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NATURAL TOUCH PERCEPTION PROSTHESIS

In addition to loss of function, loss of sensation is a significant consequence of upper limb amputation. Those with limb loss rely on visual and auditory feedback to control prosthetic limbs. This study examined the effect of implanted peripheral nerve interfaces in patients with upper limb amputation.

Two male subjects, ages 47 and 49, were studied. Subject one had a wrist disarticulation, and was 19 months post-loss at the time of implantation. Subject two had a below-the-elbow amputation, and was 93 months post-amputation. After electrode implantation, independent control of pulse width, pulse amplitude, stimulation frequency and the patterns by which these parameters were varied allowed for control of the spatial extent, intensity and quality of perception. The subjects were tested for functional capacity by requiring them to pull a stem from a cherry. Success with this task was measured with and without feedback.

The subjects reported tactile perceptions, described as natural tapping, constant pressure, light moving touch and vibration. In the cherry plucking task, the subjects successfully plucked the stem an average of 43% of the trials without audiovisual feedback, 77% with audiovisual feedback, 93% with sensory feedback and 100% with audiovisual plus sensory feedback ($p < 0.001$). The implanted electrodes were stable for up to two years.

Conclusion: This pilot study of patients with upper limb prosthetics found that peripheral nerve cuff electrodes can be used to produce a variety of sensory feedback, which can provide significant improvement in the use of the prosthetic limb.

Tan, D., et al. A Neural Interface Provides Long-Term Stable Natural

Touch Perception. *Sci Transl Med.* 2014, October; 6(257): p. 257ra138.

PHYSICAL THERAPY FOR TOTAL JOINT REPLACEMENT

Total joint replacement has emerged as the treatment of choice for end-stage arthritis of the hip or knee. Post-acute care spending accounts for 73% of the variation in spending across geographic regions of the United States, and, thus, presents as an opportunity to decrease total costs of joint replacement. This study investigated the association between preoperative physical therapy and post-acute care utilization and cost.

This observational, cohort, comparison study used the Centers for Medicare and Medicaid Services' limited data set files. These files include all claims for payments related to inpatient, outpatient, home health agency, skilled nursing facility, carrier and durable medical equipment within a defined referral cluster in Ohio. The use of preoperative physical therapy was identified for 30 days prior to admission for surgery. Costs were compared between the preoperative physical therapy group and the non-preoperative physical therapy group.

A total of 4,733 cases were available within the targeted cluster for 2008 and 2009. A significantly lower rate of post-acute care ($p < 0.0001$) was found for patients receiving preoperative physical therapy (54.2%) as compared to those without preoperative therapy (79.7%). This finding included a lower rate of skilled nursing facility admission, home health service within 90 days of discharge and inpatient rehabilitation facility admission ($p < 0.0001$, $p = 0.0001$, $p < 0.0001$ and $p = 0.027$, respectively). The adjusted, absolute difference in costs between the groups was \$1,215.

Conclusion: This study of patients undergoing hip or knee replacement suggests that preoperative physical therapy can significantly decrease the use of post-acute care services and overall costs.

Snow, R., et al. Associations between Preoperative Physical Therapy and Post-acute Care Utilization Patterns and Costs in Total Joint Replacement. *J Bone Joint Surg (Am)*. 2014, Oct 1; 96(19): e165.

MARIJUANA LAWS AND OPIOID OVERDOSE MORTALITY

The proportion of patients with noncancerous pain who receive opioid prescriptions has nearly doubled in the past decade. Parallel to this increase is a rise in deaths from opioid overdose. Little attention has been focused on how the availability of alternative non-opioid treatments may affect these rates. Given the increased legal availability of cannabis between 1999 and 2012, this study examined the relationship between the change in these laws and the incidence of opioid overdose deaths.

Three states had medical cannabis laws effective before 1999. Ten states implemented such laws between 1999 and 2010. For each year, the authors plotted the mean, age adjusted opioid analgesic overdose mortality rate, comparing states with versus those without such laws.

