

Causes of maxillofacial patient mortality in a Nigerian tertiary hospital

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BACKGROUND: An analysis of maxillofacial mortality was done in a Nigerian tertiary health care centre to determine the major causes of mortality and identify possible predisposing factors in our environment.

MATERIALS AND METHODS: A retrospective analysis of mortality in maxillofacial surgery department of Aminu Kano Teaching Hospital from January 2005 to December 2014 was done. Data were analyzed using statistical package for social sciences (SPSS) version 15.0 (SPSS Inc, Chicago, IL).

RESULTS: A mortality rate of 1.8% (46 deaths from 2,540 admissions) was recorded. There were 35 males (76.1%) and 11 (23.9%) females. The mean age of the deceased patients was 40.0±13.0 years. Orofacial infections (41.3%) and advanced (stage IV) orofacial malignancies (28.3%) accounted for most deaths.

CONCLUSION: Fascial space infections and orofacial malignancies contribute largely to mortality in our setting. Late presentation was a major factor predisposing to mortality.

Key Words: *Audit, Maxillofacial Patient, Mortality*

Introduction

One of the major aims of patient management is the prevention of mortality but it is still encountered in clinical practice [1, 2]. Mortality in maxillofacial patients often result from involvement of other systems as may be seen in Ludwig's angina or severe brain injury following craniofacial trauma and stage IV malignancies [2, 3, 4]. Intraoperative deaths may also occur from anesthetic and/or surgical complications occasionally.

While studies exist on patients' mortality generally [1, 5], reports on oral and maxillofacial patients' mortality especially in Nigeria is sparse [2, 6, 7, 8]. In the present study, we undertook an audit of maxillofacial mortality in a tertiary health care center in northern Nigeria, with the aims of determining major causes of maxillofacial mortalities and identifying possible predisposing factors.

Patients and methods

A retrospective review of all mortality under the maxillofacial surgery department of Aminu Kano Teaching Hospital (AKTH) over a ten-year period (January 2005 – December 2014) was done. Data were obtained from

case folders, mortality forms and registers (accident and emergency, admission wards and theatre). None of the patients had autopsy records for review. Information collated included patients' age, sex, working diagnosis, duration of admission, treatment carried out, the cause of death and point of demise (ward, accident and emergency or operating room). In the case of malignancies, the biopsy reports were retrieved. Possible predisposing factor for patients' death was also extracted from the case notes, duplicate mortality forms or both.

Patients who were confirmed dead on arrival were excluded from this audit and the underlying cause of death was considered to be the disease or injury that initiated the train of morbid events leading directly to death or violence that produced the fatal injury (adopted from Iliyasu et al [9]).

The data were analyzed 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.

Results

A total of 2,540 (1,979 males, 561 females) maxillofacial admissions were made during the period under review; of these 46 mortalities were recorded (1.8%) of which 35 (76.1%) were male. The mean age of the deceased patients was 40.0 ± 13.0 years; the age distribution is presented in Table 1. All the deceased subjects practiced Islam as a religion.

The working diagnosis of all the mortalities along with the possible predisposing factor to mortality are presented in Table 2. When considering where patients died, one patient died in the accident and emergency unit while 42 patients in the maxillofacial ward. There were three intraoperative deaths, two of whom were patients

with temporomandibular joint ankylosis who underwent distraction osteogenesis and interposition arthroplasty respectively. The third case had histologic diagnosis of odontogenic fibroma.

The average admission time was 3 weeks, and this included the time spent at the accident and emergency before transfer to the ward. Details of the treatment carried out and the causes of death are presented in Tables 3 and 4 respectively. The cause of death was documented in only 23 subjects. Intensive care unit (ICU) admission had been recommended for 25 of the diseased patients (54.3%), 24 of whom were unable to access the ICU due to lack of finances and the only one whose relatives were willing to pay could not access it because of lack of available ICU space at that time. The need for or against ICU admission were not captured in the records of other patients.

Discussion

A literature search found few mortality studies carried out in maxillofacial surgery units, (Fahad et al [2]). Although Verco et al [10] studied only mortality in maxillofacial day surgeries, where stringent measures were used to select only cases whose surgeries did not exceed 30-45 minutes and excluded patients who were significantly medically compromised, they recorded 0.13% mortality in 5 years. In contrast, Fahad [2] working in an independent maxillofacial center, which is not a part of a medical hospital, recorded a mortality rate of 0.0021% in a 3-years retrospective analysis. These values were much less than

Table 1. Distribution of patient mortality by age.

Age Range Year	Frequency n	Percentage
0-10	5	10.9
11-20	4	8.7
21-30	5	10.9
31-40	10	21.7
41-50	7	15.2
51-60	11	23.9
61-70	3	6.5
>70	1	2.2
Total	46	100

Table 2. Patients' diagnoses, frequency distribution and possible predisposing factors for mortality

Diagnosis	Details	Possible predisposing factor	Frequency (%)
Benign odontogenic tumor	Ameloblastoma (3), Odontogenic fibroma (2)	General anesthesia, advanced age, excessive bleeding, tracheostomy	5 (10.9)
Malignant tumor	Soft tissue sarcomas (4), Salivary gland tumours (3), Squamous cell carcinoma. (3), Merkel cell carcinoma. (2), Burkitt's lymphoma (1)	Stage IV disease with multi-organ involvement/extreme age	13 (28.3)
Gunshot injuries	trauma to neck region (1) and base of tongue (1)	Excessive blood loss, vital organ damage	2 (4.3)
Infection of the maxillofacial region	Ludwig's angina (17), Cavernous sinus thrombosis (2)	Overwhelming sepsis/septic shock	19 (41.3)
Facial fractures	Pan-facial fractures (2), Splenic rupture (1)	CNS involvement, intra-abdominal injury	3 (6.5)
TMJ ankylosis	Distraction osteogenesis (1), interpositional arthroplasty (1)	Tracheostomy related, blind nasal intubation	2 (4.3)
Cancrum oris	Pulmonary tuberculosis (1), Severe malnutrition (1)	Immunosuppression/multi-organ involvement	2 (4.3)
Total			46 (100)

