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Myasthenia Crisis Management in the ICU: A Case Report

Manajemen Krisis Miastenia di ICU: Laporan Kasus

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Abstract

This study focuses on analyzing the clinical course of myasthenic crisis in post-thymomectomy patients by examining the triggering factors, physiological responses, and the effectiveness of multidisciplinary interventions in stabilization and recovery. The research method used was an in-depth clinical case study that monitored the patient's condition from the acute phase to the weaning phase through direct observation, medical data analysis, and tracking of the therapeutic interventions provided. The results showed that myasthenic crisis was influenced by a combination of nosocomial infection, severe neuromuscular weakness, electrolyte disturbances, and acute respiratory failure. Each intervention from emergency intubation, aggressive antibiotic therapy, hypokalemia correction, IVIG administration, to respiratory physiotherap contributed directly to the improvement of respiratory function and hemodynamic stability. This study provides important implications that myasthenic crisis is a systemic condition that requires rapid decision-making, a structured therapeutic approach, multi-layered monitoring, and cross-professional integration. In addition to strengthening the global literature, these findings emphasize the value of early identification of triggering factors and metabolic correction as key to accelerating recovery, while also opening up space for further research with larger sample sizes to develop more comprehensive clinical guidelines.

Kata Kunci:

Miastenia Gravis; Krisis Miastenia; Ventilasi Mekanis.

Abstrak

Penelitian ini berfokus pada analisis perjalanan klinis krisis miastenia pada pasien pasca-timomektomi dengan menelaah faktor pencetus, respons fisiologis, serta efektivitas intervensi multidisipliner dalam proses stabilisasi dan pemulihan. Metode penelitian yang digunakan adalah studi kasus klinis mendalam (clinical case study) yang memantau kondisi pasien dari fase akut hingga fase weaning melalui observasi langsung, analisis data medis, serta penelusuran intervensi terapeutik yang diberikan. Hasil penelitian menunjukkan bahwa krisis miastenia dipengaruhi oleh kombinasi infeksi nosokomial, kelemahan neuromuskular berat, gangguan elektrolit, dan kegagalan napas akut. Setiap intervensimulai dari intubasi emergensi, terapi antibiotik agresif, koreksi hipokalemia, pemberian IVIG, hingga fisioterapi respirasi memberikan kontribusi langsung terhadap perbaikan fungsi respirasi dan kestabilan hemodinamik. Penelitian ini memberikan implikasi penting bahwa krisis miastenia merupakan kondisi sistemik yang memerlukan pengambilan keputusan cepat, pendekatan terapeutik

terstruktur, pemantauan berlapis, serta integrasi lintas profesi. Selain memperkuat literatur global, temuan ini menegaskan nilai identifikasi dini faktor pencetus dan koreksi metabolik sebagai kunci percepatan pemulihan, sekaligus membuka ruang bagi penelitian lanjutan dengan sampel lebih besar untuk pengembangan pedoman klinis yang lebih komprehensif.

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INTRODUCTION

Background

Myasthenic crisis is a neurological emergency that exhibits high clinical complexity, particularly in the context of resource-limited healthcare (Atmaja et al., 2022; Salsabila et al., 2023). Current clinical evidence suggests that the trigger for a crisis is not a single factor, but rather a multifactorial combination involving infection, surgical stress, certain medications, metabolic imbalance, and non-compliance with therapy (Mulyadi et al., 2024; Putra et al., 2025). In the case focused on in this study, the crisis occurred after a thymectomy procedure and was exacerbated by nosocomial pneumonia and hypokalemia, illustrating a mutually exacerbating pathophysiological interaction. This reality emphasizes that the management of patients with myasthenia gravis requires a systematic, integrative, and evidence-based approach, particularly in the complication-prone postoperative phase. This situation also highlights the urgent need to reevaluate the standards for managing myasthenic crisis in Indonesian healthcare facilities. Field observations demonstrate that myasthenic crisis management in Indonesia faces structural and operational challenges that directly impact clinical outcomes.

Limited access to lifesaving therapies such as IVIG and PLEX remains a major obstacle, particularly in low-resource hospitals. High rates of nosocomial infections in intensive care units exacerbate the condition of patients who have recently undergone surgical procedures such as thymectomy, increasing the risk of recurrence and prolonging hospital stays. Furthermore, difficulties in differentiating between myasthenic and cholinergic crises often lead to ineffective treatment, as these two conditions require contrasting therapeutic approaches. The complexity of these issues highlights the urgency of developing a new understanding of myasthenic crisis management that aligns with the realities of healthcare in Indonesia.

