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Use of Botulinum Toxin and Pneumoperitoneum for Hernias with Loss of Dominance

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ABSTRACT

When the abdominal cavity's material migrates to the hernial sac (HSV) and the HSV/abdominal cavity volume ratio exceeds 25%, systemic alterations known as "loss of domain" occur, resulting in an estimated 5–30% of cases of post-incisional ventral hernia. Usage of botulinum toxin appears to be a secure way to do a tension-free repair on treatment for hernias with loss of dominance.

KEYWORDS: Ventral Hernia; Loss of Dominance; Botulinum toxin A

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INTRODUCTION

Abdominal wall flaws resulting from a prior surgical procedure are known as post-incisional ventral hernias. After a midline exploratory laparotomy, there is a 5–30% chance that this complication may manifest. It is a factor that raises morbidity and directly affects patients' quality of life. When a ventral hernia first develops, it often gets bigger because of a mechanical force that causes the wall muscles to retract laterally, leading to atrophy and fibrosis. A number of things can happen when these structural abnormalities are present, and they can alter the respiratory physiology. The diaphragm's stability, balance, and mobility are all impacted by the drop in intra-abdominal pressure that occurs as the viscera migrate to the hernial sac (HSV), along with a reduction in venous return in the porta and cava. Chronic inflammation brought on by mechanical friction with the hernial ring causes the mesentery, omentum, and intestine to swell and thicken, leading to the development of flanges or adhesions. The HSV is mechanically compressed, causing atrophy of the skin and subcutaneous cellular tissue. Hernia with loss of dominance is a condition for which there is no accepted definition; this is based on the size of the lesion and the systemic implications. Tanaka et al. generated an HSV/VAC ratio by using CT to describe the volume of the HSV and the volume of the abdominal cavity (VAC); if the ratio is greater than 25%, it may be interpreted as a loss of domain. Pre-operative treatments include the use of tissue expanders, progressive pneumoperitoneum (PN), and bolutinum toxin Type A (BTA) may be carried out [1-5].

Relapses	Type of implant		Size of the hernial gates				Total
			W1	W2	W3	W4	
R0	Modeled		8	4	8	3	23 (34.84%)
	Standard		1	8	6	7	22 (33.33%)
R1	Modeled		2	2	2	1	7 (10.60%)
	Standard		0	3	5	1	9 (13.63%)
R2	Modeled		0	0	1	0	1 (1.51%)
	Standard		1	0	1	2	4 (6.06%)
	Total	absolute	12	17	23	14	66
		relative	18.8%	25.75%	34.84%	21.21%	100%

Figure 1. Chevrel classification

DISCUSSION

One of the eight toxin serotypes (A–H) generated by clostridium bacteria (including butyrricum, argentinensis,

barati, and botulinum) is botulinum toxin Type A. well-known for its numerous medicinal uses in the treatment of urological disorders, depression, achalasia, hyperhidrosis, migraines, cerebral palsy, cosmetics, and strabismus, among other ailments. By blocking the release of acetylcholine in the neuromuscular plate, it operates at the nerve ends, resulting in a chemical denervation that will reduce muscle contraction and cause reversible muscle atrophy. Currently, it is being used to prepare patients for abdominal wall incisional hernias, which were initially documented in 2009 by Ibarra-Hurtado et al. Regarding application on the abdominal wall, there is no standard dosage or equivalency between the various commercial presentations. Research on the biological and pharmacological characteristics of the various BTA presentations has revealed a 1:1 correlation between Xeomeen® and Botox® (Allergan, Irvine, CA), and these in turn have a 1: 2.5-3 association with Dysport® (Ipsen Ltd, Slough, Berkshire, UK). When applied to the muscles of the abdominal lateral wall, it will condition a flaccid paralysis that will allow it to extend momentarily. The highest effect is usually observed between weeks 4 and 6, and it is reversible. The duration of the effect can range from 6 to 9 months. reducing the HSV's transverse diameter, which will thin the lateral muscles' width and the abdominal cavity's size and promote a tension-free healing. Hypersensitivity to the toxin or any of its constituents, site infection, and myasthenia gravis are contraindications to its usage. To precisely place the BTA in every muscle layer, electromyography is used in conjunction with ultrasound guidance. Ibarra-Hurtado et al. identified five places of treatment on each side of the abdomen using anatomical references, and additional writers have since suggested three points of application. The dosage varies amongst reviewers, with low dosages ranging from 100 U to 500 U overall. In mice (MLD50) and Rhesus monkeys, the hazardous dose was investigated via intraperitoneal injection. It was determined that the fatal dose of Botox® is 5,000 U, whereas the toxicity in intramuscular administration is 2730 U. Since the dose used is significantly less than the toxic dose, its use is regarded as safe. Moreover, no mortality has been reported as a result of its application to the abdominal wall, likely due to its localized effect at the application site, which can result in up to 25% of mild, transient, and non-systemic adverse effects related to the mechanism of action. Since incobotulinumtoxin A lacks complex proteins, its ability to elicit an immune response is minimal. According to certain research, it doesn't create antibodies, which lowers the likelihood of tachyphylaxis [6-8].

