

Odontogenic Cervicofacial Infection in Pregnancy: A Need for Oral Care

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Abstract

Objective: During pregnancy, changes occur in the oral environment with gingivitis predominating. The development of odontogenic infections within the period of pregnancy may endanger the life of the mother as well as that of her unborn baby.

Materials and methods: A retrospective observational study of cases of cervicofacial infection in women during pregnancy was conducted at the oral and maxillofacial surgery clinic of a northern Nigerian tertiary health care center from January 2006 to June 2018.

Results: Seventy women were managed for cervicofacial infection during the period reviewed, out of which 20 women (28.6%) presented during pregnancy. Their mean age was 33.8 ± 9.35 years with a range of 20 to 55 years. The 30-39 years age bracket had the highest frequency (40%) and the mean duration of pregnancy at presentation was 24.9 ± 11.12 weeks with a range between 10 to 36 weeks. Majority ($n=15$, 75.0%) presented in the 3rd trimester. At presentation, the frequently involved fascial space was unilateral submandibular space ($n=10$; 50.0%), All the patients had incision/drainage/decompression on the dental chair under local anesthesia (2% lidocaine with 1:80,000 adrenaline). The mean length of hospital stay was 13.9 ± 6.2 days with a range of 6 to 26 days. The mortality rate was 15% ($n=3$ cases).

Conclusion: There is a need for oral health evaluation in pregnant women during ante-natal visits to prevent these complications. Oral health education should also form part of teachings received by women both in the ante-natal and postnatal clinics.

Keywords: Mouth; Infection; Pregnancy; Mortality; Health Education

Introduction

Pregnancy is associated with great physiological

changes in an otherwise medically fit female (1, 2). Adequate knowledge of these changes and their implication is important in improving outcomes and reducing morbidity or mortality (1, 3).

Oral changes during the perinatal period are common and 70% of pregnant females present with

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pregnancy gingivitis, periodontal diseases, gingival bleeding, gingival hyperplasia and pregnancy epulis or pyogenic granuloma. A threefold increase in periodontal disease has been reported in those with simultaneous gestational diabetes (1, 4, and 5). Neglected dental care during pregnancy may result in life threatening odontogenic infections (1).

The odontogenic infection could be major or minor and should be treated promptly during pregnancy. Major odontogenic infections known as cervicofacial infections (CFI) are related to the orbit, zygomatic space, lateral pharyngeal space, or may affect other contiguous fascial spaces (6). They are mostly bacterial in origin arising from a sequel of established dental caries (such as pulpitis and apical periodontitis), pericoronitis or periodontal disease among others (6, 7). Predisposing factors to these infections include systemic diseases such as diabetes mellitus, malnutrition, alcoholism, a compromised immune system such as seen in patients with acquired immune deficiency syndrome (AIDS) and organ transplantation (6, 7).

Although pregnant patients are usually not immunocompromised, the maternal immune system does become suppressed in response to the fetus. As such, there is a decrease in cell-mediated immunity and natural killer cell activity. Consequently, odontogenic infections have the potential to develop rapidly into deep-space infections and to compromise the airway (3). The majority of these patients are seen as emergency cases due to late presentation (6, 7, and 8).

CFI is usually preceded by toothache and may be associated with limitation of mouth opening (trismus), fever, malaise and dysphagia. This may lead to death from acute airway obstruction or multi-organ failure (6, 7) in severe cases. A recent study from Nigeria found cervicofacial infection to be one of the leading causes of death in a maxillofacial unit, accounting for about 41.3% of maxillofacial mortality over a 10 years period (7). Other reported incidences of mortality in developing countries are 17.4% in Burkina-Faso (9), 5.8% in Ghana (10) and 0.8% in China (11). Generally, a higher incidence of cervicofacial infection and mortality rate has been reported in developing countries and this has been attributed to malnutrition, late presentation and poor health services (7).

Pregnancy coexisting with infective foci sometimes presents with adverse consequences such as miscarriage and stillbirth. The mechanism of occurrence of these adverse effects is unclear but they

have been thought to be associated with increased inflammatory mediators (2). Maternal periodontitis represents one potential source of microorganisms that are known to routinely enter the circulation to influence the health of the mother and the unborn baby (2).

Prematurity has been reported as one of the primary causes of infant morbidity and mortality. Prevalence of infant prematurity in the USA has been documented to range from 7 to 11% (12). Periodontal disease is said to be a potential risk factor for preterm birth. The mechanism of preterm deliveries in women with periodontal diseases is not fully understood (12, 13).

