PROCEDURES FOR THE USE OF IMPLANTABLE AND EXTERNAL PUMPS FOR CONTINUOUS INFUSION CHEMOTHERAPY

Bettina Bentley Willis

Department of Nursing and Medicine, SUNY-Downstate Medical Center, Brooklyn, New York

The administration of chemotherapeutic agents is now being done more frequently on an outpatient basis which contributed to the improvement of the quality of life of cancer patients; this has become possible since small portable pumps were developed. The use of two of these pumps, one implantable (Infusaid), the other external (Cormed) will be described in this article. They are herein described, because of the author's familiarity with their use for more than three years at the Chemotherapy Unit of Downstate Medical Center, Brooklyn, N.Y. Several other types of portable pumps are also available and apparently equally effective, but the author did not have the opportunity to use them.

The Infusaid pump (Fig.1, see appendix) is an implantable apparatus which continuously infuses the desired dose of chemotherapy into the hepatic artery. It is implanted under the abdominal skin and therefore allows the patient complete mobility and minimal self-care. It does, however, require that patient returns to the clinic or physician's office for refills at regular intervals. The care, maintenance, and management of this delivery system are factors to be considered. To date, the use of Infusaid pump is approved by the FDA only for the administration of FUDR.

The following equipment should be assembled prior to the refilling procedure:

- Betadine swabs, alcohol swabs, surgical gloves, sterile drape, template (optional), huber needles, emptying syringe (without plunger), refilling syringe, refill tubing, 2" X 2" gauze, bandaid or spot.

The patient should be placed in a supine position. After identifying the pump site, its perimeter and side ports, it may be necessary to aspirate fluid, as the presence of a seroma surrounding the pump is frequently seen. Sterile techniques should be employed throughout the refilling procedure. The content of the seroma should be first removed in a syringe and should be appropriately cultured before proceeding with the routine of pump refilling. This routine should begin with the cleansing of the skin around and over the pump, first with betadine then with alcohol. A template may be used to locate the septum by placing it directly over the pump using the sideport as a guide. If flushing is needed this can be done through the sideport. In some cases, there may be two sideports, depending upon the type of pump which has been implanted (single or dual catheter).

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The central rubber septum should be identified (it is located directly in the center of the pump). The refill tubing can then be attached to the emptying syringe, and a special needle is attached to the tubing. It is imperative that the integrity of the rubber septum be maintained; for this reason we recommend the use of the Infusaid huber needles to avoid any coring, thereby preventing leaks and subsequent complications (a refill kit containing all the necessary items can be purchased from the company). The pump should be held steady with one hand. The needle is inserted into the septum by injecting directly perpendicular into the pump (right angle). Upon opening the stopcock on the tubing, if the needle is in place, fluid should return immediately into the empty syringe.

Sometimes it may be necessary to "walk" the needle around under the skin, if the initial puncture is not on target. This prevents needle withdrawal, and saves the patient from the discomfort of another puncture. "Walking" the needle clockwise subcutaneously frequently allows to successfully locate the septum without withdrawing the needle.

Once the needle is in place, and the fluid is returning, the syringe barrel is lowered to a level below the patient and maintained like this until the fluid has stopped rising in the syringe barrel. Once the meniscus ceases to rise in the barrel, the stopcock is turned off, preventing any of the fluid from returning into the pump inadvertently. The returned fluid must be measured, adding one ml to account for the fluid left in the tubing. The stopcock and syringe combination with the fluid can then be disconnected and replaced with the medication-filled syringe. The needle should not be removed. The medication can now be injected slowly with steady pressure. The plunger should be released every 5 cc, causing it to rise slowly, as the fluid returns to the syringe. This will confirm the fact that the needle is indeed still in place. One must never aspirate directly from the pump, as this may introduce blood into the pump and render it inoperable. Upon completion of the refill, the needle is removed with one swift upward thrust, and a 2 X 2 gauze is applied with slight pressure. When bleeding has ceased, a bandaid or spot is applied, and the refill procedure is completed.

It is of the utmost importance that patients keep their refill appointments, as the pump must never be allowed to empty completely. Patients should be instructed to return to the ambulatory clinic or physician's office for refill at 2-3 week intervals.

Each patient's pump has its individual table of curves supplied by Infusaid company to the surgeon at the time of implantation; they permit to calculate the FUDR dose and the administration flow rate.

While bearing the pump patients must avoid temperature extremes (e.g. sunbathing, saunas, etc.), high altitudes, and any activities which may cause trauma to the pump site. Such factors may cause a change in the pump flow rate; patients should notify their doctor or nurse if they become febrile, plan air travel or relocation to higher altitudes. In these cases the amount of drug and fluid injected in the pump should be recalculated applying special correction factors indicated in the instructions included with each pump. Should air travel be planned, the patient should be given an explanatory note, as the metal of the pump may cause questions at airport checkpoints.

The portable Cormed pump (Fig.2, see appendix) is an external device, which is attached to the patient's central venous catheter (e.g. the Hickman's and Broviac's catheters, etc.) and can infuse the desired dose of medication to the patient's circulatory system via a peristaltic pump action over a pre-set length of time.