

Prevention of Intraoperative Blistering in the Prone and Lateral Positions

Hiromi Takamura
Nurse

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Introduction

Our research in 2001 showed that “there is a significant association between the occurrence of skin disorders and the degree of incline of the bed used during surgery, and in procedures involving more than 300 minutes in surgical position.”¹⁾

Modification of position fixing and new pressure-reducing devices have since been introduced to prevent pressure ulcer; however, postoperative blistering is still reported on many occasions. Our survey on postoperative pressure ulcers conducted in 2003 found 15 cases of pressure ulcer, among which about 60% had been caused by surgery lasting more than 240 minutes either in the prone or lateral position.

Blistering is classified in the second depth degree of pressure ulcers, and should not be neglected. The fundamental cause of a pressure ulcer is locally compromised blood flow, although many factors are involved in its pathogenesis. Blistering develops when shear stress is applied to the skin surface.

The present study involved the application of polyurethane film (film dressing) usually used for blistering protection or prevention of progressive pressure ulcers at the bony prominences, in order to prevent shear stress—a local cause of blistering. The study results, which are reported here, demonstrated that the film dressing was effective for blistering prevention after more than 240 minutes of either the prone or lateral surgical position.

Purpose

To demonstrate that applying film dressing on the compressed region of the skin will reduce postoperative blistering after more than 240 minutes in either the prone or lateral surgical position.

Methods

1. Study subjects and period

Patients undergoing a surgery requiring more than 240 minutes of either the prone or lateral surgical position.

January 2002 – July 2004

133 cases: Without applying film dressing

August 2004 – April 2005

66 cases: With applying film dressing

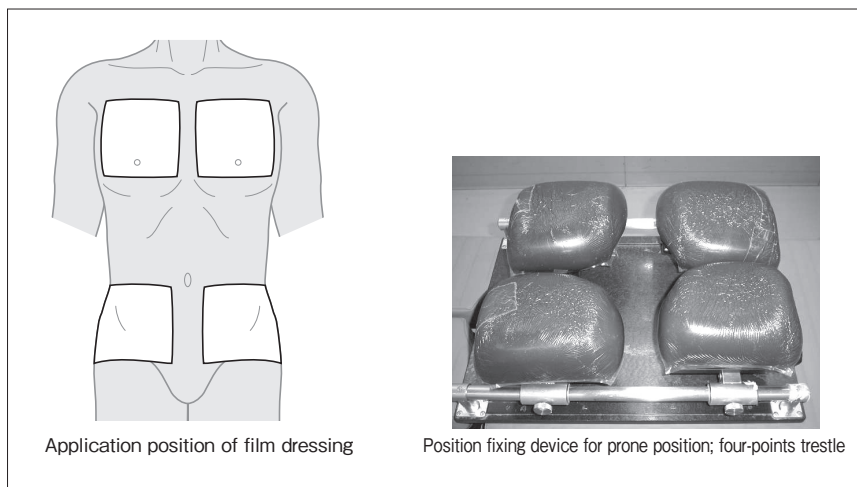


Figure 1: Application position of film dressing in the prone position

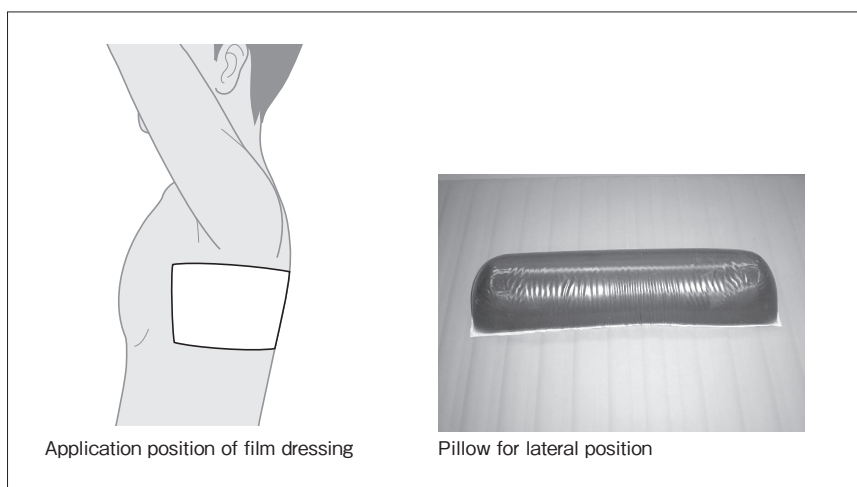


Figure 2: Application position of film dressing in the lateral position

2. Methods

a. The relation between application of film dressing and blistering was examined and weighed by the following data.