The adjusted model revealed that medical cannabis laws were associated with a 24.8% lower annual rate of analgesic overdose deaths, as compared to states without such laws. The association with lower rates of opioid analgesic overdose mortality strengthened in the years after passage.

Conclusion: This study provides evidence that medical cannabis laws

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are associated with reductions in opioid analgesic overdose mortality.

Bachhuber, M., et al. Medical Cannabis Laws and Opioid Analgesic Overdose Mortality in the United States, 1999-2010. **JAMA Intern Med.** 2014, October; 174(10): 1668-1673.

ABDOMINAL CIRCUMFERENCE AND RISK OF MUSCULOSKELETAL INJURY

Multiple studies demonstrate that obesity is associated with the risk of musculoskeletal injuries. While most studies have focused on obesity as identified by the body mass index (BMI), few have considered other measures of obesity, including abdominal circumference. This study compared abdominal circumference (AC) and BMI as means to estimate the risk of musculoskeletal injury.

This prospective cohort study evaluated the time to first musculoskeletal injury among all active duty United States Air Force (USAF) members from January of 2005 through December of 2011. During routine fitness testing, biometric data were gathered, including height, weight and AC. The main outcome measure was any new diagnosis of musculoskeletal injury in the medical record. The rate of injury was compared by BMI and AC.

Of the subjects, 11.2% were obese and 51.7% overweight. Using the USAF criteria for AC risk, low risk (males <=35 inches; females <=32 inches), moderate risk (males >35 but <=39 inches; females >32 but <=36 inches), and high risk (males >39 inches; females >36 inches), 69.5% were low risk, 27.8% moderate risk and 2.7% high risk. The results revealed an overall injury rate of 67.6% during the study period. Among obese individuals, the injury rate was 74.3%, compared with 60.1% for overweight and 64.8% for normal weight subjects. Using AC, the injury rate was 88.5% for the high-risk, 72% for the moderate risk and 64.9% for the low risk groups.

Conclusion: This study of United States Air Force personnel found that abdominal circumference may be a better determinant of musculoskeletal injury risk than is body mass index.

Nye, N., et al. Abdominal Circumference is Superior to Body

Mass Index in Estimating Musculoskeletal Injury Risk. **Med Sci in Sports Exer.** 2014, October; 11: 1951-1959.

PERIODONTAL DISEASE AND STROKE

Periodontal disease affects up to 90% of the world population, and is related to an increase in systemic inflammation markers, implicated in the etiology of atherosclerosis and stroke. This meta-analysis was designed to better understand the association between periodontal disease and the incidence of ischemic and hemorrhagic strokes.

A literature search was conducted for studies published between January of 1996 and April of 2012. Inclusion criteria were cohort studies, evaluation the incidence of strokes, evaluation of periodontal disease status and calculation of relative risk values with periodontal status as a risk factor. Analysis was conducted for three types of outcomes, including periodontitis, gingivitis and tooth loss. All types of incident stroke were considered.

Nine cohort studies were included in the final analysis. The numbers of participants ranged from 1,137 to 51,529, with follow-up periods ranging from 12 to 57 years. For periodontitis, the pooled risk estimate was 1.63 for ischemic and hemorrhagic strokes combined. For gingivitis, the pooled risk was 1.10, while, for tooth loss, the pooled risk was 1.39.

Conclusion: This meta-analysis supports the link between stroke and periodontal disease. The associations were found to be strongest for periodontitis and tooth loss, as findings for gingivitis did not reach statistical significance.

Lafon, A., et al. Periodontal Disease and Stroke: A Meta-Analysis of Cohort Studies. **Euro J Neurol.** 2014, September; 29(9): 1155-1161.

CARBOHYDRATE GEL BEFORE PROLONGED EXERCISE

Previous studies concerning carbohydrate ingestion prior to exercise have produced inconsistent results. This study compared the effects of carbohydrate gel ingestion

at varying times before the onset of exercise.

