

Analysis of the reported symptoms that preceded the death of King Rajasinghe of Sithawake (1592 AD)

Was it medical misadventure or wilful murder?

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Summary

A copy of an *ola* leaf manuscript, the original of which was written around the late 1590s, was published recently. It describes the sequence of events leading to the death of the warrior King Rajasinghe of the Sithawake Kingdom (1521-1593). A study of the contents of this letter is presented. The dressing applied to a wound on the foot of the King is described in that letter. It is likely that this dressing would have been an ideal medium to produce the highly potent tetanus exotoxin. The toxin would have diffused into the open wound and produced the sequence of symptoms and signs mentioned in the letter. An analysis of the symptoms and signs noted during the King's last illness as described in the letter is presented. Laryngospasm, and tonic and clonic spasms are easily identified. In addition, a group of symptoms attributed in the 1960s to sympathetic over-activity in tetanus are also recognisable. The conclusion is drawn that the King died of tetanus. The intriguing possibility of the wilful use of a lethal dressing on an open wound as a biological contact poison is left open for discussion.

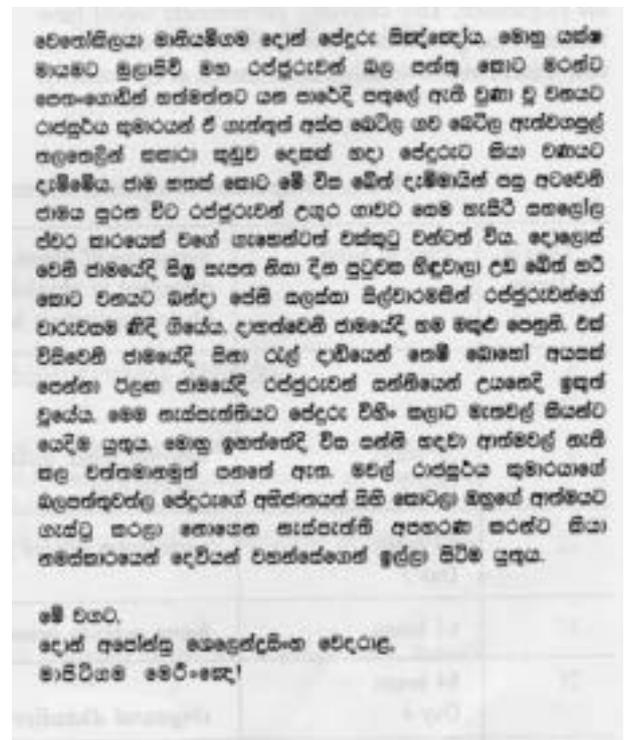
The source of information

King Rajasinghe of Sithawaka (1521-1593AD) is regarded as a doughty warrior of the Sithawake era (1530-1592 A D). He is reputed to have got his first command of troops when he was 12 years old. In the battles around Mulleriyawa he routed the Portuguese. This was the first time that a European power had suffered such a resounding defeat at the hands of an eastern Prince. The subsequent siege of the Portuguese fort of Colombo was a masterpiece of military strategy. The Portuguese were saved in the nick of time by reinforcements from the sea. The Portuguese called King Rajasinghe "The Hannibal of the East" because of his military prowess.

The manner of King Rajasinghe's death is associated with many legends. His subjects believed that black magic was used to terminate his life. Prof. Risimon Amarasinghe has published (1) a copy of a letter purported to have been written after the death of the King by a renowned physician of the era, who also was the equivalent of a Provost Marshal under the Portuguese (Figure). This letter, written on an *ola* leaf was subsequently sent by Rev. Gaspar de Magdalena of St. Mary's Shrine in Mapitigama to Bishop's House in Borella, around the late 1590s. Rev. Joseph

