

## LUDWIG'S ANGINA FOLLOWING SELF APPLICATION OF AN ACIDIC CHEMICAL

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### ABSTRACT

**Ludwig's angina is a potentially life threatening diffuse cellulitis usually resulting from odontogenic infection. We report a case of Ludwig's angina resulting from self administration of an acidic chemical to treat toothache.**

**Keywords:** Toothache, Acid chemical, Ludwig's angina

### INTRODUCTION

Ludwig's angina is an aggressive, fast spreading, potentially life threatening diffuse cellulitis that bilaterally involves the submandibular, sublingual and submental fascial spaces and causing progressive airway obstruction<sup>1,2,3</sup>.

Etiology of Ludwig's angina includes odontogenic infection, penetrating injury of the floor of the mouth, osteomyelitis, compound fracture of the jaw, otitis media, submandibular gland sialadenitis, sialolithiasis and tongue piercing<sup>1,4,5,6</sup>. Of all these, the major cause is of odontogenic infection, mainly around the second and third lower molar teeth<sup>1,7</sup>.

Most odontogenic infections are uncomplicated resolving following the removal of the cause and sometimes with antibiotic therapy. However, a few cases of odontogenic infections do get complicated by Ludwig's angina amongst others. Several factors which may either act locally or systemically are responsible for these complications<sup>8,9,10</sup>.

To the best of our knowledge, no case of Ludwig's angina secondary to use of acidic chemical has been reported. In this article, we report a case of Ludwig's angina with panfacial abscess resulting from the topical use of sulphuric acid solution (normally used in lead acid rechargeable batteries) for the treatment of a mild odontogenic infection in an otherwise healthy patient. Possible contributory factors to the rapid spread of infection in the patient are also discussed.

### CASE REPORT

A 43 year old male, Muslim Yoruba farmer residing in Osun State of Nigeria presented at the outpatient unit of Osun State Hospital, Asubiaro Osogbo, with complaints of toothache in the lower left jaw of 2 weeks duration as well as cough, dysphagia, left earache and swelling of the neck and face of 5 day duration. The Patient was in his normal state of health until about 2 weeks before presentation when he developed toothache in the lower left quadrant of the jaw. He was advised by his friend to apply acidic chemical used to recharge car batteries to rinse the mouth. On first application of the acidic chemical, he experienced burning sensation and pain making him to immediately rinse with water, which gave him some relief. Some minutes later he reapplied the acidic chemical and held it in the mouth for some minutes "so as to derive maximum benefit" as advised by his friend which he later rinsed off with water but without much relief from the burning sensation and pain. Twelve days later, his medical condition worsened as the pain persisted and increased. He also noticed a swelling around the jaw which progressively increased in size to involve the face and neck. He used different analgesics such as paracetamol and ibuprofen during this period without any improvement but rather worsening of his condition leading to progressive difficulty in swallowing, breathing and talking which made him to present at the out patient department of the State hospital.

At presentation, he was a toxic looking young man, conscious, alert well oriented in time place and person.

He was having difficulty in talking and moderately dyspneic as evidenced by alar flaring. There was marked diffuse facial swelling extending from the temporal region downwards involving the face to the cervical region bilaterally. Swelling was warm to touch, tender and firm in consistency. There was pus discharge from the mouth with marked trismus which prevented thorough intraoral examination. Medical history was significant for regular alcohol intake and smoking. An assessment of Ludwig's angina with impending respiratory obstruction secondary to topical use of chemical substance to treat an odontogenic infection was made.

The Patient was hospitalized and commenced on intravenous fluid therapy and intravenous antibiotics (cefuroxime – 1gram daily and metronidazole – 1.5grams daily). Laboratory investigations (packed cell volume, electrolyte and urea, random blood glucose, fasting blood glucose, microbiology culture and sensitivity testing) were ordered for. He was immediately taken to the theatre and under local anaesthesia and parenteral analgesia, incision and drainage (I&D) of the submandibular, submental, sublingual, infratemporal and cervical spaces were carried out. About 300mls of pus was drained from the extra oral incision and intraoral discharge. Rubber tubing drains were inserted and thick gauze dressing placed. He was continued on intravenous antibiotics and haematinics.

The result of the laboratory investigations were as follows – packed cell volume-33%, microbiology culture and sensitivity testing yielded growth of *Streptococcus pyogenes*, sensitive to Cefuroxime, Refloxacin, Cimefloxacin and Amoxycillin, results of other investigations were within normal limits. He was also commenced on active jaw exercise and hourly warm saline mouth bath. There was regular change of dressing as copious amount of pus continued to be discharged from the inserted drains with a sustained improvement of his general condition and by the third post I&D day, the drains were removed. By the fourth post I&D day, necrosis of the skin in parts of the cervical region were noted which later broke down to form 3 oval shaped defects with necrotic tissue at the base (two on the left and one on the right side of the neck). The two defects on the left were about 4cm and 5cm in their widest diameters respectively while the one on the right was about 5cm in widest diameter. Debridement and daily dressing with dilute eusol was commenced. By the eighth day post I&D, the patient could tolerate oral intake well, intravenous antibiotics were discontinued and replaced with oral antibiotics. By the seventeenth day post I&D, the patient was discharged to the clinic to continue active jaw exercise

and daily dressing of the neck wound which was beginning to look healthy.

