Managing Wound Care and a Fistula with High Output Drainage with Negative Pressure Wound Therapy (NPWT) using Antimicrobial Gauze

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The Enterostomal Therapy Department at the Grey Nuns Community Hospital in conjunction with the Surgical Department are working together to trial and evaluate the use of a specific advanced dressing technology - NPWT using antimicrobial gauze instead of foam on patients with a challenging wound and life threatening post operative complications.

This case study focuses on a 53 year old male who developed sepsis and postoperative complications after a laparotomy which was converted to an open cholecystectomy for acute cholecystitis and cholecholithiasis. This patient's gastric high output fistula was located in his abdominal incision.

Patient underwent ICU admission and a long course of IV antibiotic treatment, NPO (nothing by mouth) and TPN, in conjunction with NPWT postoperatively for a period of 3 months.

During the course of the NPWT dressing, this patient's incision healed and the high output from the gastric fistula was managed. The patient then required surgery to close the gastric fistula.

This patient was a willing participant in his care with NPWT and allowed for tracking of the progress of his wound with photographs. He was also willing to try different techniques for application to help manage the wound and the fistula drainage. This case study along with an analysis of other wound and fistula patients using this therapy will lead us to develop a standard of practice for its use.

Introduction

Wound healing and treatments are progressive and the medical environment is evolving. There are multiple new technologies and research providing innovative insight and opportunity for advancing best practice to be implemented into multiple clinical areas. Best practice includes a multi-disciplinary approach. [4,7,8] This team includes: Physicians (makes diagnosis), Dieticians (nutritional support), Physiotherapist/Occupational Therapist, (guiding treatment to maintain quality of life through maintaining and enhancing physical function), Pharmacist (pharmacological support), Staff Nurses (direct nursing care), and Enterostomal Therapist (a facilitator and provisionary of wound care treatment protocols). It also focuses on patient-centered care. NPWT was the chosen treatment in this particular case. Clinicians and the team have to "develop treatment strategies that take into account not only the theoretical mechanisms of NPWT, but also the practical realities of what available systems can deliver." [1]

A fistula is an abnormal tract between two structures; classified by location, involved structures, and type/amount of effluent/exudates. [2,5,7,8] Location of fistula is imperative to determining goals of care and management/treatment strategies. There are studies indicating that mortality rate with fistula occurrence post treatment are between 5-21%. [5] Fistula recurrence is 20% in the first 3 months after a major surgical procedure. [5] Factors that contribute to fistula occurrence include: 1% in advanced malignancy or obstructing tumor, Crohns Disease, presence of foreign body, and tension at surgical suture lines. [5,8] Through series of research, uncomplicated fistula with conventional treatment is predicted to be closed within 6-7 weeks. [5]

Method

This poster presents a case study of a 53 year old patient who acute cholecystitis and cholecholithiasis and underwent an open cholecystectomy. During surgery, he was found to have large stone in his bile duct and underwent ERCP (Endoscopic Retrograde Cholantiopancreatography). Unfortunately, he developed a bile leak post ERCP and underwent another emergency operation. He developed multiple fistulae within the abdominal surgical wound, with the most prominent fistula direct from stomach to skin. More corrective surgery could not be considered again for this patient due to his past surgical history and multiple co-morbidities; therefore, alternative methods were trialed to fix the wound/fistulae. This patient gave informed consent to treatment and a repeated time course of images to record data.

Immediately after the first surgery, NPWT with foam was applied in the OR. When the effluent was not managed by the NPWT with foam, this was discontinued and conventional gauze dressing was chosen as treatment of choice to address the sensitive nature of the wound (e.g.-"possible exposed bowel" and "unexplored fistulae"). Fistulae effluent was continuous and flowing. Through post-radiological exam and multiple multidisciplinary discussions between Physician and ET (Enterostomal Therapists), it was determined and confirmed that four fistulae within the wound were present, fascia was open and bowel was exposed. It was further discussed that NPWT would still be the most appropriate treatment and therefore, NPWT with gauze was considered.

In this case, NPWT with gauze has been proven a superior dressing. [3,4] What makes it equally important are two NPWT machines used simultaneously to treat this wound with multiple fistulae. Due to unmanageable effluent, time-consuming care, increase staff demand and consideration for patient quality of life, the more effective, creative approach had to be trialed. The fistulae especially impacted the emotional, mental and physical status of the patient; therefore having patient input on a regular basis was a critical aspect of wound/fistulae treatment. "NPWT results in greater reduction of wound size in a decreased amount of time." [4,6] NPWT is a "non-invasive therapy that uses negative pressure under a seal to provide a closed environment, reduce edema, remove exudates; allow for transient cellular movement throughout the wound, increase cell replication and granulation, and approximate the wound by secondary intention." [1,5,6]

Outcome Goal

The initial goal was to contain effluent in the wound and reduce bacterial burden on surrounding tissues and organs. This proved difficult. Therefore, the outcome goals stood to include: slowing down of fistula output, and provide healable wound environment; provide adjuvant medical support (nutritional/pharmacological), provide emotional/physical support and maintain quality of life, eventually closure of the fistulae.