There are few studies on odontogenic infections in pregnant females and most of these are case reports. Wong et al. (1) reported a prevalence rate of 1.4% from a study of five cases in the first and last trimester of pregnancy in Australia while three cases were reported from Morocco in females in the third trimester of pregnancy (14). Similarly, a prevalence rate of 13.7% from a review of eighteen cases was reported from Nigeria (15) while Doumbia-Singare et al. (8) reported a prevalence of 9.7% in a series of 10 cases from Mali.

The aim of this retrospective observational study was to analyze 20 cases of CFI in women who presented in their perinatal period to a tertiary health care facility, share the experiences gained in the management of these cases and to highlight the dangers of neglecting oral care in pregnant women.

Materials and methods

A retrospective observational study of cases in women in their perinatal state diagnosed as cervicofacial infection at the oral and maxillofacial surgery clinic of a tertiary health care center was conducted between January 2006 and June 2018. Data collected from the medical records and maxillofacial surgery procedure room included biodata, facial spaces involved, obstetrics and gynecological review details, diagnosis, ancillary investigations, transfusion history, the status of the fetus where applicable and treatment was given to the patients in addition to the outcome. Patients with incomplete or missing clinical records were excluded from the study.

Results

Seventy female patients with cervicofacial infection were managed during the study period out of which 25 (35.1%) of them presented in the perinatal period. The

indexed pregnancies were spontaneously conceived and suspected after a missed menstrual period. However, because of incomplete data, 5 of the patients who presented in the perinatal period were excluded.

Of the 20 (28.6%) patients who formed the study cohort, their mean±SD age was 33.8±9.35 years with a range of 20 to 55 years. The 30-39 years group had the highest frequency (40%) followed by 20 to 29 years age group (30%). The 50-59 year age group constituted the lowest frequency (10%). Concerning patient's parity, 15 were multipara, 2 were para 1, and 1 was primigravida. In the remaining 2 (10%) patients, parity was not documented.

The mean±SD duration of pregnancy at presentation was 24.9±11.12 weeks with a range of 10 to 36 weeks. Majority of the patients (n=15, 75.0%) presented in the 3rd trimester, 4 (22.2%) patients in the 2nd trimester while 1(5.6%) patient presented in the first trimester (Table 1). Details of their antenatal records were documented in 16 cases; 10 (50.0%) had regular antenatal clinic visits while 6 (30.0%) had no antenatal visit records. A total of 6 deliveries were recorded from the patients that were managed and all were preterm deliveries (3 of these were premature stillbirth). All the deliveries were spontaneous vaginal delivery.

Table 1: Patients' parameters in relation to their age group

	Age group of patients (years)			
	20-29	30-39	40-49	50-59
Pregnancy Trimester				
1 st trimester	1	1	0	0
2 nd trimester	0	1	2	1
3 rd trimester	6	6	2	1
Length of Hospital stay (days)				
0-9	2	1	1	0
10-19	2	6	1	2
20-29	2	1	2	0
Packed cell Volume (%)				
10-19	0	2	1	0
20-29	5	5	2	1
30-39	1	1	1	1
Duration of presenting complain (weeks)				
<1	0	0	0	0
1 to <2	0	4	1	1
2 to <3	2	1	1	1
3 to <4	0	3	1	0
4 to <5	2	0	0	0
5 to <6	2	0	1	0

Analysis of their health-seeking habit showed that a significant number (n=11; 55%) consulted traditional healers for their toothache before hospital presentation. However, the details of the treatment received from traditional healers were not documented. About 80.0 % (n=16) had no formal western education and were full-time housewives

The medical conditions in pregnancy encountered were 2 cases of preeclampsia, 2 cases of hypertension and 2 cases of diabetes mellitus (DM). One of the patients with DM was diagnosed from the previous pregnancy whereas the others were unaware of their medical conditions. The mean±SD packed cell volume (PCV) of the patients was 26.4%±3.58 with a range of 17% to 31% (Table 1) and 4 (20%) patients required blood transfusion.

All the patients presented with facial swelling and pain. Other clinical presentations were limited mouth opening (n=13; 65%) and dyspnea (n=8; 40.0%). The involved fascial spaces were unilateral submandibular space (n=10; 50.0%), bilateral submandibular-sublingual with submental space involvement (Ludwig's angina) (n=6; 30.0%) and parapharyngeal space (n=4; 20%). Most of the patients (n=15; 75.0%) had never visited a maxillofacial or dental surgery clinic.

