A Collection of Cold/Compression studies

Postoperative cryotherapy after total knee arthroplasty: a prospective study of 86 patients.

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A study of 86 patients undergoing total knee arthroplasty (TKA) was performed to evaluate the role of cold compression. The patients were treated with cold compression or epidural analgesia for 3 days after TKA. Pain was measured on a visual analog scale, and total consumption of analgesics was recorded. Range of movement (ROM) was recorded before TKA until 3 weeks postoperatively. Weight bearing, blood loss, and time in hospital were recorded. Visual analog scale scores and analgesic consumption were equal in both groups. Range of movement at discharge was 75 degrees in the cold compression group vs 63 degrees in the control group. By 3 weeks' follow-up, ROM was 99 degrees vs 88 degrees. Mean Hb values averaged 120 mmol/L in the cold compression group vs 109 mmol/L in the control group after surgery. Mean time in hospital of patients with cold compression averaged 4.8 days vs 6.2 days in the control group. The study shows that cold compression therapy improves the control of pain and might thus lead to improvement in ROM and shorter hospital stay.

PMID: 17162178 [PubMed - indexed for MEDLINE]
Combination of cold and compression after knee surgery. A prospective randomized study.

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The objective of this study was to investigate the effect of continuous long-term application of a combined cooling and compression system (Cryo/Cuff, Aircast Inc., Summit, New Jersey, USA) on postoperative swelling, range of motion (ROM), pain, consumption of analgesics, and return of function after anterior cruciate ligament (ACL) reconstruction. We compared the cold-compression system with traditional ice therapy. There were 44 patients in the series (aged 15-40 years) who were randomly assigned to a control group (ICE) or a study group (CC). The ICE group consisted of 23 patients (aged 24.2 +/- 4.5 years); the CC group consisted of 21 patients (aged 24.8 +/- 5.6 years). The ICE group received ice bags postoperatively; the CC group was provided with the Cryo/Cuff during the 14-day hospital stay. Girth, ROM, pain score (visual analog scale), and consumption of analgesics were determined on postoperative days 1, 2, 3, 6, 14, and 28. Twelve weeks after surgery, isokinetic testing was performed, and the functional knee score was determined. In the CC group, significantly less swelling was observed ($P < 0.035$). These patients also reported less pain and had a significantly reduced consumption of analgesics ($P < 0.04$). On all examination days, ROM in the CC group was up to 17 degrees greater than in the ICE group ($P < 0.02$). The functional knee score was significantly increased in the CC group ($P = 0.025$). The results from our study document the advantages of continuous cold-compression therapy over cold alone following ACL reconstruction.

PMID: 7584198 [PubMed - indexed for MEDLINE]
The role of cold compression dressings in the postoperative treatment of total knee arthroplasty.

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A prospective randomized study was performed to evaluate the role of cold compressive dressings in the postoperative treatment of total knee arthroplasty (TKA). Eighty consecutive unilateral and ten bilateral primary total knee replacements were evaluated in terms of blood loss, pain relief, and range of motion. Patients in the cold compression group demonstrated an average of 548 ml in suction drainage, whereas those in the control group averaged 807 ml. This resulted in an average 3.1 mg hemoglobin drop in the cold compression group and 4.7 mg in the control group. When body habitus and weight were taken into account in the cold compression group, an average total blood loss of 1298 cc was calculated, with 744 ml arising from soft tissue extravasation. The corresponding total blood loss calculated average was 1908 ml in the control group, with 1101 ml attributed to soft tissue extravasation. Total injectable morphine per kilogram per initial 48 hours averaged 0.53 mg in the cold compression patients and 0.69 mg in the control patients. In the cold compression knees, range of motion averaged 86 degrees before operation, 53 degrees on postoperative day (POD) 7, and 77 degrees on POD 14. In the control knees, range of motion averaged 88 degrees before operation, 44 degrees on POD 7, and 65 degrees on POD 14. The use of cold compression in the postoperative period of TKA results in a dramatic decrease in blood loss. In addition, mild improvements are seen in early return of motion and injectable narcotic pain needs in the postoperative period.

PMID: 7902225 [PubMed - indexed for MEDLINE]
Continuous-flow cold therapy after total knee arthroplasty.

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Cryotherapy is widely used as an emergency treatment of sports trauma and postoperatively especially after anterior cruciate ligament reconstruction. Studies in the literature on the effect of cryotherapy after total knee arthroplasty (TKA) have been limited and controversial. In this prospective study, 60 primary TKAs were done on 30 patients (all staged bilateral TKAs). For every patient, 1 TKA had a continuous-flow cooling device applied over the surgical dressing immediately postoperatively. The other TKA in the same patient (control TKA) was done 6 weeks later and had no cooling device. The study compared the range of motion, the volume of hemovac output and blood loss, visual analog pain score, analgesic consumption, and wound healing in the 2 limbs of the same patient. This study showed that continuous-flow cold therapy is advantageous after TKA because it provides better results in all the areas compared. Copyright 2002, Elsevier Science (USA).

PMID: 12216025 [PubMed - indexed for MEDLINE]
The older athlete with tennis elbow. Rehabilitation considerations.

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Athletic injury in the older adult community is likely to have more serious repercussions than a similar injury in a young adult because of age-related change. A balance between adequate rest and restoration of movement and strength must be established. Recovery from an athletic injury should be expected, but older tissues take more time to heal. Rest, cold application, avoidance of stressful movements, and compression are known to be highly effective for alleviating symptoms, but other modalities may further enhance recovery. To avoid reinjury and further complications, strength and ROM must be fully restored in the older adult athlete. A careful evaluation of causative factors, treatment efficacy, and the recovery phase is imperative.

