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3 **Management of difficult airway in a pregnant patient with**
4 **severely reduced mouth opening**

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6 **Faisal Shamim¹, Aly Bahadur², Dinaz Gandhi³, Anum Aijaz⁴**

7 **1** Department of Anaesthesiology, Aga Khan University, Karachi, Pakistan; **2** Department of
8 Anaesthetics, Letterkenny University Hospital, Ireland; **3,4** Department of Surgery, Aga
9 Khan University, Karachi, Pakistan

10 **Correspondence:** Faisal Shamim. **Email:** faisal.shamim@aku.edu

11
12 **Abstract**

13 Pregnancy is associated with a wide variety of oral and dental changes ranging
14 from gingivitis to odontogenic infections. If left untreated, severe dental abscess
15 can progress to Ludwig's angina, which is a potentially lethal cellulitis that
16 rapidly extends to the neck region and may lead to life-threatening upper airway
17 obstruction. We report the case of a pregnant woman who presented with
18 intense throbbing pain, trismus and severely reduced mouth opening due to
19 dental abscess for the last one week. She required incision and drainage of
20 abscess with extraction of third molar under general anaesthesia. There are
21 some significant challenges to anaesthesiologist like the risk of aspiration and
22 failed intubation in patients with pregnancy and anticipated difficult airway.
23 With counselling and proper preparation, we were able to manage this case with
24 awake intubation. The potential merits of securing airway in conscious state
25 with necessary steps in preparation are particularly discussed with emphasis of
26 creating awareness among local healthcare practitioners.

27 **Keywords:** Dental Abscess, Ludwig's Angina, Pregnancy, Awake Fibre optic
28 Intubation, Incision and Drainage.

29 **Introduction**

30 There are marked oral changes during pregnancy with 70% of women having
31 gingivitis and an increase in periodontal disease including gingival bleeding,
32 hyperplasia and pregnancy epulis.¹ The mandibular third molar is one of the
33 most common sources of odontogenic infections that can spread into
34 submandibular, sublingual and submental spaces.¹ Severe dental abscess is
35 usually manifested by an intense, throbbing pain that may start suddenly and
36 spread to ear, jaw and neck on the same side. It is also accompanied by redness
37 and swelling on the face along with trismus, resulting in limited mouth opening.
38 If left untreated, it can progress to Ludwig's angina, which is a rapidly
39 spreading cellulitis and can produce life-threatening upper airway obstruction
40 with septicaemia often leading to death.² In severe forms of odontogenic
41 infections, it requires surgical drainage under general anaesthesia. Associated
42 pregnancy makes airway management and choice of anaesthesia further
43 difficult.

44

45 **Case Report**

46 A 40-year-old lady who was 26 weeks pregnant, weighing 78 kg, presented to
47 dental and maxillofacial clinic at Aga Khan University Hospital, Karachi on 04th
48 May 2018 with one-week history of toothache on the left lower side along with
49 moderate facial swelling, fever and reduced mouth opening. On examination,
50 there was diffuse tender swelling involving the left mid face, angle of mandible
51 and submandibular region with mild skin redness (Figure 1a). The maxillofacial
52 surgeon diagnosed it as severe dental abscess with impending Ludwig's angina
53 and planned incision and drainage procedure under general anaesthesia for
54 which the patient was referred to the anaesthesiologist.

55 On the day of surgery (05th May 2018), the preoperative assessment reveal that
56 she had restricted mouth opening with inter-incisor distance of 1cm, modified
57 Mallampati class IV and unable to protrude her tongue (Figure 1b). The

58 consultant anaesthesiologist had a detailed conversation with the patient and the
59 surgeon regarding the choice of anaesthesia, benefits of intubation in conscious
60 state, complications in the event of failed airway and anaesthetic and procedural
61 risk on preterm delivery. The patient was explained all the steps in preparation
62 and procedure for nasal fibre optic intubation (FOI). An informed consent was
63 obtained and she also kindly agreed to photographs being taken for the purpose
64 of scientific publication. The obstetrician also saw her before the procedure and
65 an ultrasound was advised. It showed single alive intrauterine pregnancy
66 corresponding to 25 weeks and five days with foetal heart rate of 140/min and
67 there were no uterine contractions.

68 She was given premedication with intravenous Ranitidine 50 mg, intravenous
69 Metoclopramide 10 mg and Sodium citrate. Standard monitoring was applied in
70 preoperative holding area and injection Glycopyrrolate 0.2 mg IV was given.
71 Fifteen minutes later, Xylometazoline 1:1000 nasal vasoconstrictor two sprays
72 were instilled in both nostrils. A safe dose of Lignocaine for topical anaesthesia
73 of airway was calculated with 5 mg/kg. Nebulisation with 3ml Lignocaine 4%
74 was done in the operating room. Further topicalization was achieved with 2ml
75 Lignocaine 4% via mucosal atomisation device. During all these steps, the
76 patient was continuously observed through standard ASA monitoring (NIBP,
77 ECG, Pulse oximetry).

