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ORIGINAL ARTICLE

Delay in the Referral of Pregnant Patients with Fascial Spaces Infection: A Cross-Sectional Observational Study from Khartoum Teaching Dental Hospital, Sudan

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Abstract
Purpose Odontogenic infections have the potential to develop rapidly into deep-space infections and compromise the airway. This problem is aggravated by pregnancy because of the physiological changes. This study aimed to determine the causes of referral delay for pregnant patients presenting with fascial space infections.
Methods Ten pregnant patients with severe odontogenic infections reported to the outpatient clinic atKhartoum Teaching Dental Hospital included in the study during the study period included in the study. Patients with any systemic disease excluded. Demographic data were taken followed by history and then extraoral and intraoral examinations. A predesigned case report form was completed for each patient including the cause of referral delay, the offending teeth, space involved, and trimester at the time of presentation.
Results The age range was from 18 to 35 years, and the mean age was 26.5 years SD ± 6.3. The odontogenic infections were most common in the last trimester (60%), followed by the late second trimester (40%).The most common tooth involved was the mandibular wisdom tooth (50%), and the submandibular space was the most frequently involved fascial space (70%). All patients were admitted and treated with incision and drainage under local anesthesia; the offending tooth was extracted and intravenous antibiotic and fluids were administered. Patients were on daily dressing until they were discharged on oral antibiotics. Two patients with Ludwig's angina progressed to necrotizing fasciitis.
Conclusion Misconceptions among women regarding dental treatment during pregnancy were the most common cause of the delay. The myths and misconceptions should be addressed by dentists and prenatal care providers about oral health during pregnancy, and obstetricians' awareness increased that oral health needs special attention during pregnancy.

Keywords Pregnancy · Odontogenic infection · Referral delay · Ludwig's angina

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Introduction

Odontogenic infections are one of the most common serious orofacial infections encountered by oral and maxillofacial surgeons ranging from simple dental care to life-threatening Ludwig's angina and mediastinitis [1]. Poor oral health in pregnancy has been implicated in adverse birth outcomes, specifically prematurity, development of preeclampsia, and infants born at small-for-gestational-age [2]. Although pregnant patients are usually not

immunocompromised, the maternal immune system does become suppressed in response to the fetus [2].

The odontogenic infections have the potential to develop rapidly into deep-space infections and to compromise the airway; moreover, due to increased oxygen demands of the maternal–fetal system in pregnancy, many changes in the respiratory physiology were reported, for example, increased tidal volume, dyspnea, and hyperventilation [3]. Half of the patients experience these clinical signs in the second trimester, and up to 75% experience it by the third trimester [4]. Ludwig's angina can aggravate these respiratory changes leading to airway compromise; therefore, early incision and drainage of odontogenic infections are indicated with the appropriate antibiotics [5].

Oral health procedures in pregnancy are often avoided and misunderstood by physicians, dentists, and patients. There was some degree of confusion over the safety of accessing dental care during pregnancy. Cultural beliefs about the effects of pregnancy on dental health are well established in the society with the statement "a tooth for a baby" among pregnant patients and even some health professionals. This study aimed to determine the causative factors of the referral delay of pregnant patients presented with fascial space infections as consequences of dental causes.

Methods

The present study was carried out on ten pregnant women with fascial space infections reporting at the Department of Oral and Maxillofacial Surgery, Khartoum Dental Teaching Hospital (KDTH), from January 2014 to May 2015. The ethical clearance was obtained from the ethical committee review board and research unit in KTDH. Patients with gestational diabetes or known diabetes mellitus, hypertensive patients, or any patients with a systemic disease were excluded from the study. The purpose of this study was to determine the cause of the delayed referrals of those pregnant patients. Moreover, it was to identify the causative tooth, the facial space involved, and the trimester of pregnancy with an increased frequency of odontogenic infections at the time of presentation.

Demographic data were taken followed by history taking and then extraoral and intraoral examinations. The diagnosis was made based on the history, clinical examination, and radiographic assessment whenever needed using lead shields. A questionnaire regarding the variables of the study, i.e., the cause of referral delay, the offending teeth, space involved, and trimester at the time of presentation, was designed. Patients with dehydration, extreme mouth opening limitation, fever, and dysphagia were hospitalized and managed under local anesthesia; the causative tooth was extracted, followed by incision and drainage. A corrugated rubber drain was inserted and secured and then removed once stoppage of the pus drainage was noticed. Patients were given intravenous antibiotics and fluids during their stay at the hospital.

Fig. 1 A clinical picture of a patient who has developed necrotizing fasciitis

Results

A total of ten patients were included in this study; the age range was from 18 to 35 years with a mean age of 26.5 years SD ± 6.3. Six females (60%) presented with odontogenic infections in the third trimester, and the remaining were in their second trimester. The most commonly involved tooth was the lower mandibular third molar (50%), followed by the lower first molar (40%) and the lower canine (10%). The most frequent space involved was the submandibular space (70%). One patient with submental space (10%) and two other patients (20%) were reported as having Ludwig's angina and then progressed to necrotizing fasciitis (Fig. 1). Antibiotics were prescribed to the patients before they presented to the hospital (50% by a physician and 50% by a pharmacist). Only two patients didn't take an antibiotic. Regarding the cause of the delay, 50% didn't seek any treatment because of misconception among women in the community, 40% because of their doctors, and 10% because of their dentist.

