CASE REPORT

Spontaneous pneumothorax following caesarean section under spinal anaesthesia

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SUMMARY

It is unusual for pneumothorax to occur spontaneously during pregnancy. Its occurrence during or following caesarean section is extremely uncommon with only three other cases reported previously. In none of the reported cases, was the caesarean section performed under spinal anaesthesia. We report the successful management of a multigravida female patient, who developed spontaneous pneumothorax following caesarean section, performed under spinal anaesthesia. Tube thoracostomy was required for management and the patient had an uneventful recovery.

BACKGROUND

Although spontaneous pneumothorax occurs more commonly in young male patients, occurrence in women is not uncommon.¹ However, spontaneous pneumothorax during pregnancy or postpartum period is rare. On performing a search of the English medical literature, we found only three previously reported cases of spontaneous pneumothorax associated with caesarean section.²⁻³ In all the three cases the patients had received endotracheal intubation and mechanical ventilation for surgery. The present case highlights that pneumothorax should always be considered in the list of differential diagnosis while managing a patient with acute onset of respiratory distress during pregnancy or in the immediate postpartum period. In rare circumstances, pneumothorax may complicate the course of delivery performed by caesarean section even if the procedure is performed without the administration of general anaesthesia.

CASE PRESENTATION

A 32-year-old multigravida (third gravida) patient presented to the gynaecology emergency room at 36 weeks period of gestation with premature rupture of the membranes. Uterine contractions were present at the time of admission. The patient was a non-smoker. There was no history of fever, bronchial asthma, hyperemesis during the present pregnancy or history of drug abuse. There was no significant family history.

In view of fetal distress present during admission, an emergency lower segment caesarean section was performed under spinal anaesthesia. The immediate postoperative period was uneventful for the patient and a healthy baby was delivered without any perinatal complications.

On the second postoperative day, the patient developed sudden onset of dry cough, right-sided pleuritic chest pain and shortness of breath. There

was no associated haemoptysis or leg swelling. On general physical examination, the pulse rate was 120/min, respiratory rate was 33/min and blood pressure was 120/84 mm Hg. There was no *pulsus paradoxus* and the oxygen saturation while breathing room air was 93%. Clinical examination revealed absent breath sounds over the right hemithorax with a hyper resonant note on percussion. There were no audible murmurs or adventitious sounds on chest auscultation. A chest radiograph obtained subsequently demonstrated right-sided pneumothorax (figure 1, left panel).

High flow oxygen was administered by venturi mask and single-time needle aspiration of pneumothorax was performed from second intercostal space, which was followed by symptomatic improvement. The patient developed worsening of symptoms 2 h following aspiration and a repeat chest radiograph demonstrated a large right pneumothorax with near total collapse of the underlying lung (figure 1, right panel). Tube thoracostomy was performed on the right side. The procedure was followed by immediate improvement in respiratory distress and a chest radiograph obtained subsequently demonstrated complete expansion of the right lung (figure 2). The intercostal tube was removed 2 days later. The patient recovered well and was discharged on the seventh postoperative day. At the time of discharge, the patient was advised to return to the emergency room should any further breathlessness occur. At the time of follow-up 2 months postoperatively, the patient was asymptomatic and the chest radiograph was normal.

DISCUSSION

A number of conditions can present with acute or subacute onset of dyspnoea in the postpartum period, like venous thromboembolism, pulmonary oedema, amniotic fluid embolism, air embolism, acute exacerbation of asthma, pneumonia and pneumothorax.

During pregnancy, pneumothorax can occur during any trimester, parturition, immediately post-delivery or during/following caesarean section. The aetiology of most pneumothoraces occurring in pregnancy, like most spontaneous pneumothoraces in the population, is rupture of apical blebs or bullae. The possible proposed mechanisms which can increase the risk of bleb rupture during pregnancy include valsalva manoeuvre during spontaneous labour, increased minute ventilation of pregnancy and positive pressure ventilation during general anaesthesia.⁴ Reported risk factors for

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Figure 1 Left panel—chest radiograph showing right side pneumothorax prior to single time aspiration. Right panel—chest radiograph demonstrating increase in the size of pneumothorax following failed single time aspiration.

pneumothorax during pregnancy include underlying respiratory infection, bronchial asthma, hyperemesis gravidarum, prior history of pneumothorax, cocaine and ecstasy abuse, iatrogenic causes (insertion of central venous line) and endotracheal intubation with positive pressure ventilation.^{3 5}

Only three cases of pneumothorax have been reported following or during caesarean section.^{2 3} The details of those cases are summarised in table 1.

