Introduction:
Airway related events are common after cervical spine surgery leading to long ventilator stay. Previous studies documented that the patients with prolonged procedures (i.e., >5 hours) exposing more than three vertebral levels that include C2, C3, or C4 with more than 300-ml blood loss and even combined anterior and posterior approach are the risk factors for postoperative ventilator insufficiency. (1, 2) While a posterior approach avoids many of these potential complications. Airway obstruction is a well-recognized complication after neck surgery, including cervical spine surgery. (3, 4, 5) But the risk factors are same or different in posterior approach? The various factors related to postoperative airway complications are not studied. Hence we carried this retrospective study to find the risk factors for extubation failure in cervical ossified posterior longitudinal ligament (OPLL) surgery through posterior approach.

Aim and Objectives:
1. To find the risk factors related to prolonged intubation in cervical ossified posterior longitudinal ligament (OPLL) surgery through posterior approach.
2. To correlate various factors for extubation failure and needing elective ventilation

Material and Methods:
After ethics committee approval, we retrospectively collected data from medical records during 2015 and 2016. Informed consent had been taken from all patients before surgery. We analysed data of 50 patients, electively posted for cervical OPLL surgery through posterior approach. ASA (American Society of Anaesthesiology) I to III patients posted electively for posterior approach surgery were only included. Different risk factors were recorded to assess extubation difficulty.

Results:
Out of 50 patients, 14 had extubation difficulty. Duration of surgery and levels of spine involved are main risk factors with odds ratio of 1.022 and 2.365 respectively. ASA classification, NYHA classification and preoperative neurological dysfunction are also among the major risk factors contributing for delayed extubation.

Conclusion: Duration of surgery and levels of spine involved are primary risk factors involved for difficult extubation.
Table 2: Surgical factors compared between immediate extubation and delayed extubation group. (The data was displayed in number, percentage and p-value)

<table>
<thead>
<tr>
<th></th>
<th>Immediate extubation (n=26)</th>
<th>Delayed extubation (n=24)</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjuvants for intubation</td>
<td>10 (25%)</td>
<td>9 (22.5%)</td>
<td>.186</td>
</tr>
<tr>
<td>Duration of surgery</td>
<td>179.23 ± 37.72</td>
<td>227.64 ± 46.63</td>
<td>.003</td>
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<tr>
<td>Blood loss (ml)</td>
<td>97.31 ± 34.82</td>
<td>124.29 ± 32.52</td>
<td>.533</td>
</tr>
<tr>
<td>No of surgical levels</td>
<td>3.03 ± 0.93</td>
<td>5.71 ± 1.51</td>
<td>.001</td>
</tr>
<tr>
<td>Intra operative inotrope required</td>
<td>5 (12.5%)</td>
<td>1 (2.5%)</td>
<td>.399</td>
</tr>
</tbody>
</table>

Table 3: Factors influencing delayed extubation after cervical spine surgery following multiple logistic regression.

<table>
<thead>
<tr>
<th></th>
<th>P value</th>
<th>Odds ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre operative neurological dysfunction</td>
<td>0.416</td>
<td>0.323</td>
</tr>
<tr>
<td>ASA</td>
<td>0.310</td>
<td>3.324</td>
</tr>
<tr>
<td>NYHA</td>
<td>0.986</td>
<td>0.984</td>
</tr>
<tr>
<td>DOS</td>
<td>1.130</td>
<td>1.022</td>
</tr>
<tr>
<td>no of surgical level</td>
<td>0.043</td>
<td>2.365</td>
</tr>
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Discussion:

Ossification of the posterior longitudinal ligament (OPLL) is a disorder of progressive ectopic calcification and ossification of the cervical and thoracic segments of the posterior longitudinal ligament (PLL) that results in a compressive myelopathy and/or radiculopathy. The decompression can be done through anterior or posterior approach. Anterior decompression yielded better outcomes than a posterior approach for severe OPLL (6, 7, and 8) but anterior approach – related complications related to injury to the soft-tissue structures of the neck are well known. These include temporary or permanent dysphagia, recurrent laryngeal or superior laryngeal nerve injury, vertebral artery injury, esophageal perforation, and soft-tissue swelling that constricts the airway and necessitates prolonged intubation or tracheostomy. (1) In posterior approach, prone position is an additive risk factor to increase airway edema. (9) Multi-level spinal surgeries often require long anesthetic and operative times in the prone position. In patients who have just undergone extensive cervical spine procedures, emergency intubation or tracheostomy can lead to a significant incidence of graft-related or neurological complications, hypoxia, and death. Potential causes of airway obstruction include pharyngeal edema (10), hematoma, (11) cerebrospinal fluid leak, (12) angioedema (13), and graft or plate dislodgment (11).

The published literature reports a higher rate of postoperative respiratory compromise (1.6%–6%). (1, 14, 15). Patients with prolonged procedures (i.e., ≥5 hours) exposing more than three vertebral levels that include C2, C3, or C4 with more than 300-ml blood loss should be watched carefully for respiratory insufficiency. In one study, Bone morphogenetic protein was responsible for airway obstruction. (16) One recent study (17) demonstrated the rate of postoperative prolonged ventilation and reintubation after combined spine surgery is 0.62% and 0.64%, Independent predictors for a postoperative reintubation include a history of recent weight loss more than 10%, recent operation within 30 days, low preoperative hematocrit, and a high serum creatinine level respectively. This was done for both anterior and posterior approach i.e. combined spinal surgery and included multiple variables. In another study conducted by Rowbottom J et al (18), long operative times, large volumes of crystalloid administration, and blood loss were significant factors in patients with delayed extubation In our study, we retrospectively analysed 50 patients only posted for posterior approach cervical spine surgery and found 14 patients had delayed extubation (28%) and 26 patients (52%) were safely extubated on table. Though it is not statistically significant, delayed extubation is the reason for prolonged ventilation and increased morbidity. In this study, ASA class, NYHA class, upper cervical intervention and preoperative neurological deficit are direct patient related risk factors for poor airway outcome in postoperative period. The current study suggests that the preoperative assessment is very important to plan anaesthesia and to have good outcome. Upper cervical involvement adds to risk as may be surgical issues or the above factors contribute. (3, 19) The study also demonstrated that duration of surgery and numbers of levels are main risk factors along with ASA classification, NYHA classification and preoperative neurological dysfunction. Reduced neck movements and anticipated difficult airway have not contributed much for delayed extubation with non-significant p value. That suggests, if planned intubation is done in anticipated difficult airway, contributes least for extubation difficulty.

Conclusion:

Duration of surgery and numbers of cervical levels along with ASA classification, NYHA classification and preoperative neurological dysfunction are the major risk factors contributing for delayed extubation. Hence proper planning is important if more numbers of cervical vertebrae are involved and duration is more for the surgery. This is to avoid reintubation and airway trauma.

Conflict of interest-Nil

References: