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Case Report

Image guided preoperative abdominal wall botox injection for large ventral hernia repair: A case series [☆]

Younes Motii, BS^a, Hussein Chahrour, MD^{b,*}, Ali Harb, MD^b

^a Wayne State University School of Medicine, 540 E Canfield St, Detroit, MI 48201, USA

^b Detroit Medical Center/Wayne State University, Diagnostic Radiology, 4100 John R St, Detroit, MI 48201, USA

ARTICLE INFO

Article history:

Received 18 November 2023

Revised 20 February 2024

Accepted 22 February 2024

Keywords:

Interventional radiology

Hernia repair

Botox injection

ABSTRACT

This case series aims to explore the application of preoperative CT guided Botox injections in three different cases of abdominal wall reconstructions. Each of the three cases highlights the role of chemical component separation in achieving myofascial release and contributing to a successful surgical repair. The use of Botox in the preoperative planning of abdominal wall repair aims at creating a tension-free environment for midline closure and promoting an overall positive postoperative course for the patient. This case series presents as a valuable contribution to the different surgical approaches in abdominal wall reconstruction and the collaboration between Interventional Radiology and Surgery in treating such patients.

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Introduction

Abdominal wall reconstructions are a very common surgical procedure to treat ventral and incisional hernias. Incisional hernias are a very common complication of midline abdominal incisions and may occur in up to 10%-30% of cases [1]. This case series explore the use of preoperative Botox injections in the lateral abdominal wall muscles as an adjunct to surgical hernia repair in select patients. Botulinum toxin A, otherwise known as Botox, is a neurotoxin

that works by blocking the release of acetylcholine and causing a temporary muscle paralysis [2]. When injected precisely into the lateral abdominal muscle groups using precise image guided techniques, the resultant temporary paralysis and elongation of the muscles may be used to facilitate rectus approximation and full abdominal wall closure [3]. By exploring the unique cases presented in this series, this report aims to contribute valuable insights to the surgical treatment of abdominal wall hernias and the use of Botox to augment myofascial closure and enhance patient outcomes.

[☆] Competing Interests: The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

* Corresponding author.

E-mail address: Hchahrou2@dmc.org (H. Chahrour).

<https://doi.org/10.1016/j.radcr.2024.02.079>

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Case review

Case 1

A 50-year-old male with a history of multiple abdominal surgeries, underwent a complex abdominal wall reconstruction for a recurrent incarcerated ventral incisional hernia as shown in Fig. 1. Two weeks before undergoing the operation, Interventional Radiology was consulted to administer Botox injections into the lateral wall abdominal muscles. This preoperative intervention aimed to facilitate perioperative tension free closure and address potential postoperative pain to enhance the patient's overall surgical experience. The IR procedure was performed under CT guidance, and the three layers of the lateral abdominal wall musculature was targeted bilaterally. About 200 units of Botox was injected in aliquots of 25 units and evenly distributed into the external abdominal oblique, internal abdominal oblique, and transverse abdominis muscle in the anterolateral abdomen bilaterally, as shown in Figs. 2 and 3.

The subsequent surgical procedure included an open abdominal wall reconstruction with the placement of meshes, myofascial releases, and extensive lysis of adhesions. Two weeks following the surgical procedure, the patient was seen in clinic. The wound was noted to be healing well except for a 3 cm area of dehiscence with serosanguinous discharge, but no signs of infections. The patient was instructed to return to clinic in 2 weeks for further evaluation of the wound. At this visit, he reports feeling weak and a loss appetite, and has had some purulent drainage from a right sided skin opening. He was afebrile during this visit but appeared to be dehydrated and weak. An I&D was performed in the clinic to drain and clean out the purulent pocket in the wound,

and the patient was subsequently admitted to the hospital overnight for IV antibiotics, IV hydration, and further wound management, and was discharged the following day. At his next clinic visit one week after being discharged, the patient reports doing very well and has returned to performing his daily activities. He denies any symptoms of infection including fever, chills, nausea, and vomiting, and he reports he has been taking good care of his wound and performing daily dressing changes. At his 2-month postoperative visit, the patient reports feeling back to normal with no issues or concerns. He plans on following up with his primary care physicians for chronic issues and pain management that he has been dealing with since before surgery and will follow up with the surgical team as needed for wound checks or further concerns.

