



Research Article

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Postoperative Tetanus in Abdominal Surgery: Scope Review

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Abstract

Postoperative tetanus is a rare, often forgotten, but potentially fatal complication of abdominal surgery. The purpose of this paper is to review the available literature on postoperative tetanus following abdominal surgery, including its incidence, risk factors, clinical features, management, and outcomes. A comprehensive search of the PubMed, Embase, Scopus, Lilacs, and Google Scholar databases was conducted using relevant keywords ("Tetanus," "abdominal surgery," "Postoperative"), and a total of 1.182 articles were identified for review, with 11 being selected. The incidence of postoperative tetanus following abdominal surgery is very low, with only a few case reports published in the literature. Most cases occurred in patients with risk factors such as chronic alcoholism, diabetes, and malnutrition. The clinical presentation of postoperative tetanus can be variable, ranging from mild symptoms such as muscle stiffness and spasm to severe features such as respiratory failure and cardiac arrest. The diagnosis of postoperative tetanus is primarily clinical and is based on characteristic symptoms and signs. Treatment involves prompt administration of tetanus immunoglobulin, wound debridement, and supportive care. In conclusion, postoperative tetanus following abdominal surgery is a rare but severe complication that requires immediate recognition and management. Clinicians should be aware of the risk factors for tetanus and take appropriate preventive measures, such as preoperative vaccination, in high-risk patients.

Keywords: Tetanus, Postoperative, Abdominal surgery, Surgery

Introduction

Postoperative tetanus is a rare, often forgotten, but severe complication that can occur after surgery that has been a historical certainty in different periods. Tetanus is a bacterial infection caused by *Clostridium tetani*, commonly found in soil and animal feces [1-4]. The bacteria can enter the body through a wound or cut and produce a toxin that affects the nervous system, leading to muscle stiffness, spasms, and potentially life-threatening complications. It can happen if surgical instruments or equipment are contaminated with bacteria or if the wound is not cleaned correctly or cared for after the procedure [2,3]. Patients who have had surgery on the

gastrointestinal tract, respiratory tract, or genitourinary tract are at a higher risk of developing postoperative tetanus due to bacteria in these areas. Patients that are not vaccinated are also at risk [3].

The symptoms of postoperative tetanus can vary depending on the severity of the infection. Early symptoms may include muscle stiffness and soreness at the site of the wound, as well as a fever and chills [2]. However, there have been atypical presentations of the disease, especially if there are localized sites for the disease. As the infection progresses, the patient may experience muscle spasms, especially in the jaw and neck muscles, making it difficult



to swallow and breathe. Other symptoms may include sweating, rapid heartbeat, and high blood pressure [1-3]. Treatment for postoperative tetanus typically involves hospitalization and supportive care. The patient may be given antibiotics to fight the bacterial infection and tetanus antitoxin to neutralize the toxin produced by the bacteria. In severe cases, the patient may need to be placed on a ventilator to help them breathe, and medications may be given to control muscle spasms and other symptoms [2,4,5]. Prevention is the best way to avoid postoperative tetanus. All surgical equipment and instruments should be properly sterilized to prevent contamination with bacteria. Wounds should be thoroughly cleaned and dressed after surgery, and patients should be monitored for signs of infection [1-3].

Vaccination against tetanus is also recommended for all individuals, especially those with a higher risk of exposure to the bacteria, such as healthcare workers and individuals who work with soil or animal feces [5,6].

Thus, this review is essential, as, so far, not many studies have discussed the topic of postoperative tetanus. The studies that relate to the subject have aged and have not been revisited in a while. When producing this review, we had to remove period limitations to guarantee a safe sample to work on while the most recent and

updated studies were still being searched for.

Methods

A comprehensive scoping review of the literature was conducted on "Postoperative Tetanus." The following databases were searched: PubMed, Scopus, Embase, Lilacs, and Google Scholar. The references in each study were also hand-searched. Our search strategy included the following search terms: tetanus; postoperative; abdominal surgery, and surgery. We applied no language or date restrictions. Two independent, double-blind reviewers screened all titles and abstracts for relevance, with a third reviewer to solve any disparities. Full-text articles were assessed for eligibility based on predetermined inclusion criteria. Data were extracted from the eligible studies using a standardized data extraction form. Information on the study design, sample size, type of intervention, outcome measures, and results was extracted. The extracted data were analyzed using a narrative synthesis approach. Our search yielded a total of 2,632 articles. After removing duplicates and screening titles and abstracts using the Rayyan® tool, 11 articles were assessed for eligibility and included in our review. Limitations of this review include potential publication bias and limited generalizability of the findings to other populations and contexts (Figure 1, Table 1).

