

Overdosage of opiate from patient controlled analgesia devices

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Patient controlled analgesia devices must be correctly positioned and include safety features to prevent overdosage

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When Keeri-Szanto described patient controlled analgesia in 1971 he observed that, because a large, potentially fatal amount of a narcotic drug is "hooked up" to the patient, fail safe methods of administering such drugs should be incorporated into the devices used. He suggested for example, that gravity feeding or syphoning should not be used.¹ Since then five cases of overdosage from patient controlled analgesia devices that have been correctly set up have been reported.²⁻⁵ We report a case of overdosage in a young girl, which was apparently caused by a fault in the syringe in the patient controlled analgesia device that she was using.

Case report

A 13 year old girl weighing 48 kg underwent surgery for kyphoscoliosis, in which Harrington rods were implanted in her spine. In the intensive care unit patient controlled analgesia was started (Graseby Medical, Watford, United Kingdom). The machine housed a 50 ml syringe containing 100 mg of

on a stand next to the girl's bed, about 80 cm above her.

While the second syringe was being used the girl became very drowsy, with a respiratory rate of eight breaths per minute. The nurses called the anaesthetist to assess both her and the patient controlled analgesia device. Figure 1 shows the position of the device in relation to the patient. Since the syringe had been changed, four hours earlier, the girl had demanded 15 ml of morphine solution (30 mg of morphine), which left 35 ml in the syringe. Closer examination, however, showed 20 ml of air in the syringe, which implied that the girl had received 40 mg of morphine more than she had demanded. The syringe seemed normal on close examination. The girl was given 200 µg of naloxone intravenously; within five minutes her breathing returned to normal and she became alert. No further problems arose either with her breathing or with her use of the patient controlled analgesia device.

Discussion

In paediatric wards patient controlled analgesia devices are often positioned a couple of metres above the floor so that small children cannot interfere with them. This precaution is unnecessary because the controls are locked. The raised position creates an uninterrupted column of fluid down to the patient. If the syringe is not airtight syphoning may occur, and a tiny air hole will allow a substantial flow. In this case we suspect that a small leak was present around the rubber plunger of the syringe, but a defect anywhere in the syringe would have the same effect. No flow occurs if an antisiphon valve is used (fig 2).

Syphoning may occur from any infusion syringe regardless of whether it is part of a patient controlled analgesia device and of the drug that it contains. Most opiate infusions, however, are given in high dependency areas, where frequent observation by nurses minimises the likelihood of a serious incident. The increasing use of patient controlled analgesia devices in low dependency areas demands that such devices should incorporate the highest standards of safety. We suggest that antisiphon valves should be used with all patient controlled analgesia devices (manometer tubes, which have no antisiphon valve, are often used); the devices should be positioned at or below the level of the patient; and support clamps for the devices should be lockable and the key available only to trained staff. Ideally, in the device the syringe should be positioned with its outlet at the top to prevent syphoning from occurring if the above recommendations are not followed (fig 1).

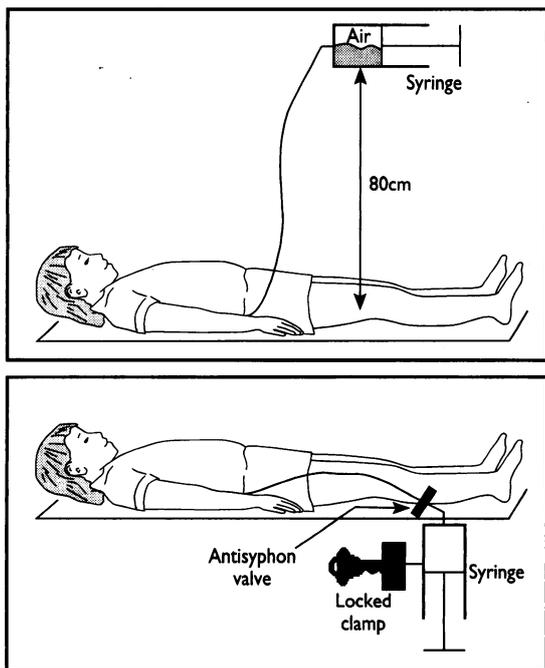


FIG 1—Top: Patient controlled analgesia device as used in case described. Bottom: Ideal patient controlled analgesia device with antisiphon valve, syringe with outlet at top positioned level with patient, and locked clamp

morphine in 50 ml of saline. The girl was allowed a 1 mg bolus on demand but no more than once every five minutes. The pump was connected to her with a fine bore manometer tube 200 cm long and a dedicated intravenous catheter. Satisfactory analgesia was achieved with only modest sedation. The girl returned to the older children's section of the paediatric ward. During the move the patient controlled analgesia device was detached from its stand and put on the bed beside the girl. In the ward the device was positioned

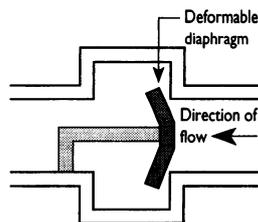


FIG 2—Diagram of cross section of antisiphon valve

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