

## Severe odontogenic infection in pregnancy: a timely reminder

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### ABSTRACT

Dental practitioners often treat patients that are pregnant. Understanding the altered physiology in the pregnant patient, especially changes in immune function, is vital in effective management of orofacial infections. We present a case of rapidly spreading odontogenic infection in a pregnant patient requiring surgical management. We also discuss the physiological changes of pregnancy relevant to dentistry, and the principles of managing such infections in the gravid patient.

**Keywords:** Infection, management, odontogenic infection, pregnancy, surgery.

**Abbreviations and acronyms:** CT = computed tomography; SOI = severe odontogenic infections.

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### INTRODUCTION

Pregnancy has been shown to be associated with compromised oral health, but the implications of severe odontogenic infections (SOI) in pregnancy are poorly understood. Health practitioners may be reluctant to treat orofacial infections aggressively in pregnancy due to the potential risks of imaging modalities and medications such as antibiotics.<sup>1</sup> Severe infections during pregnancy can be life-threatening for both the mother and the foetus.<sup>2</sup> The risk of morbidity to the mother and foetus with progressing odontogenic infection therefore needs to be weighed up against the potential risks associated with dental or surgical treatment. Health care providers should appreciate the implications of severe odontogenic infections in pregnancy, and be able to manage them appropriately in a multidisciplinary team. We discuss management of odontogenic infections in pregnancy, and present a case of a pregnant patient who underwent successful surgical management of a spreading odontogenic infection.

### CASE REPORT

A 29 year old female who was 17 weeks pregnant presented to her local dentist with 2 days of left submandibular pain. She was otherwise healthy. The patient was prescribed analgesia and antibiotics

(amoxicillin) and told to return for extraction of the offending teeth in 1 week. Three days later, she presented to the local General Hospital Emergency Department with worsening pain and submandibular swelling.

On presentation she was afebrile and haemodynamically stable, but had significant left submandibular swelling which was fluctuant, warm and tender. The swelling extended to the right submandibular space and down the neck. Her white cell count was elevated at  $14.8 \times 10^9/L$  and C-reactive protein was 120 mg/L. She had developed trismus to 8 mm inter-incisal (Fig. 1), and complained of pain on swallowing.

The patient was assessed as having a spreading odontogenic infection associated with impending airway compromise. The case was discussed with anaesthetists and general surgeons at the hospital. Oral and maxillofacial surgical specialists were not available at this centre and therefore the patient was also discussed with a medical retrieval team, and a transfer was arranged to a tertiary hospital with oral and maxillofacial surgery and intensive care specialties.

The patient was administered prompt i.v. benzylpenicillin and metronidazole, and was intubated via an awake fibre optic intubation, as she was not deemed stable for long-distance transfer. She was transferred to the aforementioned tertiary hospital and underwent incision and drainage of the abscess, exploration of neighbouring fascial spaces, and



**Fig. 1** Clinical photograph of patient showing limited mouth opening and significant submandibular swelling, predominantly on the left but crossing the midline.

removal of the lower left third molar (38) which was grossly decayed. She remained on i.v. antibiotics and was extubated after a further 72 h when her swelling had subsided.

The patient was reviewed by the obstetrics and gynaecology team throughout her admission, and there was no measured insult to the foetus.

## DISCUSSION

A careful consideration of risks and benefits of any treatment modality is vital when determining best management in patients with SOI. There seems to be a tendency to underutilize antibiotics and imaging modalities in the setting of pregnancy because of fears

of the potential harm to the foetus.<sup>1</sup> However, it would be prudent to also remember the serious nature of these infections, and the risk of loss of life of either the mother or the foetus.

The submandibular space is the most common location of odontogenic abscesses.<sup>3</sup> There is extension of the infection to adjacent fascial spaces in 61.2% of cases.<sup>3</sup> Without adequate treatment, the infection can spread along fascial planes caudally to the cranial base and in a rostral direction to the mediastinum.

Pregnancy is associated with many changes to haemodynamics and the immune system.<sup>4,5</sup> Some of the changes relevant to patients with odontogenic infections are outlined in Table 1.

There are also intraoral changes in pregnancy which may increase the patient's risk of developing odontogenic infections.<sup>6,7</sup> These are outlined in Table 2.

Of course, prevention is ideal and, where possible, patients considering pregnancy should be assessed by their dentist and have any appropriate treatment before starting their pregnancy. They should also be reviewed during their pregnancy to ensure they remain dentally fit. However, realistically this is not always possible, and therefore the dental or medical practitioner needs to be able to manage odontogenic infections in the setting of pregnancy. Elective dental treatment is best done in the second trimester, whereas emergency dental treatment can be provided in any trimester, as the risk of harm to the foetus from stress of dental treatment is less than the risk of harm from a progressing infection.<sup>8</sup>

Antibiotics often used in the setting of odontogenic infections are penicillin, amoxicillin and cephalosporins. None of these are associated with risk to the developing foetus<sup>9</sup> and therefore can and should be used without delay in cases with odontogenic infection pregnant patients. Metronidazole has also been

