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Case Report
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Brain Abscess in Pregnancy as a Result of Dental Caries with Sinusitis

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Abstract

Introduction: Brain abscesses are extremely rare, potentially life-threatening events that require immediate neurosurgical evaluation. Less than 10% of brain abscesses have been attributed to be from dental infection. We describe a case of a pregnant women with twins who developed a brain abscess as a result of sinusitis due to dental caries, masked by a diagnosis of preeclampsia.

Case: 21-year-old gravida 2 para 1 at 36 weeks and 3 days with dichorionic diamniotic twins presented to labor and delivery triage with a severe headache, nausea and vomiting, diagnosed with preeclampsia with severe features and recommended to undergo delivery. Prior to delivery the patient developed altered mental status with expressive aphasia, as well as a fixed and dilated left pupil. Computed tomography revealed 6 mm left-sided holo-hemispheric subdural fluid collection with mass effect, brain edema, and midline shift. She underwent emergent craniotomy with neurosurgery with intraoperative findings consistent with subdural empyema. After further workup, the intracranial empyema was thought secondary to bacterial sinusitis, originating from persistent dental caries.

Conclusion: Dental care in pregnancy is an important, yet commonly unaddressed topic at prenatal care visits. While there are many complications that can result from poor dental hygiene, including dental caries, gingivitis and preterm delivery, brain abscess is among the most severe. This case illustrates the importance of addressing good nutrition as well as oral hygiene habits at prenatal visits and throughout pregnancy.

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Introduction

Brain abscesses are extremely rare, potentially life-threatening events, with an incidence of approximately one per 100,000 populations [1]. Less than 10% of brain abscesses reported in the general population have been attributed to be from dental infections [1]. Few cases of brain abscesses in pregnancy have been reported in the literature [1]. We describe a case of a pregnant woman with twins who developed a brain abscess as a result of sinusitis due to dental caries, masked by a diagnosis of preeclampsia. This case highlights the importance of addressing dental care at prenatal visits.

Case Presentation

A 21-year-old gravida 2 para 1 at 36 weeks and 3 days with dichorionic diamniotic twins presented to labor and delivery triage with a severe headache that was associated with nausea, vomiting and diarrhea for 2 days. She denied fever, abdominal pain or labor symptoms. The patient had been diagnosed as having gestational hypertension earlier in gestation due to mild range blood pressures without proteinuria after 20 weeks gestation. Three weeks prior to this presentation, she was diagnosed and treated for sinusitis with a 7-day course of Augment in. She had relayed history of intermittent headaches over this three-week time period, which had resolved spontaneously. There was a past history of migraines, but the patient was otherwise healthy entering the pregnancy.

On labor and delivery presentation, vital signs were blood pressure of 139/78, heart rate 83, temperature 96.3 Fahrenheit, and BMI was 34. She appeared ill, remaining in the fetal position on her bed. Neurologic exam was non-focal and her cardiorespiratory and abdominal exams were normal. A head and neck exam was not documented. Fetal heart rate tracings were both category I, with intermittent painful contractions. Her cervical exam at this point was 4-5/90/-2. Laboratory evaluation revealed normal liver function tests, hemoglobin and platelets. Her white blood cell count was 16.2, but a differential was not sent. Her urine protein to creatinine ratio was 0.32. A diagnosis of preeclampsia with severe features was made based on a previous diagnosis of gestational

Table 1: Reported cases of brain abscess in pregnancy arising from sinus or odontogenic origin.

Author	Gestational age	Predisposing factor	Organism	Antibiotics used	Surgery	Maternal outcome
Wax et al. [11]	36 wks	Sinusitis	Unknown	Cefepime, vancomycin, metronidazole	None	Full recovery
Hobson et al. [12]	19 wks	Infected tooth, left pterygoid abscess	*Bacteroides fragilis, Campylobacter gracilis, Prevotella*	Ampicillin, cefotaxime, metronidazole	Abcess I/D, multiple lobectomies	Broca's aphasia, apraxia, right hemiplegia
Jendoubi et al [2]	32 wks	None	Unknown	Cefotaxime, metronidazole, fosfomycin	Stereotactic abscess drainage	Seizure, homonymous hemianopia
Liu et al [13]	37 wks	Sinusitis	*Beta hemolytic streptococcus*	Chloramphenicol, metronidazole, gentamicin, penicillin, cefotaxime	Drainage of par nasal sinusitis and brain abscess	Hydrocephalus, seizure, left hemiparesis
Kim et al [14]	34 wks	Sinusitis, pituitary abscess	*Streptococcus Viridans*	Ceftriaxone, amikacin	Transphenoidal drainage	Full recovery
Our case	36 wks	Dental caries, sinusitis	*Streptococcus Intermedius*	Ceftriaxone, ampicillin, metronidazole	Emergent craniotomy, dental extraction and sinus clean out	Minor facial palsy, right pronator drift, right homonymous hemianopsia

