Preventing post-operative blisters following hip and knee arthroplasty

The aim of this study was to assess the ability of an absorbent foam dressing in preventing post-operative wound blistering following hip and knee arthroplasty. Complications following hip and knee arthroplasty are surprisingly common with widespread reports of wound blistering, leakage and infection. The selection of suitable dressings for the treatment of such wounds is, therefore, an important part of surgical wound care management. Until 2001, a traditional absorbent dressing (Cosmopor® E; Hartmann) was used at Alingsas Hospital, in Sweden, for the management of surgical wounds but persistent leakage resulted in the need for frequent dressing changes, increasing the risk of infection. Wound blistering was also a problem. The introduction of an Aquacel® (ConvaTec)/Tegaderm™ (3M Health Care) dressing combination did address absorption concerns but wound blistering remained an issue. Mepilex® Border (Mölnlycke Health Care), an absorbent foam dressing incorporating Safetac® (soft silicone) technology, was subsequently introduced with the ultimate aim of preventing periwound skin blister formation during the post-operative treatment period following hip and knee arthroplasty. The absorbent foam dressing was applied to 146 patients who had undergone scheduled hip or knee arthroplasty. Dressings were changed on the fourth postoperative day or earlier if there was a clinical need. The post-operative wound status and dressing performance were recorded.

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INTRODUCTION
Post-operative wound blistering is a common surgical complication. Increased friction and/or tension at the interface between the skin and the wound dressing creates shear forces, loosening the connections between the epidermis and dermis, which causes the separation of the two skin layers and allows interstitial fluid to seep into the newly created space to form blisters[1,2]. Wound exudate, an essential factor in the normal healing process[3] can exacerbate this problem — moisture increases friction forces and softens the skin, which weakens its outer layers.

Following the development of skin blisters, patient discomfort and pain can increase, wound healing can be delayed and the risk of wound infection can rise because of a breakdown in skin integrity[4]. Blisters require extra dressing changes, which necessitate additional nursing time and can delay hospital discharge[5], all of which increase overall treatment costs.

THE IMPORTANCE OF DRESSING CHOICE
Skin blisters generally develop at the point of...
dressing adherence. Dressing choice, therefore, is an important consideration. Dressings that lack elasticity, or those that are applied too tightly, in some cases to provide compression, create greater tension at the skin/dressing interface. This can be exacerbated by post-operative wound oedema and/or physical movement [6,12].

HIP AND KNEE ARTHROPLASTY
Orthopaedic patients, especially those undergoing hip and knee arthroplasty, commonly experience problems with skin blistering. These surgical procedures involve incision sites that are located over joints with continual skin movement, and are associated with much of the intra-operative positioning and joint manipulation that can result in soft tissue oedema. In addition, wound dressings are required to remain in place over long time periods. All these factors can contribute to the development of post-operative skin blisters.

Rates of incidence of skin blistering following hip and knee arthroplasty have been reported in the literature as being between 2.4% and 41% [3,6,7,12]. The number of joint replacements that are performed annually is steadily increasing. For example, in Sweden 35,699 patients underwent hip and knee prosthesis surgery in 2009, compared with 20,224 patients in 1999 [14]. Due to the rise in joint replacements, the number of surgical complications and their related health care costs will concomitantly increase. Until 2001, post-operative wound care following hip and knee arthroplasty at Alingsås Hospital saw the traditional absorbent dressing, Cosmopor E being routinely used. Unfortunately, hip and knee arthroplasty wounds can be highly exuding [10], simply as a consequence of their size [11], and persistent dressing leakage was identified as an issue. Dressing changes were, therefore, carried out more frequently, which increased the risk of post-operative wound infection. Furthermore, periwound skin blistering was a concern.

In an attempt to overcome these problems, an Aquacel/Tegaderm dressing combination was introduced, which provided sufficient absorption but failed to prevent the development of wound blisters. This continued development of skin blisters correlates with results in the published literature of wound blistering following treatment with Aquacel alone (13%) [10], in combination with Tegaderm (2.4%) [12] or with Tegaderm plus pad (16%) [13] following hip and knee surgery.

