Acute postoperative hypoxemic respiratory failure as a result of Chilaiditi's syndrome: contribution of high flow oxygen through nasal cannula

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Editor—A 56 yr old man was admitted in our intensive care unit for acute hypoxaemic respiratory failure after orthopaedic surgery for an infected hygroma of the right knee.

At three h after surgery, he presented with acute respiratory failure with dyspnoea and respiratory rate to 35 per min. Sp_{O_2} was 89% despite nasal oxygen at 6 < L min^{-1}. Arterial pressure was 115/69 mm Hg. Pulmonary auscultation was unremarkable, with arterial blood gas analysis of pH 7.35, Pa_{O_2} 62 mm Hg, Pa_{CO_2} 47 mm Hg. Chest radiograph showed a pneumoperitoneum (Fig. 1A), and the physical examination revealed a soft abdomen without pain. We decided to not realize an abdominal computed tomography, preoperative chest radiograph showed colonic distension with colonic haustration, called Chilaiditi sign (Fig. 1B). We concluded that colonic interposition was responsible for the respiratory failure.

Therapy by high flow oxygen through nasal cannula was provided (FiO_2 80% and gas flow of 60 L min^{-1}) with nasogastric decompression. We observed a progressive improvement in ventilation, and clinical status and chest radiograph was normal after 12 h of high flow oxygen therapy (Fig. 1C). The patient's subsequent course was uneventful.

Chilaiditi syndrome is extremely rare.[1] It was defined by the association of colonic interposition between the liver and the diaphragm with dyspnoea or haemodynamic disturbances. The principal differential diagnosis is pneumoperitoneum. Chilaiditi sign and Chilaiditi syndrome are therefore often misdiagnosed in clinical practice[2]; however, they may be accompanied by a series of severe complications, such as respiratory failure or shock.[3,4] They can lead to unnecessary surgical intervention if not recognized correctly. This case emphasizes that physical examination is the most important element in diagnosis and, in some cases, avoids further testing. Anaesthetists should be aware of Chilaiditi syndrome and its management. The advent of high-flow oxygen therapy for acute hypoxaemic respiratory failure can avoid invasive ventilation through the contribution of positive expiratory pressure, and decreased respiratory load and respiratory work.[5]

Declaration of Interest

None declared.

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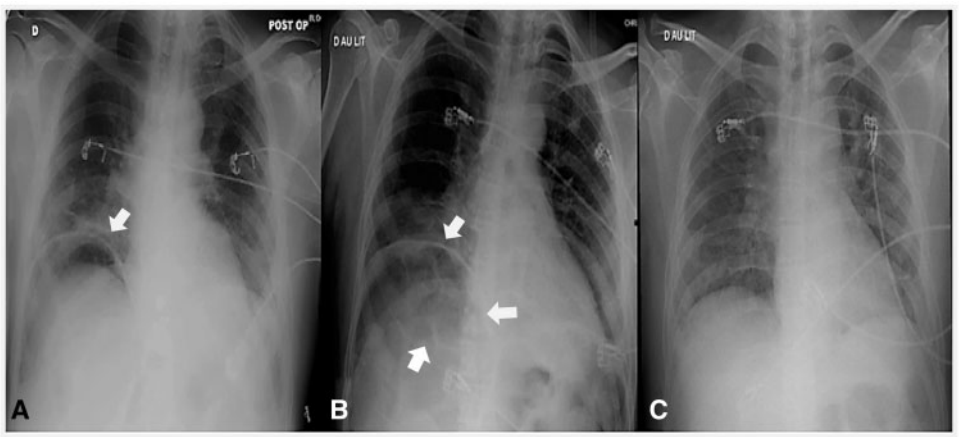

Fig 1 Chest radiographs. (A) Postoperative. White arrows indicate a pneumoperitoneum. (B) Preoperative. White arrows indicate Chilaiditi's sign. (C) After 24 h of high flow oxygen therapy.

