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A REVISIT OF ORAL AND MAXILLOFACIAL MORTALITY FROM OROFACIAL INFECTIONS IN A RESOURCE LIMITED SETTING: IS THERE A NEED FOR A CHANGE IN MANAGEMENT PROTOCOL?
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A REVISIT OF ORAL AND MAXILLOFACIAL MORTALITY FROM OROFACIAL INFECTIONS IN A RESOURCE LIMITED SETTING: IS THERE A NEED FOR A CHANGE IN MANAGEMENT PROTOCOL?

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ABSTRACT

Background: **Orofacial infections are communicable infections usually of odontogenic origin, they often present as rapidly spreading infection involving the fascial spaces of the head and neck. When they are not promptly and adequately intercepted, they may result in fatal outcomes. The common pathway to mortality in these patients is often airway compromise. The advent of antibiotics and improvement in quality of health care has been said to improve the success rate in the management of orofacial infections, however the findings from our setting showed that the mortality from orofacial infections have remained high.**

Objective: **To report mortalities from patients managed for orofacial infections in our center, review our treatment protocol and ascertain the necessity for a change in management protocol**

Design: **A retrospective study Setting: Maxillofacial surgery department of Aminu Kano Teaching Hospital (AKTH) Kano, Kano state Nigeria.**

Subjects: **All patients who died in our facility over a one hundred and thirty eight-month period (January 2005 – June 2016) following management of orofacial infections**

Results: **A total of 115 (76 males, 39 females) maxillofacial admissions were recorded on account of orofacial infection during the period under review; of these 26 mortalities were recorded (22.6%). Male subjects constituted 19 cases**

while female subjects were 7 in number. The demised patients' ages ranged from 19 years to 73 years with a mean age of 34.0 ± 12.0 years.

Conclusion: **Orofacial infections are potentially lethal; they constitute one of the commonest causes of mortality in maxillofacial surgery facilities. A standard care of early intervention, aggressive medical and surgical therapy has consistently provided the best results.**

INTRODUCTION

Communicable diseases have been known to contribute more significantly to the cause of patient mortality in developing countries compared to the developed nations where non-communicable diseases are the major causes of patient mortality. (1) Orofacial infections are communicable infections of odontogenic origin, they often present as rapidly spreading infection involving the fascial spaces of the head and neck. When they are not promptly and adequately intercepted, they may result in fatal outcomes. Efforts to reduce the mortality associated with orofacial infections have been only moderately successful over the past half-century despite the subsequent introduction of intravenous antibiotics, vast improvements in anaesthesia and critical care and the development of advanced imaging modalities like CT (computerized tomography). (2) A recent review conducted in our centre of patient mortality following orofacial infection recorded a loss of 19 patients within a 10-year period. (3).

Common management protocol for orofacial infections in our environment includes prompt institution of incision and drainage or what some would refer to as surgical decompression as well as use of potent antibiotic therapy. (4) There has been a slight deviation from the use of parenteral form of crystalline penicillin, metronidazole and aminoglycoside to use of third and fourth generation cephalosporin in the management of these infections in our centre; however the recorded percentage mortality from our setting has not significantly changed. (5)

The common pathway to mortality in these patients is often airway compromise. 6 Most patients in our environment often present late when airway management is very challenging. In these patients institution of tracheostomy, which ordinarily is a life saving measure may constitute increased morbidity. Oedematous and distorted anatomy of the airway makes tracheostomy difficult and its surgical access may facilitate spread of infection into the mediastinum.

Socio-economic factors have been noticed to play a significant role in the outcome of odontogenic infections. These patients have been reported to be of a lower socio-economic class, uneducated and ignorant of possible sequale of untreated dental infection. 5 Their reason for late presentation is also mostly related to their inability to finance the cost of care.

This paper aims to review mortalities and treatment protocol employed in the management of patients who died from severe orofacial infection in our institution and determine if there would be a need for review of our treatment protocol.

MATERIALS AND METHODS

This study was a retrospective analysis of patients who died in our facility over one hundred and thirty eight-month period (January 2005 – June 2016) following management of orofacial infection. Orofacial infection in our patients was taken as any infection of the orofacial region, which was considered severe enough to justify hospitalization.

Our criteria for hospital admission included orofacial infection causing swelling in one or more of the deep fascial spaces of the head and neck, impending threat to the airway or vital structures, fever greater than 101°F, need for general anaesthesia, or the need for inpatient control of a concomitant systemic disease. Potential subjects that were excluded from this study included pregnant women with odontogenic infection and patients who were confirmed dead on arrival to the hospital.