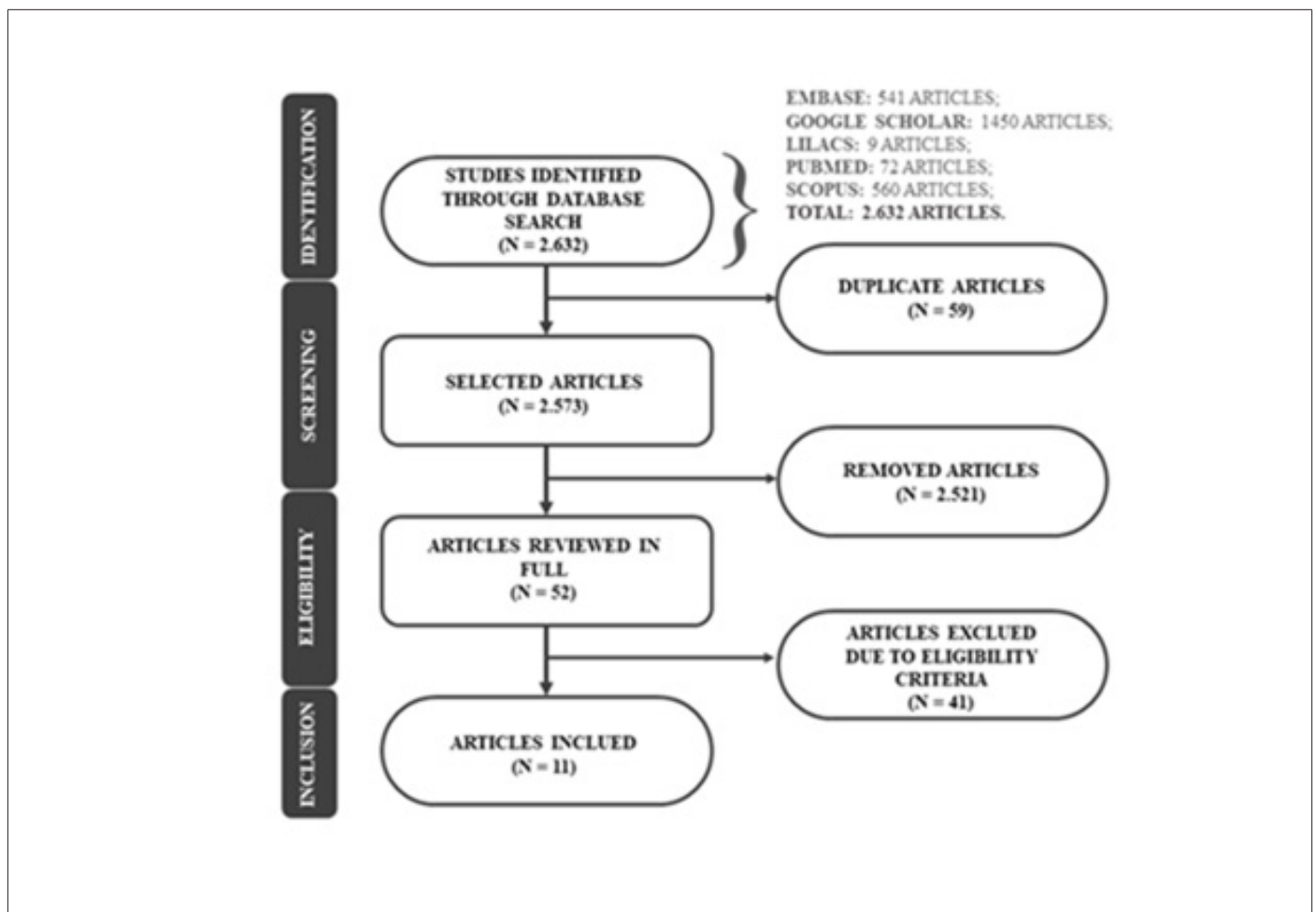


Figure 1: Articles selection flowchart.

Table 1: Summary of the Included Studies.