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Human factors can't intubate can't oxygenate (CICO) bundle is more important than needle *versus* scalpel debate

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Editor—We believe best practice for front-of-neck access will be achieved when using human factors engineering principles, optimizing the interaction between people (most skilled airway manager available) and clinical decision-making (using Help to overcome cognitive bias and perform the task) in an environment using standardized equipment following a practised algorithm regardless of the technical approach taken.[1]

Moneypenny[2] correctly points out that a human factors approach to a 'can't intubate, can't oxygenate' (CICO) scenario should move beyond the human/anaesthetist viewpoint. We agree with this and suggest that addressing the cognitive aspects of clinical decision-making along with an organizational approach is what is required to solve the problem of optimal practice for front-of-neck access. Although Moneypenny[2] provides a compelling argument that a 'wider' human factors approach to a CICO scenario favours the use of a scalpel-only technique, we suggest that this approach can equally support the use of a cannula-only technique. The decision-making part of a human factors approach would suggest that the individual performing the front-of-neck access should not be the individual who has failed to secure the airway initially. In line with intuitive *vs* analytical thinking,[3] we would suggest it is easier for the 'Help' to perform this task whichever approach is favoured, because they will not be locked into the intuitive cycle of task fixation or other cognitive bias that may occur while managing the crisis.

The ongoing discussion about which CICO technique is better is unresolvable until we define in the literature the level of airway skills the participants have: novice (medical students), trainee-junior (<2 yr), trainee-senior (>2 yr), and trained consultant. This information is not provided in the Fourth National Audit Project (NAP4) from the UK.[4] It is likely that an experienced anaesthetist is far more adept at a Seldinger needle method than a novice airway manager who has minimal Seldinger technique skills (as noted by Henderson[5] in his correspondence). However, in lieu of Difficult Airway Society guidelines suggesting three attempts plus one by a more experienced anaesthetist at intubation,[6] it follows that for the front-of-neck access the most senior skilled airway manager should be performing the procedure (who was not involved in the initial failed intubation, as described before).

Particularly unhelpful are the studies using novice airway managers,[7] for which opinions/guidelines are translated to all levels of airway skills.[8] The personnel should be nominated in a team approach to determine which person should gain front-of-neck access; in our department, it is the most senior airway manager available at the scene. On an organizational level, our institution endorses a cannula cricothyroidotomy/tracheotomy as its first-line technique for emergency front-of-neck access in a CICO scenario.

Rather than primarily focusing on education and training, we also implemented a comprehensive human factors programme in an effort to optimize its success. Our human factors approach was to deliver the combination of guidelines, equipment, and training as a 'CICO bundle'. Underpinning our human factors approach was the development of a CICO algorithm and a CICO equipment kit, which have been precisely matched (Fig. 1). This satisfies the fundamental concept in human factors of improving interactions between people and their environment. The CICO algorithm is based on that published by Royal Perth Hospital;[9] however, it has been modified to match the specific equipment used at our institution. Our CICO kits are standardized and organized so that the equipment required for each step in the algorithm is easily identifiable and sequentially accessible. The CICO kits are located on every anaesthetic machine, making them immediately available. We have regular education and training sessions for all staff members, which involve both low- and high-fidelity simulation using the algorithm and real equipment in the kits.

Despite the NAP4 findings, feedback from participants through our CICO programme has been overwhelmingly positive in favour of a cannula-first approach. The standardized approach to our initial technique choice and use of equipment avoids indecision and benefits the human factors relating to 'task' and 'person'. The standardized equipment and training also benefits both the 'person' and 'team'. On an 'organizational' level, the implementation of our CICO algorithm and kit has facilitated funding for the required equipment, and ongoing training has benefits for both participants and facilitators within our department. We have also gained accreditation to deliver CICO emergency response training programmes to anaesthetists external to our institution in accordance with our National Continuing Professional Development requirements.

Rather than debate which of these techniques should be used first for emergency front-of-neck access, we think that a greater focus should be placed on maximizing success when either of these techniques is required. The role of human factors to maximize a successful outcome in a CICO scenario is well established.[4 10] These effectors of human performance will, however,