Previous research provides an important theoretical foundation for the development of this study. Basuki et al., (2025) emphasized that mechanical ventilation with lung protection strategies is a crucial component in the initial stabilization of myasthenic crisis, and early intubation is recommended for most patients. Meanwhile, studies by Nelson et al., Zain et al., (2022; 2024) showed that IVIG and PLEX are equally effective as rescue therapy, although PLEX tends to produce a faster clinical response. Inayah et al., (2022) found that azathioprine offers a better long-term safety profile than other immunosuppressive agents in preventing relapse. Furthermore, research by Howard et al. Putri et al., (2024) introduced new biologic therapies such as eculizumab, ravulizumab, efgartigimod, and rozanolixizumab, which have been shown to provide significant improvements in international clinical trials. However, most of these findings have not been fully contextualized when applied to the resource-constrained Indonesian healthcare system.

Identification of problems

The problem identification in this study stems from the complexity of myasthenic crises that arise from the interaction of various clinical and systemic factors, particularly after thymectomy. The case in question demonstrates that the patient experienced a crisis not only triggered by surgical stress but also exacerbated by nosocomial pneumonia and hypokalemia, highlighting weaknesses in the early detection and prevention of postoperative complications. This situation illustrates that the intensive care system still faces limitations in implementing anticipatory protocols that should minimize the risk of deterioration. Furthermore, limited access to lifesaving therapies such as IVIG and PLEX hinders effective management during the acute phase of the crisis, particularly in healthcare facilities with limited resources. This combination of multifactorial clinical factors and structural constraints in healthcare services suggests a fundamental problem that requires comprehensive identification and assessment.

Another identified issue is the diagnostic difficulty in differentiating myasthenic crisis from cholinergic crisis, both of which have similar clinical manifestations but require very different treatment approaches. This diagnostic inaccuracy has the potential to lead to inappropriate interventions, increase the risk of treatment failure, and prolong the patient's stay in the intensive care unit. The high rate of nosocomial infections in various Indonesian hospitals further complicates the situation, as infection is a major trigger for myasthenic crisis, which can worsen the condition of patients after thymectomy. Furthermore, the lack of standardization in postoperative care management leads to variations in the quality of care that do not always benefit patients. These issues indicate significant gaps in clinical practice, diagnostics, and service governance that must be identified as a basis for formulating scientific and practical solutions.

This problem identification emphasizes that research on post-thymectomy myasthenic crisis cannot focus solely on individual clinical factors but must involve a broader analysis of the health system. Barriers to access to therapy, the high risk of nosocomial infections, inaccurate diagnoses, and weak anticipatory protocols demonstrate that this issue is multidimensional and interconnected. Therefore, this study aims to comprehensively identify the root causes of the problem in order to provide relevant scientific contributions and applicable policy recommendations to improve the quality of myasthenic crisis management in Indonesia.

Formulation of the problem

Based on the complexity of the identified phenomena, the research problem formulation in this study focuses on how multifactorial triggers, particularly post-thymectomy surgical stress, nosocomial pneumonia, and hypokalemia, contribute to the occurrence of myasthenic crises and influence the effectiveness of clinical management in the context of resource-constrained Indonesian healthcare facilities. This formulation also includes questions regarding how structural barriers such as limited access to IVIG and PLEX and high rates of nosocomial infections hinder successful crisis management.

Furthermore, this study questions how diagnostic difficulties in differentiating myasthenic crisis from cholinergic crisis impact clinical decision-making and potentially worsen patient outcomes. Thus, the primary research question aims to comprehensively understand the relationship between clinical triggers, health system limitations, and diagnostic challenges that collectively shape the pattern of myasthenic crisis management failure in Indonesia.

Objectives and Benefits

Research Purposes

The primary objective of this study is to comprehensively analyze the multifactorial factors that trigger post-thymectomy myasthenic crisis, specifically the role of nosocomial infections, metabolic disturbances such as hypokalemia, and surgical stress in worsening patient conditions. This study also aims to evaluate the effectiveness of clinical management applied to myasthenic crisis cases in Indonesia, taking into account limited access to rescue therapies such as IVIG and PLEX and gaps in diagnostic practices that often hinder the accurate identification of myasthenic crisis from cholinergic crisis. Furthermore, this study aims to identify systemic and operational barriers in intensive care units and examine the extent to which these factors influence the success of short- and long-term therapy. Overall, this study aims to generate a deeper and contextual understanding of the clinical and structural dynamics that influence myasthenic crisis management in Indonesia.

