boli of epinephrine 0.1 mg and then an i.v. infusion at 2 mg h⁻¹ were given. Sugammadex 400 mg was also given, bringing the total to 16 mg kg⁻¹.

Again arterial pressure increased to 140/65 mm Hg and stabilized, the heart rate decreased to 90 beats min⁻¹, and the bronchospasm relaxed. The operation was postponed. Methyprednisolone 100 mg was given and she was weaned off the epinephrine infusion over the next 10 h.

Analysis of the blood samples supported a diagnosis of anaphylaxis. Immuno-assay identified the source as rocuronium.

Screening 9 weeks later showed a positive response to rocuronium, mivacurium, and vecuronium, but not succinylcholine, pancuronium, atracurium, or cisatracurium. Povidone iodine, chlorhexidine, propofol, sufentanil, and sugammadex all tested negatively. The surgical procedure was then performed uneventfully under general anaesthesia without neuromuscular blocking agent.

It seems logical to administer a dose of sugammadex sufficient to ensure a 1 to 1 ratio for every molecule of rocuronium. To achieve this, a theoretical sugammadex to rocuronium dose ratio of 3.57:1 is needed. In clinical practice, the evidence indicates that sugammadex 16 mg kg⁻¹ is needed to obtain a T4/T1 ratio >0.9 in <3 min in the presence of profound neuromuscular block. Dosage is clearly an important issue, and it is proposed that for anaphylaxis, at least 16 mg kg⁻¹ of sugammadex should be given with the aim of isolating as many molecules of neuromuscular blocking agent as quickly as possible.¹ Our case required a total dose of 16 mg kg⁻¹ before the improvement was maintained.

In summary, the importance of this case lies in the apparent dose-dependent recovery from a proven case of rocuronium anaphylaxis. We suggest the adoption of a dose of sugammadex of at least 16 mg kg⁻¹ when the treatment of rocuronium anaphylaxis does not rapidly respond to standard measures.

**Declaration of interest**

None declared.

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**Clinical evaluation of the C-MAC D-Blade videolaryngoscope in severely obese patients: a pilot study**

Editor—Morbidly obese patients often have a large neck circumference that necessitates special positioning for intubation and reduced posterior airway space that could lead to improper mask ventilation.¹ ² Videolaryngoscopy provides superior views compared with traditional laryngoscopy in both normal and difficult intubation situations and is relatively easy to use, making it potentially advantageous for this type of patient.³ ⁴ We performed a pilot study to evaluate the performance of the C-MAC D-Blade videolaryngoscope (Karl Storz, Tuttingen, Germany) in severely obese patients and to test the hypothesis that the C-MAC D-Blade would enable a superior view of the glottic structures, and also provide faster tracheal intubations than the C-MAC blade.

After approval from the institutional board of the University of Texas Medical School at Houston, 50 morbidly obese (BMI ≥ 40 kg m⁻²) ASA I–III patients who underwent elective surgeries at Memorial Hermann Hospital-Texas Medical Center (Houston, TX, USA) provided written consent. The patients were randomized into either a group that underwent laryngoscopy first with the C-MAC followed by a secondary laryngoscopy with the C-MAC D-Blade and then tracheal intubation with the D-Blade or a group that underwent laryngoscopy first with the C-MAC D-Blade then laryngoscopy with the C-MAC and then tracheal intubation with the C-MAC. Intubations were performed by second- and third-year residents (CA-2 and CA-3). The time required to obtain optimum view [modified Cormack–Lehane (CL) grade score], ⁵ time required to intubate, and the number of attempts were recorded. The time to the optimal view of the glottis was defined as the time from the moment the anaesthesiologist had the laryngoscope in hand to time to optimal visualization of vocal cords. Intubation time was defined as the time from which the anaesthesiologist had a tracheal tube (TT) in hand to when the TT cuff passed distally through the vocal cords. Data were compared by the Mann–Whitney U-test (continuous variables) and χ² test (categorical variables) using Stata (Stata Corp., College Station, TX, USA). Times were reported as median (1st inter-quartile, 3rd inter-quartile). Comparisons were considered statistically significant if P<0.05.

