Anaesthetic management of a pregnant woman with Chiari Malformation type 1 following failed endotracheal intubation for caesarean section

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BACKGROUND

Chiari Malformation type 1 (CM-1) is a congenital anomaly where the hindbrain herniates into the foramen magnum and is associated with syringomyelia in 25% of cases. Consensus regarding the mode of delivery and anaesthetic management in parturients with CM-1 remains controversial with regards to the risk of raised intracranial pressure (ICP)¹. We describe a patient with severe CM-1 and associated syringomyelia who had elective caesarean section (CS) under general anaesthesia (GA). Her airway was managed with a supraglottic device (iGel) after endotracheal intubation failed. To our knowledge this is the first report describing use of iGel in a patient with CM-1 during an elective CS.

THE CASE

32yo female, referred to the anaesthetic preoperative assessment clinic at 13/40 gestation in view of her CM-1 with associated syringomyelia and high body mass index (BMI).

Past Medical History

- Severe CM-1 (cerebellar tonsillar herniation of 12mm) and extensive cervicothoracic syrinx (extending from C2 to T5)**
 - Due to have foramen magnum decompression when found out that she was pregnant on preoperative urine pregnancy test → operation postponed until after delivery
 - Symptoms: Headache, unsteady gait, neck and right upper limb pain with associated paraesthesia
- BMI 40** (103kg, 158cm)
- Gestational diabetes** (insulin dependent)

Airway Assessment:

- Mallampati 4
- Thyromental distance <6cm
- Jaw protrusion grade A
- Limited c-spine flexion/extension
- Small mouth
- No previous intubation attempts

Multidisciplinary Team Discussion:

❖ Obstetric plan:

- Accelerated fetal growth >97th centile
- Vaginal delivery too high risk → plan for elective CS

❖ Neurosurgical and neuroanaesthetic advice:

- Headache + unsteady gait secondary to cerebellar tonsillar herniation + symptomatic extensive syrinx
- Strongly advised against neuroaxial anaesthesia
- Recommend GA with neuroprotective measures

❖ Anaesthetic plan:

- Not for spinal or epidural anaesthesia
- Elective CS under GA with neuroprotective measures
- Plan for difficult airway
- Awake versus asleep intubation → up to anaesthetic consultant on the day

ON THE DAY OF THE ELECTIVE CAESAREAN SECTION

Two senior anaesthetic consultants present, agreed airway plan:

- Asleep intubation with opioids, fiberoptic/glidoscope ready
- In case of failed intubation: iGel as rescue plan → if good oxygenation achieved; to continue with CS on iGel

Magnetic resonance image of our case demonstrating: A) cerebellar tonsillar descent below the dotted line, B) extensive multi-septated syrinx extending from C2 to T5.

DISCUSSION

1. MDT discussion is paramount, clinical decision on an individual basis

- Previous case reports of successful neuroaxial anaesthesia in CM-1 parturients without worsening of neurological condition²
- Our case was deemed too high risk if accidental dural puncture

2. Airway plan and management

- Asleep intubation with opioid cover and tight control of blood pressure
- Due to grade 4 view, bleeding and drop in oxygen saturation iGel was inserted as per rescue plan, oxygen saturation maintained >95%
- Hypercarbia with pCO₂ 6.5kPa

3. Previous case reports of airway difficulties in CM-1 parturients

- Known difficult airway → awake fiberoptic¹
- Successful intubation 2nd attempt using laryngoscope airtraq³

4. iGel supraglottic airway and caesarean section

- Supraglottic airway the most common rescue plan in failed intubation⁴
- Randomised study supporting the use of iGel in elective CS⁵

What could we have done differently?

- Pre-operative ENT nasendoscopy to assess for intubation
- Awake fiberoptic intubation / use of glidoscope at start
- Wake patient up if failed intubation → however, obstetric concern re: baby's size and elective CS already moved forward by one week

CONCLUSION

We have shown that it is possible to use an iGel airway after failed intubation in a parturient with severe CM-1 for CS with a good outcome and no neurological deterioration. However, due to the difficulty in controlling the pCO₂ and thereby the risk of increasing the ICP, we would only recommend iGel use in CM-1 parturients for emergency airway rescue.

1	11:25am - Prior to induction: Oxford pillow Sodium citrate 2 x 16G cannulae Awake arterial line Optiflow 30L Equipment available: McCoy, Glidoscope, Fiberoptic	2	11:59am - Rapid Sequence Induction Pre-oxygenation Fentanyl 100mcg + 100mcg Midazolam 1mg Propofol 300mg Suxamethonium 150mg Optiflow maintained
3	12:00 - After Induction 1st attempt intubation: McCoy blade size 3 – Grade 4 view Unable to pass bougie blindly + bleeding from oropharynx O ₂ Sats dropped to 87% iGel size 4 inserted; oxygenating well, good seal, EtCO ₂ 5.6kPa Good oxygenation → to go ahead with CS using iGel as planned Rocuronium 40mg given		
4	Intra-operatively O ₂ Sats >95%, FiO ₂ 50% Sevoflurane/N ₂ O/Oxygen VCV; Tidal volumes 450-550mls Peak inspiratory pressure 24cmH ₂ O IABP controlled with opioids/phenylephrine/labetalol Pupils assessed every 5 minutes 12:27pm – Live baby girl, Apgar 8 and 9 at 1 and 5 minutes, cord gas pH 7.23 12:56pm – maternal ABG : pH 7.28, pCO ₂ 6.5kPa, pO ₂ 15.3kPa, Lac 1.5		
	5	Post-operatively Bilateral transversus abdominis plane block Sugammadex 200mg Labetalol on emergence Optiflow 30L Nil new neurological deficit Morphine PCA Monitored on HDU for 24 hours Discharged home day 2 post-operatively	

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