**Table 1. Changes relevant to patients with odontogenic infections**

Change	Mechanism	Implication
Increased cardiac output	<ul style="list-style-type: none"> <li>Increased stroke volume</li> </ul>	<ul style="list-style-type: none"> <li>May be able to maintain end organ perfusion until later stages of septic shock</li> </ul>
Decreased blood pressure	<ul style="list-style-type: none"> <li>Increased heart rate in third trimester</li> <li>Decreased total peripheral vascular resistance</li> </ul>	<ul style="list-style-type: none"> <li>Decreased ability to compensate for sepsis related hypotension</li> </ul>
Increased gastric reflux	<ul style="list-style-type: none"> <li>Patient should be kept in left lateral position to prevent inferior vena cava compression</li> <li>Gastric compression from gravid uterus</li> <li>Decreased gastric motility</li> <li>Relaxation of the lower oesophageal sphincter</li> </ul>	<ul style="list-style-type: none"> <li>Increased intraoral acidity with potential of bacterial shift to more acidophilic, cariogenic flora</li> <li>Increased risk of aspiration at general anaesthetic induction</li> </ul>
Relevant anaemia and leucopenia	<ul style="list-style-type: none"> <li>Decreased ability to fight infections</li> <li>Increased erythrocyte and leucocyte counts, but physiological anaemia/leucopenia due to increased plasma volume</li> </ul>	
Shift of leucocytes	<ul style="list-style-type: none"> <li>Increased monocytes and regulatory T cells</li> <li>Decreased CD4<sup>+</sup> and CD8<sup>+</sup> T cells, B cells</li> </ul>	<ul style="list-style-type: none"> <li>Increased risk of severity to some infections in third trimester</li> </ul>
Hypercoagulable state	<ul style="list-style-type: none"> <li>Decreased production of anticoagulant factors</li> <li>Increased production of clotting factors</li> </ul>	<ul style="list-style-type: none"> <li>Increased emphasis of deep venous thrombosis prophylaxis</li> </ul>

**Table 2. Intraoral changes in pregnancy which may increase the patient's risk of developing odontogenic infections**

Change	Mechanism
Pregnancy gingivitis	<ul style="list-style-type: none"> <li>• Increased blood flow to oral mucosa</li> <li>• Altered immune function as per Table 1</li> </ul>
Increased risk of periodontal disease	<ul style="list-style-type: none"> <li>• Altered immune function as per Table 1</li> <li>• Increased risk in setting of gestational diabetes</li> </ul>

shown to be safe in pregnancy (category B2).<sup>10</sup> Similarly, local anaesthetic agents such as lignocaine and articaine have not shown to be harmful in pregnancy, and therefore timely management of periodontal disease or decay is safe under local anaesthesia during pregnancy.<sup>11</sup> Therefore, delaying dental treatment until after the baby is born (or until after breast-feeding) increases the risk of progression of severe odontogenic infections, and is not warranted.

Radiology was not obtained in this case, due to the patient's pregnancy. Although normally head and neck computed tomography (CT) would help to ascertain which fascial spaces were involved, in this case the diagnosis was made on clinical grounds alone to avoid radiation to the developing foetus. Not obtaining imaging preoperatively risks missing surgical exploration of infected fascial spaces, especially deeper spaces such as the retropharyngeal space and the potential space between the alar fascia and the prevertebral fascia (the danger space). Spreading infections involving the danger space are especially ominous as this space extends from the base of the skull to the thoracic cavity, allowing rapid spread of infection. The decision to not obtain any imaging in pregnant patients with severe odontogenic infections should not be taken lightly, and needs an extensive risk-benefit analysis and discussion with a consultant oral and maxillofacial surgeon.

Radiation of the head and neck is associated with minimal radiation to the developing foetus.<sup>12</sup> Even with direct radiation to the foetus, doses of less than 50 mGy are associated with negligible risk when compared with other risks of pregnancy.<sup>12</sup> As always, imaging should only be obtained if it is likely to change the clinical management of the patient. Plain radiographs of the head and neck are safe in pregnancy. CT imaging of the head and neck is also safe in pregnancy, but should only be obtained if plain radiographs fail to yield the desired clinical information.

The definitive management of odontogenic abscesses is surgical exploration and drainage.<sup>13,14</sup>

In the setting of pregnancy this does not change, and early and aggressive surgical management is likely to be less harmful than prolonged i.v. antibiotics, which is more commonly associated with progression of disease to sepsis and multi-organ dysfunction syndrome, compromising both the patient and her baby.<sup>2</sup> Effective management of pregnant patients with a spreading odontogenic infection requires a multidisciplinary team including oral and maxillofacial surgeons, anaesthetists and obstetricians.

## CONCLUSIONS

The combination of altered immune function in pregnancy, as well as the reluctance of health practitioners to treat odontogenic infections in pregnancy, means that these patients are at exceedingly high risk of developing severe odontogenic infections. These infections can be life-threatening for both the mother and her baby. This case serves as a timely reminder for all health practitioners to have a low threshold for diagnosis of odontogenic infections in pregnancy, and to refer these patients for timely and appropriate management by a multidisciplinary team.

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