The proposed mechanisms for development of pneumothorax during caesarean section include presence of a clinically silent pneumothorax during antepartum period, which became manifest during general anaesthesia and positive pressure ventilation, presence of apical bullae, which ruptured during positive pressure ventilation, coexistent smoking and coexistent chest infection.^{2 3}

A case of spontaneous hemothorax following caesarean section has also been reported in which the authors had demonstrated pleura-peritoneal communications which allowed the drainage of blood into the pleural cavity from the peritoneum.⁶ In a similar way, we believe that presence of silent pleura-peritoneal communications can allow egress of air into the pleural cavity when the peritoneal cavity is opened to the atmosphere as during caesarean section. The same mechanism

might have operated in our case as our patient neither received general anaesthesia nor was there any clinico-radiological evidence of active chest infection. However, as the occurrence of pneumothorax in our patient was delayed, the likely operating mechanism might be spontaneous bleb rupture. This is the first reported case in which pneumothorax occurred following caesarean section performed under spinal anaesthesia.

Patients with pneumothorax during pregnancy are usually managed like primary spontaneous pneumothorax in non-pregnant population with initial treatment options being observation, single time aspiration or tube thoracostomy. It has been reported by some authors that as there is an increased risk of recurrence of pneumothorax during successive pregnancies, therefore a corrective surgical procedure (video-assisted thoracoscopic surgery) may be undertaken for the same following the first episode.⁴ However, there is no definite consensus regarding the same. Patients should be informed about the possible increased risk of pneumothorax recurrence during subsequent pregnancies. If there is recurrence of pneumothorax, then a surgical option should definitely be considered for the prevention of further recurrences.

The index case was managed with tube thoracostomy alone and planned for follow-up. Tube thoracostomy alone has been the most common modality of management of patients who developed pneumothorax during pregnancy.⁵

Spontaneous pneumothorax is usually not associated with significant physiological compromise unless tension pneumothorax develops. Pneumothorax occurring during pregnancy or intrapartum, however, can have serious physiological consequences for the mother and the fetus because of the physiological changes associated with pregnancy. Pregnancy is associated with a reduced functional residual capacity and increased oxygen consumption. In addition, disproportionate increases in oxygen consumption can occur during labour. The tolerance of the fetus to hypoxaemia is poor and the umbilical vein partial pressure of oxygen is 35–40 mm Hg. Any insult leading to impaired oxygenation or ventilation therefore can have serious consequences for both the mother and the baby.⁴ Very rarely, maternal and fetal death have also been reported.⁷ If appropriate and timely management of pneumothorax during pregnancy is undertaken, it is usually associated with good maternal and fetal outcomes.

Even though our patient developed pneumothorax following caesarean section performed under spinal anaesthesia, this is a rare occurrence and spinal anaesthesia is extremely unlikely to

Figure 2 Chest radiograph demonstrating complete expansion of the right lung following tube thoracostomy.

Table 1 Clinical details and outcomes of all the patients who developed pneumothorax during/following caesarean section until reported

Case	Author	Age	Gravida	Smoker	Duration of pregnancy (weeks)	History of fever	Previous history of pneumothorax	Time to symptom onset	Tension pneumothorax	Management	Type of anaesthesia during caesarean section	Outcome	Duration of discharge postoperatively (days)
1	Harten <i>et al</i> ³	37	1	Yes	42	Yes	No	8 h postoperatively	Yes	Tube thoracostomy	General anaesthesia	Recovered	7
2	Harten <i>et al</i> ³	34	2	Yes	35	No	No	4 days postoperatively	No	Single time aspiration	General anaesthesia	Recovered	5
3	Harris ²	40	3	No	23	Yes	No	5 min after induction of anaesthesia	Yes	Tube thoracostomy	General anaesthesia	Recovered	7
Index case	Madan <i>et al</i>	32	3	No	36	No	No	2 days postoperatively	No	Failed single time aspiration followed by successful tube thoracostomy	Spinal anaesthesia	Recovered	7

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be associated with this complication as it obviates the need for endotracheal intubation and mechanical ventilation. Therefore, in our opinion, spinal anaesthesia is still the preferred anaesthesia technique when a caesarean section is performed for obstetric reasons.

Learning points

- ▶ Spontaneous pneumothorax during pregnancy is rare.
- ▶ Pneumothorax should always be considered in the list of differential diagnosis whenever managing a patient with acute onset respiratory distress during pregnancy or in the immediate postpartum period.
- ▶ Timely diagnosis and appropriate management of pneumothorax during pregnancy/following delivery/caesarean section, is usually associated with an uneventful recovery.

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