

Review Article

Botulinum toxin in Recurrent Postoperative Hernias

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Abstract

Incisional hernias constitute a complex issue in the field of general surgery. The traditional invasive techniques of the hernias repairing are partially efficient as there are many recurrences. The further operations lead to numerous problems such as contamination, morbidity and damaging the tissues. A very promising method to overcome the problems mentioned above was the introduction of the usage of Botulinum toxin A in the treatment of recurrent hernias.

Aim of the present systematic review is to evaluate the possible application of the Botulinum toxin type A before surgery and the disadvantages of this method. Detailed research was conducted via the PubMed database using the keywords: "Recurrent" AND "Postoperative" AND "Hernias" AND "Botulinum toxin". No further filters were applied.

The existing experience suggests that Botulinum toxin A supports the uneventful postoperative recovery after hernia surgery offering decreased tension to suture line tension without perturbing the structure and physiology of the abdominal wall. However, it has been spontaneously associated with minor complications mainly from the respiratory system.

KeyWords: botulinom toxin, postoperative hernias, recurrent hernias

Introduction

Open abdominal surgeries can lead to various complications, with ventral hernias being one of the most prevalent. Roughly 30% of patients may be affected by these hernias, which can negatively impact their quality of life both aesthetically and due to issues like abdominal compartment syndrome.[1] The likelihood of ventral hernia occurrence increases in patients with risk factors, such as obesity, diabetes, smoking, malignancy, infection, emergency intervention, use of steroids and immunomodulatory factors, or a previous laparotomy.[2] Managing incisional hernias presents a complex challenge in the field of surgery. Traditional invasive techniques, like abdominal wall reconstruction and hernia repair, offer only partial effectiveness and can result in numerous recurrences. Repairing recurrent hernias through repeated operations carries the risk of damaging and thickening tissue even further. Additionally, in more complicated cases of hernias requiring bridging, there are concerns about

recurrence, contamination, and morbidity [3]. The component separation approach is often considered the gold standard for certain types of hernias, while the Rives-Stoppa retromuscular technique is preferred for others because they allow for tension-free closure and preservation of abdominal physiology. However, even these techniques do not guarantee success, as recurrence, contamination, and surgical complications remain potential risks. Other methods like myocutaneous fascial speculums and pneumoperitonisation have proved ineffective in expanding the abdominal wall.

The primary cause of ventral hernias is often the anti-diametric movement of abdominal muscles. However, a promising alternative to surgical intervention is the non-surgical approach known as Botox based technique. This innovative technique leverages botulinum toxin type A, produced by the clostridium botulinum, to reduce the tension exerted by these muscles, inducing temporary paralysis that addresses the underlying

cause.[4] This technique is particularly effective for large incisional hernias and those that have lost domain.[5] Aim of the present systematic review is to evaluate the possible use of botulinum toxin type A preoperatively as well as to present the advantages and the disadvantages of this technique.

Materials and methods

Thorough research was conducted by using the PubMed database's published bibliography. The search was conducted using keywords such as "Recurrent", "Postoperative", "Hernias", and

"Botulinum toxin". Relevant data was extracted using a standard data elicitation form and following PRISMA-ScR guidelines. Out of the 34 records identified through the initial PubMed search, no additional ones were found through references review as they were similar to the initial ones. Furthermore, 24 full-text articles were assessed for eligibility and out of these, 10 were excluded due to non-relevant title and abstract. All 24 references assessed for eligibility were deemed relevant and fulfilled the above mentioned criteria, and hence were used in this study.

