# Circumferential wrap technique with polymeric membrane dressings after arthroscopic ACL reconstruction reduces blistering, inflammation and bruising; rapid recovery and improved patient satisfaction: 80 prospective patient series

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## Problem

Our practice annually performs approximately 50 arthroscopic anterior cruciate ligament (ACL) reconstructions, with hamstring grafting. The sites are covered with traditional adhesive island dressings in conjunction with wool and then covered with thin wrap applied around the leg. A compressive dressing is then applied over the knee. Marked swelling and bruising often accompany these procedures. Swelling around the surgical wounds often leads to blistering under the adhesive dressings. When these blisters decompress, the risk of infection is increased. Swelling, blistering and bruising can often delay patients' rehabilitation initiation, compliance, progression, and their rapid return to normal activity and sport. These negative outcomes affect the patients' initial perception of the operation as well as making recovery more uncomfortable.

## Objectives

Drug-free, multifunctional polymeric membrane dressings* (PMD) were formally evaluated because other clinicians had reported that, when placed on a surgical site, the skin and incision in contact with the PMD pad did not bruise or swell and the reduced swelling was accompanied by elimination of blistering. We had also observed these phenomena personally when using PMD dressings for hip and knee arthroplasties. Our goal was to:

- Reduce blistering and maceration associated with blister decompression.
- Reduce the spread of inflammation which results in bruising, pain and swelling; pain is recognized to slow healing and swelling is recognized to increase the risk of infection.
- Enhance inflammation resolution. This will improve patients' ability to engage in rehabilitation and reduce the risk of infection.
- Improve patients' initial rehabilitation recovery phase and ultimate return to sport and normal activity.
- Minimize surgical site infections (SSI) leading to post-operative complications.

In addition to age, gender, surgical closure detail, compliance with post-operative dressing change at 24 hours post-op and non-sterile PMD† applied, the key outcomes tracked were: swelling; bruising; pain levels at 1 and 12 days post-operatively; maceration; blistering; time to physiotherapy initiation; time to hospital discharge; average number of days to full weight bearing; days post-op full range of motion achieved; subjective patient impression.

## Methods

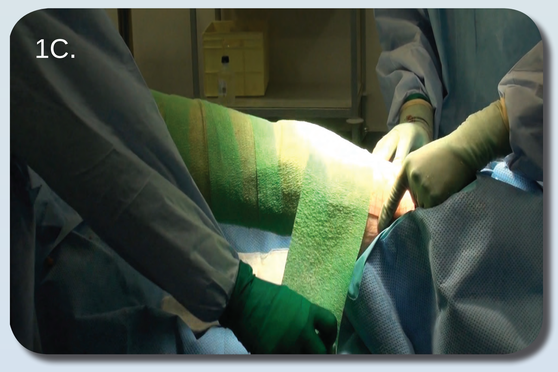
Eighty consecutive patients undergoing arthroscopic ACL reconstruction were dressed with:

***1. Intraoperative Primary Sterile Dressing Application***

A. Aseptic application of 8cm x 30cm PMD cavity filler cut to cover the proximal tibial wound & medial and lateral portals.


B. Circumferential wrapping of the knee utilising sterile 20cm x 60cm PMD rolled on, without tension, in contact with the skin from the upper third of the proximal tibia to the distal third of the femur. Care taken to overlap wraps for complete skin surface cover because direct skin contact is required in order for the inflammation modulating actions to be realized.


C. Secured with a 10cm width sterile cohesive bandage. Note – bandage gently applied circumferentially with minimal / no stretch. Goal is to assure the dressing stays in place, but not to apply compression to the limb. The purpose is to allow the dressing, without compression, to reduce the swelling and bruising through interaction with the contacted skin. Self-physiotherapy begun within the first 24 hours.




***2. Postoperative Initial Dressing Change at 24 hours Prior to Discharge***

- All intraoperative dressings removed.
- Application of PMD Film Island to the proximal tibial wound.
- Application of 10cm x 77cm non-sterile PMD† applied circumferentially over the knee. This wrap to be worn day & night except for showering. If wrap becomes wet from activity, change. Patients or family members apply at home.


## Results

| | Outcome | PMD Results Compared to Previous Approach |
|---|---|---|
| 1. | Swelling | Reduction of swelling 30% at proximal tibial compared to previous dressing using circumference measure |
| 2 | Bruising | Marked reduction in bruising immediately adjacent to the tibial wound where PMD had been in direct contact with the skin. Less bruising tracking distally |
| 3 | Pain levels at 1 and 12 days post operatively | Pain levels similar at day 1 (as similar analgesic regime including use of local anaesthetic delivery system). At 12 days patients appeared more comfortable when compliance with use of non-sterile PMD wrap was high |
| 4 | Blistering | 1 case (1.25%) of mild blistering associated with adhesive tape use. The previous dressings had blistering associated in around 15% of all the patients undergoing the surgery. |
| 5 | Maceration | Maceration eliminated. Previously maceration was a problem with the dressings used. |
| 6 | Time to self-physiotherapy initiation | Unchanged at 12 hours for PMD and original dressing group |
| 7 | Time to hospital discharge | All patients discharged after one night in hospital. Previously there was an extra night required if complications were present. |
| 8 | Average # of days to full of weight bearing | All patients discharged fully weight bearing after 1 day. With the previous dressing protocol, some patients were not able to achieve this due to the complications. |
| 9 | Days post-op full range of motion achieved | All patients (100%) flexing to at least 90 degrees by 12 days. This was not always the case with the previous dressing solution of Telfa and Wool Wrap and bandage. Only 80% were able to achieve this with the old protocol. |
| 10. | Subjective patient impression | Marked increase in patient satisfaction at first dressing change and at 12-day mark. This increase in satisfaction appeared to lead to greater confidence in initiating rehabilitation program at the level planned. |

## Conclusion

Use of a PMD wound dressing protocol lead to objectively and subjectively improved outcomes. Bruising and swelling was noticeably reduced, particularly in the proximal tibial region. Blistering was almost entirely eliminated. It was postulated that this was due to reduced swelling under the PMD. Patient comfort, lack of wound problems and rapid inflammation resolution allowed an early rapid rehabilitation of the reconstructed knee.

## Discussion

PMD dressings, combined with the accompanying dressing change and wrap protocols, were found to be exceptional in arthroscopic ACL reconstruction with hamstring grafting surgery at our hospital. The inflammatory process was concentrated on the surgical site but the surrounding tissues showed no inflammation at all. This ensured there was also a greatly reduced chance of a post-operative infection occurring.

The patient's perception of the technical success of an operation is often coloured by the amount of bruising, swelling and blistering. Improvement in these parameters seemed to increase the patients' confidence in the outcome of their surgery and thus proceed more rapidly to full rehabilitation.

The dressing proved cost-effective for the hospital in terms of number of dressings used versus the old protocol as well as the nursing time saved in dressing changes and lack of complications. All those factors added up to an overall cost benefit to the hospital.

Staff involved with these patients reported that the drug-free multifunctional dressings combined with the dressing change protocols provided increased comfort for the patient, improved patient compliance and participation in rehabilitation resulting in more rapid and more cost-effective return to usual activities of daily life.

On-going commitment to the use of these dressings and dressing change protocol by medical and nursing has been reinforced by these results, as we strive to promote best practice in order to continuously improve outcomes for our patients.

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*PolyMem Wic, *PolyMem, †SportsWrap are manufactured by Ferris Mfg. Corp. Fort Worth, Texas 76106 USA

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