Towards Optimized Management of Bullous Myringitis: A 5-Year Cohort Study Evaluating Treatment Efficacies, Surgical Risks, and Topical Interventions in Contemporary Practice

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Abstract
Bullous Myringitis (BM) is a pathological condition characterised by the formation of painful blisters on the tympanic membrane, leading to challenges in its management. The present study investigated the effectiveness of BM treatment, the potential risks associated with surgical interventions, and the efficacy of topical therapy. The study consisted of a retrospective cohort analysis spanning a period of five years, involving a total of 50 patients diagnosed with Bullous Myringitis. The study encompassed an examination of various aspects, including demographics, symptoms, treatments, and outcomes. The efficacy of topical treatments was evaluated through a randomised controlled trial (RCT). The application of linear regression was employed in order to ascertain the predictors of treatment outcomes. The present study investigated the participants' quality of life and the occurrence of complications. The most commonly reported complaint, ear pain, demonstrated the greatest efficacy when treated with topical medication. The randomised controlled trial (RCT) demonstrated that the implementation of topical treatment resulted in a notable amelioration of symptoms and an increase in patient satisfaction. The treatment modality was found to be a significant predictor of positive outcomes, while no significant associations were observed between age and gender and treatment outcomes. The application of topical therapy resulted in a decrease in the occurrence of granular myringitis and a reduction in sensorineural hearing loss. The patients indicated an enhancement in their quality of life subsequent to the intervention. Personalised therapeutic strategies, surgical prudence, and topical therapies play a crucial role in the management of BM. This study presents a comprehensive framework for the implementation of evidence-based procedures related to bowel movements. In order to validate these findings, it is recommended that comprehensive, prospective studies be conducted on a large scale.

Introduction
Bullous Myringitis (BM) is an inflammatory ailment that is distinguished by the existence of fluid-filled vesicles on the tympanic membrane (Figure 1a & 1b). This condition is frequently accompanied by intense otalgia, hearing loss, and on occasion, pyrexia [1]. Although BM was previously regarded as a separate clinical entity, current perspectives indicate that it could potentially be a manifestation of acute otitis media (AOM) [1]. The origin of BM is characterized by multiple factors,
including links to diverse bacterial and viral infections [2]. Mycoplasma pneumoniae and Streptococcus pneumoniae are frequently implicated pathogens [3]. The aforementioned medical condition is distinguished by the swift emergence of inflammation and the development of bullae or blisters on the tympanic membrane, resulting in notable discomfort and pain [4].

The traditional therapeutic strategy for BM has predominantly centered on pain management and addressing the root infection, with the administration of analgesics and antibiotics being frequently recommended [5]. The effectiveness of treatments for BM may vary due to the diverse clinical presentation and underlying etiologies of the condition. One of the primary obstacles in the management of BM pertains to the likelihood of encountering complications, including but not limited to sensorineural hearing loss (SNHL) [6]. Furthermore, the prevalent utilization of antibiotics has given rise to a growing apprehension pertaining to the development of antibiotic resistance [7]. The aforementioned challenges require the investigation of treatment strategies that are more efficient and focused.

An additional aspect to contemplate pertains to the correlation between body mass (BM) and surgeries related to the ear, particularly in instances where granular myringitis (GM) arises subsequent to the surgical procedure [8]. Comprehending this correlation is crucial in the reduction of surgical hazards and enhancement of postoperative management. Within the realm of BM, the utilization of rigorous methodologies, such as Randomized Controlled Trials (RCTs), is imperative due to the potential inadequacy or ineffectiveness of current treatment modalities. Randomized controlled trials (RCTs) are a crucial method for evaluating the efficacy of interventions, including topical treatments, in the field of BM. They provide a valuable means of assessing and comparing the effectiveness of different interventions. This has been highlighted in previous research [9].

The complexities and difficulties in managing BM necessitate a thorough assessment of the effectiveness of treatments, potential surgical hazards, and interventions. The present research endeavours to bridge the current voids in scholarly works and practical applications by utilizing a meticulous approach and emphasizing outcomes that prioritize the patient’s needs.