ABSORBENT FOAM DRESSING
In 2007, Mepilex Border was introduced into the post-operative wound care regimen with the ultimate aim of preventing these periwound skin blisters.

Mepilex Border is an all-in-one island dressing that incorporates a perforated wound contact layer that uses Safetac (soft silicone) technology, an absorbent pad, and an outer vapour-permeable waterproof film. Mepilex Border is designed to absorb exudate but still maintain a moist wound-healing environment and minimise the risk of maceration.

The Safetac technology allows the dressing to adhere to the surface of intact dry skin yet it remains in situ on the surface of a moist wound or damaged periwound skin without adhering to the fragile tissue. Soft silicone adhesives are described as micro-adherent — many contact points are established over the uneven surface of the skin.

Consequently, it could be reasonably assumed that the increased contact between the skin and dressing may help to reduce the risk of friction resulting from physical movement, alleviating blister formation. In addition, the seal that forms between the intact skin and dressing prevents the lateral movement of wound exudate onto the surrounding skin, which helps prevent the maceration of the periwound area [14].

The aim of this study was to assess the effectiveness of Mepilex Border in preventing post-operative skin blisters following hip and knee arthroplasty.

METHODS
This prospective study was carried out at Alingsås Hospital between February and April 2010. It initially involved 146 patients, all of whom received the test dressing (Mepilex Border) to use as the post-operative dressing. Ethics committee approval was not required because the dressing was used in accordance with its intended use and in line with routine clinical practice. After relevant training, the study nurses documented the post-operative wound status for each patient during the treatment period using case report forms designed for the study [Fig 1 - see end of article]. All the nurses were educated about wound blisters and their appearance.
The test dressing was applied to the wounds while in theatre and, unless considered necessary (ie as a result of exudate saturation, leakage or bad adhesion), dressings remained in place until the fourth post-operative day when the initial routine dressing change was performed. The reasons for early dressing changes were recorded.

At dressing change, wounds were examined for periwound skin blisters and exudate levels were documented. The test dressing was assessed for its ease of application and removal and nurses were asked to provide an overall evaluation of the dressing. Data from the completed case report forms were entered onto a Microsoft Excel spreadsheet and the results were presented graphically.

RESULTS
During the study period, 146 patients had scheduled hip or knee arthroplasty at Alingsas Hospital. The sections of the patient forms relating to periwound skin status were all fully completed so data from all 146 patients were included in the analysis of results. Regarding the other parameters, 29 patient forms were filled in incompletely so data from 117 patients (40 male; 77 female) who underwent hip or knee surgery (62 and 55 patients respectively) were included in the final analysis. The median patient age was 72 years, ranging from 49 to 93 years. Prior to surgical intervention, 94% of patients were reported to have normal skin at the site of incision; 6% of patients had fragile skin, ie minor skin rashes associated with rheumatoid arthritis.

Application of the test dressing to the post-operative wound was graded as either ‘easy’ or ‘very easy’ in 5.1% and 94.9% of patients, respectively [Fig 2].

POST-OPERATIVE CARE
In 74% of the patients, the initial dressing change was performed on the fourth post-operative day. Due to the high level of exudation, 26% of patients required dressings to be changed earlier in order to avoid the problem of dressing saturation and leakage [Fig 3]. Further analysis of this sub-population revealed more than 75% of these dressing changes were associated with medium to high exuding wounds [Fig 4].

The removal of the test dressing was found to be ‘easy’ or ‘very easy’ in 8.6% and 89.7% of patients, respectively [Fig 5]. Furthermore, only one out of the 117 dressings (0.9%) became caught in the wound sutures and there were just five (4.3%) reported occurrences of bleeding upon dressing removal, none of which were deemed by the investigators as being dressing-related [Fig 6].

PERIWOUND SKIN STATUS
All 117 patients (100%) showed no signs of blistering to the periwound skin at the initial dressing change following post-operative treatment with the test dressing [Fig 7].

OVERALL ASSESSMENT
The overall assessment of the test dressing as a postoperative wound dressing was reported by the nurses to be ‘good’ or ‘very good’ in 9.4%