An odontogenic etiology was documented in 19 out of the 20 cases studied and these were dental caries (n=16; 80.0%) and chronic periodontitis (n=3; 15%). No etiology was documented in the remaining single case. The lower molars (first and second) were the most widely involved teeth in 14 cases. This was followed by 3 cases of periodontal disease. Majority of the patients (17; 85.0%) also had poor oral hygiene and bleeding gums. In 12 (60.0%) patients, multiple retained tooth roots were also present and were extracted under local anesthesia during the period of admission.

The imaging modalities employed included intraoral (periapical) radiograph as well as extraoral radiographs (posterior anterior and oblique lateral views of the jaws) where mouth opening was inadequate. No patient had computerized tomographic imaging scan done and the reason attributed to this was lack of finance.

All the patients had incision/drainage/decompression on the dental chair in the minor surgery room at the maxillofacial or the accident and emergency department under local anesthesia (2% lidocaine with 1:80,000 adrenaline). In those with features of compromised airway,

supplemental oxygen was administered via nasal mask during and after the procedure. None of the patients had intubation for airway management. Additionally, during the procedure, pus was taken for microscopy culture and sensitivity (MCS). There were no bacterial growths in all cases. Of the 20 patients treated, 4 (20.0%) required additional re-exploration after the initial incision and drainage.

The patients were all started on crystalline penicillin and metronidazole empirically. The mean±SD length of hospital stay was 13.9±6.2 days with a range of 6 to 26 days (Table 1). There were 3 cases of mortality and their profile is shown in Table 2.

Discussion

A 28.5% prevalence rate of cervicofacial infections (CFI) in pregnancy noted in this study is higher than 6% reported in Libreville (16), 20.3% reported in Madagascar (17), 1.4% from Australia (1), 13.7% from Nigeria (15) and 9.7% from Mali (8). The higher prevalence rate recorded in the present study may be related to the period of the study which was higher in the present study. The influence of sociocultural practices among patients in the present study as evident in their health seeking habits may also be contributory.

The mean age of the patients in this study was 32.5 years which is higher than the 29.5 years reported by Kano, Northwest Nigeria (18). This mean age (which reflects the ages of child bearing) is often influenced by biology, culture and traditions of a people or society.

Patients in the 4th followed by 3rd decade of life constituted the majority of cases seen. This finding is similar to previous studies which reported a higher

frequency of occurrence of cervicofacial infection (CFI) in pregnant women in the third and fourth decades of life (15, 18). Similarly, in agreement with findings from Mali (8), multipara women appear to be more affected.

The present study showed a higher presentation of CFI in the third trimester of pregnancy followed by the second trimester and this is in agreement with previous studies (1, 15, and 18). However, this finding is contrary to report by Doumbia-Singari et al. (8) who reported a higher frequency of CFI in the second trimester. The second trimester is reported to be the safest period for procedures because the uterus is below the umbilicus allowing for comfort during dental treatment. Also organogenesis has been completed and abortion is minimized (5, 19). However, odontogenic infections should be treated at all stages of pregnancy due to risk of developing deep fascial space infection and other complications such as brain abscess (19). It should be noted that during the third trimester there could be compression of the inferior vena cava if the patient is supine and this may lead to hypotension, nausea and vomiting. It is important to take this into consideration during positioning of the patient on the dental chair or operating table.

The 50% antenatal clinic attendance rate in the present study is higher than the 20% reported in Mali (8). This could be due to the availability of primary healthcare facilities in most of the local government areas in our setting. Antenatal clinic attendance allows early detection of pregnancy related complications thus reducing maternal-child mortality. Two out of the three cases of mortality in the present study was recorded in patients who did not attend antenatal clinic.

Table 2: Profile of pregnant patients who died from cervicofacial infection

	Patient 1	Patient 2	Patient 3
Age (years)	38	28	30
Pregnancy (weeks)	12	34	33
Parity	4	2	5
Medical condition	Preeclampsia	-	-
Packed cell volume (%)	23	26	28
Duration on Admission (Days)	12	7	16
Antenatal attendance	Yes	No	No
Delivery on Admission	Preterm still birth	Preterm still birth	Preterm still birth
Suspected cause of Death	Anemia, Sepsis	Anemia, Sepsis and Airway obstruction	Anemia, Sepsis
Initially Treated by Traditional healer	Yes	Yes	Yes
Others	Finance was the major challenge	Finance was the major challenge	Finance was the major challenge

It is also important to incorporate oral health examination in pregnant women especially in the early stages of pregnancy so that existing oral health challenges can be identified and treatment planned to avoid complications including maternal-child mortality.

