoperative complications, and patient satisfaction.

The management of microstomia in post-burn patients presents a complex challenge that requires a multidisciplinary approach. This study's data highlights key factors related to patient demographics, intervention techniques, outcomes, complications, patient satisfaction, time frames, and follow-up periods so the discussion of the results can be organized into several key sections

The analysis of intervention techniques underscores the wide range of approaches employed to manage microstomia. Commissuroplasty emerges as a dominant technique, appearing in a substantial percentage of papers and demonstrating its popularity and effectiveness. This surgical procedure involves reconstructing the oral commissures to restore mouth opening, and it has been consistently used in studies over the past five years. Other techniques, such as scar excision, vermilion-mucosa flaps, and dynamic commissural appliances, also show promising results. The variety of interventions employed highlights the need for individualized treatment plans based on patient characteristics and specific microstomia etiologies. Regarding results of the comparison between Oral Contracture Release Surgery and Z-Plasty and Flap Repair reveals the diversity in approaches. The former showcases significant improvement in mouth opening, while the latter focuses on widening the inter-commissure distance. This highlights the importance of selecting techniques based on individual patient needs and clinical considerations

The data reveal various complications associated with microstomia management interventions, these include marginal necrosis, drooling, webbing, respiratory distress, sensory and motor reinnervation

issues, edema, ecchymosis, and pain. While the reported complications are generally manageable and often resolve over time, they emphasize the importance of careful patient selection, thorough preoperative assessment, and postoperative monitoring to mitigate adverse effects.

Regarding the results of patient satisfaction is a crucial aspect of microstomia management. The reported levels of patient satisfaction across different techniques suggest favorable outcomes for several interventions, such as vermilion-mucosa flaps and commissuroplasty. However, the variation in reported satisfaction levels underscores the need to consider not only functional outcomes but also patient preferences and subjective experiences when selecting the most appropriate management strategy.

The wide range of time frames and follow-up durations across studies reflects the diversity of research designs and objectives. Longer follow-up periods, when available, provide valuable insights into the durability and long-term outcomes of microstomia interventions. However, the variability in follow-up durations highlights the need for standardized reporting of follow-up data to facilitate meaningful comparisons and meta-analyses.

The reported outcomes of different interventions demonstrate overall positive results in terms of functional improvements, oral opening, and aesthetic appearance. Scar excision and closure techniques, as well as various surgical approaches, show promise in addressing microstomia-related issues. However, the lack of specific quantitative outcome measures in some studies underscores the importance of standardized outcome assessment and reporting to enhance the comparability of results.

Based on the findings, several avenues for future research emerge. Long-term follow-up studies are needed to assess the

durability and stability of intervention outcomes over extended periods. Comparative studies directly comparing the effectiveness of different techniques could provide valuable insights into the optimal management approach for specific patient populations. Additionally, investigating the impact of patient characteristics, such as age, etiology, and severity of microstomia, on treatment outcomes could help tailor interventions for individual patients.

The findings have important clinical implications for the management of microstomia. Commissuroplasty appears to be a widely used and effective technique, particularly for increasing oral aperture in patients with post-burn complications. However, other techniques, such as vermilion-mucosa flaps and scar excision, also demonstrate promising outcomes and should be considered in the treatment algorithm. The reported patient satisfaction underscores the importance of individualized treatment plans that take into account both functional improvements and patient preferences.

It is important to acknowledge the limitations of the current review. Variability in study designs, patient populations, and outcome measures may introduce biases and hinder direct comparisons between interventions. The lack of standardized reporting across studies, particularly regarding outcome measures and follow-up durations, limits the depth of analysis and synthesis of results. Additionally, the absence of detailed quantitative data in some studies precludes a comprehensive quantitative meta-analysis.

Conclusion:

The comprehensive assessment of age distribution, intervention techniques, complications, patient satisfaction, time frames, follow-up, and outcomes provide valuable insights into the management of microstomia. The diverse range of

interventions and reported outcomes underscores the complexity of addressing this condition and the need for a multifaceted approach. While certain techniques, such as commissureplasty, show consistently positive results, further research is warranted to optimize treatment strategies, enhance long-term outcomes, and improve patient satisfaction in microstomia management.

Conflict of interest:

There was no conflict of interest, and no financial support was obtained from anybody.