hypertension with proteinuria and a severe headache. Magnesium sulfate was started for seizure prophylaxis and delivery was recommended. As the twins were cephalic/cephalic, it was deemed reasonable to attempt vaginal delivery with induction of labor and with patient consent. Induction was initiated with Pitocin given her favorable bishop score and she received an early epidural. There were no severe range blood pressures requiring antihypertensive therapy.

Four hours after the induction was begun, the patient developed altered mental status with lethargy, confusion and expressive aphasia. The remainder of her neurological exam at that point was non-focal. Blood pressures continued to be in the normal to mild range. Fetal heart rate tracings were category I. The working diagnosis at that time was worsening preeclampsia with subsequent cerebral edema. Due to the acute change in neurological status thought from preeclampsia, remote from delivery as her cervical exam was 6/100/-2, cesarean section was recommended. Maternal Fetal Medicine and Neurology were consulted, with head CT scan planned immediately postoperatively. The cesarean section was uncomplicated and performed with epidural anesthesia. Twins were delivered with Apgar scores of 8/9/9 and 9/9/9. Arterial cord gases were both normal. Estimated blood loss was 900 cc.

Postoperatively, she continued to have expressive aphasia along with a new finding of a fixed and dilated left pupil. She developed severe hypertension, requiring multiple IV anti hypertensives. CT scan showed a 6 mm left-sided holo-hemispheric subdural fluid collection with mass effect, brain edema, and a midline shift (Figure 1). Neurosurgery was consulted and recommended emergent craniotomy, with the working diagnosis of subdural hematoma likely due to severe preeclampsia. She was intubated in the neuro ICU and then taken to the OR.

Intraoperative findings from the craniotomy included a subdural empyema rather than a hemorrhage. The empyema was evacuated and a drain was placed. She was extubated in the neuro ICU on postoperative day three. She initially had right hemiparesis, aphasia and fluctuation in mental status. Subsequent CT scans revealed multifocal ischemic strokes (thought to be from mass effect of the empyema). The empyema was then treated medically with IV ceftriaxone, vancomycin, and metronidazole.

Further postoperative workup to identify the source of the empyema was remarkable for sinusitis and dental caries. She had consultation from Infectious Disease, ENT and Dentistry. She underwent a nasal endoscopy by ENT and was found to have purulent fluid in the left sinus, and subsequently underwent a left sinus clean

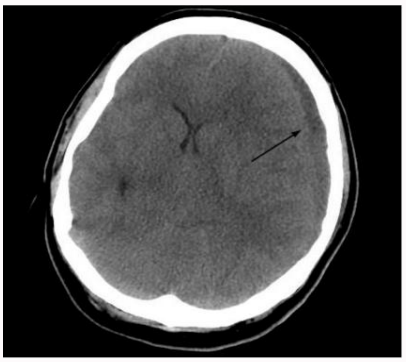

Figure 1: Coronal image of CT head without contrast. Arrow demonstrating 6 mm left hemispheric subdural collection resulting in subfalcine herniation and left-to-right midline.

out. Dental was consulted and found gross caries on teeth #2 and #14, the latter of which demonstrated periapical radiolucency on imaging. This tooth was thought to be the potential source of sinus infection and was extracted. It was noted to have a communication with the maxillary sinus on the left. In retrospect, the patient had not received dental care for years and had been complaining of tooth pain over the past several months per her husband's report. Bacterial culture growing from both the subdural empyema and sinuses showed *Streptococcus Intermedius*. On postoperative day 4, antibiotics were transitioned to IV ceftriaxone, ampicillin and flagyl based on cultures and susceptibilities. These antibiotics were continued for 6 weeks. After proven stable, she was discharged to sub-acute rehabilitation on postoperative day 12. Over the next couple months of intensive therapy, she regained nearly all of her normal functions. She regained a normal mental status. Persistent deficits as of 4 months post-op are minor facial weakness, right pronator drift and right homonymous hemianopsia.