Sources of clinical information included accident and emergency records; ward admission records and patients case files. Others included mortality forms and registers. Information collated includes patients' age, sex, working diagnosis, duration of admission, treatment carried out, method of anaesthesia employed, retroviral disease sero-positivity and co-morbid medical conditions. The underlying cause of death was considered to be the disease that initiated the train of morbid events leading directly to death (adopted from Iliyasu et al (7).

The data were analysed using statistical package for social sciences (SPSS) version 15.0 (SPSS Inc, Chicago, IL). Absolute numbers and simple percentages were used to describe categorical variables. Quantitative variables were described using measures of central tendency (mean, median) and measures of dispersion (range, standard deviation) as appropriate.

Our protocol for the management of Patients with severe orofacial infection starts with admission and an initial patient assessment, which includes vital signs, ATLS (Advance Trauma Life Support), Airway, Breathing and Circulation. This assessment may determine the urgency of the need for Incision and drainage at the expense of other clinical procedures. Patient history as well as clinical examination and request for necessary radiographs including chest x-ray often precede incision and drainage except where there is an obvious airway compromise at presentation in which case airway management along with incision and drainage is instituted at the time of initial assessment. After establishment of a secure airway, the skin and mucosa were prepared with antiseptic solution. Incision and drainage was performed for all anatomic fascial spaces that were involved by either cellulitis or abscess. Specimens for microbiology, culture and sensitivity testing are taken by either aspiration or by swab sampling of open surgical wounds. All spaces that were opened were copiously irrigated and maintained using corrugated rubber drains.

Medication for adult patient was the administration of a parenteral loading dose (2 grams) of a third generation cephalosporin (Rocephin) plus 500 mg of metronidazole and 80 mg of gentamicin for 10 days. (Dosing of the drugs may be modified depending on patient's age, weight and renal status). Administration of appropriate intravenous fluids is accompanied with a strict input/output-monitoring chart. Therapy is not completed until the removal of source of infection is effected. Then blood samples are collected for full blood count, urea, creatinine and electrolyte. Others tests include random blood glucose, 2 hours post-brandial glycaemic assessment, retroviral screening and any other investigations depending of patient's secondary co-morbid medical problems. Patients' vital signs and other laboratory parameters were used to monitor progress, need for further re-exploration, medical consultation, tracheostomy etc. but these were determined on a case-by-case assessment basis.

Our protocol prescribes intensive care (ICU) for every patient with severe orofacial infection, however only patients that could afford the services and were managed at a time when there is availability of bed space at the ICU were treated at the ICU.

RESULTS

A total of 115 (76 males, 39 females) maxillofacial admissions were recorded on account of orofacial infection during the period under review; of these 26 mortalities were recorded (22.6%). Male subjects constituted 19 cases while female subjects were 7 in number. The demised patients' ages ranged from 19 years to 73 years with a mean age of 34.0 ± 12.0 years; the age distribution is presented in Table 1. All the deceased subjects practiced Islam as a religion.

When considering where patients died, one patient died in the accident and emergency unit while 25 patients died in the maxillofacial ward. Four patients were managed under general anaesthesia; these were also the patients that had tracheostomy to relieve upper airway obstruction (tracheostomies were performed under local anaesthesia prior to surgical decompression under general anaesthesia). Two patients were seropositive to human immune deficiency virus (HIV) antigen. The other co-morbid medical conditions noted were 3 cases of diabetes mellitus (DM) and 2 cases of hypertension. While 2 of the DM patients were uncontrolled at presentation, the 2 patients with hypertension were controlled.

The average admission time for the patients was 3 weeks and 4 days, and this included the time spent at the accident and emergency before transfer to the ward. The cause of death was documented in only 22 subjects. Intensive care unit (ICU) admission was indicated for all the subjects, however only 3 subjects had an ICU management. None of the deceased subjects had any form of posthumous examination.

DISCUSSION

One of the major aims of patient management in the hospital is the prevention of mortality, 3 however mortality remains a common finding in clinical practice. Although patient mortality is not very common in maxillofacial surgical practice, 8 however when it occurs orofacial infection is often the greatest culprit. (3) Mortality in maxillofacial patients often results from involvement of other systems as may be seen in Ludwig's angina and advanced cervico-facial cellulitis. Treatment of severe odontogenic maxillofacial infection with surgical intervention and antimicrobial therapy is well established in the literature (4-6). Early surgical interventions have been emphasized in several studies. (4, 5) Surgical intervention covers early tooth extraction, incision, exploration, drainage and institution of drains. These surgical procedures are performed under local or general anaesthesia. When the infection is rapidly spreading or is associated with airway compromise, intubation or tracheostomy becomes an essential component of the treatment, with extension of infection to the mediastinum; mediastinotomy and or thoracotomy may be inevitable if the respective anatomical space is affected. (9)