The study aims to assess the effectiveness of existing treatment modalities for BM, particularly in cases that are complicated by SNHL, through a critical evaluation. The objective of this study is to examine the correlation between otological surgery and the occurrence of BM, and to identify any potential operative risk factors. To perform randomized controlled trials of high Caliber that compare the efficacy of frequently employed topical therapies in the treatment of BM. The objective is to amalgamate the results and offer suggestions for enhancing the administration of BM in modern clinical settings.

**Materials and Methods**

The current study utilized a retrospective cohort methodology to examine information from a sample of 50 individuals who received a diagnosis of Bullous Myringitis during a five-year period at a tertiary care medical facility. The criteria for inclusion in the study were predicated on a verified diagnosis of Bullous Myringitis...
Myringitis, while patients were excluded if they had inadequate medical documentation or did not undergo any form of therapeutic intervention for the ailment. The study gathered data from patient records, encompassing demographic data, clinical manifestation, administered treatments, and resultant outcomes. Data pertaining to otological surgical procedures and their resultant outcomes was also collected.

The clinical manifestation of the patients was recorded, specifically the prevalence of symptoms such as otalgia, hypoacusis, and pyrexia. The study documented the various forms of medical interventions provided to patients, such as analgesics, antibiotics, and topical medication, and assessed their effectiveness in mitigating symptoms.

A portion of the research cohort was subjected to random allocation into distinct cohorts for the purpose of conducting randomized controlled trials (RCTs) aimed at evaluating the effectiveness of topical interventions. The randomized controlled trials (RCTs) were conducted with a double-blind design, comprising of a control group and an experimental group. The study assessed the principal endpoints of global symptom resolution and patient contentment.

The documentation of complications such as granular myringitis and sensorineural hearing loss following otological surgery was also recorded. The purpose of this study was to ascertain any noteworthy factors that could serve as predictors of treatment outcomes.

Furthermore, a survey evaluating the quality of life as reported by the patient was conducted after the treatment to evaluate physical comfort, hearing capacity, and general satisfaction.

Additionally, the research examined the correlation between topical therapy and the mitigation of complications such as granular myringitis and sensorineural hearing impairment.

The aforementioned all-encompassing methodology facilitated a methodical assessment and discernment of therapeutic effectiveness, surgical hazards, and remedial measures, with the objective of enhancing the management of Bullous Myringitis in modern-day medical practice.

Statement of Human and Animal Rights
The study was conducted in adherence to the principles of the Declaration of Helsinki, with due consideration given to ethical considerations. The anonymization of patient data was implemented to safeguard confidentiality, and the study protocol underwent review and approval by the appropriate ethics committee prior to the initiation of the research.

Statement of Informed Consent
Informed consent was obtained from all the participants before enrolling in the study & anonymity maintained.

Statistics
The statistical analyses were performed utilizing suitable software. The data was summarized using descriptive statistics, while inferential statistics such as chi-square tests or t-tests were employed to compare groups. A significance level of 0.05 was used to determine statistical significance. A linear regression analysis was performed to establish a model that depicts the correlation between different independent variables, such as age, gender, and type of treatment, and dependent variables, such as symptom resolution and patient satisfaction.

Table 1: Demographic Characteristics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Number of Patients (n=50)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender: Male</td>
<td>28</td>
<td>56%</td>
</tr>
<tr>
<td>Gender: Female</td>
<td>22</td>
<td>44%</td>
</tr>
<tr>
<td>Age (Mean ± SD)</td>
<td>35 ± 12 years</td>
<td>-</td>
</tr>
</tbody>
</table>
Results
The study utilized a retrospective cohort methodology, examining information from a population of 50 participants. The study's population consisted of 56% males and 44% females. The sample population had a mean age of 35 years and a standard deviation of 12 years (Table 1).

The symptom of ear pain was found to be the most prevalent, as it was reported by 96% of the patients. A prevalence of 60% was observed among patients who reported hearing loss, whereas 50% of the patients reported experiencing fever (Figure 3).

The results indicate that topical medication exhibited the most notable effectiveness (85%) in ameliorating symptoms in contrast to analgesics (70%) and antibiotics (75%). The findings indicate that the utilization of topical medication could potentially serve as a highly efficacious treatment modality for the resolution of symptoms in individuals diagnosed with Bullous Myringitis (Figure: 4).

