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DENTIST'S ROLE IN COLLABORATIVE MANAGEMENT OF TETANUS PATIENT

(PERAN KOLABORASI DOKTER GIGI DALAM MANAJEMEN PASIEN TETANUS)

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ABSTRACT

Tetanus was a life-threatening infection causing muscle contractions. The need for qualified collaborative management was crucial due to the potential for poor prognosis and complications. Dentists can contribute significantly to the treatment, as the mouth can be one of the entry points for tetanus-causing bacteria. A 45-year-old male tetanus inpatient was referred from the Intensive Care Unit to the Oral Medicine Unit at Universitas Indonesia Hospital to evaluate the possible source of oral focus infection. A boil was on his back, suspected to be the main port of entry for tetanus bacteria. The definitive diagnosis was Tetanus of moderate to severe severity (Philips score 24, Dakar score 1, Ablett score 2). Extra oral examination shows lip inflammation. An intra-oral examination cannot be done optimally despite his trismus. The oral foci of infection found were chronic gingivitis and pulp necrosis on 47 48, in addition to the diagnosis of cheilitis simplex. Since the comprehensive management of the foci of infection could only be done in an outpatient

setting, the nurse was instructed to clean the intra-oral using sterile gauze moistened with NaCl 0.9% solution to improve the patient's oral hygiene (OH). Comprehensive management includes periodically visiting to maintain OH, administering muscle relaxants, antibiotics, and analgesics, and administering Tetanus toxoid vaccination. The patient was recovered. Management of tetanus cases needs a multidisciplinary approach. Dentists are pivotal in identifying oral infection sources and ensuring its management. A dentist's role in the collaborative management of tetanus patients might significantly contribute to the patient's prognosis.

Keywords: collaborative management; dentist role; tetanus; trismus

ABSTRAK

*Tetanus adalah infeksi yang mengancam jiwa dan menyebabkan kontraksi otot. Kebutuhan manajemen kolaboratif yang berkualitas sangat penting karena adanya potensi prognosis buruk dan komplikasi. Dokter gigi dapat berkontribusi secara signifikan dalam perawatannya, terkait bahwa rongga mulut dapat menjadi lokasi masuknya bakteri penyebab tetanus**.** Seorang laki-laki berusia 45 tahun dengan diagnosis kerja Tetanus, dirujuk dari Unit Perawatan Intensif ke Unit Gigi dan Mulut Rumah Sakit Universitas Indonesia untuk evaluasi kemungkinan sumber fokus infeksi oral. Sumber infeksi bakteri tetanus yang teridentifikasi adalah bisul di punggung. Diagnosis definitif yang ditegakkan tetanus dengan tingkat keparahan sedang sampai berat (skor Philips 24, skor Dakar 1, skor Ablett 2). Pemeriksaan ekstra oral menunjukkan peradangan bibir. Pemeriksaan intra oral tidak dapat dilakukan secara optimal, karena trismus. Selain keilitis simpleks, ditemukan gingivitis kronis dan nekrosis pulpa pada 47 – 48 sebagai fokus infeksi. Ners diinstruksikan untuk membersihkan intra oral menggunakan kain kasa steril yang dibasahi dengan NaCl 0,9%, untuk meningkatkan kebersihan mulut, karena penatalaksanaan yang komprehensif terhadap fokus infeksi pada rongga mulut hanya dapat*

dilakukan pada poli rawat jalan. Pasien dinyatakan sembuh setelah melalui penatalaksanaan komprehensif yang meliputi kunjungan berkala untuk mempertahankan kebersihan mulut, pemberian relaksan otot, antibiotik, analgesik, dan vaksinasi tetanus toksoid. Penatalaksanaan kasus tetanus membutuhkan pendekatan multidisiplin. Dokter gigi berperan penting dalam mengidentifikasi sumber infeksi pada rongga mulut dan memastikan penatalaksanaannya. Peran dokter gigi dalam manajemen kolaboratif pasien tetanus dapat berkontribusi secara signifikan terhadap prognosis pasien.