Author	Study	Results
<i>Fleshner, et al.</i> [1]	Case Report	A large cell lymphoma male patient, who underwent a gastrectomy and transverse colectomy, presented fever, back pain, dysphagia, trismus and opisthotonos 21 days later.
Dhalla [2]	Literature Review	The period of incubation > 7 days and the interval between the first symptom and the first spasm > 48 hours is associated with poor outcome of postoperative tetanus. The presence of necrosis, secondary infection and foreign bodies can facilitate the growth of the organism.
<i>Beisland, et al.</i> [3]	Case Report	A case of severe postoperative tetanus who underwent bowel resection after strangulation of the ileum. The patient was treated on an intensive care unit and was artificially ventilated for 64 days. Seven months later, she had fully recovered.
<i>Kasher, et al.</i> [4]	Case Report	A patient underwent rubber band ligation of the internal hemorrhoid presented symptoms compatible with tetanus postoperative. This patient had never been immunized against tetanus.
<i>Strypstein, et al.</i> [5]	Case Report	The case shows a patient who presents symptoms of tetanus postoperative and evolved respiratory deterioration and acute cardiac failure. The patient of her vaccination status against tetanus and has no record of immunization against tetanus.
<i>Furui, et al.</i> [6]	Case report	After undergoing surgery to resect a gangrenous perforated small intestine, a man developed severe tetanus within 24 hours. The patient was diagnosed with tetanus only after opisthotonos became apparent and the standard treatment for tetanus proved to be effective.
<i>Mori, et al.</i> [7]	Case Report	This case presents a patient without history of toxoid tetanus immunization who developed tetanus 3 days after the resection of a gangrenous small intestine caused by obturator hernia incarceration.
<i>Park, et al.</i> [8]	Case Report	The postoperative tetanus has a shorter incubation period, and symptoms may appear after 24h. In this case, the symptoms resolved after a month without sequelae.
Philips [9]	Literature Review	This author describes the tetanus as a complication of ovariectomy after analyzing statistics of 64 procedures from various specialists in Europe and elsewhere.
Malins [10]	Case Report	The author describes a case of tetanus after ovariectomy, in which the patient evolved, on the 1st postoperative day, with exhaustion, staring and spasms, in addition to suffocation and chest discomfort. On the 10th day, the patient convulsed for 30 minutes and died.
Federmann and Kotzerke, [11]	Case report	In this case, a man experienced a severe case of tetanus 12 days after having an operation for a pericaecal abscess caused by appendix perforation, requiring mechanical ventilation was required for 37 days. The patient also suffered from additional complications such as pneumonia with septicaemia, disseminated intravascular coagulopathy and renal failure.

Discussion

Tetanus is a rare but serious medical condition that results from an infection caused by the bacterium *Clostridium tetani* through the production of an exotoxin, tetanospasmin, that affects the central nervous system and causes muscles to become spastic [1,2]. Although tetanus is preventable, it can still occur in individuals who have not been adequately vaccinated. Even though it is usually a result of the contamination of an injury, in some rare cases, tetanus can be a complication of surgical procedures [6,7]. Knowledge of tetanus has evolved in the past decades. However, not many cases or reviews have reported how postoperative tetanus has affected abdominal surgery, thus why it can be considered a neglected or forgotten pathogen. However, despite that, it can still determine fatal outcomes, especially in lower-income countries with limited access to immunization [3,4].

According to the research, case reports have described patients who developed tetanus after undergoing different types of gastrointestinal surgery, demonstrating that contamination and infection with the bacteria were a possible risk regardless of the organ or structure presented [4-6]. General surgical procedures have been described as a possible source of contamination, such as a laparot-

omy, with the likeability of it being related to oxidation present in the materials used and the vaccinal status of the patient [7-9]. A different but very recent case disclosed by *Strypstein, et al.* [5]. has shown a healthy 79-year-old woman that underwent surgery for a strangulated loop of the small bowel and presented tetanus on the second-day post-procedure. She had not received tetanus immunoprophylaxis in over 20 years [3].

A similar case was described by *Beisland*, a 57-year-old woman with a resected bowel after ileum strangulation, and by *Kasher*, in a report of a 63-year-old woman with a hemorrhoid banding procedure, both presenting tetanus a few days into postsurgical recuperation [4,5]. Despite that, it is known that symptoms may not develop until weeks have passed, such as a case described by *Fleshner, et al.* [1]. of a 48-year-old male after a gastrectomy, Billroth II and transverse colectomy for a large cell lymphoma operation, only developed symptoms after 21 days [1].