78 For prevention of hypoxaemia during FOI, nasal prongs were applied with
79 oxygen 4-5 litres/min. The operating table was kept in head-up (30°) position
80 and the patient was approached from the front. The Karl Storz fibre optic
81 bronchoscope (FOB) with C-Mac system (Karl Storz, Tuttlingen, Germany) was
82 introduced from the right nostril, into the lower nasal meatus, identifying nasal
83 septum and floor of the mouth and passed through the nasopharynx. It was
84 further advanced into the laryngeal opening and 1ml Lignocaine 4% was
85 sprayed through the working channel of FOB. As the scope passed into the
86 glottic opening and subglottic space, another 1ml Lignocaine 4% was sprayed.

87 After carina was visualised, size 7.0 mm cuffed reinforced endotracheal tube
88 was railroaded over the scope. Then, the FOB was slowly brought out while
89 ETT tip was seen and ensured its position 3-4 cm above the carina. After
90 securing the airway and observing the end tidal CO₂, anaesthesia was induced
91 via injection Propofol and Atracurium was given for muscle paralysis.
92 Morphine and Paracetamol were used for analgesia. The patient remained
93 haemodynamically stable. Even after general anaesthesia, the mouth opening
94 did not improve and the surgical team struggled in accessing the involved tooth
95 (Figure 2). Incision and drainage of abscess, along with the infected lower left
96 third molar, was removed and purulent material was extracted and sent for
97 culture and sensitivity. Corrugate drain was placed at the site of abscess. The
98 procedure lasted for about 30-45 minutes. At the end of the procedure,
99 combination of Neostigmine 2.5mg and Glycopyrrolate 0.5mg was used and the
100 patient was extubated and shifted to the post anaesthesia care unit (PACU).
101 Cardiotocography (CTG) was performed in PACU, which confirmed the foetal
102 cardiac activity and absence of uterine activity.

103

104 **Discussion**

105 Pregnancy has been associated with compromised oral health, and there is an
106 overall increase in the incidence of orofacial infections in this state.¹ Severe
107 infections during pregnancy can be life-threatening for both the mother and the
108 foetus. Health practitioners may be reluctant to treat odontogenic infections
109 aggressively in pregnancy due to the potential risks of imaging modalities and
110 medications such as antibiotics.³ Without adequate treatment, infection can
111 spread along fascial planes caudally to cranial base and in a rostral direction to
112 the mediastinum. The definitive management of odontogenic abscesses is
113 surgical exploration and drainage. This does not change during pregnancy, and
114 early and aggressive surgical management is likely to be less harmful than
115 prolonged intravenous antibiotics, which is more commonly associated with

116 progression of disease to sepsis and multi-organ dysfunction syndrome,
117 compromising both the patient and her baby.

118 Pregnancy, with its anatomic and physiological changes, is expected to make
119 the airway management further difficult in these cases.⁴ Because of this
120 difficulty, similar cases have been reported where incision and drainage
121 procedure in pregnant woman have been performed under local anaesthesia.
122 They reported that local anaesthetic drugs relieved the pain, trismus and
123 permitted a thorough incision and drainage.⁵ But in clinical setting, element of
124 discomfort, anxiety and mild pain always persists, complicating the procedure,
125 while sometimes it is almost impossible for the surgeons to proceed with such
126 procedures under local anaesthesia mostly due to the extent and location of the
127 abscess and limited mouth opening. Furthermore, laryngospasm leading to
128 asphyxia and death have been reported following incision and drainage under
129 local anaesthesia.⁶ But in our case, the incision drainage of dental abscess could
130 not be performed under local anaesthesia because of difficult surgical access
131 and restricted mouth opening.

132 In such circumstances where this procedure under LA is not an option, general
133 anaesthesia would be required. However, in pregnant patients with anticipated
134 difficult airway, intubation after putting the patient to sleep with anaesthetics
135 poses a threat not only for aspiration but also for hypoxia due to failed
136 intubation.⁷ Our patient also posed difficulty in supraglottic airway placement.
137 Therefore, the safer option would be to secure airway while the patient is still
138 awake. Our decision to perform awake intubation has been validated by the fact
139 that even after giving general anaesthesia and muscle relaxant, the restricted
140 mouth opening could not improve and a lot of effort was required by the
141 maxillofacial surgeon to access the third molar that was causing the problem
142 (Figure 4). One of the pivotal findings in the UK-based national audit project
143 (NAP) 4 was failure to consider awake fibre optic intubation as the primary
144 airway technique and led to direct harm in a number of patients.⁸ When the

145 patient is conscious, airway is better preserved due to adequate muscle tone in
146 upper airway structures. Awake nasotracheal fibre optic intubation has been
147 safely performed in pregnant women keeping the following considerations in
148 mind: 1) Possibility of nasal engorgement and bleeding may occur more in
149 pregnant woman; 2) they may be more sensitive due to reduced dose
150 requirements of LA drugs.⁹

151

152 **Conclusion**

153 Success and management in these cases require close communication and
154 collaboration between physicians and the patient.

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156 **Disclaimer:** This is to certify that the manuscript has been read and approved
157 by all the authors, the requirements for authorship have been met, and each
158 author believes that the manuscript represents honest work.

159 **Conflict of interest:** All authors have no conflict of interest

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Figure 1a: Extent of abscess involving midface and submandibular region

Figure 1b: Severely reduced mouth opening with 1 cm inter-incisor distance

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Figure 1: (a) Extent of abscess involving midface and submandibular region

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(b) Severely reduced mouth opening with 1 cm inter-incisor distance

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Figure 2: Reduced mouth opening persisted after giving general anaesthesia with muscle relaxation following awake intubation.

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