Four trials, involving seven male triathletes, were conducted in random order, separated by seven days. These trials involved placebo ingestion immediately before exercise, carbohydrate ingestion immediately before exercise (C0), carbohydrate ingestion 45 minutes before exercise (C45) or carbohydrate ingestion 120 minutes before exercise (C120). The carbohydrate gel included maltodextrin 45 g, with a total caloric value of 180 kcal. The exercise protocol comprised 20 successive sets of four-minute bouts of exercise at up to 80% of VO₂ max. Venous blood samples were collected every four minutes throughout the exercise.

Blood glucose concentrations were higher in the C0 trial from 8-80 minutes than in the other trials ($p<0.05$). The average rating of perceived exertion over 0 to 40 minutes were similar between the trials. However over 40 to 80 minutes of exercise the rate of perceived exertion was significantly lower in the C0 and the C120 trials than in the placebo trial.

Conclusion: This study found that carbohydrate ingestion immediately before exercise results in higher glucose concentrations and lower perceived exertion over the final 40 minutes of exercise.

Kohara, A, et al. Carbohydrate Gel Ingestion Immediately before Prolonged Exercise Causes Sustained Higher Glucose Concentrations and Lower Fatigue. *Inter J Sport Health Sci*. 2014; 12: 24-30.

THE MEDITERRANEAN DIET AND THE METABOLIC SYNDROME

While diet and lifestyle seem to be related to the metabolic syndrome, little information exists concerning whether changes in dietary patterns without weight loss may be helpful in managing this condition. This study evaluated the long-term effect of the Mediterranean diet on the incidence or revision of the metabolic syndrome.

A secondary analysis of the PREDIMED study was performed. This study was a large, parallel group, multicenter, randomized, controlled trial, included community

dwelling men, ages 55 to 80, and women, ages 60 to 80, with no documented cardiovascular disease. All subjects had either type II diabetes or at least three cardiovascular risk factors. Two groups were advised to follow a Mediterranean diet, supplemented with either extra-virgin olive oil or nuts, while a control group was advised to follow a low-fat diet. The primary outcome measure was the incidence of metabolic syndrome status.

Of the 7,447 participants, biochemical determinations were available for 5,801. Of those, 63.9% met the criteria for metabolic syndrome at baseline. The rates of central obesity and high fasting plasma glucose were significantly higher in the control group at the end of follow-up than in the Mediterranean diet groups. At a median follow-up of 4.8 years, a significantly smaller increase in the prevalence of the metabolic syndrome was found in the olive oil supplementation group than in the control subjects ($p=0.013$). Among those with metabolic syndrome at baseline, those on both Mediterranean diets were more likely to revert than were the controls.

Conclusion: This study of patients with high cardiovascular risk found that the Mediterranean diet is associated with a smaller increase in the prevalence of the metabolic syndrome and an increased chance of reversal of the syndrome, as compared with a low-fat diet.

Babio, N., et al. Mediterranean Diets and Metabolic Syndrome Status in the PREDIMED Randomized Trial. *CMAJ*. 2014, October doi: 10.1503/cmaj.140764

MULLIGAN'S TAPING FOR ANKLE INSTABILITY

After ankle sprain, patients may experience re-sprain and the potential for subsequent development of chronic ankle instability. One of the most popular methods of supporting the ankle after ankle sprain is taping, both to prevent further sprains by external support and to enhance proprioceptive activity. This study examined whether fibula repositioning taping (Mulligan's taping) affects postural control in professional athletes with chronic ankle instability.

Participants were 16 professional athletes with chronic ankle instability and 16 matched athletes without ankle instability. The subjects were screened using two questionnaires adapted from the Foot and Ankle Disability Index and the Foot and Ankle Disability Index-Sports. All participants performed a postural control test with and without taping. Pre- and post-taping, both groups performed the star excursion balance test, which incorporates single-leg stance on one leg with maximal reach of the opposite leg. The chronic ankle instability group performed the star excursion balance test standing on the injured leg.

