An unusual defect in the nitrous oxide pipeline

Sir,

We wish to report an unusual defect in nitrous oxide hose (Amvex, Richmond Hill, ON) that was detected while delivering anesthesia to a child. Routine checkup of all the equipment was done before starting the case in accordance with association guidelines and no leaks were detected.[1] A 3-year-old boy was scheduled for herniorrhaphy. Inhalational induction of anesthesia was started with oxygen (O_2), nitrous oxide (N_2O), and sevoflurane, using an Ohmeda Aestiva/5 machine (Ohmeda, Helsinki, Finland) with a Jackson Rees breathing system. Sevoflurane was increased progressively by 2% every 3–4 breaths. Despite delivery of 8% sevoflurane for 2 mines, the child continued to struggle. Inadequate filling of the reservoir bag was observed. Circuit was checked for any accidental disconnections. Visual inspection of the N_2O flow meter revealed a drop in the level of the bobbin from the initial setting of 3 to 0.8 l/min. An attempt to increase the N_2O flow rate, by rotating the knob, failed to increase the level of the bobbin. A fall in the N_2O pipeline pressure (on the anesthetic work station gauge) from 45 psig initially to 30 psig was also noted. Induction of anesthesia was achieved with sevoflurane in 100% O_2 at fresh gas flow rate of 4 l/min. Following induction, a quick search was made for possible cause of fall in N_2O pressures. The manifold pressures were at 45 psig and the machine had been checked for any leak before starting the case.

A close inspection of the N_2O hose demonstrated 18 cm long segment of fusiform dilatation [Figure 1] with a minute hole [Figure 2]. This portion of the hose was soft on texture and crepitations could be felt over it. Defect occurred possibly following the initial damage of internal nylon braided pipe resulting in the seepage of N_2O (at intermediate pressures) between the external polyvinylchloride (PVC) coating and nylon braiding. The gas leaked between the two layers of pipe, before puncture of the PVC coating resulting in sudden drop in the N_2O pipeline pressures occurred at the machine end. The most likely cause of the defect was the repeated wheeling of the anesthesia machine over the pipeline. Pipeline of N_2O was changed later.

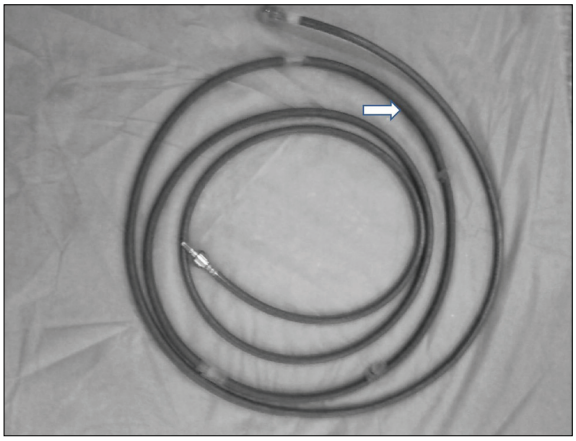

Figure 1: Nitrous oxide pipeline with arrow showing a dilated segment

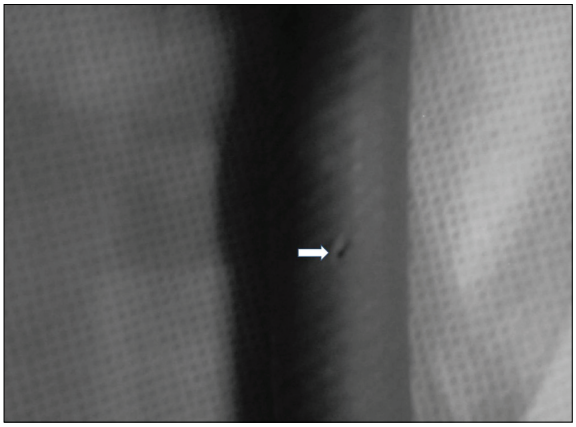

Figure 2: Arrow pointing hole in the dilated portion of nitrous oxide pipeline

Such a damage to the N_2O pipeline could present as sudden burst of pipeline and can even occur in an oxygen pipeline. The damage can be prevented by raising pipelines off the floor or by using gas columns/pendants/ceiling hose drops/articulating arms. Inspection of the anesthesia pipelines along with the test recommended for leaks[2] should be performed carefully and this should be added to the list of defects reported in the anesthesia gas pipeline systems.[3-5]

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