Tabard, in charge of the shrine of St Joseph in Negombo, made a copy of this *ola* leaf from the Bishop's House Borella on 6 March 1934, and sent the copy to Rev. Gnanapragasar, of Bishop's House Jaffna. The original *ola* leaf found at Bishop's House Borella, by Rev. Tabard, is now lost. Prof. Risimon Amarasinghe found a copy of this letter at the Bishop's House in Jaffna. He photocopied this letter and first published the contents of this letter in his book *Aithihasika Sithawake* written in Sinhala. He claimed that tetanus was the cause of death of the King in a subsequent book, also written in Sinhala (1). This letter describes the treatment given to a wound in the foot of the King. It also describes the course of the illness leading to the King's death in concise but vivid detail, and a confession of guilt by the physician, Don Peduru, who treated the King in his last illness. It requests a pardon for Don Peduru for being accessory to the death of the King. It is the purpose of my article to analyse the contents of this letter and the symptoms described in it.

Figure. Copy of letter written by Shelendrasinghe "vedarala" (physician)



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The intention to kill

The first point of note in the letter is the mention of the evil influence exerted by Prince Rajasooriya, who was King Rajasinghe's daughter's son, and his cohorts, on the attending physician Don Peduru. The influence exerted was apparently on the method of preparing the dressing which was applied to the wound on the King's foot. According to the letter the dressing was done with the idea of killing the King. The letter reads *Yaksha maayavata mulawee..maha rajjuruwan balapathukota maranta... vanayata dammaeya*. Translated it means "under the influence of evil forces with the idea of killing the kingapplied to the wound". It is also of note that the dressing is called *me visha beheth*, meaning "this poisonous dressing". This statement shows that the physician who wrote the letter had known that the type of dressing used was poisonous and was presumably not in standard use at the time.

The type of dressing used

The preparation of the dressing is described as *aswa beti, gawa beti, aethvaga pul, thalathevalin kakara, kudawa dekak hadaa, Peduruta kiyaa, vanayata dhammeya*. Translated it means "horse and cow dung and a plant product *aethwaga pul*, were heated in gingelly oil, made into two bundles, and applied on the wound, by instructing Peduru" (the attending physician). With our present knowledge of bacteriology, the following comments could be made of the dressing. The preparation would have contained spores of *Clostridium tetani* from the horse and cow dung. The oil used in the preparation of the dressing would have produced an anaerobic microenvironment in the preparation. This anaerobic environment would have facilitated the growth of *Clostridium tetani* present in the concoction. The heat described in the letter is of low intensity.

This would not have killed the tetanus spores, but could have helped to germinate them as tetanus spores are notoriously resistant to heat. Micronutrients and protein present in the concoction would have ensured the growth and multiplication of the *Clostridium tetani* spores. Production of tetanus exotoxin in the dressing would have almost certainly followed.

The progression of symptoms

One *jama* equals 10 old "*Sinhala payas*" and one old "*Sinhala paya*" equals 24 minutes of present day reckoning of time, so that one *jama* equals 4 hours. According to the letter the following sequence of events took place (2).

In the 8th *jama* the patient had a mucus filled throat, with chills, spasms and a curled up body posture. (*ugurate sema ..gahenta una, wakutu una*). In the 12th *jama* there was poor response to the treatment. The King was made to lie on a (? reclining) chair and the dressings were reapplied. The patient subsequently became lifeless (*waruwasam bindee giya*). In the 17th *jama* the patient's skin looked like white clay (*hama makulu penuni*)." "*Makulu*" in Sinhala also means white clay. In the 21st *jama* there was sweating in the scalp area (*singalar dhaadiyen themee giya*). The illness got worse. In the 22nd *jama* the King died of *sanniya*. *Sanniya* is a rather loose term used in the Sri Lankan medical vocabulary of that era. If we compare the sequence of symptoms described in the *ola* leaf written around the late 1590 with the sequence of symptoms of tetanus described in a modern day textbook of medicine, we see striking similarities (Table). The symptoms printed in bold letters in the table and described in the letter, are caused by sympathetic over-activity in tetanus. They include profuse sweating, peripheral vasoconstriction, and an unusual electroencephalographic sleep pattern with arousal during stimulation.