Benefits of Research

This research is expected to provide significant theoretical and practical benefits in the development of science and improving the quality of healthcare services. Theoretically, this study contributes to the literature on neurology and intensive care management by offering a new perspective on the interaction between clinical factors, service systems, and resource limitations in managing myasthenic crises, particularly in developing country contexts. The findings of this study can also strengthen the academic foundation for future studies addressing neuromuscular crises in postoperative situations or other complicating conditions.

Practically, this research is beneficial for medical personnel and health policymakers in designing more effective treatment protocols, improving diagnostic accuracy, and minimizing the risk of complications through evidence-based anticipatory strategies. Furthermore, this research can provide applicable recommendations for hospitals in Indonesia to improve the management of nosocomial infections, increase access to immunomodulatory therapy, and strengthen the capacity of intensive care units to more optimally handle myasthenic crisis cases. Thus, this research not only expands scientific knowledge but also offers concrete solutions that have the potential to improve patient safety and quality of life.

THEORETICAL AND CONCEPTUAL FRAMEWORK

Theoretical Framework

The theoretical framework of this study summarizes three main perspectives: the pathophysiology of myasthenia gravis, medical crisis management theory, and the concept of healthcare systems. From a biological perspective, the autoimmunity theory explains that antibodies against acetylcholine receptors inhibit neuromuscular transmission, triggering muscle weakness that can potentially progress to crisis when triggered by triggers such as surgical stress, infection, or metabolic disturbances (Hidayanti et al., 2023). Thymectomy can also induce a transient immunological stress response that increases the risk of exacerbations, particularly if the condition is exacerbated by nosocomial infections or electrolyte imbalances such as hypokalemia (Sarılar et al., 2022). Evidence-based intervention theory and clinical decision-making theory provide a foundation for understanding myasthenic crisis management strategies, including the use of mechanical ventilation, IVIG, PLEX, and immunosuppressants

(Hamzens, 2024). Accurately differentiating myasthenic crisis from cholinergic crisis is crucial because the two conditions exhibit similar manifestations but require contrasting therapies. Misidentification at this stage can significantly impact patient safety and outcomes.

At the health system level, systems theory and quality management theory explain how limited facilities, irregular ICU protocols, and high rates of nosocomial infections can reduce the effectiveness of clinical care (Jasmin Ambas et al., 2025; Latuconsina et al., 2023). This situation suggests that successful treatment depends not only on the patient's biological condition or clinical competence, but also on the strength of hospital governance and the readiness of the healthcare organization's structure. The integration of these three perspectives provides a comprehensive conceptual foundation for examining the relationship between triggering factors, the quality of clinical decision-making, and systemic barriers in managing the post-thymectomy myasthenia crisis in Indonesia.

Conceptual Framework

This research's conceptual framework then maps post-thymectomy myasthenic crisis as the result of a simultaneous interaction between biological, clinical, and health system factors. Biological triggers such as autoimmune activity, postoperative stress, nosocomial infections, and electrolyte disturbances lead to neuromuscular exacerbations that require a rapid and accurate clinical response. The effectiveness of this response is greatly influenced by the accuracy of distinguishing the type of crisis, the speed of interventions such as mechanical ventilation or immunomodulatory therapy, and the readiness of ICU facilities. All of these processes are within the structural framework of the health system, which determines the availability of lifesaving services, the quality of hospital management, and the consistency of the implementation of care protocols. Thus, the effectiveness of myasthenic crisis management is understood as a multi-layered sequence that moves from biological triggers, through clinical processes, to health system capacity, which directly determines the success of treatment and patient outcomes.

METHODOLOGY

This study employed a qualitative method with a descriptive case study design, aiming to provide a narrative and comprehensive overview of the clinical course of a 46-year-old female patient experiencing a post-thymectomy myasthenic crisis (Poltak & Widjaja, 2024). This design was chosen because it captures the complexity of clinical situations that are rarely reported, especially in the context of middle-income countries where large-scale studies are still limited. The choice of a case study design is also in line with the International Consensus Guidance for Management of Myasthenia Gravis (Narayanaswami et al., 2021), which emphasizes the importance of reporting rare cases or cases with resource challenges to enrich clinical practice.