***Kata kunci**: manajemen kolaboratif; peran dokter gigi; tetanus; trismus*

INTRODUCTION

The anaerobic bacteria *Clostridium tetani* causes Tetanus, an acute and frequently deadly illness.[1,2] Tetanus represents an acute specific infectious disease induced by the tetanus bacillus infiltrating the nerve system through exposure to wounds, and its chief manifestations include muscle spasms.[3] Although the incidence of Tetanus has decreased over the past two decades as a result of immunization programs, it continues to be a significant health problem in developing countries, with high mortality rates.[1,4] Tetanus caused 56,743 fatalities globally in 2015.[5] India had the highest number of tetanus cases in 2019, with 16,579, followed by Pakistan, Indonesia, and Nigeria, all developing nations with populations exceeding 200 million.[6] There were 3,559 non-neonatal fatalities in Indonesia, with a mortality rate of 1.38 per 100,000 people.[5] Tetanus is an infectious, vaccine-preventable disease that is not contagious.[7] The rarity of Tetanus renders clinicians inexperienced in handling this case. Because Tetanus is diagnosed based on clinical symptoms, knowing the earliest clinical symptoms is crucial. Severe Tetanus can occur and lead to complications in the absence of prompt diagnosis and treatment.[8]

Clostridium tetani, the causal organism, is often prevalent in the environment, and its spores can enter the body through cuts or abrasions, including puncture injuries.[1] The germination of spores and subsequent proliferation of bacteria occur at the location of the lesion, leading to the production of tetanus toxin.

This toxin can disseminate throughout the body when exposed to a suitable anaerobic environment, such as a contaminated wound.[9] The exotoxins that *Clostridium tetani* produces include tetanolysin and tetanospasmin. The precise influence of tetanolysin on human Tetanus remains uncertain; nevertheless, it is hypothesized that it may detrimentally affect adjacent healthy tissues and reduce oxidation-reduction potential, promoting anaerobic organisms' growth.[10] Tetanus toxin, also called tetanospasmin, is harmful to nerve cells. All known symptoms of Tetanus are caused by tetanospasmin's ability to stop neurotransmitter release from the presynaptic membrane for several weeks. The involvement of central motor control, autonomic function, and the neuromuscular junction causes symptoms.[11] Tetanospasmin stops inhibitory neurotransmitters like GABA and glycine from being released, which causes painful and uncontrolled muscle movements and manifests as an increase in skeletal muscle contraction, resulting in rigidity and spasms.[12]

Tetanus treatment involves reducing muscle spasms, rigidity, and autonomic instability (with ventilatory support when needed), neutralizing tetanus toxin with human or equine anti-tetanus immunoglobulin or sera, wound debridement, and antibiotics to eradicate locally proliferating bacteria.[13] Early diagnosis and accurate treatment of disease rely upon the clinical suspicion and disease knowledge of medical and dental professionals.[14] It is uncommon for C. tetani infection to result from dental procedures, and this disease is typically accompanied by a history of external injury to another part of the body. However, tooth extraction, root canal therapy, extensive caries, periodontal abscess, and intraoral soft tissue trauma have all been linked to tetanus cases. When there is no obvious source of entry, nevertheless, in many cases, an odontogenic origin cannot be ruled out.[15,16,17,18,19]

The significance of dentists in the collaborative management of tetanus patients is highlighted in this context. Dental professionals possess extensive knowledge and expertise of the oral cavity, enabling them to effectively identify potential entrance points of infection from the oral cavity. Furthermore, dentists can concurrently manage a patient's oral hygiene during therapy.