Patient characteristics and pre-procedural intubation conditions did not differ between the groups. The average time to glottis visualization was shorter for the C-MAC when compared with the D-Blade when used during the first laryngoscopy [6.7 (4.45, 9.7) vs 7.2 (4.82, 9.95) s, P=0.67]. The C-MAC was found to provide a lower average time to visualization of
the epiglottis when used during the second laryngoscopy than the D-Blade [5.5 (4.04, 9.4) vs 6.7 (4.2, 9.1) s, \( P = 0.85 \)]. After the second laryngoscopy, the average time for intubation was shorter for the C-MAC when compared with the D-Blade [9 (5.85, 13.95) vs 7.3 (5.35, 13.45) s, \( P = 0.41 \)]. A cross-comparison was also performed to examine the CL scores and visualization times for all C-MAC procedures in comparison with D-Blade procedures, regardless of the order (Table 1).

Overall, the study had negative results. We did not find statistically significant differences in time to optimal view of the glottis, time of intubation, or number of attempts. Several studies have confirmed that the use of the C-MAC system is safe and provides comparable results, in comparison with direct laryngoscopy, for laryngoscopy and intubation.6 7 Although morbid obesity does not constitute a difficult airway per se, it can constitute a serious event in a patient population (mild to severe desaturation). Taking into consideration the limitations of a pilot study, we found that the D-Blade provided a good view of the glottis, which resulted in fast and successful tracheal intubation during routine induction of anaesthesia in severely obese patients, possibly anticipating advanced usage in more serious and difficult situations.

### Table 1

<table>
<thead>
<tr>
<th>Variable</th>
<th>CMAC (n=50)</th>
<th>DMAC (n=50)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glottis view for laryngoscopy (1/2a/2b/3)</td>
<td>37/7/6/0</td>
<td>44/5/1/0</td>
<td>0.11</td>
</tr>
<tr>
<td>Before BURP</td>
<td>1/1/4/0</td>
<td>0/2/0/0</td>
<td>N/A</td>
</tr>
<tr>
<td>After BURP</td>
<td>6/0/0/0</td>
<td>2/0/0/0</td>
<td></td>
</tr>
<tr>
<td>Time to optimal visualization (s) [median (1st, 3rd quartile)]</td>
<td>6.125 (4.3, 9.2)</td>
<td>6.85 (4.5, 9.7)</td>
<td>0.65</td>
</tr>
<tr>
<td>&gt;1 attempt to intubate (n)</td>
<td>0</td>
<td>0</td>
<td>N/A</td>
</tr>
<tr>
<td>Fog/secretions</td>
<td>6 (12%)</td>
<td>0%</td>
<td>0.01</td>
</tr>
</tbody>
</table>

The portable Diamedica Glostavent was recently described in this journal1 after an adaptation for use with sevoflurane. We would like to share our experience using this simple and intuitive machine, and recommend two improvements. This portable ‘suitcase’ anaesthetic machine (Fig. 1) is designed with the developing world in mind.2

The machine comprises a draw-over breathing circuit with non-rebreathing valves, a Diamedica vaporizer suitable for halothane or isoflurane, and a breathing circuit with a pressure-relieving valve. This circuit incorporates an expiratory disc, which spins with each exhaled breath, thus

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**Declaration of interest**

D.C. has been granted funds from Storz (Germany) to continue research on the C-MAC system. C.A.H. is a paid consultant for Storz (Germany).

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**Portable Diamedica Glostavent: an anaesthetic machine for the itinerant anaesthetist**

Editor—The portable Diamedica Glostavent was recently described in this journal1 after an adaptation for use with sevoflurane. We would like to share our experience using this simple and intuitive machine, and recommend two improvements. This portable ‘suitcase’ anaesthetic machine (Fig. 1) is designed with the developing world in mind.2

The machine comprises a draw-over breathing circuit with non-rebreathing valves, a Diamedica vaporizer suitable for halothane or isoflurane, and a breathing circuit with a pressure-relieving valve. This circuit incorporates an expiratory disc, which spins with each exhaled breath, thus

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Fig 1 The portable Diamedica Glostavent.