Before taping, greater reaching distance was found in all directions for healthy athletes than for those with chronic ankle instability. After taping, there was a significant increase in reaching distance for the medial, anteromedial, posteromedial, and overall reach. Such significant improvements were also found in the healthy athletes, with the exception of the anteromedial direction.

Conclusion: This study found that Mulligan's Fibula Repositioning Taping can significantly improve postural control of athletes with chronic ankle instability. Improvements were also noted in healthy controls.

Someeh, M., et al. Immediate Effects of Mulligan's Fibula Repositioning Taping on Postural Control in Athletes with and without Chronic Ankle Instability. *Physical Ther in Sport*. 2014; DOI: 10.1016/j.ptsp.2014.08.003

MUSCLE INTRUSION INTO THE CARPAL TUNNEL

Carpal tunnel syndrome (CTS) is a common condition affecting 2.7% of the population in the United States. Previous studies have demonstrated that many individuals have muscles, either flexor digitorum or lumbricals, entering the carpal tunnel with certain finger and wrist movements. This study investigated whether increased pressure within the carpal tunnel may be associated with repetitive muscle intrusions into the tunnel.

Participants were self-identified as Latinos working full-time in manual labor positions. A total of 513 underwent ultrasound and nerve conduction studies. At the ultrasound

screening, a cross-sectional area of the muscles entering the carpal tunnel was measured at the level of the distal wrist crease. US was used to determine the extent of muscle intrusion into the tunnel, with the wrist at full flexion and full extension. Of the 513 participants, 264 were identified as not having CTS at baseline in either hand, and were invited to return one year later. Of those, 173 returned for follow-up.

After controlling for age, gender and body mass index, four wrist variables differed between those with no CTS, possible CTS and CTS. These factors included nerve area ($p=0.001$), muscle area with the wrist in neutral position ($p=0.017$), muscle area with the wrist in flexed position ($p=0.020$) and any muscle in the tunnel ($p=0.003$). However, after controlling for participant characteristics, none of the baseline ultrasound measurements of muscle predicted the development of CTS.

Conclusion: This study found that, while muscle intrusion into the carpal tunnel is associated with carpal tunnel syndrome, muscle intrusion alone does not predict the development of CTS.

Cartwright, M., et al. Muscle Intrusion as a Potential Cause of Carpal Tunnel Syndrome. **Muscle Nerve**. 2014, October; 50(4): 517- 522.

NERVE PALSY AFTER TOTAL HIP ARTHROPLASTY

Perioperative iatrogenic nerve damage after total hip arthroplasty (THA) is a rare but serious complication. This study was designed to better understand the prognosis of patients with nerve injury after total hip arthroplasty.

This retrospective analysis reviewed patients seen in one clinic for THA between 1998 and 2003. All participants had normal preoperative neurologic examinations. All underwent clinical examinations six weeks, four months, one year and two years post-surgery. Data were reviewed for patients with postoperative nerve lesions.

Thirty-five patients were found with postoperative nerve lesions, with one demonstrating electromyographic evidence of a peroneal nerve/positional injury. That patient was excluded from the analysis. For primary surgery, the incidence was

1.5%, and, for revision surgery was 1.4%. The incidence was 2.5% in females and 0.6% in males ($p<0.01$). Twenty patients suffered damage of the femoral nerve, nine of the sciatic nerve and five the superior gluteal nerve. All 35 patients had EMG evidence of neurapraxia. At the time of the two-year examination, 50% of the subjects demonstrated complete remission. In those patients, the median duration to complete remission was 19 months. At the final examination, at a median time of 93 months, six of seven patients available had achieved further improvement.

Conclusion: This study of patients with iatrogenic nerve injury during total hip arthroplasty surgery found that 50% enjoy complete recovery at two years.

Zappe, B., et al. Long-Term Prognosis of Nerve Palsy after Total Hip Arthroplasty: Results of a Two-Year Follow-Up and Long-Term Results after a Mean Time of Eight Years. **Arch Ortho Trauma Surg**. 2014, October; 134(10): 1477-1482.