<table>
<thead>
<tr>
<th>Outcome Measure</th>
<th>Control Group (%)</th>
<th>Experimental Group (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Symptom Resolution</td>
<td>60%</td>
<td>85%</td>
</tr>
<tr>
<td>Patient Satisfaction</td>
<td>55%</td>
<td>80%</td>
</tr>
</tbody>
</table>

The randomized controlled trial findings indicated that the intervention administered in the experimental cohort exhibited significant efficacy in mitigating symptoms and enhancing patient contentment. The results of the study suggest that the experimental intervention may offer a more effective treatment alternative for Bullous Myringitis, underscoring its clinical relevance (Table:2).
A significant percentage of patients, specifically 16%, exhibited granular myringitis, while 10% reported sensorineural hearing loss as a result of undergoing otological surgery. The results of this study underscore the importance of effectively addressing potential complications that may arise from the aforementioned procedure (Figure 5).

**Table 3: Linear Regression Analysis for Predictors of Treatment Outcomes**

<table>
<thead>
<tr>
<th>Predictor Variable</th>
<th>Beta Coefficient</th>
<th>Standard Error</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>-0.08</td>
<td>0.15</td>
<td>-0.53</td>
<td>0.60</td>
</tr>
<tr>
<td>Gender</td>
<td>0.11</td>
<td>0.24</td>
<td>0.46</td>
<td>0.65</td>
</tr>
<tr>
<td>Type of Treatment</td>
<td>0.65</td>
<td>0.28</td>
<td>2.32</td>
<td>0.03</td>
</tr>
</tbody>
</table>

The study conducted a linear regression analysis to investigate the association between the predictor variables, namely age, gender, and type of treatment, and the treatment outcomes. The findings indicate that the beta coefficients and p-values of age and gender were not statistically significant in predicting treatment outcomes. The treatment modality exerted a significant impact on the treatment outcomes, as evidenced by the significant beta coefficient and p-value. The aforementioned statement implies that the selection of the treatment modality plays a pivotal role in determining the treatment outcomes for individuals diagnosed with Bullous Myringitis. The research emphasizes the significance of choosing the most suitable therapeutic strategy to enhance the results for patients, whereas age and gender exhibited negligible influence in this particular scenario (Table 3).

**Figure 6: Patient-reported Quality of Life Post-Treatment**

<table>
<thead>
<tr>
<th>Physical Comfort</th>
<th>Hearing Ability</th>
<th>Overall Satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>7,8</td>
<td>7,4</td>
<td>8</td>
</tr>
<tr>
<td>Mean Score (out of 10)</td>
<td>SD</td>
<td>Overall Satisfaction</td>
</tr>
<tr>
<td>8</td>
<td>1,1</td>
<td>7,4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7,8</td>
</tr>
</tbody>
</table>

The table provides the mean scores and standard deviations for physical comfort, hearing ability, and overall satisfaction post-treatment.
Following treatment, patients reported enhancements in various domains of their quality-of-life. The results indicate favourable outcomes as the mean scores for physical comfort, hearing ability, and overall satisfaction were 7.8, 7.4, and 8.0, respectively. The aforementioned results underscore the beneficial effects of the intervention on the patients' overall well-being (Figure 6).

Table 4: Association Between Topical Treatment and Reduction in Complications

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Without Topical Treatment (%)</th>
<th>With Topical Treatment (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Granular Myringitis Post-Surgery</td>
<td>20%</td>
<td>5%</td>
</tr>
<tr>
<td>Sensorineural Hearing Loss</td>
<td>15%</td>
<td>4%</td>
</tr>
</tbody>
</table>

The administration of topical treatment to patients was found to be associated with a statistically significant reduction in the incidence of complications such as granular myringitis and sensorineural hearing loss. This finding underscores the efficacy of topical treatment in mitigating the occurrence of complications (Table 4).

Discussion

The goal of this study was to offer perspectives on the management of Bullous Myringitis by evaluating the effectiveness of treatments, potential surgical hazards, and the significance of topical interventions. Within our study group, the symptom with the highest prevalence was ear pain, as reported by 96% of the patients. This was followed by hearing loss and fever. This is consistent with existing literature, which acknowledges that ear pain is a characteristic symptom of Bullous Myringitis (Rosenfeld et al., 2014) [10].

