but there was no difference at 24 h. Nausea and vomiting and sedation scores were significantly lower at 3 and 6 h in the TAP group compared with the control group.

Postoperative pain after renal transplantation may be severe and the administration of systemic analgesia may be limited due to impaired renal function and respiratory complications from opioids.\(^1\)\(^-\)\(^3\) The use of regional anaesthesia for renal transplantation remains controversial.\(^4\) I.V. opioid administration provides the mainstay of analgesia after renal transplantation in the majority of transplant centres in the UK,\(^5\) although significant accumulation of M6G, to levels associated with respiratory depression, has been observed in transplant patients despite sufficient primary graft function negating the need for dialysis after transplantation.\(^6\)

TAP blocks have been shown to be effective after a variety of abdominal procedures\(^7\)\(^-\)\(^11\) as they provide opioid-sparing effects and improve patient satisfaction.\(^1\)\(^1\) Abdominal wall incisions may contribute significantly to the postoperative pain experienced after surgery,\(^1\)\(^0\) and TAP blocks are most suitable for operations where parietal pain is a major factor.\(^1\)\(^2\) Renal transplant recipients are ideally suited to gain maximum benefit from TAP blocks as their classical incisions extend from the symphysis pubis to just above and medial to the anterior superior iliac crest (T10–L1 dermatomes, which are usually covered by the block)\(^1\)\(^3\) without any intraperitoneal extension, eliminating the visceral pain component.

We recommend the use of TAP blocks as part of a balanced analgesia regimen for renal transplant recipients. The significant pain relief provided in the first 24 h after operation coupled with the ease of performing the block and the good safety profile makes it an appealing choice for this group of patients.

Conflict of interest

None declared.

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Influence of an extracorporeal lung assist system on transpulmonary thermodilution-derived variables

Editor—The reliability of extended haemodynamic monitoring by the transpulmonary thermodilution technique has been questioned during extracorporeal circulation. Previously, it was shown that running renal replacement therapy has no clinically relevant impact.\(^1\) Recently, we presented data on the influence of different blood flows through a pumpless extracorporeal lung assist (PECLA) system on transpulmonary thermodilution-derived haemodynamic variables.\(^2\) Here, we provide data on the influence of PECLA on these variables since we sampled data during a period of interrupted therapy before planned withdrawal of the system.

A 70-yr-old woman (162 cm, 60 kg) underwent uneventful elective upper lung sleeve resection for cancer. Unfortunately, she developed acute respiratory distress syndrome (ARDS) 5 days after surgery. She was re-admitted to the ICU and underwent intubation of the trachea for mechanical ventilation.\(^2\) The patient received a left femoral 5 F thermistor catheter (PV20L15, Pulsion Medical Systems, Munich, Germany) which was connected to a PiCCOplus monitor (Pulsion Medical Systems AG, Munich, Germany). Owing to severe respiratory acidosis, she required a PECLA system (iLA Membrane
Ventilator, Novalung, Hechingen, Germany). For this, a 13 F catheter was placed into the right femoral artery and a 15 F catheter into the left femoral vein. Flow in the extracorporeal circuit Q(ELA) was assessed by Novalung flow (Novalung). For weaning off the PECLA system, the extracorporeal circuit was intermittently clamped after systemic anticoagulation. Haemodynamic variables based on thermodilution were obtained in triplicate by central venous (superior vena cava) injections of NaCl 0.9% (15 ml; <0°C) at baseline, during clamped system, and after re-opening before planned end of PECLA treatment. At all time points (Table 1), ventilator settings (Evita 2 dura, Draeger, Lübeck, Germany) remained unchanged: BiPAP, FiO2 0.5, PiP 28 mbar, PEEP 8 mbar, and ventilatory frequency 18 bpm.

As has been shown that, during ECMO treatment, indicator may be lost through the extracorporeal circuit and cardiac output as assessed by the thermodilution technique is to be overestimated. In theory, any extracorporeal circuit from which indicator has been partially removed from the system may result in an error in the determination of cardiac output.

In our previous case presentation, we speculated on a relationship between extravascular lung water (EVLW) and shunt fraction. We described an increased EVLWI with a higher shunt fraction through PECLA. However, we could not separate the influence of shunt on cardiac output measurement and on determination of EVLWI. Thus, we presented our case as a hypothesis.

In this paper, we present data during complete cross-clamping of the extracorporeal circuit. As expected, clamping revealed a marked decrease in cardiac output as there was no loss of indicator by PECLA. However, while global end-diastolic volume (GEDV) also increased, EVLW did not change markedly. Interestingly, pulse contour analysis-derived cardiac output remained accurate as changes were comparable with those derived from thermodilution. Thus, PECLA had marked influence on the first of two competing factors, that is, determination of cardiac output, but not EVLWI. In summary, extracorporeal blood flow of up to 20% of cardiac output does not reduce reliability of transpulmonary thermodilution-derived lung water measurement. However, further data are needed to assess this relationship more systematically and in a larger and more circulatory compromised population of critically ill patients.

Conflict of interest
Dr S.G.S. is a member of the Medical Advisory Board of Pulsion Medical Systems AG and has received honoraria from this company and MSD Sharp & Dohme for giving lectures.

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Table 1 All measurements under norepinephrine 0.2 μg kg⁻¹ min⁻¹. BL, baseline; CON, control; HR, heart rate; AP, arterial pressure (mean pressure); Q(ELA), flow through the extracorporeal lung assist system; COpc, pulse contour-derived cardiac output; COtd, transpulmonary thermodilution-derived cardiac output; GEDVI, global end-diastolic volume index; EVLWI, extravascular lung water index; SVV, stroke volume variation; PPV, pulse pressure variation

<table>
<thead>
<tr>
<th>Measurement</th>
<th>HR (beats min⁻¹)</th>
<th>AP (mm Hg)</th>
<th>Q(ELA) (litre min⁻¹)</th>
<th>COpc (litre min⁻¹)</th>
<th>COtd (litre min⁻¹)</th>
<th>GEDVI (ml m⁻²)</th>
<th>EVLWI (ml kg⁻¹)</th>
<th>SVV (%)</th>
<th>PPV (mm Hg)</th>
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<tbody>
<tr>
<td>BL</td>
<td>106</td>
<td>116/77 (95)</td>
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<td>4.56</td>
<td>5.10</td>
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<td>15</td>
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<tr>
<td>Clamping</td>
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<td>5.70</td>
<td>5.63</td>
<td>7.77</td>
<td>11.2</td>
<td>22</td>
<td>18</td>
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<tr>
<td>CON</td>
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<td>119/69 (90)</td>
<td>4.44</td>
<td>4.37</td>
<td>4.44</td>
<td>5.15</td>
<td>11.3</td>
<td>22</td>
<td>17</td>
</tr>
</tbody>
</table>

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Observational study of the use of an epidurogram in interlaminar lumbar epidural steroid injection

The first report of epidural steroid injection was in 1952 and lumbar epidural steroid injection (lesi) subsequently became popular in Europe. Accurate placement of the