Enteral Feeding Best Practices

Background

When parenteral nutrition (PN) was first introduced in the 1960s, the adverse effects of feeding a patient intravenously were unknown. Caretakers could not predict PN's deleterious effects on mucosa, increased risk of infection, or potential for organ damage. It is now known that even partial involvement of the gut is better than no involvement at all and, therefore, enteral nutrition is the preferred modality over PN. Simply put, the first rule of feeding is now paraphrased by the following dictum:

"If the gut works, use it."

Of particular concern is the enteral feeding of neonates, infants, and pediatric patients and the associated gastric reflux of feeding material around the outside of the feeding tube. Such material can potentially enter the lungs (i.e., aspiration) and result in serious complications in an already vulnerable patient population.

During enteral feeding, a patient's stomach contractions, abdominal movement, or crying may cause excessive gastric pressure through the accumulation of gas or liquid in the stomach. Such pressure is typically relieved by eructation (i.e.,burping), but in the case of a young patient undergoing enteral feeding, a control clamp or pump often prevents retrograde flow through the feeding tube. The resultant gastric distension and bloating can cause severe pain, inhibited lung expansion, and feeding intolerance. Resolution of these complications is further complicated in cases where patients cannot verbally articulate their pain because of age, intubation, or developmental delay.

Because feeding tubes alone are unable to obviate the potential for reflux and gastric distension, several solutions to enteral feeding complications have been attempted. The Murphy tube—a rudimentary system involving clamps to control flow—and other plastic tube improvisations proved infeasible because they were difficult to move with the patient, open to room air, or required sterilization.

The FARRELL® Valve System with Equilibrium Technology™

The FARRELL Valve System (FVS) is a reservoir system intended to allow the evacuation of excess gas and formula from the stomach of patients who are receiving enteral feeding. The FVS is a disposable, single-patient-use product that

- Reduces the threat of aspiration pneumonia by allowing the overflow of feeding formula to reenter the feeding tube rather than move upward to the esophagus[1,6]

- Reduces the pain and discomfort associated with fluid and gas retention by providing release via a ventilated FARRELL bag that doubles as a repository for excess formula[2,3]

- Reduces patient exposure to caregivers by continually refeeding formula that has backed up into the FARRELL tube and FARRELL bag rather than requiring the involvement of a caregiver
- Assists patients in reaching caloric goals, thus reducing the need for alternative nutrition (e.g, total parenteral nutrition [TPN])[5,7]

Gastric pressure occurs when excessive digestive gases are not vented by the patient or, in cases of limited gastric motility, when the stomach has reached its volume capacity. Medical therapies or conditions that create gastric distention or bloating—and often necessitate use of an FVS—include the following:

- Gastroesophageal reflux[2,3]
- Continuous positive airway pressure (CPAP)[4]
- Aerophagia[3]
- Delayed gastric emptying (DGE [gastroparesis])[2]
- Neurological impairments[2,3]
- DGE post–abdominal surgery[2,3]
- Motility disorders
  - Pseudo-obstruction
  - Short-bowel syndrome

FARRELL Valve System Best Practices

Over 2 million units of the FVS are sold every year, and although the principle technology is intuitive, best practices should be observed to ensure the viability of FVS as an enteral feeding solution. Best practices are simple and require little effort on the part of health care professionals. They include appropriate monitoring and priming, ideal positioning of the *Y* port, and early training of patients and caregivers in home health settings.

Appropriate Monitoring and Priming

During setup of the FVS, the blue clamp set below the *Y* port (i.e., the point of intersection for the FARRELL and feeding tubes) should be opened to establish flow after priming. In the case of our institution's neonatal intensive care unit (NICU), patients are on very low volume feeds (e.g. 1 mL/h) and thus require markedly longer time to establish flow before opening the white clamp positioned above the *Y* port. For this reason, our nurses continually monitor backup into the FARRELL tube, especially at the commencement of feeding. Flow must always be established before releasing the white clamp.

Y Port Positioning

If the *Y* port is positioned too high above the patient's stomach level, the formula will fail to reverse into the FARRELL tubing, thus preventing our NICU nurses from accurately gauging feed tolerance at bedside. A *Y* port set too far below the stomach can cause an excess of formula to back up into the FARRELL tubing—and subsequently the FARRELL bag—thereby precluding recurrent delivery of feeding formula into the gut. The ideal position of the *Y* port should be at or just below the stomach level, with the reserve of formula inside the

tube terminating just above the patient's stomach.

Early Patient and Caregiver Education

Early patient and caregiver education is of key importance, particularly in the home health setting or in cases where the patient cannot verbalize the need to vomit. The system should be demonstrated by practitioners first, and then patients or parents of patients should be encouraged to practice setup of the FVS. Such practice includes filling a feeding container, connecting the feeding tube to the *Y* port, and allowing the patient or parent to move the feeding tube vertically to observe the mechanics of the system (i.e., the Equilibrium Technology™). Caregivers of younger patients should be instructed to clamp the FARRELL tube during priming and setup and to only unclamp the tubing once the pump has started. Even in the home health setting, the FVS needs to be changed daily.

Mobile patients pose unique challenges and therefore require additional training. If the patient is in a stroller, caregivers should practice attaching the *Y* to a point on the stroller that appropriately corresponds to the patient's stomach level. Car seats set patients in a curved position and, consequently, potentiate reflux. If a patient is in a car seat for only a short time (<30 minutes) while traveling to clinic, we recommend caregivers to clamp the FVS to avoid apsiration, reflux, and vomiting. However, many of our patients are on 24-hour-a-day feeds, so for longer commutes, caregivers are instructed to practice hanging the FVS in a vehicle's backseat to ascertain a location that will avoid interrupting the continuous feed during travel. Backpacks may adequately house an FVS, but the *Y* port should be attached to a piece of clothing at the stomach level rather than to the backpack itself, since the latter may eventuate in inconsistent feedings if the backpack is removed.

Lastly, basic troubleshooting is an important component of patient and caregiver training. If there is a large amount of formula in the FARRELL bag, a caregiver should check the *Y* port for any occlusions or other issues and confirm that the lower (blue) clamp is not routing the formula directly to the FARRELL bag from the feeding container. The bag itself should be checked, as moisture can prevent air or gas from being released through the ventilation system. Sometimes troubleshooting is not related to the FVS but rather to the patient: caregivers can be trained to assess for bowel sounds, distension, and stool output, since some discomfort may manifest as a result of the patient needing to defecate.

References

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NOTE: Citations are for reference purposes only. These studies were not about the FARRELL Valve System; however, they do support the need for relieving gastric pressure in certain patient groups.