Case 2

This case involves a 50-year-old male with paraplegia presenting with a large ventral hernia and loss of abdominal wall domain. Preoperatively, the patient was counseled on the need for an open operation involving component separation and transversus abdominis release. Considering the patient's improved mobility with therapy, abdominal wall exercises, and the potential for future complications, it was deemed appropriate to proceed with surgical repair.

To facilitate myofascial release and aid in postoperative pain management, the patient underwent preoperative Botox injections to the lateral abdominal wall muscles under CT guidance, administered by Interventional Radiology, 2 weeks before the scheduled surgery. The patient was placed in the supine position in the CT machine and preprocedural scans were taken as seen in Fig. 4. Afterwards, aliquots of 25 units were evenly administered into the external and internal ab-



Fig. 1 – Preprocedure CT imaging showing large ventral abdominal wall hernia.



Fig. 2 – Image guided Botox injection into the right lateral abdominal wall musculature.



Fig. 3 – Image guided Botox injection into the left lateral abdominal wall musculature.

dominal oblique, as well as the transverse abdominis muscle at each of the four levels on the anterolateral abdomen, bilaterally. In total, 200 units of Botox was injected into 8 total sites as seen in [Figs. 5 and 6](#).

Two weeks following the injection of Botox by Interventional Radiology, an open abdominal wall reconstruction was performed to address the large irreducible incisional hernia and loss of domain. This surgery was completed using myofascial release techniques on both sides of the abdominal wall, and the hernia was successfully repaired. Postoperatively, the patient exhibited an overall positive clinical course. Follow-up visit on postoperative day 12 revealed a well healed

incision and minimal serosanguinous drainage from both drains which were removed during this visit. A subcutaneous hematoma was noted on the right side of the abdomen but there was no recurrence of the hernia during the physical exam. The patient reports feeling well and was scheduled to follow up in 2 weeks for further examination. At the 4-week postoperative follow up visit the patient reports no pain or recurrence of the hernia and has been very happy with the overall result. He was instructed to follow up in clinic as needed if he has any issues or concerns. The use of Botox injections preoperatively, coupled with a meticulous surgical approach, contributed to optimal results, as evidenced by the patient's



Fig. 4 – Pre-procedure CT scan showing ventral abdominal wall hernia.



Fig. 5 – Right lateral abdominal wall Botox injection.

improved postoperative condition and reduced tension during the abdominal wall reconstruction.

Case 3

This case involves a patient with a complex history of perforated diverticular disease and multiple abdominal surgeries

with Hartmann's procedure who presents to us with a large recurrent ventral and parastomal hernia as seen in Fig. 7. This patient's complex history and recurrent hernia puts him at a very high risk of recurrence even after proper closure of the abdominal wall. The patient was informed of this risk and consented to have the surgical repair. Due to the complexity of the hernia, Interventional Radiology was consulted to



Fig. 6 – Left lateral abdominal wall Botox injection.



Fig. 7 – CT scan showing large ventral hernia.

perform preoperative Botox injections into the lateral abdominal wall musculature to facilitate myofascial release. Interventional Radiology performed the CT-guided injection of 200 units of Botox into the external abdominal oblique, internal abdominal oblique, and transverse abdominis muscles bilaterally, as seen in Fig. 8. The patient tolerated the procedure well.