This study was conducted in the Intensive Care Unit (ICU) of Arifin Achmad Regional Hospital, Pekanbaru, a tertiary referral hospital in Riau Province. The clinical episode occurred in the post-thymectomy period and was complicated by nosocomial pneumonia and hypokalemia. Continuous observation was conducted from the time the patient was admitted to the ICU until she was weaned from mechanical ventilation. The subject was a 46-year-old woman diagnosed with myasthenia gravis three months prior to admission. The patient was referred after experiencing worsening dyspnea following a thymectomy performed at a private hospital, and upon ICU admission, she was

diagnosed with a myasthenic crisis, nosocomial lung infection, and electrolyte disturbances.

Data collection was conducted through multiple sources to ensure the accuracy and depth of information. Medical data were obtained from medical records, including medical history, neurological examination results, laboratory data, ventilator records, and documentation of therapeutic interventions. Observers also conducted direct clinical observations through continuous monitoring of vital signs, oxygenation status, and neuromuscular function. Additional diagnostic data, such as arterial blood gas analysis, chest radiography, and electrolyte examination, were used to enrich clinical interpretation. In addition, all therapeutic interventions, both pharmacological (such as pyridostigmine, azathioprine, antibiotics, and IVIG), and non-pharmacological (such as mechanical ventilation and respiratory physiotherapy), were systematically recorded.

Data analysis was conducted using a qualitative narrative approach, comparing the patient's clinical course with international guidelines and empirical findings related to myasthenic crisis (Muhammad, 2022). This analysis emphasized critical aspects such as risk factor identification, ventilation strategies, timing of immunotherapy, the effectiveness of pharmacological therapy, and supportive care such as physiotherapy and metabolic correction. This approach enabled the study to provide a comprehensive evaluation of the appropriateness of treatment based on current scientific evidence.

The ethical aspects of the study were strictly adhered to. All patient-identifying information was anonymized to maintain confidentiality, and informed consent was obtained from the patient's family for publication. This study complies with the ethical principles of the Declaration of Helsinki and applicable institutional ethical standards.

RESULTS AND DISCUSSION

Result

Patient Presentation

The results showed that a 46-year-old female patient arrived in the ICU in severe respiratory distress after undergoing thymomectomy. On admission, the level of consciousness was recorded as GCS E4VtM5, indicating that the patient was still able to open her eyes spontaneously and provide adequate motor responses, but her verbal responses could not be assessed due to the endotracheal insufficiency. Vital signs showed significant tachycardia (120 bpm), fever of 38.5°C, and relatively stable blood pressure (110/70 mmHg). These findings are consistent with the acute stress response that often occurs in patients with myasthenic crisis who experience severe infection or respiratory failure.

Arterial blood gas analysis (ABG) showed hypoxemia and hypercapnia, consistent with the use of accessory muscles, rapid shallow breathing, and decreased alveolar ventilation. Clinical evidence suggests that approximately 75-90% of patients with myasthenic crisis progress to hypercapnic respiratory failure due to weakness of the diaphragm and other respiratory muscles. Therefore, the ABG pattern in this patient directly confirms ventilatory failure, requiring immediate mechanical ventilation.

Neurological examination revealed upper and lower extremity weakness with an MRC score of 2/5, along with bilateral ptosis and severe dysphagia. These findings are classic indicators of myasthenia gravis exacerbation involving the bulbopharyngeal and oculomotor muscles. The literature indicates that severe dysphagia and ptosis are important predictors of the need for intubation, as they are associated with the risk of

aspiration and failure of airway protection. This explains why the patient required immediate intubation early in the ICU admission.

Laboratory tests revealed leukocytosis and severe hypokalemia (2.8 mmol/L). Leukocytosis indicates an active infection, while hypokalemia exacerbates neuromuscular weakness, as low potassium levels can interfere with nerve impulses and muscle contraction. Research suggests that hypokalemia is a factor that can exacerbate myasthenic crisis and reduce muscle response to acetylcholine. Thus, these metabolic disturbances contribute to the patient's worsening condition.

A chest imaging scan showed bilateral infiltrates consistent with nosocomial pneumonia. This is an important precipitating factor, given that pneumonia is the most common cause of myasthenic crisis, occurring in more than 30-40% of cases. The bilateral infiltrates on the chest radiograph confirm that the infection was severe and involved both lungs, directly impairing the patient's respiratory function.

Overall, the clinical findings of respiratory distress, severe neuromuscular weakness, hypokalemia, and bilateral pulmonary infiltrates clearly confirm that the patient was experiencing a multifactorial myasthenic crisis. This exacerbation was triggered by a combination of post-operative thymomectomy, nosocomial infection, and electrolyte disturbances, consistent with international literature findings that suggest 60-80% of myasthenic crises are triggered by infection, surgical procedures, and metabolic imbalances.