The use of PN to prepare for ventral hernias was initially reported by Goni-Moreno in 1946. Its goals include enhancing portal circulation, lowering intestinal and mesentery edema, repositioning the diaphragm, bringing the organs back into the cavity, and raising intra-abdominal pressure to enhance ventilatory function. In addition to causing pneumatic lysis of adhesions, air in the cavity influences the immune system and promotes healing. The puncture site specified is different for each patient; it is a location away from the skin scars from prior surgery. The patient's tolerance to positive pressure ventilation (PN), which typically does not exceed 12–15 mmHg, and the extent of the hernia will determine how much ambient air needs to be insufflated. First, 1000–4000 cc of ambient air are introduced; thereafter, 1000–2000 cc of insufflation each day are used for maintenance. A sphingomanometer or the laparoscopy tower's insufflator can be used to take an objective measurement. The authors state that the PN maintenance period varies from 7 to 15 days before to the day of operation. With no related direct mortality, up to 12% of problems are documented as a result of its administration, including discomfort radiating to the scapular area, subcutaneous emphysema, and puncture site infection. Both strategies were applied in several case series. We did not come across any other publication that employed incobotulinumtoxin A topically applied to the abdomen wall when reviewing the literature in preparation for this paper [9, 10].

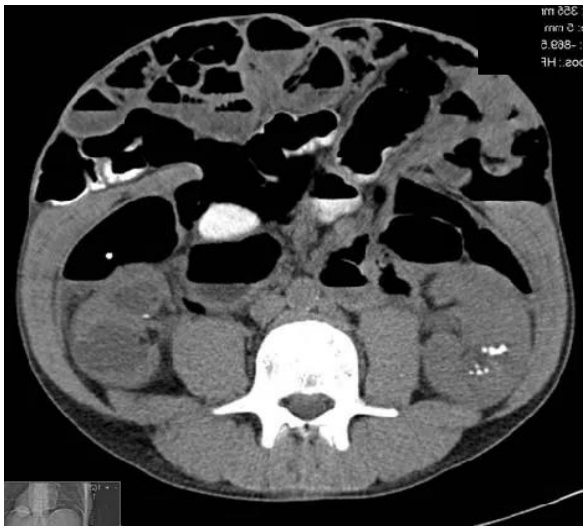

Figure 2. Loss of domain

CONCLUSION

One of the goals of hernia repair is to establish a tension-free closure of the abdominal wall, and both procedures have demonstrated an advantage in this regard. Although there need be more cases, these benefits are also evident in the post-operative phase when abdominal compartment syndrome is avoided. The amount or timing of PN and the BTA dosage are not standardized. When carried out under visual guidance, both methods' degree of safety is increased since they are simple to duplicate and safe. To be able to specify it, further research will be required.

REFERENCES

I. Tuveri, M., Tuveri, A., Nicolo, E., Tsuruma, T., Nagayama, M., Nakano, S., ... & Chen, J. (2015). Topic: Incisional Hernia—"Difficult case" as specialistic case: real loss of substance, multi recurrences, infections, fistulas, lombocel, burst

abdomen, reconstruction of the entire wall. Hernia, 19, S225-S236.

II. Afaque, M. Y. (2021). Assessing the complexity of ventral hernia by methods of Tanaka, Sabbagh, Carbonell, and Love. Hernia, 25(2), 557-558.

III. Said, S., Thomas, J., Montelione, K., Fafaj, A., Beffa, L., Krpata, D., ... & Petro, C. (2022). Tanaka score predicts surgical intensive care admission following abdominal wall reconstruction. Hernia, 26(3), 873-880.

IV. Rombaldi, M. C., Barreto, C. G., Peterson, C. A., Cavazzola, L. T., Santis-Isolan, P. M., & Fraga, J. C. (2021). Complex ventral hernia repair in a child: An association of botulinum toxin, progressive pneumoperitoneum and negative pressure therapy. A case report on an arising surgical technique. International Journal of Surgery Case Reports, 81, 105828.

V. Mourad, A. P., De Robles, M. S., & Winn, R. D. (2020). Low-dose pre-operative botulinum toxin A effectively facilitates complex ventral hernia repair: a case report and review of the literature. Medicina, 57(1), 14.

VI. Choudhury, S., Baker, M. R., Chatterjee, S., & Kumar, H. (2021). Botulinum toxin: an update on pharmacology and newer products in development. Toxins, 13(1), 58.

VII. Helm, J. M. (2017). The use of botulinum toxin in abdominal wall reconstruction: A case series.

VIII. Tang, F. X., Ma, N., Huang, E., Ma, T., Liu, C. X., Chen, S., ... & Zhou, T. C. (2022). Botulinum toxin A facilitated laparoscopic repair of complex ventral hernia. Frontiers in Surgery, 8, 803023.

IX. Barst, H. H. (1972). Pneumoperitoneum as an aid in the surgical treatment of giant herniae. Journal of British Surgery, 59(5), 360-364.

X. Tsirline, V. B., Belyansky, I., Klima, D. A., & Heniford, B. T. (2012). 30. Loss of Abdominal Domain. The SAGES Manual of Hernia Repair, 353.