Incident reports from January 2002 to December 2003

Nursing reports for surgery from August 2004 to April 2005

b. YU-KI Perme-Roll® (Nitto Medical Corporation) was used as film dressing.

c. Application of film dressing:

- Surgery in prone position: Film dressing of about 15 x 15 cm were applied on the precordial and bilateral iliac regions where the body was in contact with the four-point trestle (Figure 1). The four-point trestle supports the body at four points in bilateral subclavian precordial and iliac regions, and is covered with sponge of about 15 cm and a gel mat about 2 cm in

thickness.

- Surgery in lateral position: Film dressing of about 15 x 10 cm were applied on the lateral pectoral region where the body was in contact with the pillow for lateral position (Figure 2).

The author uses a four-points trestle during prone position surgery, and a gelatinous pillow for lateral positioning during lateral position surgery.

d. The film dressings were removed in 30 minutes after the end of the surgery when the patient was returned to the supine position. Thus redness caused by stimulus of dressing removal was distinguished from that caused by compression.

3. Analysis

Fisher's exact test was used.

4. Ethical considerations

Preoperative explanation of the purpose and methods of the study, anonymity, and non-use of data except for the purpose of the study was provided to the subjects, who gave their informed consent.

Results

Surgery requiring more than 240 minutes of surgical position was performed in 199 patients, among whom 102 were in the prone position, and 97 were in the lateral position (Figure 3).

Concerning the relation between

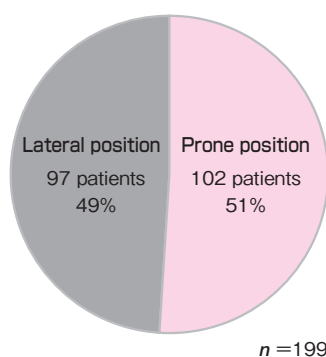


Figure 3: Ratio of prone and lateral positions

application of film dressing and blistering, blistering was observed in 23 patients who were not treated with film dressing while the group of patients who were treated with film dressing did not develop any blistering at all. A significant difference was recognized between surgeries with and without application of film dressing (Figure 4).

Concerning the relation between surgical position and blistering, blistering occurred in 11 out of 102 patients undergoing surgery in the prone position, but not in the other 91, while it occurred in 8 out of 97 patients undergoing surgery in the lateral position, but not in the other 89. Thus no significant difference was seen between surgery conducted in different positions (Figure 5).

Discussion

The fundamental methods for prevention and treatment of pressure ulcer are usually repositioning, use of pressure-