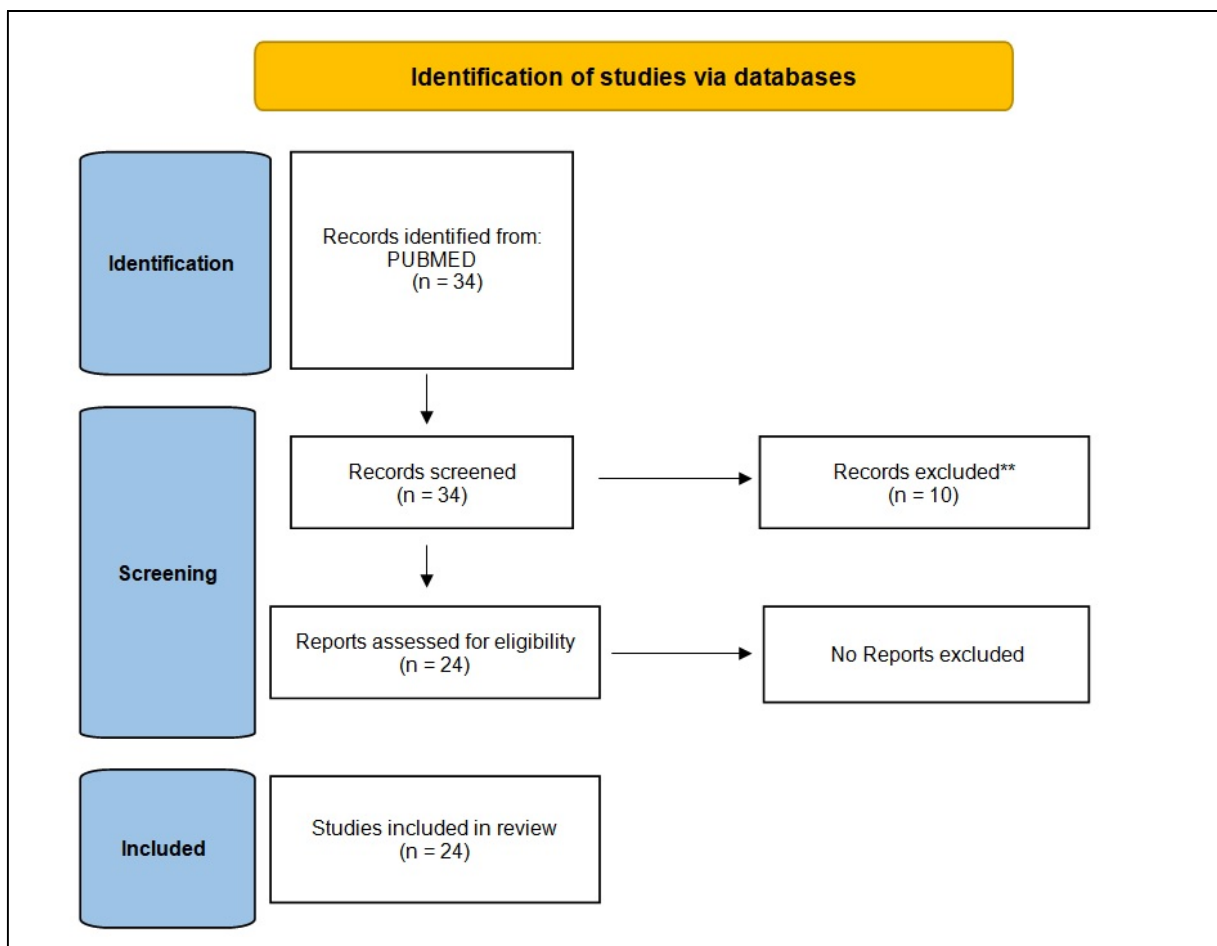


Figure 1. Botulinum toxin in Recurrent Postoperative Hernias - PRISMA

Discussion

Botulinum toxin type A, or BTA, possesses a broad range of medical applications, including the

treatment of strabismus, muscular pain, dystonia syndromes, esophagus achalasia, hyperhidrosis, and aesthetic procedures [2]. This clostridium