Table 3. Working diagnosis and treatment carried out on patients that died

Working Diagnosis	Treatment	Frequency (%)
Facial cellulitis/ Ludwig's angina	Incision and drainage	18 (39.1)
Benign odontogenic tumor	Excisional biopsy	12 (26.1)
Gunshot wounds, soft tissue injuries	Exploration/ debridement/ foreign body extraction	6 (13.0)
Facial fractures	Reduction and immobilization	1 (2.2)
Aggressive jaw tumors	Jaw resection and reconstruction	5 (10.9)
Assymmetric face ± TMJ ankylosis	Placement of distractors	1 (2.2)
TMJ ankylosis	Interposition arthroplasty	2 (4.3)
Suspected malignant lesion	Incisional biopsy	1 (2.2)
Total		46 (100)

1.8% mortality within a 10-year period in our study. The longer review period in this study, larger volume of patients attended to and an absence of a dedicated ICU as seen in the study by Fahad et al [2] may have accounted for the wide difference in the recorded mortality figures.

The large gender predisposition favoring the male compared to female patients in our study is comparable to the findings in other Nigerian hospitals [11]. The male predominance in the present study, may be a reflection of the pattern of hospital attendance as demonstrated by the high gender ratio (1,979 males versus 561 females) seen during the period of review. The low mean age of deceased patients (40 years) in our study could also be a reflection of the demographic feature of our catchment population and the low average life expectancy among Nigerians.

Infection of the maxillofacial region accounted for the most common diagnosis made amongst the recorded deaths in the present study and Ludwig's angina was the most common of these infections. Ludwig's angina is frequently complicated by spread to secondary spaces in the neck and mediastinum leading to other life threatening complications. All the Ludwig's angina cases recorded in our review were noted to have presented at the extreme of its clinical feature, which is known to confer a poor prognosis. Although Ludwig's angina is associated with

Table 4. Causes of death in 23 patients

Cause of death	Frequency	Percentage
Cardiac arrest	9	39.1
Carotid artery blow out	4	17.4
Aspiration pneumonia/ laryngospasm	3	13.0
Anaemic heart failure	2	8.7
Overwhelming infection/ septic shock	5	21.7
Total	23	100

a high mortality even in the developed world, absence of investigations such as blood gas analysis which helps to determine the level of patients toxemia even before clinical features of irreversible organ damage ensues, may have accounted for the high number of Ludwig's angina related deaths in this study. Most of our subjects presented late.

It has been observed that the poverty state of most patients, late presentation at the point of care, ignorance and the medical interference by untrained persons, often lead to most avoidable deaths in accident and emergency units [12]. These factors may have contributed to the mortalities recorded in the present study, considering the level of poverty and ignorance prevalent in most parts of Northern Nigeria, where the study was carried out. Other factors contributing to the poor prognosis may include substandard medications in our markets and inability of the patients to afford essential treatment including intensive care admission.

Intraoperative causes of death have been reviewed in the literature; the most common cause of death is related to anesthesia [5]. Although the maxillofacial surgeon often shares the same operative site with the anesthetist, various methods have been devised to ensure that the relationship is beneficial to both. The use of north and south facing endotracheal tubes, re-enforced endotracheal tubes, cuffed tube systems [13], and placement of packs around the airway are some of the measures that improve the safety of maxillofacial surgery. In one instance, intraoperative death was thought to be due to sudden extensive blood loss from "piece-meal" extirpation of an odontogenic fibroma and an inability to effectively support body compensatory hemodynamic mechanism. In the present study, the intraoperative deaths observed in patients with temporomandibular joint ankylosis were thought to be related to complicated tracheostomy.



Figure 1. 55-year old woman who died from histologically diagnosed squamous cell carcinoma of the oral cavity. (Credit: Department of oral and maxillofacial surgery, Aminu Kano Teaching Hospital, Kano, Nigeria)

Unfortunately, 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 [14]. Seilhean [15] also noted that some religions, including Islam, have an unfavorable disposition to autopsy. Review of patients lost following trauma in our study has emphasized the importance of a prompt and effective triage system. Maxillofacial surgeons should thoroughly review patients and develop a high index of suspicion to observe and promptly refer patients with more emergent medical conditions.

Patients lost from advanced malignancy in our study were from stage IV tumors with significant systemic metastasis (Figure 1). Most of these patients were found to have presented in various centers where they were labeled inoperable and therefore discharged home only to return back to the hospital following the development of complications, which prompted referral. Many patients with advanced malignancy died in the hospital because of the absence of hospice care. When their condition deteriorates, they seek hospital care and may occasionally die in our care. Institution of dedicated hospice centres would help to give these patients a more comfortable end of life care and also enable treatment centres to focus care on subjects with better prognosis.

Conclusion

Severe orofacial infections (such as Ludwig's angina) and advanced orofacial malignancies are the commonest causes of maxillofacial mortality in our environment. Late presentation of patients with these conditions places them at risk of mortality. There is a need to educate patients, especially at the grass root level on the importance of regular dental visits. In addition, caregivers, particularly at the primary level, should be educated on early recognition of orofacial conditions and the need for prompt referral for specialist attention.

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