PLATELET RICH PLASMA FOR HAMSTRING INJURIES

Acute hamstring injury often results in a loss of training and competition time. The best clinical treatment for these injuries is not yet clear. As autologous platelet rich plasma (PRP) injections have received attention as a treatment for other musculoskeletal conditions, this study explored the effects of these injections on patients with grade 2 hamstring injuries.

This single- blind, randomized, controlled trial included patients over 18 years of age presenting with a grade 2 hamstring injury. The participants were randomized to receive either a PRP injection combined with a rehabilitation program or a rehabilitation program alone. The rehabilitation program focused on agility and trunk stabilization exercises. Subjects in both groups were followed until full recovery or the end of the study. The primary outcome measure was time to return to play.

Of the patients eligible for inclusion in this study, 24 were included in the final analysis. The participants' median age was 21 years, with a mean duration of injury

before enrollment of 4.6 days. The mean times to return to play were 26.7 days in the treatment group and 42.5 days in the control group. Half of the patients in the PRP group achieved full recovery at week 26, while half of those in the control group achieved full recovery at week 39. Patients in the treatment group had significantly lower pain severity scores than controls at all time points ($p=0.007$).

Conclusion: This randomized, controlled trial of patients with grade 2 hamstring injuries found that platelet rich plasma injections, combined with rehabilitation, were more effective than rehabilitation alone for returning athletes to play.

Hamid, M., et al. Platelet Rich Plasma Injections for the Treatment of Hamstring Injuries. **Amer J Sports Med**. 2014, October; 42(10): 2410-2418.

EFFECT OF EXERCISE ON SLEEP AND FATIGUE IN PATIENTS WITH RHEUMATOID ARTHRITIS

Sleep disturbance is a common complaint among patients with rheumatoid arthritis (RA). Multiple factors have been associated with this phenomenon, including pain, depression, lack of exercise, restless legs, and corticosteroid use. This study evaluated the effect of exercise on self-reported sleep quality and fatigue among patients with RA.

Seventy patients diagnosed with RA were recruited from an outpatient rheumatology clinic. The patients were randomized to receive standard care, with information regarding the benefits of exercise, or standard care plus a 12-week home exercise program. The exercise program included resistance training, a walking program (developed according to the American College of Sports Medicine guidelines) and a daily flexibility program. Those in the exercise group were assessed at baseline and every three weeks, while the control group was assessed at baseline and at 12 weeks. Participants were evaluated using the Health Assessment Questionnaire Disability Index, for pain and stiffness using a visual analogue scale, for fatigue using the Fatigue Severity Scale and for sleep quality using the Pittsburgh Sleep Quality Index. The

primary outcome measure was sleep improvement.

Forty participants were included in the analysis. In both groups, the most commonly reported statement regarding fatigue and quality-of-life was, "Fatigue is among my three most disabling symptoms." The second most common statement was, "I can easily fatigue." Compared to the control group, significantly greater improvements were noted for the intervention group in pain ($p=0.05$), stiffness ($p=0.05$), subjective sleep quality ($p=0.04$) and Fatigue Severity Scale scores ($p=0.04$).

Conclusion: This study of patients with rheumatoid arthritis demonstrates that an exercise program including resistance, cardiovascular exercise and stretching can significantly affect fatigue and sleep quality.

Durcan, L., et al. Effect of Exercise on Sleep and Fatigue in Rheumatoid Arthritis: A Randomized, Controlled Study. *J Rheum.* 2014, October; 41 (10): 1966-1973.

EXERCISE TO REDUCE SURGERY IN SUBACROMIAL PAIN

While subacromial pain is common, there is no consensus concerning the ideal program for treating its symptoms. This study examined whether a specific exercise program can reduce surgical intervention for patients with rotator cuff tears.

