Ultrasound standard for lumbar plexus block

Editor—The lumbar plexus block (LPB) has been traditionally performed with the needle puncture guided by landmark and the injection point confirmed by nerve stimulator. Various ultrasound approaches could help improve the safety, but each has its own problems. Not until the advent of the ‘Shamrock method’1 did I routinely, perhaps more easily, apply ultrasound for real-time guidance during LPB. Personally, I recommend the ‘Shamrock method’ to be the standard of ultrasound monitoring for LPB in combination with pressure and stimulator monitoring, the so-called triple monitoring. Several advantages could be found while applying the ‘Shamrock method’ compared with others.

Firstly, the ‘Shamrock method’ is the real needle in-plane one without changing the practice of traditional landmark-guided LPB, all the same besides additional information of needle trajectory. The lumbar plexus is almost always located ventral to the medial half of the transverse process on shamrock view. Although absolute posterior–anterior approach could also be accomplished and assisted by the famous ‘trident sign’, most clinicians consider it an out-of-plane technique and hard to prevent inadvertent needle puncture during LPB, at least possible for the kidney3 and intestines. Using the ‘Shamrock method’, the needle shaft usually could be found after slightly tilting the transducer. Personal experience revealed that to obtain the complete shamrock view with the transverse process centred, sometimes the curve transducer needed to be slid more posterior, even with some part of it off the skin (Fig. 1).

Secondly, although the paramedian transverse scan (PMTS) of the lumbar paravertebral region with the ultrasound beam being insonated through the intertransverse space (ITS) provides a possible solution for in-plane LPB,4 PMTS-ITS in-plane view is not so easy and straightforward as the vertical ‘Shamrock method’ to get the needle in plane. Furthermore, lateral-to-medial PMTS-ITS approach will direct the needle towards the neuraxis, which is not recommended if the needle is not easily visible, especially for deeper targets, such as the lumbar plexus close to the intervertebral foramen. Medial-to-lateral PMTS-ITS in-plane approach inherently has the risk of introducing jelly throughout the path because the jelly will inevitably flow to the dependent part where the needle inserts nearby. Jelly introduction into the central part of the body should be avoided whenever possible, even if it is aseptic.

Thirdly, one-man technique is possible by using the ‘Shamrock method’. The vertical direction of the needle to the skin usually will ensure the needle anchored by the flank muscle; therefore, the needle-holding hand could be safely free without changing the position of the needle tip after confirmation of the patella twitch by 0.5–1.0 mA current. With the transducer in situ, the original needle-holding hand could then be used to adjust the stimulating current, execute half-the-air opening pressure test5 (better to have a luer lock syringe tip at the connection point for one-hand test), record the image during injection, . . . and so on; thus, one-man Shamrock saves manpower for one-shot LPB. Another point is the contact area for the transducer is far away from the needle injection point (Fig. 1), which also saves time because there is no need to routinely make the transducer aseptic.

Currently, a clinical trial regarding the minimally effective volume of ‘Shamrock’ LPB is being carried out by the inventor (http://clinicaltrials.gov/ct2/show/NCT01956617). Although the anaesthetic volume is probably the same compared with the traditionally landmark-guided technique, we are expecting more details about the ‘Shamrock method’ explored from the trial.

Declaration of interest
None declared.

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Results are given in Table 1. This technique resulted in only a needed standard ventilation through a cuffed TT. The main open ventilation method (TOV) and we currently use the F through acuffless 4.5mm ID tube (TOV) with following variables:

- \( V_O_2 \) = 1.0, respiratory rate 20 bpm, inspiratory time 1.5 s, and PEEP 0 cm H\(_2\)O. Arterial blood gas (ABG) analyses were performed before, during, and after PET. The time of TOV was inclusive of the initial preparation, broncoscopy, and surgical time until placement of the tracheostomy tube. The data collected in each group were compared with Student’s t-test; a P-value of < 0.05 was considered statistically significant.

