THE ADVANTAGES OF INTERMITTENT PNEUMATIC COMPRESSION AND CRYOTHERAPY TREATMENT FOR POST-OPERATIVE PATIENT CARE
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The use of cryotherapy to treat inflammation and pain goes back to at least as far as the time of Hippocrates. Since then, new techniques and technologies have emerged to improve the delivery methods, ensure patient safety, and optimize the many benefits of cold therapy.

The addition of compression to traditional cryotherapy has further improved the rate of tissue healing, the reduction of edema, and the ability to control pain and inflammation. Although both cold therapy and compression on their own are valid approaches, their simultaneous application has been shown to provide the most measurable benefits. When intermittent pneumatic compression is applied at the same time as cryotherapy, the cold is allowed to penetrate deeper and last longer, thus creating a greater therapeutic benefit for the patient.

Intermittent pneumatic cryo-compression is used in a number of medical fields, including athletic training and physical therapy, but it can also be employed for post-operative recovery to reduce the pain and inflammation that virtually every patient experiences after surgery without the harmful side effects of medications. This guide describes the many benefits of intermittent pneumatic cryo-compression, which types of surgeries it applies to, and when in the recovery process it can be used.
Intermittent pneumatic cryo-compression can be used for almost any situation in which a patient experiences pain and inflammation. Given that most surgeries result in these conditions (simply because of the procedures’ impact on soft tissues), cryo-compression can provide great benefits in a post-operative recovery plan.

Some examples of common surgeries that are known to benefit from intermittent pneumatic cryo-compression include:

- ACL and MCL tears
- Torn meniscus
- Rotator cuff repair
- Spinal surgery
- Joint replacement—hip, knee, shoulder, elbow, and so on
- Hand and wrist fractures
- Any orthopedic surgery
- Amputation

Although cold therapy has been used for centuries for post-operative care, active compression is relatively new on the scene. The development of specialized wraps designed for various areas of the body has enabled intermittent pneumatic cryo-compression to be used in a much broader range of post-surgical applications, thus taking cryotherapy from a passive to an active therapy/treatment.
Although every type of surgery is different and every patient’s experience will be unique, there are some common expectations during the post-operative recovery phases. Intermittent pneumatic cryo-compression can be implemented in multiple stages throughout the rehabilitation process—in the hospital, at the physical therapy clinic, and even in patient homes.

Some of the phases that can be enhanced by intermittent pneumatic cryo-compression during the post-operative recovery process include:

**IMMEDIATELY AFTER SURGERY**
Immediately after suffering a musculoskeletal injury or surgery, the body initiates a series of physiological responses to defend surrounding tissues and begins to repair the damage. While inflammation is a natural and necessary mechanism in this process, controlling it effectively can actually allow the body to enter the later stages of healing faster. Until now, the RICE (Rest-Ice-Compression-Elevation) principles have been used to passively control symptoms, moderating pain and swelling. Active compression mimics natural muscle contractions by increasing and releasing pressure while cooling the tissue. This helps the body to proactively aid lymphatic function, encourage cellular oxygen supply, and stimulate tissue repair.

**FIRST WEEK AFTER SURGERY**
For inpatient surgeries, the first few days of recovery typically include medication to help control pain, antibiotics to prevent infection, wound care at the surgical site, and appropriate physical therapy for the specific condition. Intermittent pneumatic cryo-compression supports almost all of these activities.
The application of therapeutic cold and active compression to the injured area helps reduce pain, as well as supports faster wound healing which helps reduce the risk of infection. The first week after a surgery is when the body’s inflammatory response is greatest, which means patients will experience pain, redness, swelling, and possibly edema. Therapeutic cold reduces pain by dulling the nerve endings, and it helps control swelling by slowing down cellular metabolism. The addition of intermittent pneumatic compression enhances these effects and also increases the circulation of blood and other fluids to remove edema.

