

disproved any epistaxis hypothesis, but merely indicated when our data were consistent with other work.<sup>5</sup> Overall, there was a significant difference between epistaxis in upper and lower pathway cannulation, but as we indicated in the paper, the number of preformed and thermosoftened preformed tubes passing through the lower pathway was too small (16.7% and 20%, respectively) for meaningful statistical analysis on their own. However, when reinforced tubes were considered, there was a significant difference between epistaxis in upper and lower pathway cannulation. In a randomized controlled trial, sample size is based on the primary focus of the investigation and not on secondary factors, particularly when the investigators are not aware of the existence of a particular secondary factor. Hence, the possibility of a beta error with regard to the epistaxis data is irrelevant here.

The size of tubes used (7 mm and 6 mm tubes, for males and females, respectively) are perfectly satisfactory for routine nasal intubation. There is seldom any need to resort to 7.5 mm tubes, which are more likely to cause nasal damage.<sup>9</sup> It is well recognized that stiffening of the tube recurs rapidly as the tube cools, and intubation was performed promptly and without delay.

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## Rhabdomyolysis after bariatric surgery: a potentially fatal complication

Editor—Rhabdomyolysis (RML) has been increasingly recognized as a complication of bariatric surgery.<sup>1 2</sup> Since 2003, several case reports have described postoperative RML after bariatric surgery, some of them fatal.<sup>3 4</sup> We report a case of severe RML in a patient who had undergone bariatric surgery, and whose renal function was preserved despite a very high creatine kinase (CK) concentration. We wish to raise awareness among anaesthetists of this potential and possibly underestimated complication in which early diagnosis can alter the outcome.

A 40-yr-old morbidly obese male (BMI 85) underwent laparoscopic sleeve gastrectomy. His medical history was only significant for sleep apnoea syndrome. The surgery was technically difficult and lasted 360 min. Otherwise, the intraoperative course was uneventful. Immediately after the extubation in the operating theatre, he complained of severe gluteal pain and dependent areas showed erythema and scattered small vesicles. RML was suspected and serial CK measurements confirmed an increase in CK levels (from 475 u litre<sup>-1</sup> immediately after the operation to 37 422 u litre<sup>-1</sup> 4 h later) (Fig. 1). Aggressive fluid replacement, urine alkalization, and administration of mannitol were initiated. The patient had a peak CK of 108 700 u litre<sup>-1</sup> at 24 h. From 48 h, CK levels started decreasing progressively to the baseline on the 10th post-operative day. The renal function remained stable during the entire postoperative period with creatinine <1.0 mg dl<sup>-1</sup> (Fig. 1). At 15 days, the patient was discharged home fully recovered.

RML is a clinical and biochemical syndrome that varies from asymptomatic increase of muscle enzymes (CK), to acute renal failure (ARF), compartment syndrome, and even death.<sup>2</sup> RML is produced by injury and necrosis of skeletal muscles and the subsequent release of intracellular toxic substances into the circulation. Increased compressive pressure owing to excessive weight has been recognized as a risk factor in obese patients. The incidence of RML after bariatric surgery is not clear, having been estimated from 1.4% to 75%.<sup>1 4</sup> Prolonged surgery, extreme surgical positions, ASA physical status III–IV, and the presence of diabetes or hypertension have been identified as factors associated with development of RML.<sup>3</sup>

The first signs and symptoms have been usually reported during the first 24 h after the injury, although, like in our case, those may appear early. The suspicion diagnosis based on clinical manifestations (reddish-brown urine, gluteal and back pain, and oliguria)<sup>2 3</sup> must be confirmed by laboratory studies. A five-fold elevation of serum CK level (>1050 u litre<sup>-1</sup>) is considered diagnostic.

The subsequent development of ARF, considered as a major prognostic factor in RML, occurs in 20–50% of

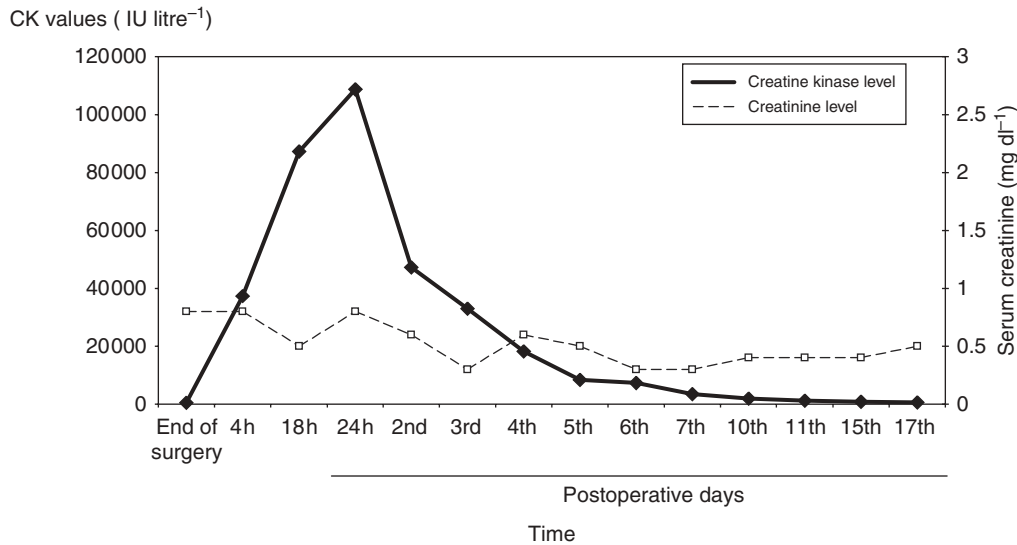


Fig 1 Follow-up of CK levels indicates a peak at 24 h after operation, which decreases rapidly in 4–5 days to the normal preoperative values. Creatinine levels remain at normal values during the entire postoperative period.

RML with a mortality of 20%.<sup>5</sup> Since CK plasma levels reflect the severity of muscle cell lysis, it has been suggested that the risk of developing ARF is closely related to CK values, with patients who present with CK >20 000 u litre<sup>-1</sup> being more at risk.<sup>6</sup> However, there is no prognostic value for irreversible damage or mortality. Our case reinforces the hypothesis that a delay in diagnosis and treatment is more strongly related to the incidence of ARF than the peak CK level. Once RML is detected, vigorous fluid administration and forced diuresis seem to be the best measures to avoid fatal consequences.<sup>7</sup> Padding pressure-points during surgery, positional changes, and strategies to reduce operative time, proposed as preventive measures,<sup>8</sup> have not been proven to be effective in decreasing the incidence of RML. Routine serial postoperative CK monitoring should be carried out in patients at higher risk of RML. Early diagnosis of RML is the cornerstone of successful outcome of this increasingly recognized complication.

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## Overestimation of intrathoracic blood volume in a patient with atrial fibrillation and subsequent severely reduced atrial blood-flow

Editor—Erroneous measurements during haemodynamic monitoring can have a major impact on assessment and treatment of critically ill patients. We report the case of a 62-yr-old male with chronic atrial fibrillation after a mitral valve replacement 2 yr previously who presented with an acute intracranial haemorrhage. After craniotomy to evacuate a haematoma, the patient remained in a coma for several days requiring mechanical ventilation. He