The mean (so) time of TOV was 30 (5) min. No patients needed standard ventilation through a cuffed TT. The main results are given in Table 1. This technique resulted in only a moderate increase in \( P_{aCO_2} \), similar to the other reports in the literature. In addition, it always guaranteed a continuous oxygen flow at the carina, ensuring adequate oxygenation without a transient decrease in arterial saturation even during the dilation phase. For this reason, TOV is safer even if complications such as bleeding may protract surgical time. The lack of the cuff and the small size of the tube allows a large operating field and a clear visualization, so that the small tube remains in site during the whole procedure also with PT technique and it maintains a continuous ventilation throughout the course of the procedure. The rhino-tracheal videobronchoscopy is fast and facilitated by the leak of the air exhaled through the mouth that opens the collapsed hypopharynx and guides introduction of the endoscope. In this way, the larynx hosts the tube and the endoscope (6.3 mm OD tube + 5.0 mm Ø endoscope) without interference.

Moreover, the cuffless 4.5 mm ID tube is placed by tube exchange and left in place throughout the procedure as it allows an easy rotation and placement of the tracheostomy cannula. We believe that the tip of the small tube at the carina level prevents aspiration into the airway; the inspiratory oxygen flow is maintained beyond the tracheal bleeding or regurgitation, while the expiratory flow pushes out any biological fluid through the hypopharynx and the mouth. Finally, we believe that the use of TOV in controlled pressure prevents the emphysema, pneumothorax, and/or pneumomediastinum. These complications were absent in our groups and in earlier studied patients because the high-resistance TT ensures ventilatory assistance during both procedures and TOV prevents hyperinflation and barotrauma.

A negligible increase in \( P_{aCO_2} \) is not associated with significant pH variation and an adequate \( P_{aO_2} \) is maintained throughout the whole procedure. For these reasons, we believe that TOV is safe, effective, and easily applied to every PET technique.

### Translaryngeal open ventilation for percutaneous endoscopic tracheostomy

Editor—The standard procedure of ventilation during percutaneous endoscopic tracheostomy (PET) is to withdraw tracheal tube (TT) until the cuff lies between the vocal cords. The use of extraglottic airway device as an alternative to the standard TT could overcome many of the problems associated with the procedure. However, the safety during ventilation may be compromised. We routinely use the uninterrupted translaryngeal open ventilation technique (TOV) and we currently use the same method also with PercuTwist technique (PT) successfully.

In our general intensive care unit, a retrospective review was performed using data from the last 2 yr. Data from 61 consecutive PET were collected: Ciaglia Blue Rhino (CBR) (n = 31) and PT (n = 30).

All patients were successfully assisted during PET with TOV. Pressure-controlled ventilation (40 cm H\(_2\)O) was maintained through a cuffless 4.5 mm ID tube (TOV) with following variables: \( F_O_2 \) = 1.0, respiratory rate 20 bpm, inspiratory time 1.5 s, and PEEP 0 cm H\(_2\)O. Arterial blood gas (ABG) analyses were performed before, during, and after PET. The time of TOV was inclusive of the initial preparation, broncoscopy, and surgical time until placement of the tracheostomy tube. The data collected in each group were compared with Student’s t-test; a P-value of < 0.05 was considered statistically significant.

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### Declaration of interest

None declared.

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1 Bodenham AR. Percutaneous dilational tracheostomy. Completing the anaesthetist’s range of airway techniques. *Anaesthesia* 1993; **48**: 101–2


3 Carron M, Free U, Michielan F, Ori C. Effects of tracheal intubation on ventilation with LMA Classic for percutaneous dilation tracheostomy. *Minerva Anestesiol* 2010; **76**: 181–7

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**Table 1** Duration of PT technique and CBR, and the maximum change in \( P_{aCO_2} \), \( pH \), and \( P_{aO_2} \). The data are mean (so)

<table>
<thead>
<tr>
<th>Variables</th>
<th>PT</th>
<th>CBR</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procedure time (min)</td>
<td>4 (2)</td>
<td>3 (1)</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td>Time of TOV (min)</td>
<td>31 (5)</td>
<td>30 (4)</td>
<td>NS</td>
</tr>
<tr>
<td>( \Delta P_{aCO_2} ) (kPa)</td>
<td>0.5 (0.3)</td>
<td>0.6 (0.5)</td>
<td>NS</td>
</tr>
<tr>
<td>( \Delta P_{aO_2} ) (kPa)</td>
<td>9.3 (4.8)</td>
<td>10.0 (4.2)</td>
<td>NS</td>
</tr>
<tr>
<td>( \Delta pH ) (pH)</td>
<td>0.04 (0.02)</td>
<td>0.08 (0.04)</td>
<td>NS</td>
</tr>
</tbody>
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