2–6 WEEKS AFTER SURGERY

For many types of surgeries, patients can start resuming activity within a few weeks. The type and location of the surgery will determine the patient’s limitations during this time, but in many cases activity is not only possible, but also encouraged. However, return to activity does not indicate a full recovery. Therapeutic cold and active compression during this time is still important as tissues continue to heal.

Many patients participate in physical therapy for at least several weeks after surgery to help regain normal range of motion, improve flexibility, and increase strength. Typically, applying intermittent pneumatic cryo-compression after physical therapy is a good idea to help prevent any pain and swelling that might occur after more intense activity.

2–12 MONTHS AFTER SURGERY

For surgeries that require a longer recovery, after the damaged tissues have healed enough to mostly return to normal activity, physical therapy continues and intensifies as the deeper healing continues. Intermittent pneumatic cryo-compression can be continued throughout the longer recovery process because, unlike traditional ice packs that can only deliver therapeutic cold superficially, cryo-compression systems enable the cold to penetrate deeper and last longer. This means that the deeper tissues continue to repair themselves and benefit from faster healing.
Both doctors and patients enjoy multiple benefits from using intermittent pneumatic cryo-compression treatment after a surgical procedure. In fact, there is clinical evidence to prove it.

MORE EFFECTIVE THAN TRADITIONAL ICE THERAPY
In a study\(^1\) that compared two groups of ACL reconstruction patients in the first week after surgery, continuous-flow cold therapy was shown to be more effective than the application of crushed ice secured with an elastic bandage. Patients experienced less pain, reduced use of pain medications, and better range of motion with continuous-flow cold therapy than with a traditional ice pack. Even without the addition of active compression, cryotherapy is clearly more effective when the therapeutic cold is delivered consistently.

Adding intermittent compression to cryotherapy is shown to provide even more benefits during post-operative recovery, including less blood loss, less wound discharge, and shorter hospital stays. In another clinical trial\(^2\) that evaluated the post-operative period after ACL reconstruction, intermittent cryo-compression was compared with continuous-flow cryotherapy and the use of traditional ice packs. The group that received combined cryotherapy and compression treatment experienced less pain, stopped taking pain medication sooner, and was more likely to participate in the treatment protocol than the other group.

Although traditional ice packs do deliver therapeutic benefits, now that there is a better way, why wouldn’t both doctors and patients want to improve the post-operative recovery process?

LESS USE OF PAIN MEDICATION
One common result of the two studies referenced above is that patients stopped

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taking medication in a shorter time period after surgery. In the first study, which compared continuous-flow cryotherapy with an ice pack, the use of hydrocodone bitartrate with acetaminophen was reduced. In the second trial, after six weeks of intermittent cryo-compression therapy after surgery, 83.3 percent of patients had discontinued the use of all pain medication, compared with only 27.8 percent of those that received conventional ice pack therapy.

In another study\(^3\) that evaluated the Game Ready intermittent cryo-compression system in 280 post-operative total knee arthroscopy patients, the need for narcotic pain medication was reduced to only two weeks after hospital discharge.

Reducing the need for pain medication is beneficial for both patients and healthcare providers. Patients reduce the risk of addiction and side effects and save money on prescriptions. Moreover, doctors and physical therapists get a better sense of how the post-operative recovery process is going when pain is not dulled by medication.

**LESS POST-OPERATIVE BLOOD LOSS**

A certain amount of blood loss after surgery is normal, but the more it can be controlled, the faster the patient will recover. In a pilot study\(^4\) of patients who received a combination of intermittent compression and cryotherapy after total hip arthroplasty, there was a statistically significant reduction in the loss of hemoglobin compared with the control group that had only an absorbent compression bandage.

In a similar study\(^5\) that observed patients after total knee arthroplasty, those who received cryo-compression treatment experienced a dramatic decrease in blood loss compared with the control group.

Reducing blood loss after surgery contributes to a lower risk of complications such as anemia, low blood pressure, and shock. It also reduces the chance of requiring a blood transfusion, which can potentially reduce the overall costs of post-operative recovery.