When the wound was covered with healthy granulation tissue and no sign of infection noticed, the defects were closed under local anaesthesia using a local flap for the defect on the right, a local flap for the 5cm wide defect on the left and a full thickness skin graft harvested from the left supraclavicular region to close the second defect on the left.

Following active jaw exercise (with the use of wooden spatula) and resolution of the infection, proper intraoral examination and radiological investigation was done which revealed the source of infection as a non vital lower right canine tooth which was subsequently extracted. The wound eventually healed totally after a couple of dressings.

## DISCUSSION

Odontogenic infections are usually polymicrobial in nature<sup>11,12,13</sup>. These infections predominantly anaerobic, frequently involve a complex ecosystem of microorganisms reflective of the resident normal oral flora. Indigenous oral flora are generally poor pathogens, however under special circumstances that lead to structural alteration in the oral mucosa barrier or result in tissue ischaemia and lowered oxidation reduction potential, these opportunistic organisms can proliferate and invade surrounding healthy tissues<sup>14</sup>.

Anecdotal reports suggests a common practice of the use of acid solution and local concoction among semi-illiterates and illiterates for the treatment of toothache in developing countries like Nigeria. This unwholesome practice has the potential of causing serious complications locally and systemically. Charging and repairing of lead acid rechargeable batteries by battery chargers/technicians is an occupation in Nigeria. They are commonly seen in towns and cities and they operate side by side with road side mechanics with majority of them being semi-illiterate. Their actual population is unknown but they constitute a large portion of the artisans in Nigeria. These battery chargers/technicians make use of sulphuric acid solution which is usually between pH values of 2 and 3 with specific gravity of 1.5 to 1.8 to either fill new lead acid rechargeable batteries or repair old ones. There is usually some quantities of this solution kept in their shops, making it readily available to the general populace. This solution is a potentially hazardous chemical that will cause severe reactions to organic and inorganic materials on contact<sup>14</sup>. When it comes in contact with human tissues, it causes severe injuries, depending on the concentration and duration of exposure<sup>14</sup>, it effectively removes elements of water from many

organic materials on contact, and rapidly destroys mucous membranes<sup>14</sup>. When in contact with the tissue, it causes severe burning and destruction of the tissues including the nerves and may well be the mechanism for the relief some patients observe following its topical use. However this kind of effect has the potential of actually aggravating the patient's problem, particularly when it is due to a local soft tissue infection. This chemical can reduce the tissue redox potential, lower the local tissue resistance and open up the tissues for microorganisms invasion. It also causes local tissue necrosis (including the associated vessels), hence forms a nidus for microorganisms proliferation since they can not be reached by the body's immune competent cells, making them prone to exacerbation of a mild infection. A number of these patients might already have some form of compromise of the systemic resistance either due to restricted diet occasioned by the toothache or poor diet due to low socio-economic status.

Once the non pathogenic oral organisms gain access to the tissues following the structural damage by the chemicals, another factor aiding the rapid spread of infection is the symbiotic relationship of the polymicrobial infection. The non pathogenic symbiotic organisms in the mixed infection may be essential in providing important growth factors for the major pathogens or creating a more suitable milieu for infections by lowering the oxidation-reduction potential through products of their metabolism<sup>10, 15, 16, 17</sup>.

Odontogenic infection around the lower 2nd and 3rd molars are the common sources of Ludwig's angina<sup>1</sup> but when conditions are conducive, it can arise from other intraoral sites as well<sup>18</sup>. A typical example is as discussed above in which these factors prepared a good ground for the establishment and rapid spread of the otherwise low grade infection, which if not urgently attended to can be rapidly fatal. A number of these patients are reluctant to visit the hospital and indulge in unwholesome practices like self medication, visiting quacks and use of local remedies because of ignorance or financial considerations<sup>3</sup>. For these same reasons, late presentation is a common finding among these patients<sup>3</sup>. Unfortunately, most times they end up spending much more with different attendant morbidities. The patient who probably would have benefited from exodontia (extraction of the implicated tooth) and possibly simple antibiotics eventually had to use a number of expensive antibiotics, pay for theatre session and have reconstructive surgery.

We have reported this case to bring to the notice of clinicians and other health care providers that Nigerian citizens are still ignorant of the dangers in self medication, use of dangerous chemicals and other local medicaments to treat diseases. A number of these agents have the potential of causing severe or life threatening complications. The government and custodians of the National Health Insurance Scheme need to make healthcare more accessible, available and affordable to both rich and poor, and make the healthier choice the easier choice. Even in centres where healthcare is almost free like in our own centre, some of the citizens still engage in these unwholesome healthcare practices as typified by our patient. This shows that more programmes that will target and involve every group of the citizenry needs to be put in place. There is a need for routine medical check ups which helps to pick diseases at the early stage before any complication sets in.

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