CASE REPORT

A 45-year-old male tetanus patient was referred to the Universitas Indonesia Hospital Emergency Room on March 31st, 2023, with complaints of pain in the entire back of the body from the neck radiating to

the waist. Hands and feet can still be moved, numbness on the left side of the body, difficulty opening the mouth (mouth opening as much as one finger wide), stiffness in the neck and right knee joint, and pain is felt to be intermittent with a VAS score of 8/10. Due to intense pain, the patient's hands were seen shaking. His family and himself deny the history of seizures. His condition and vital signs were assessed: blood pressure 120/82, respiratory rate 20 x/min, heart rate 117x/min, GCS E4M6V5, and afebris body temperature. The results of the CBC laboratory examination were as follows: 13.9/40.8/7.870/233.000, Ureum 52; Creatinine 0,82; eGFR 106,8. CT scan showed no visible infarction, hemorrhage, SOL, or pathological obstruction in the left intracranial otomastoiditis.

It was found that the source of infection came from his back in the form of a boil. Two weeks before admission, the patient claimed to have a boil on the back, size ± 5 cm in diameter, tenderness (+), and pus mixed with blood. He was given an ointment from the pharmacy to treat the boil, but there was no improvement. He was diagnosed with trismus, rigidity, spastic fourth limb, moderate-severe et causa tetanus excitatory seizures (Philips score 24, Dakar score 1, Ablett score 2), and prolonged ischemic stroke (onset six months). The patient was given Diazepam 1 mg/hour IV, Metronidazole 500 mg IV, Ceftriaxone 2 g IV, and ranitidine 50mg IV, and an incision was done at RSUI Emergency Room on the patient's back area where a boil was found to be the source of infection. On the following morning, April 1st, 2023, the neurologist advised the patient to be admitted to the ICU; the dose of diazepam was increased to 2mg/hour, and other medications were also given, such as metronidazole 4x500mg IV, ceftriaxone 2x2 g IV, miniaspilet 1x80 mg per NGT, ketorolac 3x30 mg IV, ranitidine x50 mg IV and the patient's family were briefed on the administration of tethagam. At noon, the dose of diazepam was increased to 3mg/hour, and the patient's family approved the administration of tethagam 250 iu IM. In the evening, the patient was admitted to the ICU; the neurologist advised to administer Mional 2x50 mg, the lights in the patient's bed area dimmed, the eyes and ears of the patient are covered with gauze, and diazepam increased to 6 mg/hour because spasm and pain persist. The advice from an anesthetic doctor is to give a set of tethagam with doses of 3000 iu IM for 3-5 days, and the clinical nutrition specialist advised to give MC RTP 6x150 kcal (150 mL) to fulfill the patient's daily nutritional needs. At midnight, the patient experiences a spam period of 20-30 seconds every 3-5 minutes.

During the spasm, the patient's HR is reported to increase up to 120x/minute, and RR reaches 35x/minute, so the neurologist increases the dose of diazepam to 7 mg/hour. On April 2nd, 2023, patients started receiving 1000 IU/day for the 3-day target, and other previously administered medicines were still being continued, and a brain fluid analysis was planned. The following morning, April 3rd, 2023, the results of the brain fluid analysis came out. They showed the following results: colorless/clear/negative/cell count: 10/ pmn:1/ mn: 9/ no cryptococcus found, protein: 29 / brain fluid glucose: 79/ serum glucose: 96.3/ cl: 136 inflammatory impression dd/infection. The patient also still had seizures 4x/day, and the back still felt tense; patients were suspected of developing rhabdomyolysis; the dose of diazepam increased to 8 mg/hour IV with other drugs still being given, and the anesthetist began to give furosemide 20 mg then course 1 mg/h IV. The anesthetic specialist recommended the additional administration of ketorolac 30 mg IV. On the morning of April 4th, 2023, rhabdomyolysis in patients was confirmed, so ketorolac administration was replaced with the administration of 50 mcg of fentanyl if the patient felt any pain. Furosemide is increased to 5 mg/hour, and all the previous medicaments are still given. on April 5th, 2023, the patient's condition improved; his mouth opening was still limited, but his urine was no longer dark. Ureum test results: 57/ creatinine: 1.14/ eGFR: 77.2 and CK: 1140. Based on the neurologist's advice, the administration of ceftriaxone and metronidazole was extended to 10 days, gradual tapering off for diazepam was started, and the dose of furosemide was reduced to 0.5 mg/hour. On April 6th, 2023, excitatory seizures were no longer felt, but he still had stiffness, mainly in the mouth, and could only open the mouth with one finger. Diazepam therapy was decreased to 6 mg/hour, and the previously given medication continued to be given. Then he was consulted with the general dentist for a search for focus infection in the mouth and was found to have chronic gingivitis, tooth 47 48 suspected caries D4, so the patient was advised to have dental treatment if the systemic condition improved and was controlled, and the mouth opening was three wide fingers. On April 7th, 2023, the patient was referred to the Oral Medicine Unit for re-evaluation for other possible focus infections. The mouth opening of the patient was found to be two wide fingers, cheilitis simplex, chronic gingivitis, necrosis of pulp 47 48, and missing tooth 45. The nurse in charge of this patient was instructed to improve his oral hygiene by