botulinum-derived substance works by inhibiting the release of acetylcholine from the neuromuscular junction, resulting in muscle paralysis and elongation. Its effects become evident within 2-3 days and peak within 2 weeks, with a duration of up to 6 months that declines gradually. Infusing the toxin into the abdominal wall muscles produces a relaxed state that tightens and repairs a hernia without resorting to invasive component separation. This approach preserves the abdominal wall's physiology and myofascial structures [6]. As it is described in an interesting report the toxin is injected in an outpatient setting approximately four weeks before the impending operation. [7] Under high-resolution ultrasound, five specific points are identified in patients who are positioned laterally. Two of these points are located between the upper iliac crest and rib margin in the mid-axillary line, while the remaining three points are situated between the anterior axillary line and midclavicular line, between the costal margin and superior iliac crest. The procedure is performed bilaterally, and each point is injected with 5ml of a solution containing 500 units of BTA dissolved in 50ml of 0.9% saline solution. This chemical technique results in paralysis that lasts up to four-six months and begins approximately two weeks after injection. The diminished tension caused by the BTA enables efficient repair. However, as there is no clinical effect in the first 48 hours, the use of negative pressure ligatures is recommended to prevent abdominal wall contraction [8]. More invasive techniques can be safely applied with guaranteed permanent results once the toxin's effects are visible, as confirmed by CT scans. The muscle did not swell during the preoperative BTA application, as stated in the first report [9]. Another advantage of BTA lies in the flaccid paralysis of the lateral abdominal muscles, allowing the closure of large hernias without excessive tension, reducing the likelihood of ventilation duration or postoperative complications such as abdominal hypertension and

respiratory disorders [10]. BTA is preferred over invasive procedures for patients with spastic muscles disorders [8]. Additionally, BTA can be used as complementary treatment to progressive preoperative pneumoperitoneum (PPP) when it is insufficient [11]. Lastly, BTA can also be employed postoperatively to alleviate pain.

Disadvantages. Despite its widespread use for medical purposes, the botulinum toxin A has several drawbacks that prevent its broad application. High cost is a major barrier to access, with some insurance companies declining coverage for the repair of large ventral hernias. Moreover, some patients have reported temporary concerns, such as weakened breath, sneezing, and coughing, due to the flaccidity of the abdominal muscle wall.[14,15] Furthermore, some patients experienced a feeling of fullness and bloating after the onset of BTA action, with others reporting pain, bruising, and detention sensations following toxin injection.[13,16,19] Multiple reports confirm that the normal functioning of the abdominal muscles involves contraction, aiding movement and stabilizing the spine and torso. However, the use of BTA can hinder these muscles, causing back pain through invasive component separation and chemical paralysis. Additionally, the BTA can relax the lateral abdominal wall muscles, leading to altered respiratory physiology and resulting in dyspnea. [13,17,18,20]. Animal experiments support the claim that BTA inhibits pain, signal, and perception transmitters beyond blocking acetylcholine secretion. [2,7]. Patients who are hemodynamically stable [8] and non-smokers, during the application period, are the only eligible candidates for BTA treatment. Moreover, the weight loss of obese patients is a prerequisite for BTA therapy. However, BTA is known to cause anaphylaxis due to its constituents and exacerbate Myasthenia Gravis, making it an absolute contraindication [6]. Lastly, patients who undergo BTA must undergo long-term follow-up to mitigate any potential side effects. [10,15].

Botulinum toxin type A is an effective and safe technique that is easily tolerated and has reversible effects without permanent complications. Separating the chemical components with BTA allows for closure without tension, without disrupting the abdominal wall's structure or physiology. Previously thought unmanageable hernias can now be cured using this technique, thanks to BTA's ability to induce relaxation and elongation. This eliminates the need for surgical expansion of the abdominal cavity and reduces pain and muscle tension in the postoperative period. However, BTA may cause inconvenience to patients such as temporary concerns, weak breathing, coughing, bloating, pain, and difficulty breathing. BTA should only be used in hematologically stable patients who do not smoke or are not obese.[21-24].

Conclusions

The healing process is safeguarded for a considerable duration due to the effects of Botox. Additionally, the utilization of Botox obstructs the occurrence of postoperative issues including necrosis, fibrosis, recurrency, and morbidity. Despite being a relatively new approach, thorough monitoring and observation are imperative before any conclusions about potential complications can be determined.

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