

IMPACT OF EARLY TRACHEOSTOMY ON OUTCOME IN TETANUS PATIENTS

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ABSTRACT

Background: Tetanus is a disease with high mortality, and different treatment modalities are being tried. **Objective:** The objective of this study was to compare the impact of early tracheostomy on outcome in tetanus. **Patients and Methods:** This randomized clinical trial, was carried out in Surgical Unit-5, DHQ Hospital, Faisalabad, Pakistan from 1st January, 2012 to 31st December, 2013. Sixty patients of tetanus (grade-2) of any age and sex, diagnosed clinically were taken and divided into two groups, 30 patients in each. One group was given only medical treatment and second group was given medical and surgical treatment and both groups were observed for the impact of these treatment modalities on outcome. The data was entered and analyzed in SPSS version 17. **Results:** Out of 30 patients who underwent medical treatment, 10 (33.3%) were cured and 20 (66.7%) were expired. Among patients who underwent both medical and surgical treatment, 18(60%) were cured and 12 (40%) expired. 21(70%) developed tracheostomy complications and 9 (30%) did not develop any complication. (P-value < 0.05). **Conclusion.** Tracheostomy in early stages of tetanus has mortality benefit and it is associated with less morbidity and mortality.

Key Words: Early Tracheostomy, Tetanus, Outcome

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INTRODUCTION

Tetanus is a preventable neurologic disease caused by the toxin-producing bacterium *Clostridium tetani*, which infects via a cut in the skin or mucosa and causes rigidity and spasms of voluntary muscles all over the body.¹ Local muscle spasms can cause trismus (lockjaw), facial muscle contraction (risus sardonicus), and spasms of the back muscles (opisthotonos). Generalized muscle spasms cause pain and affect the respiratory muscles which can be fatal. Spasm related respiratory compromise, hospital acquired pneumonia and autonomic instability are usually the main causes of morbidity and mortality of this disease.^{2,3,4}

The presentations usually arise from the action of tetanus toxin, which blocks inhibitory input of gamma aminobutyric acid to motor neurons, resulting in unchecked motor nerve activity.^{5,6} Generalized spasms typically develop one to four days after the initial symptoms and if frequent or prolonged, might impede respiration.

These patients will require artificial respiratory supports for the period of active symptoms to prevent cardio-respiratory failure and death.⁷ Definitive airway may prevent sudden death from

spasm related respiratory failure and significantly reduces mortality rate from this disease.⁸ Among different methods of definitive airway, tracheostomy occupies central role in patients of tetanus who are being managed in intensive care unit. It is very promising in preventing death due to asphyxia resulting from laryngeal muscle spasm, respiratory muscle spasm, aspiration or extreme fatigue.⁹

The global incidence of tetanus is estimated to be one million cases annually with a case fatality rate which ranges from 6% to 72% depending on the availability of well equipped intensive care units. In the developed countries, its incidence has genuinely declined since 1940, mainly due to the wide spread vaccine coverage. In Pakistan, like in most of the developing countries in the world, tetanus is endemic and it remains a serious public health problem even today especially among the rural farming folks. Few studies which were done in Pakistan have revealed the prevalence of tetanus and the mortality which is caused by tetanus to be high^{10,11} As tracheostomy is usually done in grade-3 of tetanus,¹² present study is an attempt to show morbidity and mortality benefits of tracheostomy if it is done early (grade-2) in patients with tetanus. So, present study was conducted to compare the effects of early tracheostomy on outcome among tetanus patients.

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PATIENTS AND METHODS

This was a two year randomized clinical trial, done on patients presented with tetanus at DHQ Hospital, Faisalabad from 1st January, 2012 to 31st December, 2013. DHQ Hospital has a ten-bedded tetanus ward

and it caters to the people of Faisalabad Division and neighbouring districts. This study included 60 patients of both sexes and of any age diagnosed clinically as having tetanus. Only the patients with grade-2 tetanus, using Ablett classification of severity of tetanus were included in this study (Table I). 30 patients were given medical treatment and 30 patients were treated surgically by tracheostomy in addition to medical treatment and the impact of these two treatment modalities in terms of outcome was compared. The data was entered and analyzed by using SPSS version 17.0

Table I: Ablett Classification of Severity

Grade	Clinical features
I (mild)	Mild trismus, general spasticity, no respiratory embarrassment, no spasms, no dysphagia
II (moderate)	Moderate trismus, rigidity, short spasms, mild dysphagia, moderate respiratory involvement, respiratory rate > 30, mild dysphagia
III (severe)	Severe trismus, generalized spasticity, prolonged spasms, respiratory rate > 40, severe dysphagia, apnoeic spells, pulse > 120
IV (very severe)	Grade 3 plus severe autonomic disturbances involving the cardiovascular system

RESULTS

Among medical group 7(23%) and in surgical tracheostomy group, 5(17%) were female.