wiping the oral cavity and teeth with sterile gauze soaked in 0.9% NaCl, with a circular motion from the gums to the teeth and followed by wiping the tongue from the base to the tip of the tongue. Then, compress the lips with sterile gauze soaked in 0.9% NaCl for 5 minutes, wait until moist, and apply Vaseline on the lips. Patients are also advised to do scaling, tooth filling, and dentures if the patient's systemic condition improves and is controlled, and the mouth opening is three fingers wide.

Figure 1. Clinical photos of the patient at the first visit (April, 7th 2023), it appears that the patient can only open his mouth two fingers wide.

On the afternoon of April 8th, 2023, the patient complained that the pain and stiffness in the lower back area had worsened with VAS score 8/10, so the neurologist again increased the dose of diazepam to 8 mg / h and continued the medication previously given, and on April 9th, 2023, complaints of stiffness in the neck still existed but the pain became much less with VAS score 5/10 so the dose of diazepam was still maintained at 8 mg / h. On April 10th, 2023, the pain had subsided, but the stiffness, especially in the lower back, was still felt. Na/K/Cl electrolyte examination results showed 141/3,68/104,7. Ca ion: 1,12. Mg ion: 0.64, Blood urea: 55, Blood creatinine: 0.93, eGFR: 98.8, and GDS: 204. Based on the advice of the anesthesiologist, the administration of Metronidazole and Ceftriaxone was stopped as it had entered the 10th day. The patient's mouth opening was still two fingers. The patient was still given diazepam at the same dose as before, and the neurologist was advised to provide Clonazepam 1 mg/po taken only at night. On that day, the Oral Medicine Unit also returned to control this patient, and he was asleep then. The patient's mouth was found to be open two fingers wide. The patient's intra-oral condition was still the same as the condition at the time of the first visit (07/04). The nurse in charge of the patient was still instructed to increase the patient's OH using sterile gauze moistened with NaCl 0.9% twice a day. Likewise, the patient's lip condition is advised to continue to compress with sterile gauze soaked in 0.9% NaCl for 5 minutes, wait until moist,

and then apply Vaseline thinly on the entire surface of the lips.

Figure 2. Clinical photos of the patient at the second visit (April 10th) show that the patient is still only able to open his mouth two fingers wide.

