was indicated (etomidate 20 mg, fentanyl 150 μg, and succinylcholine 75 mg). Once in the operating theatre, TEM study was performed at the beginning of surgery. The fibTEM MCF was 9 mm, and fibrinogen at the same time was 3.19 g litre\(^{-1}\); i.v. fibrinogen 30 mg kg\(^{-1}\) and tranexamic acid 25 mg kg\(^{-1}\) were given. Fetal extraction was performed with evacuation of a retroplacental haematoma affecting 30–40% of placental surface. During surgery, bleeding was estimated at about 1500 ml, and Ringer’s lactate 1500 ml was given. At the end of surgery, the patient was transferred to post-anaesthesia care unit (PACU) and discharged after 12 h, without symptoms or new episodes of bleedings. In the PACU, she received 1000 ml of Ringer’s lactate and one unit of packed red blood cells (PRBCs) as the haemoglobin was 7.2 g dl\(^{-1}\). Four hours after arrival in the PACU, the plasma fibrinogen level was 3.28 g litre\(^{-1}\) and fibTEM MCF reached 18 mm, while immediately before discharge, fibrinogen plasma level was 3.31 g litre\(^{-1}\) and fibTEM MCF 21 mm.

I.V. infusion of hydroxyethyl starch 130/0.4 (6%) may be accompanied by a marked overestimation of fibrinogen concentration measured according to the Clauss method.\(^5\) It also appears to impair clot formation.\(^6\) This impairment is accompanied by an increase in transfusion requirements resulting in a decline in MCF.\(^6\) This effect lasts approximately for up to 2 h,\(^7\) can be reversed with i.v. fibrinogen, and seems to be due to interference with formation of fibrin mesh.\(^6\)

Overestimation of fibrinogen concentration and interference with formation of fibrin mesh would explain the initial finding of a lower fibTEM MCF than expected, with a fibrinopenaemia of 3.19 g litre\(^{-1}\).\(^4\) Meanwhile, both the treatment and disappearance of the effects of hydroxyethyl starch would explain the progressive increase in fibTEM MCF in spite of stable fibrinogen levels. In conclusion, hydroxyethyl starch 130/0.4 (6%) seems to be a friend to haemodynamics and a foe for haemostasis.

**Declaration of interest**

None declared.

L. Falcón-Araña  
D. Fuentes-García*  
J. Hernández-Palazón  
M. J. Roca-Calvo  
F. Acosta-Villegas  
Murcia, Spain

*E-mail: smart10015@hotmail.com

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**Treatment of a life-threatening laryngeal bradykinin angio-oedema precipitated by dipeptidylpeptidase-4 inhibitor and angiotensin-I converting enzyme inhibitor with prothrombin complex concentrates**

Editor—Some drugs such as angiotensin-I converting enzyme inhibitors (ACEi) and dipeptidylpeptidase-4 (DPP-4) inhibitors can precipitate bradykinin angio-oedema (AE) attributable to the inhibition of the enzymes involved in bradykinin catalysis and affecting kinin B1 and B2 receptor signalling.\(^2\)

A 67-yr-old man presented at the emergency department with laryngeal oedema and severe dyspnoea which had developed over 3 h. He had a history of type 2 diabetes treated with metformin and DPP-4 inhibitor (sitagliptin) introduced 2 months before, hypertension for which he took ACEi (perindopril) for 10 yr, and a pulmonary embolism requiring anti-vitamin K (AVK) medication. This was the third episode within a month; the first two episodes of AE had regressed in <48 h after treatment with anti-histamines and corticosteroids. In this episode, significant glasso-pharyngo-laryngeal oedema (Fig. 1) was responsible for coughing, dysphonia, and difficulty in swallowing, dyspnoea, and oxygen saturation of 92% on masked-delivered \(O_2\) at 5 litre min\(^{-1}\). The patient was immediately treated with epinephrine aerosols, i.v. dextrochlorpheniramine 5 mg, and methylprednisolone 120 mg. The patient showed no improvement in the next hour. In anticipation of a difficult intubation or a life-saving tracheotomy, AVK antagonist, Kanokad® (LFB, France) 1500 IU, was administered. Dyspnoea and dysphonia regressed within 20 min, and symptoms completely disappeared within 8 h (Fig. 2). From blood samples before Kanokad® administration, histamine (3.6 nmol litre\(^{-1}\)), tryptase (11.2 μg litre\(^{-1}\)), C3 (138 mg dl\(^{-1}\)), and C4 (25 mg dl\(^{-1}\)) levels and also C1 inhibitor (C1-inh) level (27 mg dl\(^{-1}\)) and function were normal. The search for auto-antibodies was negative. After 36 h of observation in intensive care unit, the patient was discharged.
completely free of symptom. In the following weeks, he returned twice with a similar presentation, which completely resolved within 1 h of 1000 UI C1-inh concentrate (Berinert®, CSL Behring) on the fourth episode, and within half-an-hour after injection of icatibant (Firazyr®, Shire) on the fifth episode.