ICU Course and Interventions

Days 1-2 (Acute Phase)

The results of the study in the acute phase showed that the patient required immediate intubation and mechanical ventilation with Synchronized Intermittent Mandatory Ventilation (SIMV) due to mixed respiratory failure, a combination of hypoxemia and hypercapnia that reflects the inability of the respiratory muscles to maintain effective ventilation. The use of SIMV was chosen because this mode allows a combination of mandatory breaths with pressure support for spontaneous breaths, making it suitable for patients with myasthenia gravis who experience progressive respiratory muscle weakness. Clinical literature shows that more than 60-70% of patients with myasthenic crisis require intubation in the early hours of ICU care, in line with the findings of this study which showed that the patient's ventilatory capacity was already below the safe threshold upon arrival.

A broad-spectrum antibiotic combination of ceftriaxone and levofloxacin was administered based on a strong suspicion of nosocomial pneumonia, which was then confirmed by the finding of bilateral infiltrates on chest radiograph. The selection of this regimen was based on clinical guidelines for healthcare-associated pneumonia (HCAP), where common pathogens such as Klebsiella pneumoniae, Pseudomonas aeruginosa, and resistant Staphylococcus aureus require aggressive initial therapy to prevent the development of sepsis or acute respiratory distress syndrome (ARDS). Although the patient's hemodynamics remained stable, field findings showed that fever and leukocytosis did not show significant improvement in the first 48 hours, indicating that the infectious process was still active or the possibility of multiresistant bacterial colonization that requires further culture evaluation.

Correction of electrolyte disturbances is a crucial part of acute phase management. Severe hypokalemia is corrected through a gradual infusion of KCl, in accordance with safety guidelines, due to the risk of ventricular arrhythmias with rapid administration. Laboratory responses demonstrate a gradual increase in serum potassium levels, which

is crucial given that hypokalemia can exacerbate neuromuscular weakness and decrease the sensitivity of acetylcholine receptors in neuromuscular transmission. Scientific evidence suggests that electrolyte correction, particularly potassium and magnesium, is a factor in improving the success of weaning from the ventilator in patients with myasthenic crisis.

Myasthenia-specific therapy, including pyridostigmine and azathioprine, is continued through a nasogastric tube (NGT) to ensure continuity of treatment, even if the patient is sedated or unable to swallow. This is in line with standard clinical practice, as abrupt discontinuation of anticholinesterase or immunosuppressant medications can trigger further neuromuscular deterioration. Continuation of therapy is a preventative strategy against fluctuating muscle weakness that could worsen respiratory recovery.

Overall, the acute-phase findings demonstrate that the patient fulfills a typical clinical pattern often seen in severe myasthenic crisis, in which the interaction of nosocomial infection, extreme neuromuscular weakness, and metabolic derangements leads to dependence on mechanical ventilation. With over 60% of patients with myasthenic crisis globally requiring intubation upon ICU admission, this case demonstrates consistency with international epidemiological data regarding the physiopathological characteristics and need for emergency intervention in this condition.

Days 3-7 (Immunotherapy Initiation)

In the subacute phase, significant clinical improvement was observed after administering Intravenous Immunoglobulin (IVIG) therapy at a dose of 10 g/day for five days. This intervention began to show effects on the third day, marked by a decrease in fever, a gradual normalization of the leukocyte count, and an increase in muscle strength from MRC 2/5 to 3/5. This improvement is consistent with IVIG's mechanism of action, which reduces the activity of pathological antibodies against acetylcholine receptors and inhibits the autoimmune process that underlies the pathophysiology of myasthenia gravis. International literature consistently reports that the clinical response to IVIG usually occurs within 2-5 days after administration, so this finding is in good agreement with existing empirical evidence.

Despite improved muscle strength, patients remain highly dependent on mechanical ventilation. However, the emergence of spontaneous breathing while on the ventilator helps indicate that respiratory recovery is underway. The regaining of spontaneous breathing is an important prognostic indicator in myasthenic crisis, as it indicates improved function of the diaphragm and intercostal muscles, which were previously severely weakened. However, this dependence is understandable, given that respiratory muscle recovery in post-crisis patients often takes longer than improvement in ocular or extremity symptoms.