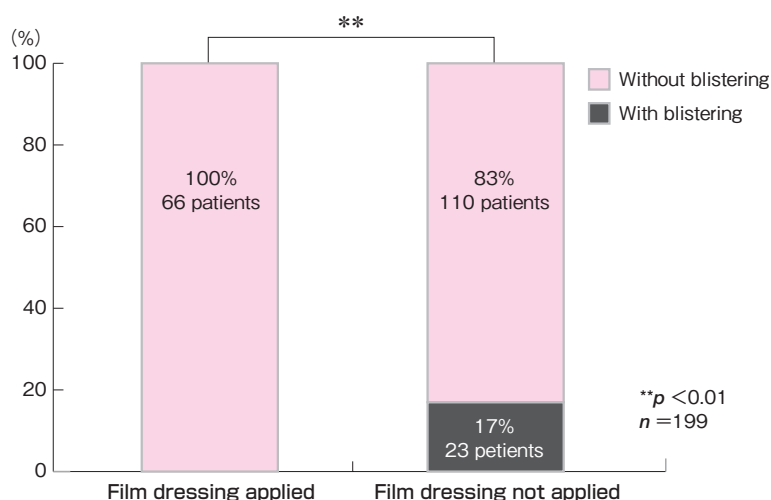


Figure 4: Relation between application of film dressing and blistering

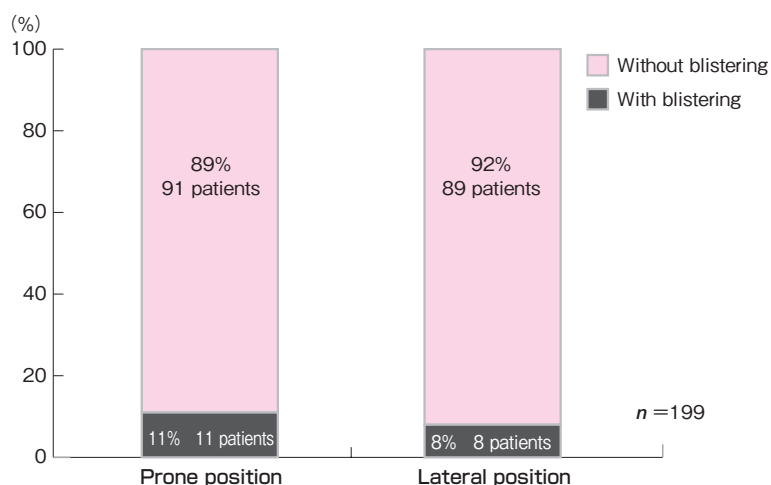


Figure 5: Relation between surgical position and blistering

reducing devices and nutrition management. These methods can also be applied in an operating room, in which use of pressure-reducing devices is most effective to prevent pressure ulcers.

Moreover, intraoperative pressure ulcer predictive scores in the study published by the Department of Surgery, University of Occupational and Environmental Health have

demonstrated that the primary cause of pressure ulcer is surgical position. Active interventions including use of pressure-reducing devices are necessary, especially in prone and lateral positions associated with high pressure ulcer scores.

Oura stated that “the pathogenic mechanism of pressure ulcer lies in stress (compressive, tensile and shear stresses) x time, and not in

compression \times time³." This means that long-time stress on the skin surface will result in susceptibility to pressure ulcer. In fact, our previous study also showed that the shear stress associated with bed rotation can cause pressure ulcers.

In the present study, film dressing were applied on the skin surface to prevent shear stress, as blistering was considered to be associated significantly with stress during surgeries in the prone and lateral positions. The film dressing used in the study are also used at bony prominences in sacral and other regions in order to prevent redness from progressing into blistering.

None of the patients who used film dressing developed blistering. This may be because the film dressing significantly suppressed the shear stress on the skin surface generated by vibration during bed rotation or surgical manipulation. In addition, antiseptic solution may permeate the compressed region of the skin, creating a moist environment.

Humidity is believed to increase friction, leading to heightened shear stress, diminished resistance due to macerated skin and susceptibility to pressure ulcer. This suggests that film dressing may have prevented antiseptic solution from permeating the skin surface, thus preventing blistering.

Skin disorder due to the stripping stimulus had been expected to occur

when removing the film dressing; however, no such occurrence was reported immediately after the surgery. This may be partially because the gelatinous adhesive used in the film dressing reduced stimulus of removal.

The day after the surgery, small blistering was observed, but resolved within two days. This blistering was caused by wrinkled film dressing which applied on the skin: in future practice, steps should be taken to ensure that the application steps and the removal steps of film dressing are well understood.

The significant difference observed between surgeries with and without applying film dressing indicates the efficacy of film dressing in the prevention of blistering.

Conclusion

Application of film dressing on compressed regions of the skin can prevent blistering in procedures requiring more than 240 minutes in the prone or lateral surgical position.

Final remarks

Pressure ulcer often develops during surgery in the prone and lateral positions, and after surgery in the supine and lithotomy positions. After surgery in the prone or lateral

position, the depth of pressure ulcer rarely increases because compression is removed. However, a lesion in the sacral, calcaneal or occipital region will progress to a I or II stage pressure ulcer in a short time even if the lesion showed only reactive hyperemia immediately after the surgery, because these regions are continuously compressed during postoperative bed rest.

Based on the study results that have demonstrated the efficacy of film dressing during surgeries in the prone and lateral positions, we would like to enhance our preventive measures against perioperative pressure ulcers, including those occurring in common sites such as sacral region.

From a presentation at the 19th annual meeting of Japan Operative Nursing Academy (Okayama, October 14 and 15, 2005)

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