All of these patients presented clinically with facial swelling, tenderness on palpation extraorally, and pus discharge on aspiration of the involved space, and the offending teeth were tender to percussion. All patients had systemic signs of infection, including fever, dehydration, and lethargy. Patients were admitted to the hospital, and the offended tooth was extracted, followed by incision and drainage. The corrugated drain was placed and secured. Intravenous fluids and antibiotics were given, and daily

Table 1 Summary of patients' data

No.	Age	Trimester	Tooth involved	Space involved	Admission duration	Condition on discharge
1	19	Third	Tooth no. 33	Submental space	7 days	Stable
2	34	Third	Tooth no. 38	Ludwig angina + necrotizing fasciitis	10 days	Delivery
3	22	Third	Tooth no. 48	Submandibular space	22 days	Developed fasciitis discharged with defect
4	31	Second	Tooth no. 46	Submandibular space	3 days	Stable
5	24	Second	Tooth no. 38	Submandibular space	1 day	Stable
6	35	Third	Tooth no. 46	Ludwig angina + necrotizing fasciitis	15 days	Developed fasciitis discharged with defect
7	24	Third	Tooth no. 38	Submandibular space	2 days	Stable
8	27	Third	Tooth no. 46	Submandibular space	1 day	Stable
9	17	Second	Tooth no. 38	Submandibular space	1 day	Stable
10	32	Second	Tooth no. 36	Submandibular space	1 day	Stable

dressing followed until no discharge was observed. Patients were discharged on oral antibiotics and put on follow-up care until they made a full recovery. Regarding the two patients with necrotizing fasciitis, triple antibiotics were started once the diagnosis was confirmed clinically, and then, patients discharged with small defects left for secondary intention. One patient was referred for baby delivery, and the dressing was continued after that until full recovery (Table 1).

Discussion

In pregnancy, major physiologic, anatomic, and hormonal changes occurred. These included changes in the cardiovascular, respiratory, and gastrointestinal systems, as well as changes in the oral cavity and increased susceptibility to an oral infection [6]. In the USA, there is an estimation of 50,000 women/year who undergo anesthesia and surgical intervention for indications unrelated to pregnancy [7, 8]. Odontogenic infections can lead to serious complications if not treated early, including upper airway obstruction, descending mediastinitis, septic shock, acute renal failure, disseminated intravascular coagulation, jugular vein thrombosis, carotid artery pseudoaneurysm, and pericardial effusion [9].

The treatment plan for pregnant women with odontogenic infections should maximize the benefit to the mother and minimize the risk to the developing fetus. Additionally, consultation should be sought before caring for patients who have been identified by the obstetrician as being at risk for pregnancy complications [5] such as pregnancy-induced hypertension, gestational diabetes and the threat of spontaneous abortion, and a history of premature labor [6]. Dental treatment is recommended during the second trimester so as to reduce any risk to the early development of the fetus and for the woman's comfort. However, it is considered safe and effective throughout pregnancy [10]. Antibiotics that are acceptable include penicillin, amoxicillin, and clindamycin. Tetracycline should be avoided since permanent discoloration of the primary and temporary dentition of the unborn child tends to arise from its use [11].

Facial spaces are potential spaces divided as primary and secondary by direct and indirect involvement from the original focus [5]. In a study by Rega et al. [12], the prevalence of odontogenic infection involving primary fascial spaces in descending order was submandibular (28.2%), submental (14.8%), buccal (12%), and sublingual (11.3%). In the present study, the most commonly involved space among pregnant patients was the submandibular space (70%) followed by the submental space (10%), and Ludwig's angina was reported in two patients (20%). More than a single fascial space involvement is commonly seen in patients with odontogenic infections. This spread may be due to delay on behalf of the patient to seek dental care. The periapical infection does not remain localized within the jaw bones; it may perforate the cortical bone and involved primary facial spaces, which may spread to the secondary spaces and present clinically as swelling and pus discharge [13]. In the present study, 50% of the patients were presented with lower wisdom tooth-related infection, followed by 40% and 10% for the lower first molar and lower canine, respectively.

Pregnancy-related hormonal changes affect the human body; they also have some effects on the oral cavity, particularly gingival tissues, as pregnant women have gingivitis even with routine oral care. These changes are aggravated

during the second and last trimester of pregnancy [14]. As in the present study, patients with an increased number of odontogenic infections were in the third trimester (60%) and second trimester (40%). None of the patients were in the first trimester. Some obstetricians and dentists hesitate to give pregnant women dental treatment for fear of putting the fetus or the mother at risk. Prenatal dental care should be stimulated as a public health measure, aiming at the integrated action of medical and dental teams. In this study, patients had experienced toothaches many months before but didn't seek any treatment because of misconceptions among women regarding dental treatment during pregnancy (50%). The remaining patients were delayed because of instructions from their doctors (40%) and dentists (10%) to postpone it until after delivery.

Pregnant patients with oral and maxillofacial infections should be aggressively treated to avoid drastic complications. Those patients are not medically compromised, and dental treatment should not be withheld because of their condition. Dental problems should be recognized earlier, before they lead to grave outcomes. As obstetricians see pregnant women earlier, their advice and attitudes toward dental treatment play a critical role in emphasizing the importance of oral health. Communication between dentists and prenatal care providers should address the myths and misconceptions many women have about oral health during pregnancy and increase awareness among obstetricians that oral health needs particular attention during pregnancy.

Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interests.

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