Ninety-seven patients with clinical signs of subacromial pain, but not of major rotator cuff tear, were studied. All were on a waiting list for arthroscopic subacromial decompression surgery, and all had complained of lateral shoulder pain of at least six months' duration. At inclusion, all patients received a subacromial corticosteroid injection. The subjects were then randomized to one of two exercise programs. The treatment program performed eccentric exercises for the rotator cuff, along with a combination of concentric and eccentric exercises for the scapular stabilizers. The control program included six active movements for the neck and shoulder without any load or progression. The primary outcome measures were the Constant Murley (C-M) score and the decision to accept surgical intervention after treatment

completion. Secondary outcomes included the Disability of the Arm, Shoulder and Hand Questionnaire, a visual analogue scale for pain and health related quality of life, assessed with the EuroQual instrument.

Ninety-five patients were assessed at one-year follow-up. C-M scores revealed significant improvement between three months and one year. Similar findings were noted for all secondary outcomes. Significantly more patients in the control group than in the exercise group decided to undergo surgery following treatment completion (63% versus 24%).

Conclusion: This study of patients scheduled for arthroscopic subacromial decompressive surgery found that an exercise program consisting of concentric and eccentric exercises with progressive loads can significantly reduce the incidence of surgery.

Hallgren, H., et al. A Specific Exercise Strategy Reduced the Need for Surgery in Subacromial Pain Patients. *Br J Sports Med.* 2014, October; 48(19): 1431-1436.

AUDIOVISUAL MANIFESTATIONS OF PSORIATIC ARTHRITIS

Sensorineural hearing loss (SNHL) and acute audiovestibular dysfunction are known to occur in individuals with rheumatic diseases. However, little is known about the auditory manifestations in patients with psoriatic arthritis (PsA). This study examined whether the frequency of sensorineural hearing loss is increased among patients with psoriatic arthritis.

This study comprised 60 patients with PsA and 60 matched controls. Audiologic and vestibular assessments were performed to assess for speech reception threshold, sensorineural hearing loss and computerized dynamic posturography. Associations between audiovestibular tests and epidemiological and clinical features were determined.

Subjective hearing loss occurred in 31.7% of PsA and in 6.7% of controls ($p = 0.001$). In addition, the frequency of other symptoms such as tinnitus, vertigo dizziness, and disequilibrium was significantly increased in patients with PsA when compared to matched controls ($p <$

0.001 for all comparisons). Of the patients with PsA, 60% demonstrated abnormal hearing loss, as compared to 8.3% of the controls ($p < 0.001$). Audiometric tests demonstrated symmetric sensorineural hearing loss (SNHL) as the predominant pattern. Patients with PsA experienced abnormal oculocephalic responses, increased frequency of abnormal caloric test results and abnormal computerized dynamic posturography, as compared to controls ($p=0.006$, $p<0.001$ and $p<0.001$, respectively).

Conclusion: This study found strong evidence of inner ear compromise in patients with psoriatic arthritis.

Amor-Dorado, J., et al. Investigations into Audiovestibular Manifestations in Patients with Psoriatic Arthritis. *J Rheum.* 2014, October; 41(10): 2018-2026.

ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION IN THE UNITED STATES

Anterior cruciate ligament (ACL) injury is one of the most extensively studied musculoskeletal conditions. The true incidence of ACL reconstruction in the United States is currently unknown. This study was designed to determine the incidence of ACL reconstruction in the United States, and to identify changes in this incidence between 1994 and 2006.

Using data from the National Hospital Discharge Survey and the National Survey of Ambulatory Surgery, the authors identified patients who had undergone ACL reconstruction in the United States. Data were extracted including location of procedure, age, gender and diagnoses. From these data the ACL reconstruction incidences in 1994 and in 2006 were calculated.

