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Syringe-based wound irrigating device

Sir,

Wound irrigation is an important aspect of wound treatment, which helps decrease bacterial contamination. The hydraulic forces generated by the stream of fluid acts on the debris on the wound surface and flush it from the wound. In order to remove the wound debris, the force of the irrigation stream has to be greater than the adhesion forces holding the debris to the wound surface. In 1994, Agency for Health Care Policy and Research (AHCPR) recommended a pressure of 10-15 pound per square inch (psi) to be ideal for wound irrigation.[1] Compared to swabbing or bathing, wound irrigation is considered to be most effective in wound cleansing.[2]

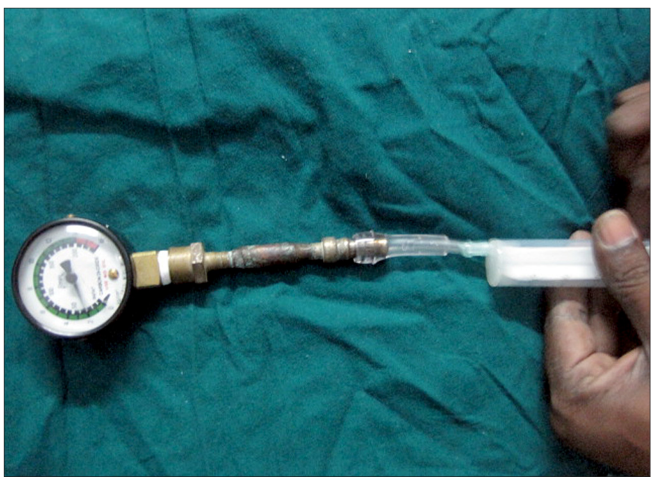

Figure 1: Experimental assessment of pressure generated

Figure 2: Wound irrigation

Many techniques of wound irrigation are currently in use.[3] Some of these, such as bulb syringe irrigation, deliver low pressure and may not be effective in decreasing bacterial load.[4] High-pressure, pulsatile irrigation devices are expensive, cumbersome, and difficult to keep sterile. A more practical and convenient way to produce pressurized irrigation is to deliver the irrigant from a syringe through a needle or catheter. It has been shown that delivery of saline from a 35-ml syringe through a 19-gauge syringe delivers a stream of irrigant to the wound surface at 8 psi.[5]

Experimentally, we have assessed the pressure generated by combinations of syringes and catheter sizes. In general, as the size of the syringe increases, the pressure decreases because the force applied to the plunger is distributed over a larger cross-sectional area. In contrast, increasing the size of the needle increases the pressure, as there is greater flow. We found that a 20-ml syringe attached to an 18-gauge angiocatheter delivers a stream of irrigant to the surface at approximately 12 psi [Figure 1].

Using this knowledge, a simple device was constructed from materials easily found in the ward. A 20-ml syringe was connected to a plastic tubing of an 18-gauge angiocatheter needle through a "three-way" connector. One inlet of the "three-way" connector was connected to a bag of normal saline on an intravenous (IV) stand. An empty IV fluid plastic bottle was cut by around 10 cm from the tip. The cut was made at an angle of 45°. The tip was then plugged on to the syringe. This funnel-shaped IV bottle piece formed a shield and prevented splash back [Figure 2]. This was important in view of significant risk of contamination with such fluids. It also made the whole process less messy. The oblique cut was made to facilitate a tangential administration of the irrigant. This also helps in easy outflow of the lavage fluid elute through one side from where it was collected into a sterile basin. The patient was positioned such that the lavage elute flow was from the upper end of the wound downward. The fluid (normal saline) was withdrawn into the syringe and the plunger was then depressed to spray the wound with the irrigant. Because of the "three way" connection fluid was sucked into the syringe on withdrawing the plunger. The total volume of irrigant used depended on the size of the wound.

This could make irrigation of wounds more convenient. One drawback of this method is operator fatigue while irrigating large wounds, and it may be better suited for medium- to small-sized wounds.

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