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الأساليب المختلفة لإدارة صغر الفم اللاحق للحرق

مراجعة منهجية / تحليل بعدى

ريهام لاشين و مصطفى سيد محمد و أحمد على حسن و ابراهيم محمد أمين عبد الجواد

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الخلفية: يمكن أن يؤدي ميكروستوميا ما بعد الحروق، والتي غالبًا ما تكون ناجمة عن إصابات الزاوية الفموية، إلى تحديات وظيفية وجمالية. يمكن أن تعوق نسيج الندب والضائقة حول الفم الأنشطة الفموية والتطور، مما يستدعي التدخل الجراحي. استخدام الملابس والمشدات المضغوطة يثير مخاوف، وفي حين أن تقنيات الطيف المخاطي شائعة، إلا أن الإدارة الأمثل لا تزال محل نقاش. التعامل مع التأثيرات النفسية والجسدية أمر حاسم في تطوير علاجات شاملة لميكروستوميا ما بعد الحروق.

الهدف من العمل: تقدم هذه الدراسة تحليلًا متعمقًا لإدارة تقنيات إدارة ميكروستوميا ما بعد الحروق، مع التركيز على توزيع الأعمار، ونتائج التدخل، والمضاعفات، ورضا المرضى، والإطارات الزمنية، ومتابعة المرضى. بمشاركة 29 دراسة و394 مريضًا، تسلط الضوء على التحديات والنهج في التعامل مع ميكروستوميا ما بعد الحروق، مشددة على طبيعتها المتعددة الجوانب.

الطرق: تلتزم هذه الدراسة بإرشادات MOOSE وPRISMA-P، مع التركيز على تقنيات إدارة "ميكروستوميا". يتم إجراء عمليات بحث في قواعد البيانات المختلفة باستخدام كلمات مفتاحية ذات صلة. تشمل معايير الاختيار دراسات إدارة مضاعفات الفم ما بعد الحروق، بما في ذلك التصاميم المستعرضة، والتصاميم المستقبلية، والتصاميم التجريبية. يشمل عملية المراجعة التقييم المستقل من قبل المراجعين واستخراج البيانات. تتضمن التحليل الإحصائي باستخدام برنامج تحليل البيانات الشامل (Comprehensive Meta-Analysis) معدلات النسب بفترات ثقة، ونموذج الآثار العشوائية، وتحليل الحساسية، وفحص مؤشرات انحراف النشر.

النتائج: بالنسبة لتوزيع الأعمار: تأثر 35% من البالغين، و35% من الأطفال، و30% من كبار السن. بالنسبة لتقنيات التدخل: الكوميسوروبلاستي أكثر تقنية شائعة (68.97%)، وتم استخدام إزالة الندب والتصفيحات أيضًا. بالنسبة للمضاعفات: تم الإبلاغ عن نخر، واللعب، والتصفح، وضيق التنفس، وقضايا الحس الحسي؛ وتحسن معظمها مع مرور الوقت. بالنسبة لرضا المرضى: اختلف حسب التقنية؛ وكان أعلى مع تقنيات التصفيح المخاطي الأحمر والكوميسوروبلاستي. بالنسبة للإطارات الزمنية ومتابعة المرضى: كانت هناك إطارات زمنية متنوعة في الدراسات، مما يشدد على ضرورة التقارير الموحدة. بالنسبة للنتائج: نتائج إيجابية عبر تقنيات مختلفة، مركزة على تحسين الوظيفة والقدرة الفموية.

استنتاج: تقدم الدراسة تحليلًا شاملاً لإدارة ميكروستوميا، تغطي التفاصيل الديموغرافية والتدخلات والمضاعفات والنتائج ورضا المرضى. في حين تظهر بعض التقنيات واعدة، إلا أنه يتطلب بحثًا إضافيًا لتحسين الاستراتيجيات وتحسين النتائج على المدى الطويل.

الكلمات الرئيسية: ميكروستوميا ما بعد الحروق، تقنيات جراحية، نتائج، رضا المرضى، مضاعفات الإفصاح: يؤكد الكاتب أنه لم يكن هناك أي تضارب مصالح وأنه لم يتلق أي دعم مالي من أي جهة. تمت الموافقة على الدراسة من قبل اللجنة الأخلاقية في جامعة عين شمس.