Should the neutropenic patient with respiratory failure be ventilated?

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The prospect of admitting a neutropenic haematology patient with respiratory failure onto an intensive care unit fills many intensivists with dread, compounded by the referring team's sometimes misplaced optimism.

An 80-year-old after emergency abdominal aortic aneurysm repair has the same chance of leaving hospital (Urwin and Ridley, 1999) as a 25-year-old with respiratory failure post-bone marrow transplant (BMT). Many view the former more sympathetically, despite the fact that the 25-year-old could be cured and could live to 80 years of age.

A landmark study by Rubenfeld and Crawford (1996), which looked retrospectively at survival predictors in 865 patients ventilated for respiratory failure following a BMT, is used as further ammunition in intensive care folklore that these patients, once ventilated, never survive. The logical progression from this is that although these patients cannot be denied intensive care they should not be ventilated. Did this paper actually show this, and have there been advances since it was written to change our attitudes and solve this dilemma?

Rubenfeld and Crawford recruited patients between 1980–1992 when the overall survival rate of their ventilated patients was 6.1%. However, during the last 5 years of the study, the survival rate improved from 5–16% despite the patients appearing sicker as judged by their APACHE 3 scores. Does this reflect better intensive care and better haematology care and referral?

Those that argue that ventilation is futile selectively choose the patients in this series with either a combination of three-organ failure (respiratory, renal, hepatic and/or cardiovascular, as judged by the use of vasopressors), or the combination of lung injury with another organ failure. In these groups, mortality was 100%. However, in those ventilated for respiratory failure alone, but not fulfilling their criteria for lung injury, the survival rate was 13%.

The dilemma seems to be unravelling: those with respiratory failure after BMT should be ventilated if required. If they develop acute respiratory distress syndrome (ARDS) criteria and require vasopressor support, or also develop hepatic and renal failure, then treatment appears futile and should be withdrawn after discussion with other carers and family. If only it were so simple.

There is evidence that non-invasive ventilation improves outcome in selected groups of patients — but are these techniques selecting out all those patients that would have survived invasive ventilation? Evidence for this comes from a prospective study of neutropenic patients with haematological malignancies (Hilbert et al, 2000) where the patients randomized to continuous positive airway pressure plus standard therapy that responded (25%) survived while all those that failed to respond died. In a second paper (Hilbert et al, 2001), trialling early non-invasive ventilation in an immunosuppressed group with lung injury, those randomized to the treatment group required intubation less and had a lower mortality.

A dilemma still exists, but the question is now: 'Should we invasively ventilate if non-invasive ventilation fails?' Rubenfeld and Crawford advocated that during consent for a BMT the risks of ventilation and the chance of surviving it should be addressed with the patient and their relatives. This is often not done before these patients come to the intensive care unit, so it is harder to explain this to them and their family at this time.

If the patient, their family and the referring team understand the intensive care prognosis, as opposed to the initial prognosis of the disease, then the decision of if/when to invasively ventilate could be seen on a more objective level. The intensivist needs to understand that all neutropenic patients cannot be lumped together and that haematology prognostic factors need to be taken into consideration before denying invasive ventilation.

These and economic issues cannot be addressed here, but aetiology of respiratory failure, time from transplantation to respiratory failure, type of transplant, previous transplant, expected time to engraftment and palliative or curative treatment are important. Lessons from the ventilation of ARDS patients and improved survival of neutropenic patients with lung injury over the last 20 years mean that we should err on the side of invasive ventilation should non-invasive ventilation fail. HM

Hilbert G, Gruson D, Vargas F et al (2000) Noninvasive continuous positive airway pressure in neutropenic patients with acute respiratory failure requiring intensive care unit admission. *Crit Care Med* **28:** 3185–90

Hilbert G, Gruson D, Vargas F et al (2001) Noninvasive ventilation in immunosuppressed patients with pulmonary infiltrates, fever, and acute respiratory failure. *N Engl J Med* **344:** 481–7

Rubenfeld GD, Crawford SW (1996) Withdrawing life support from mechanically ventilated recipients of bone marrow transplants: a case for evidence-based guidelines. *Ann Intern Med* **125**: 625–33

Urwin SC, Ridley SA (1999) Prognostic indicators following emergency aortic aneurysm repair. *Anaesthesia* **54:** 739–44

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