PMID: 7712554 [PubMed - indexed for MEDLINE]
Excessive pressure in multichambered cuffs used for sequential compression therapy.

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BACKGROUND AND PURPOSE: Pneumatic compression devices, used as part of the therapeutic strategy for lymphatic drainage, often have cuffs with multiple chambers that are inflated sequentially. The purpose of this study was to investigate (1) the relationship between cuff chamber pressure (P(chamber)) and the pressure on the cuff-skin interface (P(interface)) and (2) the mechanical interaction of cuff chambers and consequences for device control. SUBJECTS AND METHODS: In this study, we used 3 cylindrical (60-, 80-, and 100-mm-diameter) model limbs and 1 ellipsoidal model of the arm to test a commercially available pressure controller using "target pressures," indicated by the controller, of 30, 60, 80, and 100 mm Hg. We studied the time course of P(chamber) and P(interface) during the inflation sequence and the effect of local curvature on P(interface). RESULTS: Our data indicated that, overall, P(interface) is of the same order of magnitude as P(chamber). There was some effect of model diameter and shape, with the smaller curvatures yielding the highest P(interface). Cuff chamber interaction led to P(chamber) and P(interface) values in the most distal (first inflated) chamber that were up to 80% higher than the target pressure. For the 80-mm cylindrical model, for instance, pressure in this chamber reached 54, 98, 121, and 141 mm Hg, respectively, instead of the 30, 60, 80, and 100 mm Hg indicated by the controller. DISCUSSION AND CONCLUSION: The discrepancy between the target pressure, indicated by the controller, and the pressure measured inside the cuff chambers undermines the therapeutic control and efficacy of the pneumatic compression devices. Because the measured pressures were far beyond the pressure level indicated by the controller, it is recommended that pneumatic compression devices be used at much lower target pressures (<30 mm Hg) than those applied in clinical practice.

PMID: 12350214 [PubMed - indexed for MEDLINE]
A literary review on ice therapy in injuries.

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There is good evidence that cold application can be useful in certain situations as a therapeutic modality. In particular, it seems ideally suited to the acute injury where the reduction in local factors such as hemorrhage and edema can hasten recovery. Although cold has established physiologic effects which can be useful, there are specific contraindications to its use which must be recognized. Although the method of application is not critical, new products such as moldable frozen gel packs make on-the-field use simple. The important concept in the use of cold for treating the acute injury seems to be early prolonged application.

PMID: 871181 [PubMed - indexed for MEDLINE]
Continuous local cooling for pain relief following total hip arthroplasty.

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This study is the first to evaluate whether continuous cryotherapy can relieve pain soon after total hip arthroplasty (THA). Patients who had undergone THA for osteoarthritis were divided into 2 prospective, randomized groups: the cryotherapy group was fitted with a computer-controlled cooling device for 4 days, and the control group was not. The pain scores measured on a visual analog scale between days 1 and 4 following surgery were significantly lower for the cryotherapy group than for the control group. Furthermore, postoperative analgesic use by the cryotherapy group was significantly lower than by the control group. The results of this study support the potential benefit of a cold compressive device for pain reduction during the postoperative recovery of patients undergoing THA.

PMID: 15067647 [PubMed - indexed for MEDLINE]
The effect of continuous cryotherapy on glenohumeral joint and subacromial space temperatures in the postoperative shoulder.

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PURPOSE: The objective of this investigation was to determine the effect of continuous cryotherapy on glenohumeral joint and subacromial space temperatures in the postoperative shoulder. TYPE OF STUDY: Prospective, randomized, and controlled clinical trial. METHODS: Twenty patients (10 cryotherapy, 10 controls) with a full-thickness rotator cuff repair were monitored with temperature sensors in the glenohumeral joint and subacromial space of the shoulder for 23 postoperative hours. Statistical analysis (P <.05) was performed using the Mann-Whitney rank-sum test. RESULTS: In comparing the cryotherapy and control groups, analysis of the glenohumeral joint and subacromial space temperatures revealed a statistical significance at 4, 8, and 23, and 4, 8, 16, and 20 postoperative hours, respectively. In addition, a trend toward a temperature-rising phase occurs from 4 to 12 hours and is followed by a trend toward a thermostatic phase from 12 to 23 hours during which temperatures remain relatively constant. The subacromial space was consistently cooler than the glenohumeral joint by an interval between 0.07 degrees C to 0.50 degrees C except at 23 hours postoperative where the glenohumeral joint was 0.05 degrees C cooler. CONCLUSIONS: Continuous cryotherapy causes a statistically significant reduction of both glenohumeral joint and subacromial space temperatures in the shoulder at variable times during the first 23 postoperative hours. Previous investigations have shown that minor elevations in intra-articular temperature can stimulate proteolytic enzyme activity, which has detrimental effects on articular cartilage. Previous research has also shown that cryotherapy is an effective nonpharmacological method of pain control. Yet the literature has assumed that the effects of cryotherapy are part of the basic analgesia mechanism because of a reduction in joint temperature. Our results affirm that reductions in glenohumeral joint and subacromial space temperatures in the postoperative shoulder do occur, leading to potential benefits of continuous cryotherapy as an effective mode of pain control in the postoperative care of patients.