Table. Comparison of sequence of symptoms described in *ola* leaf manuscript

Time in Jamas	Time in hours	Symptoms of illness of the King described in physician Shelendrasinghe's letter	Symptoms of tetanus
7 Dressing			
8	32 hours Day 2	<i>ugurata sema, gahenta una, vakutu una</i>	Laryngospasm and mucus accumulation, spasms and opisthotonus
12	48 hours Day 3	<i>varuwasam bindee giya</i>	Sleep pattern EEG changes
17	61 hours	<i>hama makulu penuni</i>	Glove and stocking vasoconstriction.
21	84 hours Day 4	<i>singalar dhaadiye themee</i>	Excessive sweating of the scalp area.
22	88 hours	Died of <i>sanniya</i>	

From an examination of the symptoms described we can infer that the King died, almost certainly, of tetanus. Septicaemia is not compatible with the symptoms described for there is no mention of a festering wound or fever. A comparison is made to chills and rigors but the presence of fever in the patient is not mentioned *sahalola jwara kaarayak wage*. Rigidity and spasms are unlikely to occur in septicaemia. The folklore in villages around Sithawake aver that King Rajasinghe had a smile on his face even when he was dying. This could be interpreted as the *risus sardonicus* typical of tetanus.

The knowledge of poisons in this era

The next point is the statement made in the letter that the dressing was applied with the intention of killing the King. This is apparent in two statements in the letter *maha rajjuruwan balapathukota maranta*. Translated it means "to violently kill the great king". *Me visha beth bandhen pasu* means "after this poisonous dressing was applied". It is interesting that the 1590s physician knew that this dressing, containing horse and cow dung, was lethal. The exotoxin that produces tetanus is very potent. Tetanospasmin in its purified form can kill a mouse at a dose of 0.0001 microgram. It is estimated to be 20 times as potent as cobra venom and 150 times as potent as strychnine.

Clostridium tetani bacilli are not generally invasive. The potent exotoxin diffuses by various routes to affect the anterior horn cells of the spinal cord, first to produce localised tetanus and subsequently the entire nervous system, producing the clinical picture of generalised tetanus. The way the dressing was prepared would have produced a culture of tetanus bacilli outside the body. The toxin would have diffused through the open wound and caused tetanus, thus explaining the rapid onset of symptoms and its quick progression, leading to death.

Conclusions

From the above discussion, we may draw the following conclusions.

1. Knowledge that the type of dressing used would kill was there during the period in question. In present day forensic medicine parlance, it is a biological contact poison, effective through a break in epithelium.
2. The observations on the illness of the King and their recording by physicians in 1590s are excellent. The picture of tetanus is described in precise and vivid form so that we can recognise it four centuries later.
3. The description of certain symptoms of tetanus in the late 1590s, were recognised in the 1960s as the effects of sympathetic over-activity.
4. The evil pressure exerted on a physician to transgress all moral and ethical codes in poisoning a sick King so seriously as to kill him is evident.
5. The remorse of the guilty physician who confessed his transgression to a fellow physician of repute, who was also an official related to religious affairs, and who made a faithful record of this confession and forwarded it to his superiors, in the form of an *ola leaf* letter, tends to substantiate that there was a clear intention to murder the King.

References

1. Amarasinghe R. *Sithawake rajadaniye unnathiyeda avanthiyeda samahara angsha pilibanda vimarshanayak*. (The rise and decline of the Kingdom of Sithawaka) Tharangi Printers, Navinna, Maharagama, 1998: 147, 148.
2. Pieris PE. Tri Sinhala: The Colombo Apothecaries Company Ltd, 1950: 41, 42.

How to respond to bioterrorist attacks

Since 11 September 2001, WHO has often been asked about how to respond to bioterrorist attack. The answer is that the epidemiological and laboratory techniques needed to detect and contain an outbreak are the same whether that outbreak is deliberately caused or natural. Adequate data on the prevalence of natural background diseases make it much easier to recognize an unusual and possibly deliberately caused disease.

Heymann DL. The microbial threat in fragile times: balancing known and unknown risks. *Bulletin of the World Health Organisation* 2002; **80**: 179.