The occurrence of stillbirth in pregnant women with CFI as seen in the present study is similar to previous studies (8, 18). However, no stillbirth was reported in an Australian study (1) although the study population was smaller (5 patients) when compared to other studies.

Pregnancy associated hormonal changes affect the entire body including the oral cavity. These hormonal changes give rise to a low grade inflammatory process leading to pregnancy gingivitis. Intake of regular meals and snacks during pregnancy has been found to either worsen the existing inflammatory condition or create one. Infection may traverse the placenta and eventually cause fatal septicemia (20).

The mean hematocrit of patients in this study was 26.4% and this is lower than 30% reported from a previous study in Northwest Nigeria (18). The low hematocrit of these patients may be related to their low socio-economic status since they were mostly engaged in subsistence farming which is usually limited in this environment to carbohydrate food substances. Similarly, the fear of precipitating bout of toothache from chewing may result in poor nutrition and reduced hematocrit.

The management of cervicofacial infections in pregnant females must take into consideration the physiologic changes of pregnancy and the perinatal effects of the treatment. According to Abrahamovicz et al. (20), over 50,000 women during gestation undergo anesthesia and surgery each year for problems unrelated to pregnancy. Consideration must be given to the fact that in pregnancy, the immune system is greatly reduced with decreased chemotactic activity, cell mediated immunity and killer cell activity (20). Prolonged intubation and certain intravenous medications are harmful to the fetus. But in life threatening situation, the benefits need to be weighed (20). All procedures in the present study were done under local anesthesia even though lidocaine is said to penetrate the placenta if given in large doses as documented by Doumbi-Sangarie et al (8). Penicillin and clindamycin have been documented (20) as the drugs of choice in addition to metronidazole. Medications such as Tetracycline and ibuprofen/aspirin should be avoided because they can affect the primary dentition and promote bleeding

respectively. Morphine is however safe if given for a short period. Generally, the classification of drug based on safety in pregnancy by the United States food and drug administration (FDA) provides a useful guideline.

The high rate of traditional medication use noted in the present study is similar to the previous report (18) although a lower rate has also been reported (8). The use of traditional medication is usually influenced by socio-cultural, religious, and economic factors in addition to the availability of health facilities among other factors. Most of these factors were not recorded (except for economic) to allow for an understanding of this health seeking behavior. However, based on the Center for Disease Control and Prevention (CDC) Pregnancy Risk Assessment Monitoring System (PRAMS), it has been shown that 23% to 35% of pregnant women received professional dental care during pregnancy (5). Women that are educated and that are from a high socioeconomic class were more likely to have positive attitude towards dental clinic visits and their oral health. In the present study, the majority of women were full time housewives with little or no education.

In a survey on women regarding dental care in pregnancy, 54% of women noted that dental care was important during pregnancy but only 44% of them received dental care in pregnancy (20). They also reported that only about 40% of their obstetrician advised them on dental care while 10% reported been denied dental treatment because of their pregnancy state. Our experience is that most pregnant women are referred from the ante-natal clinic to the oral/maxillofacial or dental surgery clinics only when oral/maxillofacial surgical emergencies such as severe toothache or ascending/descending CFI develop. This should rather not be the case. Preventive approach and early intervention should be the rule and not the exception as currently noted in referral pattern from the ante-natal to the oral/maxillofacial surgery clinics.

The mean length of hospital stay was 13.3 days which is higher than the 6 days (range 6-19 days) hospital stay reported in a study from Mali (8). The higher value in the present study could be related to the severity of the infection as well as their malnourished state as evidenced by their low packed cell volume.

Three cases of mortality were recorded in this study. Previous studies also documented some mortality (8, 18). This further highlights the importance of early

detection of oral diseases in the female population of child bearing age and in pregnancy. Moreover, there are accumulating data supporting a possible relationship between maternal periodontal disease and adverse pregnancy outcomes (21).

Conclusion

Dental infections are often underestimated by patients and health workers. These infections which may be silent in non-pregnant females may become activated in pregnancy and may affect the ability of the pregnant female to receive adequate/appropriate nutrition. In its severe form, it may lead to descending/ascending cervicofacial infection with its attendant morbidity and mortality. There is the need for oral health evaluation in pregnant women during ante-natal visits to prevent these complications. Oral health education should also form part of teachings received by women both in the ante-natal and post-natal clinics.

Conflict of Interests

Authors have no conflict of interests.

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Odontogenic Infection in Pregnancy

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