On the other hand, the underlying infectious process still requires ongoing antibiotic management. Although clinical signs such as fever and leukocytosis begin to stabilize, nosocomial infections, particularly pneumonia, generally require a minimum of 7-10 days of treatment, or more if the infection is caused by resistant bacteria. This explains why antibiotic therapy cannot be discontinued even if there is initial improvement. Clinical stability in this phase reflects the gradual success of infection control, rather than a complete cure.

Overall, this phase demonstrates a combination of autoimmune improvement through IVIG, increased neuromuscular strength, and stabilization of infectious markers, but with continued ventilator requirements due to slower respiratory recovery. These findings reflect a common pattern in multifactorial myasthenic crises, in which

neurologic, respiratory, and infectious recovery occur at distinct but interdependent rates.

Days 8-12 (Stabilization Phase)

During the stabilization period, the study results demonstrated progressive clinical improvement in both respiratory and infectious aspects. A chest radiograph revealed gradual resolution of the bilateral infiltrates that previously characterized nosocomial pneumonia. Concurrently, infection parameters such as body temperature and leukocyte count returned to near-normal limits, indicating that the systemic inflammatory process was under control. This improvement reinforces the assumption that the previous antibiotic and supportive care regimen was effective.

Daily ventilator monitoring records showed increased tidal volume and improved oxygenation values, including a rise in PaO_2 and an improved PaO_2/FiO_2 ratio. These findings enabled the ICU team to gradually taper ventilator support, including reducing the frequency of machine breaths and increasing the proportion of spontaneous breaths. This gradual taper is an important strategy in preventing long-term ventilator complications such as ventilator-induced diaphragmatic dysfunction (VIDD), which commonly occurs in patients with neuromuscular weakness.

In addition to ventilator-assisted improvements, daily respiratory physiotherapy has been shown to contribute significantly to the recovery of respiratory function. Structured breathing exercises, lung expansion techniques, effective coughing exercises, and diaphragmatic muscle stimulation resulted in increased inspiratory-expiratory muscle strength and increased exercise tolerance. These field findings are consistent with numerous studies confirming that respiratory physiotherapy is a key component in the successful weaning process in patients with neuromuscular disorders, including myasthenic crisis. Empirical evidence suggests that intensive respiratory training can accelerate the increase in vital capacity, improve the effectiveness of alveolar ventilation, and reduce the risk of atelectasis.

Thus, this stabilization period demonstrates the synergy between antibiotic therapy, carefully tapered ventilator support, and intensive respiratory physiotherapy. This combination of three aspects plays a crucial role in preparing the patient for full recovery and reducing the risk of failed extubation later in life.

Days 13-15 (Recovery and Weaning)

In the final phase of treatment, the study results showed that the patient achieved significant clinical improvement and was declared ready to undergo a spontaneous breathing trial (SBT). The SBT test was stable without any signs of respiratory failure, thus the patient was deemed fit for extubation. On day 15, the patient was successfully extubated and was able to maintain spontaneous ventilation with minimal support via nasal cannula. This finding indicates that the patient's respiratory function has gradually recovered and is able to meet the needs of independent ventilation.

Post-extubation neurologic evaluation revealed significant improvement in skeletal muscle strength, with MRC scores improving to 4/5 in both upper and lower extremities. Furthermore, the previously impaired swallowing reflex began to return, indicating restoration of bulbar function, which is crucial for preventing aspiration. Bilateral ptosis, a key symptom of myasthenia gravis exacerbation, significantly reduced, indicating a positive response to the combination of immunomodulation therapy, metabolic correction, and intensive care.

The duration of weaning and extubation on day 15 aligns with international reports stating that patients with myasthenic crisis generally require mechanical ventilation for 10-21 days. This agreement demonstrates that the patient's care follows a scientific and realistic recovery pattern, as documented in various case studies of myasthenic crisis in intensive care units.

Another equally important finding is that the success of this recovery is inseparable from the consistently implemented multidisciplinary management approach, including collaboration between the neurology team, intensivists, respiratory physiotherapists, and trained nurses. This comprehensive approach allows for targeted treatment, ranging from respiratory stabilization and infection control to metabolic improvement and muscle strength optimization. This confirms that the implementation of team-based management with standardized protocols significantly contributes to clinical outcomes comparable to international standards.

Overall, this final phase demonstrates that respiratory recovery, neuromuscular improvement, and successful weaning are key indicators of the effectiveness of interventions during intensive care, while also confirming the successful implementation of a multidisciplinary approach in managing complex myasthenic crises.

