



# Mepilex Border Dressings for the Prevention of Pressure Ulcers Caused by Nephrostomy Tube Securement

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**Abstract:** Objective: To investigate the clinical effectiveness of Mepilex Border dressings for the prevention of medical device-related pressure ulcers (MDR PUs) caused by the nephrostomy tube securement with the drainage tube. Methods: Equally randomized 60 obstructive hydronephrosis patients in our hospital who were treated by ultrasound-guided percutaneous nephrolithotomy (from March 2018 to March 2019) into observation group and control group. The observation group was applied dressings beneath the junctions of nephrostomy tubes and drainage tubes before secured with 5\*5cm I-shaped 3M elastic adhesive tape to avoid direct contact to patients' skin; the control group was only secured with 5\*5cm I-shaped 3M elastic adhesive tape to the bare skin. The incidences of skin indentations, local pain and pressure ulcers under the junctions were compared between two groups. Results: There were statistical significance ( $P < 0.05$ ) among two groups: all patients in control group ( $n=30$ ) were presented with skin indentations in different degrees, 21 with local pain, 6 with first-stage pressure ulcers, while no evidence of the above situations was found in the observation group. Conclusions: Application of Mepilex Border dressings can prevent the occurrence of MDR PUs to improve patient comfort.

**Keywords:** Mepilex Border Dressings, Nephrostomy Tubes, Securement, Medical Device-Related Pressure Ulcers

## 1. Introduction

Urolithiasis-caused obstructive hydronephrosis as a common disease. It is a therapeutic principle to relieve obstruction, drain urine and protect renal function. At present, It can be simply treated by an effective operation called ultrasound-guided percutaneous nephrolithotomy [1-3] which requires insertion of nephrostomy catheter for urine drainage. Percutaneous renal puncture fistula guided by B-ultrasound is a simple and effective method for the treatment of obstructive hydronephrosis. It is particularly important to keep and fix the nephrostomy tube for drainage after puncture.

Catheter nursing, focusing on patency, is crucial in postoperative care, especially for pyonephrosis and hydronephrosis patients, but for nephrostomy tube-catheterized patients, detachment prevention becomes the key, which is usually performed by 3M elastic adhesive tape clinically. However, close contact to the prominent tube junctions may trigger malaise like local pain and skin indentations, and even medical device-related pressure ulcers

(MDR PUs) [4, 5] which can significantly increase pain, interfere with treatment and reduce patients' quality of life, or even result in medical disputes. Mepilex Border dressings were introduced to our department (from March 2018 to March 2019) for nursing and were well-received by both patients and their family for its simplicity and favorable outcomes. The study is reported as follows.

## 2. Data and Methods

### 2.1. General Data

Clinical data were collected from urolithiasis-caused obstructive hydronephrosis patients in the First Affiliated Hospital of Jinan University who were treated by ultrasound-guided percutaneous nephrolithotomy with postoperative nephrostomy tubes placement from March 2018 to March 2019. Patients were equally randomized into observation group and control group, each for 30. 16 males and 14 females aged 23-74 (mean age  $55.07 \pm 9.66$ ) were

enrolled in observation group with hydronephrosis (18 sever, 10 moderate, 2 mild); pyonephrosis (2 left, 4 right), urolithiasis (17 upper, 10 mid, 3 distal); catheterization time 3-15 days (average  $7.59\pm3.15$  days). 19 males and 11 females aged 20-75 (mean age  $55.24\pm10.04$ ) were enrolled in control group with hydronephrosis (15 sever, 14 moderate, 1 mild); pyonephrosis (3 left, 5 right), urolithiasis (18 upper, 9 mid, 3 distal); catheterization time 4-14 days (average  $7.72\pm2.53$  days). Two groups were comparable in terms of gender, age, degrees of hydronephrosis and catheterization time with no statistical significance ( $P>0.05$ ).

2.2. Material and Methods

2.2.1. Materials

Meplix Border dressings (Mölnlycke Health Care AB, Gothenburg, Sweden, Figure 1); disposable drainage tubes specialized for nephrolithotomy postoperative care (Bioteque Corporation, Taiwan, China); 3M medical elastic adhesive tape (3M Japan Limited Health Care Company).



Figure 1. Mepilex Border Dressings produced by Mölnlycke.

2.2.2. Fixation

The junctions of postoperative tubes in the observation group were first centred on the 10×10 cm Meplix Border dressings before secured with 5×5cm I-shaped 3M elastic adhesive tape to ensure drainage patency and avoid detachment (dressings replaced every 7 days); the control group were secured only with same tape that was slightly repositioned once a day during which the skin inspection was conducted (Figure 2).