Following the Botox injections by IR, surgery was performed to repair the ventral hernia, lyse the extensive intraabdominal adhesions, and perform a takedown of the splenic

flexure. Postoperatively, the patient's recovery progressed well. At postoperative week 3, he reported tolerating diet, having regular bowel function, and engaging in daily activities. By postoperative week 7, the patient continued to do well, reporting closure of the midline abdominal incision, no hernia recurrence, and increasing activity levels, including swimming. Unfortunately for this patient, he developed a recurrence of the ventral hernia after 5 months from his last operation as seen in Fig. 9. Because of the complexity of his history and the recurrence of his hernia previously, this was a known pos-

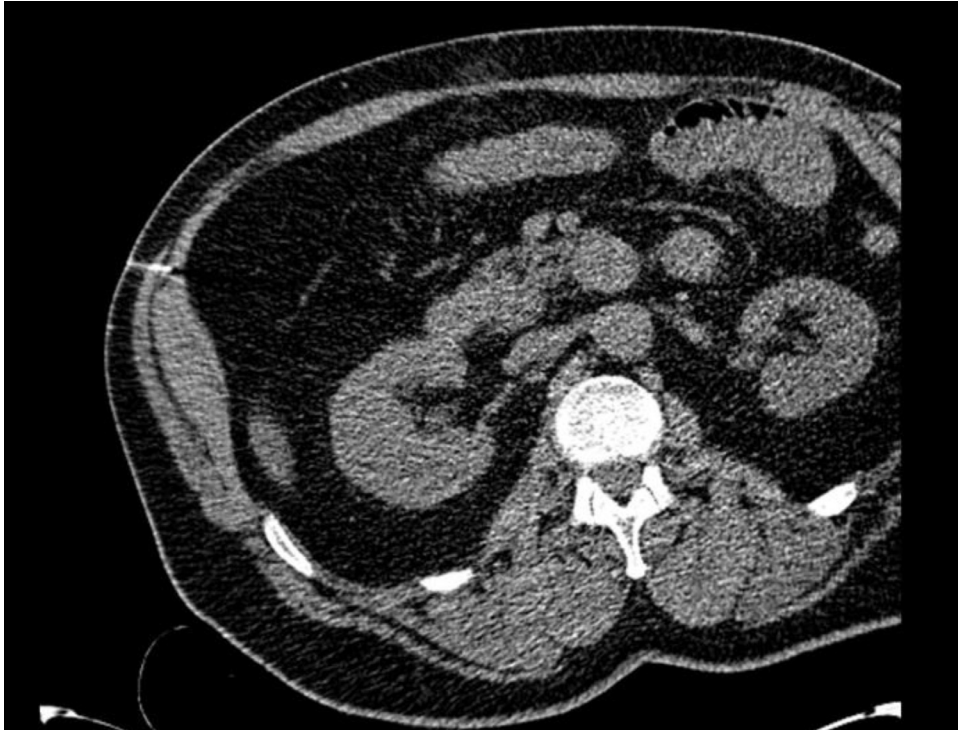


Fig. 8 – Image guided Botox injection into the lateral abdominal wall musculature on the right side.



Fig. 9 – Recurrence of ventral abdominal hernia.

sibility of undergoing the surgical repair. Due to the nature of the hernia, Interventional Radiology was consulted once again for injection of Botox into the lateral abdominal wall musculature, as shown in Fig. 10. Plans to surgically correct this defect once again have been made and discussed with the patient.

Discussion

The literature describes various techniques general and plastic surgeons use to successfully reconstruct the abdominal wall in the treatment of ventral hernias. Different techniques



Fig. 10 – Image guided injection of Botox into the left lateral abdominal wall compartment.

that are being used in practice today include progressive preoperative pneumoperitoneum, Rives-Stoppa retrorectus repair, and posterior components separation [4], which are methods that may be utilized to achieve myofascial closure in the setting of abdominal wall reconstruction. With most of these techniques, an extensive dissection of the abdominal wall musculature may be necessary, and this may lead to potential complications and worsen patient outcomes [4]. Historically, it has been a challenge to achieve tension-free myofascial closure with little to no risk of perioperative and postoperative complications [3]. This case series aims to add more information and insight into the use of Botox injections in the preoperative planning of abdominal wall reconstruction.