Discussion

The findings of this study demonstrate that the patient presented with severe respiratory distress post-thymomectomy, accompanied by hypoxemia, hypercapnia, extreme neuromuscular weakness, and nosocomial pneumonia. This clinical picture is consistent with most international reports, but also reveals some interesting clinical dynamics when compared with previous studies. For example, the results of this patient's Arterial Gas Analysis (ABG), which showed a combination of hypoxemia and hypercapnia, are highly consistent with the findings of a study by Atmaja et al. (2022) in the Journal of Critical Care, which reported that more than 80% of patients with myasthenic crisis present with a pattern of ventilatory failure due to diaphragmatic and intercostal muscle weakness. This similarity confirms that the physiopathological profile of the patients in this study follows the global pattern of myasthenic crisis mapped in recent clinical studies.

Severe neuromuscular weakness with an MRC score of 2/5, accompanied by ptosis and dysphagia, also closely aligns with the findings of a study by Lloyd et al. (2023) published in Neuromuscular Disorders. This study demonstrated that dysphagia and ptosis are the strongest predictors of the need for intubation in patients with myasthenic crisis, as both are closely associated with the risk of aspiration and failure of airway protection. However, this study found that patients required immediate intubation even before signs of aspiration developed. This discrepancy suggests that in certain cases particularly those triggered by surgical procedures and severe infections the indication for intubation may arise sooner than described in the literature, an important clinical finding that enhances the understanding of these extreme cases.

Furthermore, the presence of severe hypokalemia in this patient exacerbated neuromuscular weakness. These results align with the findings of Somaa et al. (2022) in Frontiers in Neurology, which confirmed that electrolyte imbalances, particularly hypokalemia and hypomagnesemia, can impair neuromuscular transmission and increase the risk of crisis. However, this study provides an additional contribution by observing that rapid but controlled potassium correction has a positive effect on the recovery of ventilatory capacity in this patient. These findings suggest that the role of electrolyte correction may be more significant than previously recognized and deserves broader clinical attention.

Clinical progression after IVIG administration also showed a pattern nearly identical to international reports. A study by Nurhayati (2025) in Muscle & Nerve showed that the effects of IVIG generally appear within 2-5 days, primarily marked by an increase in the MRC score. This study confirms this timeframe, as improvements in muscle strength in patients began to appear as early as the third day of therapy. However, an interesting finding from this study was the persistence of ventilator dependence despite improvement in neuromuscular symptoms in the extremities. This differs slightly from reports in several studies that state that recovery of respiratory function usually follows improvement in extremity strength. This discrepancy suggests that in cases triggered by severe bilateral pneumonia, respiratory recovery may be delayed even after neurological parameters begin to improve.

In the stabilization phase, bilateral infiltrates improved on chest imaging and increased tidal volume demonstrated an excellent response to antibiotic treatment and ventilator support. These findings are consistent with a broader study by Meyer et al. (2021) in Chest Journal, which confirmed that resolution of pulmonary infiltrates within 7–10 days is a strong predictor of successful weaning in neuromuscular patients. However, this study adds value by demonstrating that intensive respiratory physiotherapy plays a significant role in accelerating the weaning process, an aspect that, while well-documented in the literature, has rarely received the detailed empirical attention documented in this study.

In the final phase, the patient's successful Spontaneous Breathing Trial and extubation on day 15 are consistent with a multi-center study report by Bruno et al., (2022) in Critical Care Medicine, which revealed that the duration of mechanical ventilation in myasthenic crisis ranges from 10-21 days in most populations. This similarity indicates that the multidisciplinary approach implemented in this study is in line with international best practices and supports the success of safe weaning.

Overall, when compared with at least three recent international studies, this study not only demonstrates consistency with global evidence regarding the clinical profile and recovery patterns of myasthenic crises, but also contributes additional nuances, particularly regarding the influence of hypokalemia, the dynamics of delayed respiratory recovery despite improved limb muscle strength, and the contribution of respiratory physiotherapy to the weaning process. Thus, the results of this study strengthen and enrich the scientific understanding of multifactorial myasthenic crises management in the ICU setting.

Litimation Study

This study has several limitations that must be acknowledged to ensure a balanced interpretation of the findings. First, the study focused on only one case of a patient with myasthenic crisis, making it impossible to generalize to a broader population. Patient responses to interventions such as IVIG, electrolyte correction, antibiotic therapy, and weaning may differ among patients with varying age, gender, disease severity, or comorbidities. This limited sample size also prevents the study from comparing the effectiveness of therapy across groups, making the findings more descriptive and reflecting individual dynamics.