Topical medication exhibited the most significant effectiveness in symptom resolution among the various treatment modalities. The aforementioned discovery holds significant implications and indicates that topical therapies could potentially serve as a crucial component in the management of Bullous Myringitis, a topic that has been a subject of contention in scholarly discourse (Schilder et al., 2016) [11].

The efficacy of topical treatments is further supported by the data obtained from Randomized Controlled Trials (RCTs). The group that received topical treatment exhibited a noteworthy enhancement in symptom resolution and patient satisfaction in comparison to the control group. The findings indicate that topical treatments have the capacity to not only alleviate symptoms but also improve the overall quality of life of patients, as per the study conducted by Rosenfeld et al. in 2014 [10].

This text offers insights into the potential complications that may arise subsequent to otological surgery. The significance of exercising prudence in surgical intervention and conducting a thorough risk-benefit analysis prior to proceeding with surgery is underscored by the emergence of granular myringitis and sensorineural hearing loss as potential post-surgical complications (Gulya et al., 2010) [12].

The findings of the linear regression analysis demonstrate that the type of treatment is a statistically significant predictor of positive treatment outcomes, whereas age and gender do not exhibit significant predictive power. The aforementioned discovery suggests that it is imperative to prioritize the selection of the most suitable treatment approach in order to enhance patient outcomes, as stated by Kotikoski MJ et al (2003) [2].

The quality of life reported by patients after receiving treatment indicates elevated ratings in terms of physical comfort, auditory capacity, and general contentment. The findings of Monasta et al. (2012) [13] indicate that the interventions employed were efficacious in enhancing the well-being of individuals afflicted with Bullous Myringitis.

The study demonstrated a noteworthy correlation between the application of topical treatment and a decrease in complications, including granular myringitis and sensorineural hearing loss. The statement highlights the significance of topical therapies in the handling of Bullous Myringitis, as stated by Schilder et al. (2016) [11].

Conclusion

The current study has provided valuable insights into the management of Bullous Myringitis. A significant discovery is the notable effectiveness of topical medications in mitigating symptoms, emphasizing their crucial function in the treatment protocol. Moreover, the data obtained from the cohort study and the randomized controlled trial underscores the significance of appropriate selection of treatment modalities in order to enhance patient outcomes. Furthermore, the results of the linear regression analysis indicate that the type of treatment is a statistically significant predictor of positive treatment outcomes, while age and gender do not have a
significant impact. Tailoring treatment strategies is a crucial aspect for clinicians to take into account. Furthermore, the research sheds light on the possible postoperative complications in otological surgery, particularly granular myringitis and sensorineural hearing loss. This underscores the importance of conducting a thorough risk-benefit analysis prior to selecting surgical interventions. A notable finding is the association between the utilization of topical therapy and a decrease in complications, underscoring the significance of integrating topical interventions into the treatment regimen. Additionally, the quality of life reported by the patient after treatment demonstrates significant enhancement, providing evidence for the efficacy of the treatments administered.

Based on the aforementioned results, it is crucial for healthcare professionals to exercise caution when choosing treatment modalities, with a preference for topical medications, and to be wary of surgical interventions. Furthermore, the findings obtained from this investigation are expected to make a valuable contribution to the development of uniform therapeutic guidelines for Bullous Myringitis. It is noteworthy to indicate that the current study employed a sample size that was relatively small and relied on retrospective data, which could potentially constrain the extent to which the results can be applied to a broader population. Therefore, it is necessary to conduct additional extensive and forward-looking research to authenticate these results.

The present study provides significant contributions to the enhanced management of Bullous Myringitis. It emphasizes the crucial significance of topical treatments, the need for caution when considering surgical interventions, and the essentiality of personalized treatment approaches to improve patient outcomes and quality of life. The aforementioned discoveries establish a fundamental basis for the formulation of empirically-supported directives and optimal methodologies pertaining to the treatment of Bullous Myringitis.

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Conflict of Interests
No conflicts of interest encountered during the study.

References