Among medical group 7 (23%) have prior history of immunization as compared to 6 (20%) in surgical tracheostomy group.

Among 30 patients who received medical treatment, 10 (33.3%) were cured and 20 (66.7%) expired. On the other hand those who underwent both medical and surgical treatments, 18(60%) were cured and 12(40%) expired. (Table II). Among 30 patients who received surgical treatment, 21(70%) developed tracheostomy complications and 9(30%) did not develop any complication.

Table II: Outcome in Medical and Surgical (tracheostomy) groups.

		Groups		Total
		Tracheostomy	Medical	
Outcome	Cured	18 (60%)	10 (33.3%)	28
	Expired	12 (40%)	20 (66.7%)	32
		30	30	60

DISCUSSION

Tetanus still constitutes a major health challenge and it is an important cause of preventable death in developing countries. Because of no natural immunity to tetanus toxin, ineffective and outdated vaccination, falling protective antibody levels against tetanus over time, presentation during later stages of disease and management without ICU, mortality and morbidity from tetanus is increasing and it has become a dream to eradicate it from the world, especially the developing countries. In the developed or industrialized world, the incidence of tetanus has drastically reduced with only few elderly individuals being affected by the disease because they lack or have insufficient immunity against tetanus.¹³

Eighty percent of the patients were male and 20% were females. The male pre-ponderance in this study was in accordance with the findings of other studies, which were done in the developing world.^{14,15,16} This can be explained by the fact that men consume more time in farming activities and other field work and hence they are more likely to be exposed to the *Clostridium tetani* spores which are ubiquitous in the soil and that the females are protected against tetanus by the TT immunization which is given during the antenatal period. 21.7% were immunized and 78.3% were not having prior immunization. This predominance of unvaccinated population reflect poor vaccination coverage in these areas and social norms and misinterpreted religious beliefs are also responsible for this fact. This finding is consistent with that of study conducted in Ethiopia.¹⁵ Only the patients who were having grade-2 of tetanus (Moderate trismus, rigidity, short spasms, mild dysphagia, moderate respiratory involvement, respiratory rate > 30, mild dysphagia) were taken and treated medically and surgically. All the patients who received medical treatment were managed with the tetanus toxoid (0.5ml I.M.), human tetanus immunoglobulin (3000 IU IM), antibiotic therapy (penicillin and metronidazole) and muscle relaxants (diazepam, phenobarbitone), wound care and throat suction. Supportive therapy such as fluids and caloric intake, prevention of gastric ulcers and prevention of bed sores, was provided to all the patients in this group. Patients in the second group underwent

tracheostomy in addition to receiving medical treatment. Outcome was determined in terms of cure rate and expiry rate. Among patients who received medical treatment, cure rate was 33.3% and it was 60% in patients who were managed with tracheostomy in addition to medical treatment. This finding favours central place of early tracheostomy in tetanus and it prevents deterioration of disease into subsequent grades. It is also reflective of fact that increased cure rate means short duration of hospital stay, less chances of hospital acquired infections and less incidence of tracheostomy related complications and less burden on health resources. This finding is consistent with other studies.^{17,18,19}

Among patients managed with medical treatment, expiry rate was 66.7% while it was 40% in patients managed with tracheostomy apart from receiving medical treatment. Mortality lowering impact is clearly evident from reduction of mortality from 66.7% to 40% in tracheostomy group. Moreover, tracheostomy arrests progression of disease into subsequent grades. If patients in medical group had undergone tracheostomy, mortality would have been low. These findings discourage late tracheostomy in tetanus and advocate tracheostomy in grade-2.

As severity of tetanus increases, mortality from tetanus increases and mortality lowering impact of tracheostomy decreases.^{17,18,19} Seventy percent of patients in tracheostomy group developed complications and 30% did not develop. This may be due to sepsis from tracheostomy wound, poor surgical technique, tube blockage, tube displacement, use of inappropriately sized tube, tracheal stenosis and bronchopulmonary infections.

This high rate of complications is not an unusual finding and is consistent with other studies.^{19,20}

Deaths are not directly attributed to tracheostomy or its complications because these may arise in any other severely ill patients who are paralysed and on mechanical ventilatory support. As a matter of fact, benefits of tracheostomy are far more than its complications.^{20,21} Trujillo MH, et al showed reduction in mortality from 43.58% to 15%.²¹ Camacho JA et al showed a mortality rate of 30.7%

with the use of tracheostomy.²² Thwaites CL et al showed a reduction in mortality from 27.81% to 10.04% with the use of tracheostomy.²³

CONCLUSION

Tracheostomy is a life saving procedure in patients with tetanus. Though it is associated with complications but its benefits outweigh its complications. Mortality and morbidity from tetanus can be reduced dramatically if tracheostomy is done in early stages (grade-2) of tetanus. Medical management alone does not have survival benefit and it does not prevent progression of disease into subsequent stages.

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