



Botulinum Toxin Injections for Facilitated Abdominal Wall Closure

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Introduction

- Botulinum toxin A (BTA) is a neurotoxin produced by Clostridium botulinum
 - Cleaves SNARE proteins in the presynaptic terminals preventing acetylcholine release
 - Flaccid paralysis, peaks ~2-4 weeks and resolves ~3 months
- Approved by FDA for multiple clinical uses
- Preoperative chemical paralysis to facilitate abdominal wall closure
 - Off-label use
 - First described in 2009 to chemically facilitate midline closure as an alternative to surgical component separation techniques
 - Relaxes and elongates contracted abdominal muscles, increasing pliability and reducing shear stress
 - Promising evidence for use in facilitating complex abdominal wall reconstruction, with the most evidence in hernia repair

Case Presentation

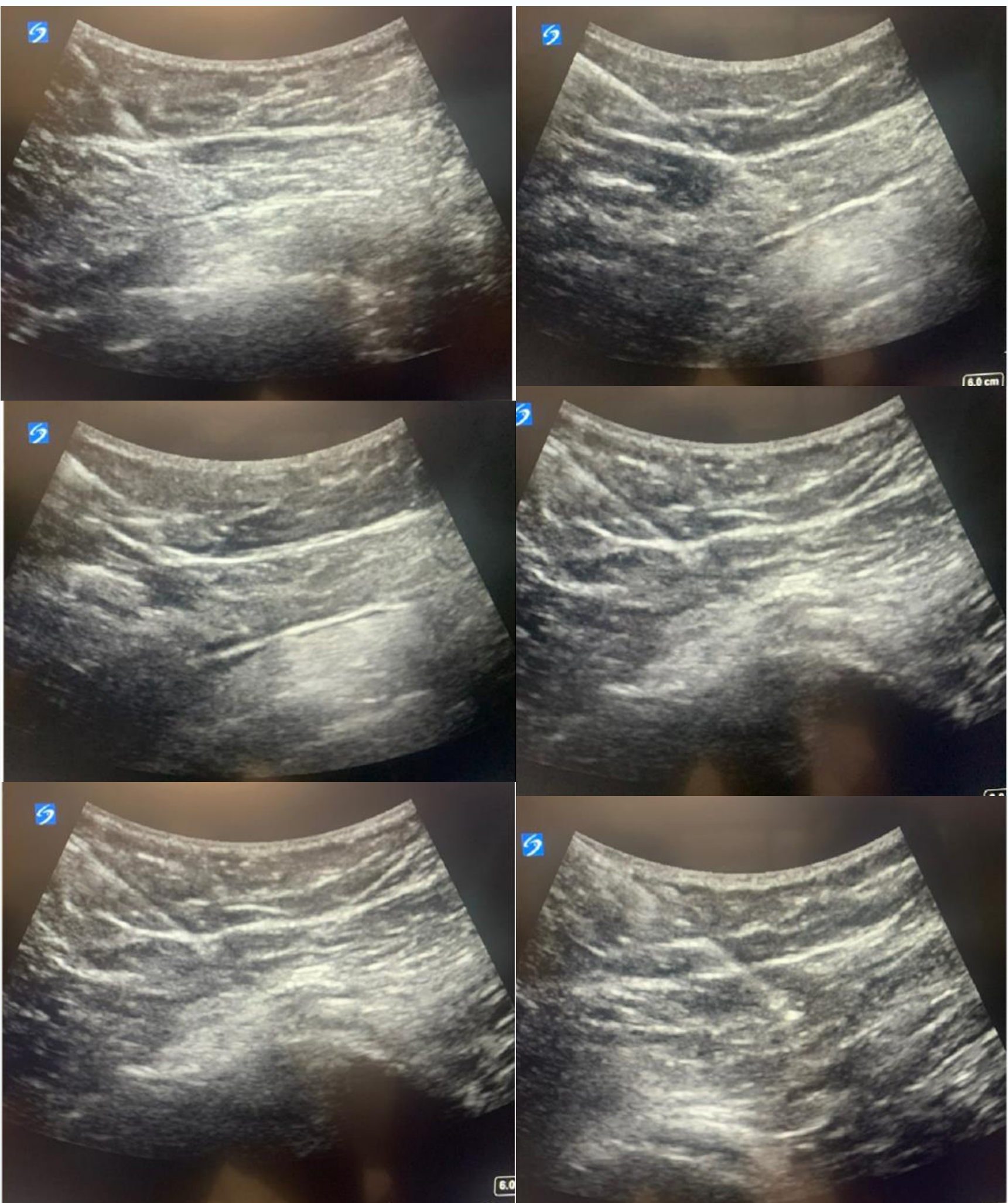
- CC: 19M trauma sp GSW to the back
 - Underwent multiple abdominal surgeries: exploratory laparotomies, small bowel resection, right hemicolectomy, IVC repair, abdominal washouts
 - Complicated by recurrent fistula formations resulting in a prolonged open abdomen in the SICU
 - Multiple attempts at abdominal wall closure
 - Pain management was consulted for chemical facilitation of abdominal wall closure with BTA
- 200 units of Botox was diluted in NS to 20mL. 22G stimulating needed was inserted under direct ultrasound visualization. 10 units (1cc) was injected at the superior, midline, and inferior areas for all three muscular layers, internal oblique, external oblique, and transversus abdominis, totaling 180 units.
- 15 days later, patient underwent abdominal closure. Surgeon reported abdominal wall was noticeably compliant and closed the abdomen without difficulty
- Patient recovered well after surgery without sequelae from BTA injections

Discussion

- Meta-analysis (2021) evaluating 23 studies evaluating the effect of BoNT-A injections on abdominal muscle/hernia dimensions and clinical outcomes
 - 21 studies involved hernia repair; 2 studies involved open abdomens sp damage-control laparotomy
 - Doses 200-300U Botox/500U Dysport were injected at 3-5 locations bilaterally into all 3 muscles of the lateral abdominal wall 4 weeks prior to surgery (range 0-6 weeks)
 - Efficacy Outcomes
 - Significant elongation of lateral abdominal wall of 3.2 cm per side and 6.3 cm total elongation
 - Significant but heterogenous decrease in transverse hernia width
 - BoNT-A pre-treatment in ventral hernia patients significantly increased fascial closure rate

- Safety Outcomes
 - No major adverse effects were reported
 - 4 studies reported mild adverse effects that did not require intervention
 - Pain immediately after injection
 - Back pain
 - Feeling of abdominal distention/bloating
 - Weaker cough/sneeze

- Moving forward
 - Promising evidence for BTA use in hernia repair
 - Lacking evidence for other types of open abdomen
 - Lack of standardization
 - Patient selection
 - Ideal type of BTA and dosage
 - Location of injection
 - Time intervals between injection and surgery
 - Outcome measures



Conclusions

- BTA pretreatment in patients undergoing hernia repair significantly increases successful fascial closure rates
- Bilateral injection of BTA in the lateral abdominal wall muscles is safe without major complications
- The technical aspects, treatment regimens and patient selection require further standardization

References

- Timmer AS, Claessen JJM, Atema JJ, Rutten MVH, Hompes R, Boermeester MA. A systematic review and meta-analysis of technical aspects and clinical outcomes of botulinum toxin prior to abdominal wall reconstruction. Hernia. 2021;25(6):1413-1425.