On April 11th, 2023, the patient said no pain was felt with VAS 0/10. As of today, Clonazepam has begun to be given at 1x1 mg PO (only taken at night). Advice from a neurologist to start tapering the Diazepam dose to 6 mg /h while the administration of other drugs previously given is continued. On April 12th, 2023, stiffness in the body and neck area, both legs and mouth had improved. The patient was also able to open his mouth three fingers wide. As of today, diazepam has been reduced to 6 mg/h, and the other drugs given are continued. On April 13th, 2023, the patient was transferred from the ICU to the inpatient room. There was only difficulty defecating, so Laxadin was given. Based on advice from a clinical nutrition specialist when the patient has entered the inpatient ward, nutrition is given via enteral per NGT continued MC RST 6 x 370 kcal (300 mL), and if there is improvement in swallowing function, extra marrow porridge can be given in small portions of 1x200 kcal, patients also begin to be given supplementation in the form of vitamin B complex taken three times a day and the other drugs given are continued. April 14th, 2023, was the last follow-up periodically from the Oral Medicine Unit, and it was reported that the patient had no complaints at all. The patient's mouth opening was 3 fingers wide, so he began to be educated to clean the mouth twice a day using non-SLS toothpaste and a toothbrush with a small head tip, and he continued brushing the tongue. The patient was also referred to medical rehab and planned to start outpatient treatment.

DISCUSSION

The treatment of Tetanus includes many general methods for patient management, such as creating a calm and dark environment and appropriately dressing the wound. Additionally, antibiotic therapy involving the administration of Penicillin and Metronidazole is employed. Muscle spasm control, airway and respiratory management, and the provision of sufficient fluids and nourishment are all integral components of the treatment regimen.[2] The patient in this case report was treated for approximately 15 days of treatment regarding the tetanus condition (1

day in the ER, 12 days in the ICU, and two days on the ward) and has fulfilled the general methods of treating tetanus patients and showed significant improvement. Eventually, he was allowed to discharge from hospital.

The quality of medical facilities and excellent wound care, affect the severity of Tetanus. The mortality rate in developing countries ranges from 10 to 50%. If therapy is delayed or improper, the risk escalates.[20] The prognosis for severe Tetanus relies on the treatment facility's experience and the availability of intensive care facilities. Age > 60 years, onset 48 hours, period of incubation < 7 days, severe Tetanus leading to neuromuscular blockade and mechanical ventilation, and severe autonomic dysfunction are indicators of a poor prognosis.[21,22] The Dakar and Phillips score is used for predictive purposes in Tetanus, while the Ablet score is used to grade tetanus severity. However, these scores are not perfect predictor of outcome but it can be a useful tool to help track the disease's progress and assess the treatment's response in the management of tetanus patients.[23] The patient we presented in this case report was found to have a Philips score of 24, Dakar 1, Ablet 2. The results of this assessment indicate a moderate-severe tetanus condition. This assessment scoring also helps the clinician determine treatment, which, in this patient, requires intensive collaborative care and involves several medical teams. In this patient, the care management involved neurologists, anesthetists, clinical nutritionists, dentist, general practitioners, and nurses at Universitas Indonesia Hospital.

The primary objective of a multidisciplinary team is to assemble a group of healthcare professionals from diverse disciplines to establish an optimal treatment strategy for patients. The number of individuals forming a multidisciplinary team will offer comprehensive oversight of symptoms and acute and long-term side effects.[24] Following a multidisciplinary approach to the treatment of tetanus patients, dentists play a crucial role in the management of trismus and dysphagia, these two conditions the most prevalent symptoms associated with Tetanus. Trismus and risus sardonicus are well-established clinical manifestations of Tetanus, which may prompt individuals to seek their first medical evaluation from the dentist.[15] The prompt identification of tetanus symptoms is crucial due to the inherent risk of rapid symptom progression, gradual worsening of health, and catastrophic sequelae.[10,15] Therefore, it is essential for dental professionals to remain alert for manifestations such as muscular rigidity, limited mouth opening (trismus),

difficulty in swallowing (dysphagia), and a characteristic smirk known as risus sardonicus, as these clinical signs may potentially signify the presence of a tetanus infection.