As other comparative examples, we could cite and compare that while *Furui, et al.* [6]. reported a case of localized tetanus after gangrenous small intestine resection, *Mori, et al.* [7] described a patient who developed postoperative tetanus following laparoscopic obturator hernia repair for strangulated ileus [6,7]. By these means,

it can be pointed out that patients subjected to the genitourinary, gastrointestinal tract, or respiratory tract surgery are at higher risk of developing postoperative tetanus due to bacteria and bacterial translocation in these areas. Not only that, but the instruments used in laparoscopies may also pose a hazard since their sanitization requires extra steps that must be performed to guarantee antiseptics [1,2,6].

Furthermore, an important observation is that tetanus vaccines (tetanus toxoid vaccine) should be present as a routine recommendation in pre-surgical preparation, as non-vaccinated patients, or patients whose vaccinations are not up to date, are at higher risk [5-8]. Tetanus, whether acquired through a wound or by a procedure, typically presents with fever, sweat, difficulty swallowing, increased blood pressure and heartbeat, muscle rigidity, weakness, and jaw stiffness or "lockjaw" [2,3]. However, these symptoms are not always present, as *Park, et al.* [8]. described, in a case that is presented with periocular discomfort. A patient that underwent sleep apnea surgery (an anterior pharyngoplasty with septoplasty and tonsillectomy) presented eye discomfort days after the procedure, but then it progressed with jaw pain and dysphagia [8]. Both typical and atypical symptoms must be attended to facilitate treatment and prevent life-threatening complications since the disease will eventually change the pattern and evolve into respiratory failure [9-11].

In addition to gastrointestinal surgery, hernia repair, and respiratory tract surgery, tetanus has also historically been reported as a complication of many different types of abdominal surgery, natural events, such as childbirth, or even common wounds. Both Phillips and Malins said a case of tetanus is a complication of ovariectomy [9,10]. It is important to note, however, that in these periods' sterilization techniques weren't as advanced as nowadays, if they existed at all. Hand sanitization wasn't standard, and instrument sterilization relied on precarious heat sources [6-8]. Since then, the resources have improved, and the surgical environment has become more sterile. Therefore, tetanus was much less likely to occur by surgeon contamination and more likely a postoperative wound complication caused by contact with oxidized metals or samples from the soil [10,11].

Fedderman, et al. [11]. disclosed a report on a patient that acquired tetanus after an appendectomy with perforation and perirectal abscess. A decisive consideration, in this case, was that the most likely source for the pathogen contamination was endogenous, as *C. tetani* can exist as a living microorganism in the gastrointestinal tract as a saprophyte. With the perforation, it reached the bloodstream [8-11]. Moreover, considering that it would be reasonable to presume that, in the other gastrointestinal postsurgical tetanus cases presented in this review, the most feasible explanation from the pathogen origin to be endogenous, it is given yet another consideration as to why immuno prophylaxis should be considered in every surgical patient [7,8,11]. One could argue even the general population should maintain routine regular 10-year interval vaccinations, as it could also be caused by a simple accidental perforation by rusted household items. For the cases reviewed, treatment

for tetanus typically involved a combination of medication, wound care, and supportive therapy. In severe cases, patients may require mechanical ventilation to help them breathe [9,11].

Conclusion

In conclusion, postoperative tetanus is a rare but severe complication of surgery, particularly in gastrointestinal procedures. Clinicians should maintain a high index of suspicion for tetanus in patients presenting with muscle stiffness and spasms following surgery and promptly initiate the appropriate treatment to improve outcomes. Further studies are needed to explore the risk factors and pathophysiology of postoperative tetanus and to identify effective prevention and management strategies. Overall, the articles emphasize the need for awareness and prevention of postoperative tetanus as a potential complication, particularly in high-risk patients and those who are not vaccinated. Healthcare providers need to maintain a high index of suspicion for patients presenting with typical symptoms, such as stiffness or spasms after surgery, since early diagnosing quickens treatment and improves outcomes. In the making of this review, it was noted that few studies report postoperative tetanus and even fewer updates. Further studies are needed to explore postoperative tetanus risk factors and pathophysiology and identify effective prevention and management strategies.

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Conflict of Interest

None.

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