The cases presented in this series illustrate the successful use of Botox injection preoperatively to help achieve tension-free closure in complex hernia repairs. Through a temporary chemical paralysis, Botox injections into the lateral abdominal wall musculature promote relaxation and elongation of the abdominal muscle groups to help facilitate closure of the abdominal wall without the need for extensive dissection. An important aspect of this preoperative procedure is the need for precision when administering the neurotoxic agent to avoid paralysis of unintended structures. In the cases described in this series, all the patients were referred to Interventional Radiology for the administration of Botox under CT guidance into 8 precisely planned injection sites. With the help of IR and their expertise in minimally invasive image-guided interventions, all the patients in our case series were successfully pretreated with Botox injections a minimum of 2 weeks before their scheduled abdominal wall reconstruction. Perioperatively, the surgeons were able to achieve tension-free myofascial closure of the abdominal wall without extensive dissection or complications. All three patients presented in this case series initially reported good postoperative recovery,

except for simple wound infection in the first case and adequate pain control. They were generally back to performing normal activities of daily living by the fourth week postoperatively. Of the 3 patients, only one reported a recurrence of the ventral hernia, which occurred 5 months after surgical repair. However, this was a known and highly likely possibility, given this patient's complex surgical history and previous recurrence of the ventral hernia.

Furthermore, in addition to the discussed techniques and their outcomes, it is imperative to delve into the role of ultrasound in guiding interventions and diagnosing abdominal wall conditions. Real-time ultrasound serves as a valuable tool in the detection of ventral hernias and can aid in guiding interventional maneuvers. It offers advantages such as immediate feedback, absence of ionizing radiation, and accessibility, making it an attractive alternative or adjunct to other imaging modalities like computed tomography (CT). Studies have shown the diagnostic utility of ultrasound in identifying ventral hernias and assessing their severity [8]. Additionally, ultrasound can be used to visualize the abdominal wall musculature, including the rectus abdominis muscles, facilitating the assessment of diastasis recti. Diastasis recti, characterized by the separation of the rectus abdominis muscles, is a predisposing factor for ventral hernias. Dynamic ultrasound plays a crucial role in evaluating diastasis recti, allowing for the visualization of the extent of muscle separation and the identification of anatomical variations [8]. Research has demonstrated the usefulness of ultrasound in assessing the patterns of anatomical variation in diastasis recti, providing valuable information for surgical planning and management [9].

Studies have demonstrated the diagnostic utility of ultrasound in detecting complications such as pseudoaneurysms arising from interventions on the abdominal wall [6]. For instance, Doppler techniques have been shown to effec-

tively identify peripheral iatrogenic pseudoaneurysms secondary to minimally invasive procedures, aiding in their prompt diagnosis and management [6]. Additionally, contrast-enhanced ultrasound (CEUS) has emerged as a valuable tool for visualizing vascular structures and detecting abnormalities such as inferior epigastric artery pseudoaneurysms, providing clinicians with crucial information for timely intervention [7].

The use of chemical component separation as a preoperative intervention to augment surgical reconstruction of the abdominal wall shows great promise in achieving tension-free myofascial closure and an overall positive postoperative trajectory in select patients. However, further research is needed to develop a standardization of protocols that may be used as a guide to determine which patients may benefit the most from this procedure. When comparing Botox injections with other surgical separation techniques of abdominal wall muscles, it has shown to be a generally safer alternative as it minimizes the potential for perioperative complications due to extensive dissections [5]. Further research on its efficacy is needed to determine how well it compares to traditional methods in preventing recurrence and achieving successful closure. Additionally, consideration of patient-specific factors, specific hernia types, and the potential for personalized treatments with chemical component separation may be areas of focus for future investigation in the field of abdominal wall reconstruction. Moreover, continued investigation into the role of ultrasound in guiding interventions and diagnosing abdominal wall conditions will contribute to advancements in the field of abdominal wall reconstruction.

Conclusion

The application of preoperative Botox injections in abdominal wall reconstruction surgeries, as indicated in the cases presented, represents an opportunity to enhance surgical outcomes in patients with complex hernias who are candidates for repair. Although there remains the need for further research and compilation of data, this series emphasizes the potential for augmenting abdominal wall reconstruction techniques and improving patient outcomes using Botox for chemical component separation.

Patient consent

Consent for publication was obtained for every individual person's data included in the study.

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