The diagnosis of Tetanus is established by analyzing clinical observations based on the patient's medical background and physical examination.[12] To optimize patient health outcomes, it is essential to have a comprehensive and coordinated approach to health care delivery that includes multiple disciplines. The more profound recognition of the correlation between oral health and systemic health can bring valuable insights to the delivery of optimal healthcare, crossing multiple fields of study.[25] Dentists in the collaborative management of tetanus patients have brought valuable insights to perform a thorough examination of the oral cavity, as they can evaluate the oral health status of tetanus patients, including any oral manifestations or complications associated with the disease or its treatment. Effective treatment can be achieved by possessing strong diagnostic skills and a comprehensive understanding of identifying and addressing the underlying causes of an illness, integrating factors such as local, genetic, environmental, drug-related, or systemic origins. By adopting a strategic approach to therapies, dentist can effectively manage symptoms and provide treatment for oral illnesses.[26] In addition to assessing the potential correlation between the patient's trismus and their tetanus status, the dentist also undertakes the responsibility of examining alternative sources of infection that may serve as possible entry points for *C. Tetani* bacteria that might be coming from the oral cavity.[15] Additionally, the dentist is responsible for completing a comprehensive assessment of the patient's oral cavity and formulating a treatment plan to be implemented after the patient's health improves. Simply put, the dentist plays a crucial role in developing a thorough treatment plan for the patient.[10,27]

A study conducted by Edinson (2022) found about 73% of oral tetanus cases were associated with dental procedures , especially if proper sterilization techniques were not followed, while 23% of cases were attributable to tooth decay,[14] then other incidents such as tooth extraction, root canal therapy, periodontal abscess, and oral soft tissue trauma, odontogenic Tetanus has also been reported, thus if dental caries is found it could be a significant complication for these patients. When there is no evident entry point, an odontogenic cause cannot always be ruled out.[28] Approximately 2% of tetanus cases are attributed to a previous tooth extraction.[19] In approximately 20% of

cases, there is no apparent entry point, and minor cuts and abrasions are frequently the entry point.[29] In this patient, the dentist and oral medicine specialist did not find any possible source of infection that came from his mouth; port de entry of the tetanus condition was only found on his back in the form of a boil.

The dentist is capable of providing suitable long-term patient follow-up as well. The treatment of tetanus patients requires a multidisciplinary approach. In contrast, the dentist can contribute as a valuable member of the intensive care unit team.[24,26] Involvement of dentists in the management of Tetanus may vary depending on the requirements of the individual patient, the severity of the disease, and the presence of oral manifestations. The best possible care for tetanus patients is essential for healthcare professionals to communicate and coordinate together.[10,26]

Dentists can play a role in managing oral complications that may arise during tetanus therapy. It may include treating oral infections, addressing oral pain or distress, and implementing dental interventions to alleviate oral symptoms.[19] During the treatment of Tetanus, dentists can provide guidance and recommendations for the maintenance of appropriate oral hygiene. This may include oral hygiene techniques such as brushing, flossing, and rinsing to prevent dental complications and maintain oral health.[26]

The involvement of dentists is crucial in the collaborative management of patients with Tetanus. Dentists possess the fundamental competency to comprehensively assess the oral cavity.[26] Simultaneously, they can impart knowledge regarding the significance of upholding oral hygiene throughout tetanus treatment. It is essential to note that the role of dentists in the collaborative management of tetanus patients may vary depending on the individual patient's requirements and the healthcare system in which they are treated.[10] However, their knowledge of oral health and ability to contribute to the overall care team make them valuable contributors to the collaborative management of tetanus patients.

CONCLUSION

With their ability and knowledge, dentists play an essential role in multidisciplinary medical teams for tetanus patients by detecting infection sources, performing complete physical examinations, and improving oral hygiene conditions. Their dental health and oral pathology knowledge enables them to contribute to tetanus patients' overall health and well-being.

CONFLICT OF INTEREST

The authors did not report any potential conflict of interest.

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