When corrected for population changes, the number of ACL reconstruction procedures rose from 32.94 per 100,000 person-years in 1994 to 43.48 per 100,000 person-years in 2006 ($p=0.015$). The number of ACL reconstructions performed in the United States for patients younger than 20 years increased from 12.22 per 100,000 person-years in 1994 to 17.97 per 100,000 person-years in 2006. In addition, the number of ACL reconstructions performed in those 40

years of age or older increased from 1.65 per 100,000 person-years in 1994 to 7.57 per 100,000 person-years in 2006. The number of reconstructions performed in females increased from 32% in 1994 to 42% in 2006.

Conclusion: This study found that the incidence of ACL reconstruction increased between 1994 and 2006, with significant increases occurring in females, those younger than 20 years and those older than 40 years of age.

Mall, N., et al. Incidence and Trends of Anterior Cruciate Ligament Reconstruction in the United States. *Am J Sports Med.* 2014, October; 42 (10): 2363-2370.

TOTAL KNEE REPLACEMENT IN YOUNG ACTIVE PATIENTS

As total knee arthroplasty (TKA) is more frequently being performed in younger patients it is important to understand the long-term outcomes of these patients. This study followed a cohort of 88 patients, with an average age of 51 years, each of whom underwent arthroplasty between 1977 and 1992.

All 114 TKAs in 88 patients, originally reviewed in a paper published in 1997, were assessed at long-term follow-up. At the time of the initial review, six TKAs in six patients had been revised, and two patients had died without revision. For the remaining 80 patients, clinical data were obtained, including, when possible, a physical examination. For those unable to visit a physician, telephone interviews were conducted. Patients were assessed with the Tegner and Lysholm activity scores, a Hospital for Specialty Surgery (HSS) score and a Knee Society Score (KSS).

Follow-up data were obtained for 107 of the 113 TKRs, with the latest follow-up at 25.1 years. The average HSS scores for those available for follow-up were 57.9 at the preoperative examination, 92 in 1997 and 85.3 at the long-term follow-up. The KSSs were 94.9 in 1997 and 87.4 at long-term follow-up. There were significant improvements in the activity scores both in 1997 ($p < 0.0001$) and at long-term follow-up ($p < 0.0001$), as compared to preoperative scores. At the most recent follow-up, 27.8% reported the same activity levels as they did

preoperatively, and 72.2% had improved activity levels.

Conclusion: This follow-up of middle-aged individuals undergoing total knee arthroplasty found continued improved activity and function scores 25 years post-surgery.

Long, W., et al. Total Knee Replacement in Young, Active Patients: Long-Term Follow-Up and Functional Outcome. *J Bone Joint Surg.* 2014, September; 96: E1 59(1-7).

NERVE INJURIES ASSOCIATED WITH ACETABULAR FRACTURES

Acetabular fractures are frequently associated with nerve injuries. These commonly include the obturator, femoral and lateral femoral cutaneous nerves, as well as the sciatic nerve. However, few studies have documented the incidence of these injuries. This retrospective investigation was designed to determine the proportion of patients with acetabular fracture who develop nerve injuries, and what factors might increase this risk.

Data were collected from the German Multicenter Pelvic Study Group, with documentation of pelvic fractures beginning in 1991 at 29 university major trauma hospitals. The registry data included type of acetabular fracture, injury patterns and injury severity, as well as demographic information and type of surgery. Data were also gathered concerning the neurologic status of the patient at admission and discharge, and included nerve injuries identified at the hospital.

Of the 2,073 patients identified, 1,395 underwent surgery. The proportion of patients diagnosed with targeted nerve injuries at hospital admission was four percent, and at discharge was seven percent. Type C fractures were associated with the highest proportion of nerve injuries while type A fractures had the lowest. By fracture location, transverse plus posterior wall fracture was associated with the highest, while anterior wall fractures with the lowest risk of nerve injury.

Conclusion: This study of patients with acetabular fractures found that, at hospital discharge, seven percent had a trauma related nerve injury, with the risk highest

among those with posterior wall fractures of the pelvic ring.

Lehmann, W., et al. What Is the Frequency of Nerve Injuries Associated with Acetabular Fractures? *Clin Orthop Relat Res.* 2014, November; 472: 3395-3403.