**SHORTER HOSPITAL STAYS**

In the hip arthroplasty study previously referenced, researchers also observed a trend toward shorter hospital stays. Most patients want to limit time in the hospital as much as possible to save hundreds to thousands of dollars, as well as allowing them to be more comfortable in their own homes. Healthcare providers also benefit from shorter hospital stays after surgery because more employee time is freed up, as is bed space for other patients.

**LESS WOUND DISCHARGE**

Reducing the amount of wound discharge after surgery helps limit the risk of infection and contributes to an overall faster recovery. Intermittent cryo-compression helps by improving the circulation of fluids and reducing cellular metabolism.

Less wound discharge was observed in the same hip arthroplasty study\(^4\) that showed less post-operative blood loss and a trend toward shorter hospital stays with the use of intermittent cryo-compression.

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**BETTER PATIENT SATISFACTION**

The Game Ready intermittent pneumatic cryo-compression system has been shown to increase patient satisfaction. The noticeable reduction of pain and swelling with a system that allows healthcare providers to control the temperature and pressure provides a vast improvement in the delivery of cryotherapy and compression. Both professionals and patients benefit from the easy-to-apply, fully adjustable wraps to deliver comfortable, effective treatment. Patient satisfaction also leads to improved compliance with treatment protocols and, therefore, more likelihood of a faster recovery.

In addition to a better patient experience, medical staff also expressed a preference for Game Ready over traditional cryotherapy methods. The testimonials from both patients and medical professionals speak for themselves.

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**GAME READY AND POST-OP CARE**

The Game Ready intermittent pneumatic cryotherapy system provides all of the advantages for post-operative care outlined in this guide. Patients who have used the system have expressed significant satisfaction, which translates to better compliance and a smoother recovery after surgery.

Game Ready can be used in hospitals immediately following surgery, in physical therapy clinics for rehabilitation treatments, and in patients’ homes for regular application of intermittent pneumatic cryotherapy. Wraps are available for every area of the body, so the system can be used after virtually any type of surgery. A list of Game Ready wraps currently available and some of the potential applications are listed below:

- **C-T Spine Wrap**—For post-whiplash and overuse injuries, degenerative spine disorders, and post-op spine treatment
- **Hand/Wrist Wrap**—For orthopedic injury and post-op recovery of the hand, wrist, and forearm
- **Shoulder Wrap**—For sprains, strains, fractures, rotator cuff repair, and other shoulder surgeries
- **Flexed Elbow Wrap**—For patients unable to straighten the elbow after elbow replacement, UCL reconstruction, and other elbow surgeries
- **Elbow Wrap**—For patients who must keep their elbow extended after replacement or surgery for tennis elbow
- **Back Wrap**—For spinal fusion, nucleoplasty, fractures, or other back surgeries
- **Hip/Groin Wrap**—For total hip replacement, hip arthroplasty, hip resurfacing, or fractures
• **Articulated Knee Wrap**—For use in a therapeutic setting with a continuous passive motion machine

• **Knee Wrap**—For use after surgery to repair the ACL, MCL, meniscus, tendons, or collateral ligaments, and for total knee replacement

• **Half-Leg Boot Wrap**—For surgery on the Achilles tendon, calf muscle, tendons, or ankle

• **Ankle Wrap**—For tendon surgery, lateral ankle repair, and Achilles tendon repair

• **Amputee Line**—For below-the-knee, above-the-knee, and upper extremity traumatic amputation

Each wrap is adjustable so that almost any post-operative patient can use Game Ready. With easy-to-use closure systems, many patients can use the wraps on their own or with the help of a trained caretaker. The Control Unit has an intuitive interface that allows you to customize and adjust the temperature, pressure, and treatment time for each patient.

If you are interested in purchasing Game Ready for your clinic or practice, get in touch with us today. If you would like to learn more, explore the Resources section on our website to read testimonials from healthcare professionals or download clinical evidence and white papers.

Are you ready to help your patients recover from surgery more quickly with intermittent pneumatic cryotherapy?

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