The oral cavity is a potential source of bacteaemia and sepsis due to a wide range of microorganisms provoked by the presence of infection and invasive procedures. Sepsis can occur after tooth extraction with or without infection. 10 Lee et al. 11 reported an incidence of odontogenic sepsis of 1.48 per 100,000 inhabitants and a mortality rate of 21.2%. There is some evidence that severe odontogenic maxillofacial infections are common in lower socio-economic classes in developing nations. The percentage mortality from our study was similar to that of Lee et al. (11) but much greater when compared with the findings from the more developed regions of the world. (12)

The finding of more mortality in male patients compared to the female patients in our study is consistent with the findings of

other workers across the world. (4, 5) This is not unexpected bearing in mind that majority of these infections are of odontogenic source and females have been known to keep a better oral hygiene and have a tendency to seek oral health care when compared to their male counterparts. The mean age of the patients that died in our study was 34.0 ± 12 years; this finding is similar to a mean of 35.0 ± 1 9.3 years documented by Fomete et al. (13) This mean age is lower than the findings from other workers (14-17), but noted to be higher than the mean age from other studies(18, 19.)

None of the subjects in our series unfortunately had autopsy, autopsies are not commonly done in this environment due to prevailing socio-cultural and religious beliefs as it is an Islamic requirement that deceased bodies are buried immediately (20). Seilhean (21) also noted that some religions, including Islam, have an unfavourable disposition to autopsy.

Most of the subjects in this series died in the maxillofacial ward while only one patient died at the accident and emergency, this also corroborates with the over 3 weeks that most of the patients stayed in the ward before they were lost. It would have been expected that most of these patients should have been cared for at the ICU. The absence of ICU care in our patients is related to the inability of the patients to pay for the services or the unavailability of bed space at the ICU at the time of patient's management or both.

The choice of anaesthesia for patients with advanced orofacial infection is dependent on the procedure to be carried out and the intactness of the patients' airway. Patients that required only incision and drainage who have little or no airway obstruction at presentation are often managed under local anaesthesia (LA) where as general anaesthesia is employed in patients who required more invasive procedures like thoracotomy although intubation is often fibre optic guided where facilities and experiences permits. The advantages of LA for management in these cases include safety, economy and lower technique sensitivity.

The role of co-morbidity in the aetiology and prognosis of orofacial infections is well documented in the literature (4, 5). Medical co-morbidity is also known to affect the duration of hospital stay.5The reason for a more severe disease pattern in patients with background HIV/AIDS (Acquired Immune Deficiency Syndrome) or diabetes mellitus may be related to the associated depression in the immune functions from these conditions. Management of these patients is often multidisciplinary and with efforts targeted at improving immune functions.

Antibiotic use in the management of these patients vary between centers however, it is always based on empirical use of antibiotics. While some centers start with simple penicillin as first line drug, others use augmented penicillin or cephalosporin as first line drug. Our reason for non-utilization of penicillin as first line drug is based on the fact that most of our patients have abused penicillin prior to presentation and often present with the extreme form of the clinical spectrum of these infections. The abuse of penicillin prior to presentation to the hospital has also been noted in another study from North western Nigeria (5). Comparisons of both techniques have been noted to show no significant difference in outcome, however the economic implication of the use of cephalosporin or augmented penicillin is often grave especially in settings where health care is by out of pocket expense.

The actual reason surrounding mortality in orofacial infection need to be further studied considering the differential outcome in 2 similarly presenting patients. Post mortem studies will play a significant role in determining some of these variabilities in patients.

Other factors that may also improve clinical outcome will include dissemination of information at the grassroots on the need for early presentation and the dangers of untreated orofacial infections. The need to improve facilities for the management of these cases is another aspect that may require a review in most of our institutions. These may include blood gas analysers, CT with ultra sound facilities, so that it is accepted as a gold standard for diagnoses and monitoring including drainage of abscess under ultrasound guidance. Advocacy to give a waiver to the financial cost for the treatment of emergency phase of odontogenic infections in government facilities might also be of great help in reducing the impact of this scourge.

In conclusion, Orofacial infections are potentially lethal; they constitute one of the commonest causes of mortality in maxillofacial surgery facilities. A standard care of early intervention, aggressive medical and surgical therapy has consistently provided the best results although improvement in facilities at the cares centers may also improve outcome.

Table 1
Distribution of patients' mortality by age

Age range (years)	Frequency (n)	Percentage
0-10	-	-
11-20	1	3.8
21-30	4	15.4
31-40	12	46.2
41-50	2	7.7
51-60	6	23.1
>70	1	3.8
Total	26	100

Table 2
Working diagnosis and treatment carried out on patients that died

Working diagnosis	Treatment	Frequency
Facial cellulitis	Incision and drainage	3
Ludwigs angina	Incision and drainage	20
Carvenous sinus thrombophlebitis	Incision and drainage	3
Total		26

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