Discussion

The use of NPWT proves to lead to obtaining these goals. "NPWT can be there to occlude the fistulae, control and monitor amount of effluent, contain the odor and protect the surrounding tissues and skin, and decrease pain." [4] It was agreed the four fistulae would be treated as one with the use of NPWT that included antimicrobial impregnated gauze to protect the internal wound environment, under a sterile drape with adjuvant dressings to protect perifistular/periwound. This alternative option, where consistent negative pressure applied to remove effluent in timely manner and still maintain moisture balance, also assisted with allowing for granulation of new tissue to wound bed, fistula closure (3 of 4), and wound contraction within three months. Due to the size of the wound and nature of wound effluent, multiple PHMB impregnated gauze were tied together and placed into the wound under the sterile drape. This "is an easy to apply dressing that allows for adaptation to wound shape, without constricting tissue and effective in wound bed for up to 72 hours." [4] The porous nature of the gauze allows the thick effluent to pass through and be removed by negative pressure, in which the NPWT foam could not do. Prior to this, to protect the wound bed and bowel, a specific non-adherent interface was chosen to be used and wound filler was placed on either side of the wound to fill any uneven surfaces. The first gauze placed over the interface kept was dry which proved an innovative approach to provide longer time for effluent to transfer through and keep the dressing intact for a longer duration. Two different skin barrier absorbent dressings were trialed to provide protection of the periwound. When the NPWT dressing was initiated, low continuous suction (50-75 mmHg) was applied. However, due to the presence of multiple fistulae and the expedient rate of effluent (>2L / 24 hours), continuous suction was increased to 80 mmHg to 100 mmHg (each). The amount of continuous suction was also manipulated and tested throughout the course of treatment leading to eventual consistent safe continuous suction to be left at 100 mmHg (each). Eventually, a mallecot drain was inserted into the largest, most active fistula, within the NPWT dressing and left to drain outside the wound. Unfortunately, none of the fistulae could be isolated; therefore they were treated as one. Patient experienced minimal dressing pain, and odor was contained, both important to patient quality of life. What is special about this case is the use of two NPWT machines, with the use of multiple antimicrobial gauzes and, large size canisters (750 ml), were used simultaneously.

This patient had four gastric high output fistulas – located at either end of his abdominal incision. Fascia was open and bowel was exposed. JP drain is insitu.

The high gastric output caused some trauma to the periwound skin so soft silicone faced polyurethane foam dressing and ostomy rings were used to protect it. The wound bed was lined with an interface, then the saline soaked antimicrobial gauze was inserted into the wound.

The porous nature of the gauze allowed the thick effluent to pass through and be removed by negative pressure, in which the NPWT foam could not do. With two NPWT machines at 100 mmHg each, a seal was maintained, the effluent was managed and the periwound skin healed.

The wound healed well and 3 of 4 fistulas closed on their own. The Malecot was placed in the fourth fistula to divert effluent from the wound allowing it to heal and patient then returned to operating room to close final fistula.

The wound closed.

The creative approach and manipulation of wound care techniques, proved positive adaptation and facilitated faster healing trajectory. In recent study, it was determined that NPWT "yields an increase in granulation tissue of 63% over saline-moistened gauze (with no negative pressure)." [1] When microvascular blood flow is improved, higher levels of oxygen and nutrients can travel to the wound base and generate healing. Reperfusion is maintained with the balance NPWT provides in a closed environment.

ET presence and support via consultation and bedside assistance with dressing changes and education proved valuable and enhanced positive team approach, despite the immense challenges the fistulae/wound presented. Weekly discussions with team members, including patient input allowed for positive hospital experience. It was agreed that two nurses were allocated to complete the dressing. In most of the dressing changes, one of the two nurses present was the ET wound specialist. This allowed for continuous reassessment and re-evaluation of the dressing process, and to provide support to staff and patient.

Conclusion

Gastrocutaneous fistula has proven to be challenging. In this case study, with the use of NPWT with gauze over conservative dressings, three of four fistulae closed and remaining fistula effluent redirected, allowing for decrease in wound size and depth. Surgery for the remaining fistula was completed in four months. This patient participated in decision making and monitoring of his wound with NPWT. The patient maintained quality of life, by being able to leave on day passes once drainage decreased and NPWT dressing stayed intact, prior to reoperation to close fistula. This supported the patient's emotional and mental health. Innovative technology is moving to the forefront, as wound care evolves at rapid speeds. The multidisciplinary approach with patient-centered care proved efficient and safe. Balance of both with a creative approach of using two NPWT with gauze simultaneously proved reliable and effective. More trials and discussions need to be centered on the use of NPWT and wound fistula, as well as using creative approaches with available wound care technology and resources.

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