This patient presented with laryngeal distress. Allergic causation was excluded on the basis of lack of effects of steroids and anti-histamines. The diagnosis considered was drug-induced bradykinin AE. The absence of similar family history, the late onset of the first symptoms, and the normality of the complement pathway excluded C1-inh deficiency. He had been taking ACEi for more than 10 yr and DPP-4 inhibitors for 2 months, with these symptoms occurring for 1 month. ACE is an important kininase, playing a major role in bradykinin degradation and inactivation. The inhibition of the ACE activity can lead to bradykinin accumulation with extended bradykinin half-life, and increasing vascular permeability causing AE. This may occur immediately or may be delayed for several years. DPP-4 inhibitors trigger AE by the same mechanism. Bradykinin catabolism, as investigated 2 weeks after this major episode, was found decreased with low aminopeptidase P (APP) activity (0.29 nmol ml min⁻¹) representing 30% of the median value of a reference population, which constitutes the risk factor of AE. ACE activity was normal (71 UI, reference values 43–95 UI), and carboxypeptidase N (57.4 nmol ml min⁻¹, reference values 0.21–1.82 nmol ml min⁻¹). This AE was induced by ACEi and DPP-4 inhibitors, in the context of low APP activity. Life-threatening laryngeal AE requires emergency treatment. Plasma-derived C1-inh (PDC1-i) (Berinert®, Cetor®, Cinryze®) is the reference treatment for AE attacks. In bradykinin forming cascade, C1-inh lowers respective activities of kallikrein and fibrinolysin in converting kininogen into active bradykinin. As reported for the fourth episode, PDC1-i was effective in our patient, as was the specific bradykinin B2-receptor antagonist Icatibant (Firazyr®) in the fifth episode.

Why was Kanokad® drip effective in our patient? This PCC contains C1-inh protein, ranging from 0.82 to 0.85 g litre⁻¹, with subsequent 50 mg C1-inh administered to the patient. C1-inh efficiently controls the activation of kinin forming enzymes with conversion of kininogen into bradykinin.

Drug-induced bradykinin AE should be considered for facial or laryngeal oedema resistant to anti-histaminic and corticosteroids, with no evident allergic causation if the patient takes ACEi or DPP-4 inhibitor. In cases of respiratory distress, standard PCC Kanokad® may be a life-saving treatment.

**Declaration of interest**

None declared.

I. Millot1*
D. Plancade1
M. Hosotte2
C. Landy1
J. Nadaud1
C. Ragot1
B. Graffin1
C. Drouet3
G. Kanny2
1Metz, France
2Nancy, France
3Grenoble, France
*E-mail: ingrid.millot@hotmail.fr

Simplified estimation of ideal and lean body weights in morbidly obese patients

Editor—Morbid obesity (MO) is associated with important physiological and anthropometric changes that alter the pharmacokinetic properties of most drugs. Knowledge of these changes and careful consideration of the optimal dosing are necessary for safe and effective anaesthesia in MO patients.

1-3 Ideal body weight (IBW), lean body weight (LBW), and total body weight (TBW) are dosing scales for the commonly used anaesthetic agents. 1-3 The most common methods for the calculation of IBW and LBW are Devine’s and Janmahasatian’s formulas, respectively. 2, 3 However, these are not intuitive, straightforward, or quick in emergency situations. 2-4 Therefore, we aimed to provide a simplified method for determining IBW and LBW using 200 consecutive male [mean (range) age (yr) 38.4 (18–65); mean (SD) BMI (kg m\(^2\)) 47.7 (6.5)] and 200 consecutive female [age (yr) 41.1 (18–70); BMI (kg m\(^2\)) 45.5 (4.8)] patients undergoing bariatric surgery at our University Hospital. A linear regression analysis was performed on the IBW and LBW as derived from Devine’s and Janmahasatian’s formulas, respectively. 2 It was based on the equation \(y = \alpha x\), where \(y\) is the IBW or LBW, \(x\) the \(h^2\), and \(\alpha\) the best-fit values estimated by the model that should be inserted into the following simplified formula: \(\text{IBW or LBW} = \text{BMI (best-fit)} \times h^2\).

The linear regression analysis determined that the best-fit BMI of values derived from Devine’s equation for IBW was 22.85 for men and 20.55 for women. Likewise,

![Graph](image.png)

**Fig 1** The relationship between Devine’s estimation of IBW and Janmahasatian’s estimation of LBW, and height square (\(h^2\)) determined by linear regression analysis. Devine’s estimation of IBW (\(a\) and \(\alpha\)) and Janmahasatian’s estimation of LBW (\(c\) and \(\alpha\)) are plotted against \(h^2\). The equation is \(y = \alpha x\), where \(y\) is IBW or LBW, \(x\) the \(h^2\), and \(\alpha\) the best-fit, gender-specific BMI (kg m\(^2\)) for use in the simplified equation: \(\text{IBW or LBW} = \text{BMI (best-fit)} \times h^2\). Data were obtained from 200 consecutive MO male patients and 200 consecutive MO female patients who underwent bariatric surgery in our University Hospital. Statistical analyses were performed with SAS for Windows, version 9.2 (SAS Institute Inc., Cary, NC, USA). 95% CI, 95% confidence intervals for the regression parameters.