



Changes in dimensions of total knee arthroplasty anterior knee dressings during flexion: Preliminary findings

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KEYWORDS

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Knee;
Arthroplasty;
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Abstract Introduction: Wound care is critical to the management of patients post total knee arthroplasty, requiring prudent selection of dressings that can accommodate changes in wound length during knee flexion. This study aims to quantify differences in dressing dimensions based on the position of the knee during the application of the dressing and subsequent flexion.

Methods: Our study involved 40 knees divided into 2 groups, an extension group and a flexion group, each consisting of 20 knees. These groups had dressings applied to the knee in full extension and in 90° of flexion respectively. Measurements of the dressings were taken for the extension group with the knee in extension and for both groups at 90° of flexion.

Results: For the extension group, the changes in length and breadth of the dressings when measured in 90° of flexion were 3.42 ± 0.15 cm, $p < 0.001$ and -0.43 ± 0.10 cm, $p < 0.001$ respectively. Compared to the flexion group, the differences in length and breadth between the dressings when measured in 90° of flexion were 3.48 ± 0.15 cm, $p < 0.001$ and -0.14 ± 0.12 cm, $p < 0.001$ respectively.

Conclusion: There are significant differences and changes in the dimensions of knee dressings depending on the position of the knee during the application of dressing and subsequent flexion.

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Editor comments

As an orthopaedic practitioner I frequently wondered about the dressings I placed over the wounds of patients who had received knee surgery that resulted in a wound that ran vertically across the knee. I wondered what impact it had on knee flexion and extension and how this impacted on the patient's ability to use the joint. I marvelled at how well these wounds (mostly) healed given the forces that act upon the joint and, consequently, the wound, during flexion and extension. I also wondered what might be the best way to dress such wounds to provide comfort, ensure the dressing remained in place and to facilitate healing. Here is the beginning of the answers to some of those questions. This study has clear relevance to every practitioner caring for patients following knee surgery.

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Introduction

Wound care is an important component of the management of patients post knee arthroplasty. Previous studies have shown that choice of dressing can affect the rate of blistering, rate of leakage, number of dressing changes during admission, mobility at discharge and rates of delayed discharge (Burke et al., 2012; Clarke et al., 2009). Factors to be considered when making the choice of dressing for patients post knee arthroplasty include permeability, transparency, adherence and dressing extensibility. (Collins, 2010; Jester et al., 2000).

Dressing extensibility is particularly relevant to patients post knee arthroplasty. Keeping the knee flexed at 30 degrees post operatively has been shown to be associated with decreased knee swelling and ecchymosis as well as increased range of movement and straight-leg raising action during the early post operative period (Li et al., 2012). Knee flexion is also critical in achieving early mobilization post operatively. However, knee flexion causes significant changes in wound length, with an increase in length of over 20% at 90 degrees of flexion (Dillon et al., 2007). Dressings with greater extensibility are more able to accommodate changes in wound length and studies have suggested that that poorer dressing extensibility may result in increased rates of wound blistering post knee or hip arthroplasty. (Blaylock et al., 1995; Dillon et al., 2007). Currently, there are no studies available that discuss which position the knee should be placed in (in terms of flexion) when applying anterior knee dressings.

The aim of this pre-clinical study was to investigate and quantify the changes in dimensions of anterior knee dressings when applied to the knee in flexion versus extension. Changes in dimension may affect the tension of the dressing and consequently the forces on the underlying skin and wound. We hypothesized that there is a significantly larger change in the dimensions of the anterior knee dressings when placed in extension as compared to flexion. This may suggest that placing anterior knee dressings in flexion

is a better clinical option due to less stretching of the underlying skin which is adherent to the dressing.

Methods

This was a pre-clinical pilot biomechanical study investigating the changes of the dimensions of anterior knee dressings when applied in different positions (90 degree flexion versus full extension). The Institutional Review Board's approval was obtained. The study involved 40 knees of 20 consecutive healthy adult patients attending an orthopaedic hip and knee clinic at our institution. Patients with morbid obesity, previous knee surgeries or scars, dermatological conditions, infections or allergies to any component of the dressing were excluded. Informed consent was sought once patients who attended the clinic satisfied the inclusion criteria. Once consent was given, the patients were included in the study.

OPSITE™ Post-Op (Smith and Nephew, Hull, England) dressing was used in the study. The dimensions of the dressing used were 25 × 10 cm. The shape of the dressing was rectangular with rounded corners.

Hair over the anterior aspect of the knees was removed with a clipper. The area was then cleaned with an alcohol swab. The dressing was applied after the alcohol had dried. The dressing was applied such that it was centered over the patella. For a group of 20 knees of 20 patients (the extension group) the dressing was applied with the knee in full extension. For the other group of 20 knees of 20 patients (the flexion group) the dressing was applied with the knee in 90 degrees of flexion (Fig. 1).

The length and breadth of the dressings were measured in the original positions in which they were applied. To minimize variability between different individuals only the primary investigator carried out the measurements. For the extension group, additional measurements were taken after placing the knee in 90 degrees of flexion. Measurements of length

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