Figure 2. Application of Mepilex Border Dressings in Nephrostomy Tube Securement.

2.2.3. Evaluation

Incidences of skin indentations on applied areas; local pain assessment by Numerical Rating Scale (NRS) and Wong-baker FACES Pain Rating Scale; incidences of MDR PUs determined by the classification system [6] in 2014 Prevention and Treatment of Pressure Ulcers: Clinical Practice Guideline.

2.3. Statistical Methods

Data was analyzed by SPSS17.0 for chi-square test and  $P<0.05$  was considered statistically significant.

3. Results

3.1. Incidences of Skin Indentations Beneath the Junctions of Nephrostomy Tubes and Drainage Tubes

Skin indentations (depth varied from 0.1-0.2 cm) occurred in all patients in control group while no evidence of that was found in observation group, indicating statistical significance ( $P=0.000$ ) as shown in Table 1.

Table 1. Incidences of Skin Indentations.

Group	Positive	Negative
Observation	0	30
Control	30	0
P		0.000

3.2. Local Pain Assessed by NRS on the Applied Areas of Nephrostomy Tubes connecting with Drainage Tubes

Local pain occurred in 21 patients in control group (10 scored 1, 8 scored 2, 3 scored 3, NRS) while no evidence of that was found in observation group with a significant difference ( $\chi^2=32.308$ ,  $P=0.000$ ) as shown in Table 2.

Table 2. Incidences of Local Pain.

Group	Positive	Negative
Observation	0	30
Control	21	9
P		0.000

3.3. Comparisons of the Incidences of MDR PUs Between Two Groups

6 patients in control group suffered from Stage I MDR PUs while no evidence of that was found in the observation group, with a significant difference ( $\chi^2=6.671$ ,  $P=0.01$ ) as shown in Table 3.

Table 3. Incidences of MDR Pus.

Group	Positive	Negative
Observation	0	30
Control	6	24
P		0.01

## 4. Discussion

To minimize infection and protect renal function, postoperative nephrostomy tube securement for drainage is usually conducted after ultrasound-guided percutaneous nephrolithotomy on urolithiasis-caused obstructive hydronephrosis patients. Patients enrolled in this study were all applied nephrostomy tubes connecting with hard drainage tubes which were simply secured by medical tape with no dressings in control group. Vertical pressure to patients' skin elevated by long-term securement and the friction increased by spontaneous movements could both contribute to local skin injuries. According to NRS, 21 patients in control group suffered from mild pain (10 scored 1, 8 scored 2, 3 scored 3) while no evidence of that were found in observation group. Therefore, we assume that the pain was associated with the hardness of catheter connectors and friction, which is in line with relevant literature and reports [7-9].

In this study, different degrees of skin indentations were found in control group, including 6 patients with Stage I pressure ulcers: intact skin with non-blanchable erythema, connector-shaped indentations and clear edges to the surrounding tissue, which all recovered (good blood circulation and smooth skin in the localized areas) through applying sanyrene and gauze and constantly repositioning the tape. In this case, more nursing time was required and patients were subjected to pain and anxiety that had substantial impacts on quality of life. It has been reported that solid medical devices create more friction and are more likely to trigger pressure ulcers, even MDR PUs (injuries develop when underlying tissue are subjected to a sustained pressure or shear from medical devices) [10-12], and foam dressings are now recommended by pressure ulcers prevention guideline to relieve pressure so as to protect the skin [6, 13-14].

In observation group, Meplix Border dressings made remarkable outcomes as no evidence of MDR PUs was found among all patients. It substantially reduced nursing burden as no constant replacement was required (changed every 7 days). Also, Meplix as barriers can effectively ease the vertical pressure brought by the junctions and friction caused by body movement. It is a kind of foam dressings with soft retention layer that can keep good blood circulation and relieve pressure by providing greater load redistribution, and has been proven to be an effective clinical preventive measure for pressure ulcers [15-17].

## 5. Conclusions

In conclusion, Meplix Border dressings can work effectively in the prevention of MDR PUs caused by nephrostomy tube securement (mainly for load redistribution and friction reduction) while ensure drainage patency. In the second fixed special drainage tube, such as fixing the end of renal fistula and the connection of drainage tube, we add Mepikang application between skin and fistula to avoid joint

friction to skin. The application of Meipikang application can effectively prevent the occurrence of catheterized pressure sore, reduce the pain of patients, improve comfort. Additional application of Meplix Border dressings is particularly efficacious in alleviating friction between patients' skin and special-shaped connectors so as to minimize the incidences of MDR PUs. It is worthy to recommend for clinical application as it lessens patients' pain, reduces nursing burden and optimizes postoperative treatment for better patient satisfaction and clinical outcomes.

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