Discussion

The most common complications from lack of dental care in pregnancy include dental caries, gingivitis and preterm delivery, however one of the worst complications resulting from unaddressed odontogenic infections are brain abscesses [1]. Using Pubmed and MESH terms "Brain abscess", "pregnancy" less than fifteen case reports regarding brain abscess in pregnancy were reported in the literature and of those five were found to arise from sinus or odontogenic sources (Table 1).

Brain abscesses are life-threatening infections that require

immediate neurosurgical attention. A recent systematic review of case studies involving brain abscesses from oral sources found that caries with periapical involvement and periodontitis were the two most common intra-oral sources, with *Streptococcus viridans* (especially anginosus group), *Actinomyces, peptostreptococcus, Prevotella, Fusobacterium Aggregatibacter Actinomycetemcomitans* and *Eikenella corrodens* among the most common microorganisms isolated [2]. *Streptococcus Intermedius* is a bacterium that colonizes various mucosal sites. It is frequently involved in invasive supurative infections including liver and brain abscess and dentoalveolar infections [3]. The most common clinical manifestations of a brain abscess are headache and fever [4]. These symptoms can be subtle, vague and last from days to weeks. As the abscess grows larger, the symptoms become more predominant and dramatic and can lead to altered consciousness, seizures and localized neurological signs [4]. Once diagnosed with imaging, immediate management is imperative to decrease morbidity and mortality and almost always includes neurosurgical intervention through craniotomy combined with long term intravenous antibiotics. When immediately identified as having a brain abscess with subsequent intervention, 70% of patients have minimal or no neurologic sequelae [4].

Dental care in pregnancy is an important, yet commonly unaddressed topic at prenatal care visits. According to the ACOG committee opinion on dental care in pregnancy, approximately 80% of obstetric providers did not use oral health screening questions in their prenatal visits and 94% did not routinely refer all patients to a dentist [4]. Diseases such as dental caries, gingivitis and adult periodontitis are extremely common in the general female population, both pregnant and not pregnant, and have been associated with poor pregnancy outcomes [7]. These diseases are largely preventative. However, due to various socioeconomic and ethnic barriers, many women are unable or do not know how to access dental care in America. The barrier to care has become so extreme that in 2000, the Surgeon General's report *Oral Health in America* stated that "a silent epidemic of oral diseases is affecting the most vulnerable citizens" [8]. Among these include minorities and those with low family income or low education level. In 2001, using PRAMS data, it was found that reports of dental care use during pregnancy ranged from 22.7 to 34.7 percent [9]. In three states, 12.2 percent to 25.4 percent of respondents reported having a dental problem of which 44.7 percent to 54.9 percent went for care, most commonly citing insurance issues and late prenatal care entry as reasons for lack of access [9]. Additionally, many health care providers in the oral health care field are not comfortable caring for pregnant patients which creates an additional barrier for this at risk population [10].

In 2013, the American College of Obstetricians and Gynecologists recommended in a committee opinion that pregnancy is a teachable moment in regards to preventative care and that health care providers should take the opportunity to help these women obtain and maintain proper dental care both during and after pregnancy [5]. According to the National consensus statement regarding oral health care in pregnancy, every provider should take an oral health history; do a thorough physical exam of the oral cavity and document findings in the woman's medical record. There should be counseling regarding the safety of oral health care during pregnancy, and referrals to dentists who maintain relationships with prenatal care health professionals should be provided. Women should have dental visits every six months with routine X-rays. Pregnant women should practice oral hygiene which includes brushing teeth with fluoridated toothpaste twice a day, replacing their toothbrush every 3-4 months and cleaning between teeth daily with floss [10-14]. Good nutrition should also be addressed at prenatal visits and throughout pregnancy.

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