Second, this study was conducted within a single healthcare facility, so the results were influenced by resource availability, clinical policies, ICU equipment, and the competency of the local multidisciplinary team. Variations in service standards between hospitals can result in significant differences in the management of myasthenic crises, ranging from the speed of intubation, the use of ventilator modes, to access to immunological therapies such as IVIG or plasmapheresis. Third, this study did not use more in-depth

immunological biomarker parameters, such as acetylcholine or MuSK antibody titers, so mapping the correlation between immune response and clinical improvement could not be comprehensively evaluated. Fourth, limitations of the observational method prevented this study from assessing long-term post-extubation effects, including the risk of relapse, residual neuromuscular function, or the effectiveness of long-term rehabilitation.

Thus, although this study provides an important contribution in the form of in-depth clinical documentation, further research with a multi-case design, quantitative analysis, and coverage of more diverse health facilities is needed to strengthen external validity and produce more comprehensive clinical recommendations.

Novelty Study

The novelty of this study lies in its approach, which combines an in-depth clinical analysis of multifactorial myasthenic crisis with particular emphasis on the simultaneous dynamics of post-thymomectomy, nosocomial infection, and severe electrolyte disturbances. Unlike most case reports that highlight only one dominant trigger, this study demonstrates how three major triggering factors—surgery, nosocomial pneumonia, and hypokalemia—coincide in aggravating neuromuscular weakness and leading to rapid respiratory failure. The synergy of these three factors has rarely been comprehensively discussed in the literature, thus enhancing our understanding of the complex pathophysiology of myasthenic crisis in the postoperative setting.

Furthermore, this study offers a new perspective on the significance of electrolyte correction, particularly hypokalemia, in accelerating the recovery of ventilatory capacity. Most previous studies have only described hypokalemia as an aggravating factor, but few have directly linked it to the success of ventilator weaning. Clinical observations in this study demonstrate that controlled potassium correction not only improves peripheral muscle function but also significantly impacts diaphragmatic function and the effectiveness of spontaneous breathing. These findings provide a relevant clinical contribution and may serve as the basis for further evaluation in myasthenic crisis management protocols.

This study also provides added value through structured documentation of the effectiveness of multidisciplinary collaboration neurology, intensive care, respiratory physiotherapy, and nursing which plays a significant role in successful weaning and patient recovery. While a multidisciplinary approach is often mentioned in guidelines, this study provides empirical evidence illustrating how intensive interdisciplinary coordination concretely impacts clinical outcomes, from respiratory stabilization to successful extubation on day 15, in line with international standards. Thus, this study not only enriches clinical insights but also emphasizes the need for more integrated, cross-professional protocols in the management of myasthenic crises.

CONCLUSION AND RECOMMENDATION

Conclusion

This study demonstrates that myasthenic crisis in post-thymomectomy patients is a complex clinical condition influenced by a combination of nosocomial infection, extreme neuromuscular weakness, electrolyte disturbances, and acute respiratory failure. Findings from the early to late phases indicate that every intervention from emergency intubation, aggressive antibiotic administration, hypokalemia correction, IVIG immunomodulation therapy, to respiratory physiotherapy has a direct impact on the stabilization and recovery of respiratory function.

The main lesson to be learned from this study is that myasthenic crisis is not simply a matter of muscle weakness, but a systemic manifestation that requires rapid decision-making, structured interventions, and multi-layered monitoring. These findings strengthen the international literature and provide new insights into the importance of early identification of precipitating factors and the role of metabolic correction in accelerating recovery. Theoretically, this study demonstrates that the clinical pattern of myasthenic crisis in Indonesia is similar to global reports. Practically, this study emphasizes that myasthenic crisis management must be carried out comprehensively and sequentially to achieve optimal outcomes.

Recommendations

This study's contribution lies in mapping the detailed clinical course of myasthenic crisis patients from the acute phase to the weaning phase, a situation rarely described in depth in local reports. This study adds scientific value by systematically depicting the relationship between immune response, infection, neuromuscular function, and the need for mechanical ventilation. Furthermore, it highlights the importance of integrated multidisciplinary therapy as a key to successful recovery, enriching the literature with a case study that can serve as a clinical reference.

However, this study has limitations, primarily because it is based on a single case, making it impossible to generalize to the entire population of myasthenic crisis patients. Factors such as age, gender, comorbidities, pathogen variations, and differences in immune response have not been comprehensively evaluated. Therefore, further research with a larger sample size, involving demographic variations and multimodal monitoring methods, is essential to provide a more comprehensive picture and support the formulation of more targeted clinical guidelines.

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