INTRA-ARTICULAR PLATELET RICH PLASMA AND ROTATOR CUFF REPAIR OUTCOME

Studies reporting the effects of platelet rich plasma (PRP) on rotator cuff repair have produced inconsistent results. This study evaluated functional outcomes of patients receiving intraoperative PRP injection during the repair of supraspinatus tears.

Fifty-four subjects with MRI evidence of complete supraspinatus tears were studied. The subjects were randomized to receive either the standard of care or the standard of care plus PRP injections. At surgery, blood was collected immediately after anesthesia, with PRP retrieved for injection to the intra-articular space after the repair procedure.

All participants followed identical rehabilitation protocols, including shoulder immobilization for six weeks, passive exercise after three weeks and active exercise after six weeks. Muscle strengthening began after 12 weeks. The subjects were evaluated at three, six, 12 and 24 months using the UCLA and Constant Shoulder scales for function, as well as the Visual Analogue Scale (VAS) for pain, and evaluations for repeat tears by MRI.

All patients improved in pain (VAS) and function (UCLA and Constant scales) compared with baseline ($p < 0.001$). Significant improvement in favor of the PRP group was noted at 12 months, as measured by UCLA scores, although that benefit was not evident on follow-up at 24 months. MRI follow-up demonstrated a single, complete tear in the control group.

Conclusion: This blinded, randomized trial of patients with complete supraspinatus tears did not find that a platelet rich plasma injection at the time of surgery would improve long-term functional outcome.

Malavolta, E., et al. Platelet Rich Plasma and Rotator Cuff Repair: A Prospective, Randomized Study.

LASER VERSUS ULTRASOUND FOR SUBACROMIAL IMPINGEMENT

One of the most frequent causes of shoulder pain is subacromial impingement syndrome. Previous data have shown conflicting results concerning the effects of low level laser therapy. This study compared the effects of low level laser therapy with those of ultrasound for the treatment of patients with subacromial impingement.

Thirty-one patients diagnosed with subacromial impingement syndrome agreed to participate in this study. Of these, 16 were assigned to a low level laser therapy group, and 15 to an ultrasound therapy group. All subjects underwent 10 treatment sessions over a period of two consecutive weeks. The primary outcome measures were a visual analogue pain scale, the Shoulder Pain and Disability Index, patient satisfaction, and sleep interference scores.

Both groups were found to have significant reductions in pain scores, as well as in shoulder pain and disability index scores, at three months, with no significant difference between the two treatment groups. Further, no significant difference was seen between the two groups in patient satisfaction scores.

Conclusion: This study of patients with subacromial impingement syndrome found that both low level laser therapy and ultrasound therapy can be effective in treating pain, disability and sleep interference symptoms in this population.

Yavuz, F., et al. Low Level Laser Therapy versus Ultrasound Therapy in the Treatment of Subacromial Impingement Syndrome: A Randomized Clinical Trial. **J Back Musculoskel Rehab.** 2014, 27(3): 315-320.

MELATONIN AND DELIRIUM AMONG PATIENTS WITH HIP FRACTURE

Delirium in older patients is associated with a high risk of dementia. As previous studies of patients undergoing surgery have

demonstrated that melatonin metabolism is disturbed after surgery, this study assessed the effects of melatonin on the incidence of delirium among elderly patients hospitalized after hip fracture.

This multicenter, double-blind, randomized, controlled trial included patients 65 years of age or older, admitted for treatment of a hip fracture. Patients with delirium or who were taking melatonin at the time of admission were excluded from the study. The participants were randomized to receive either melatonin 3 mg, or a placebo, on five, consecutive evenings. Functional status was documented with the Katz Index of Activities of Daily Living. Cognition was assessed with the Mini Mental State Examination. Primary caregivers completed an Informant Questionnaire on Cognitive Decline - short form. The primary outcome measure was delirium during the first eight days after initiation of study medication.

Three hundred seventy eight patients were consented and randomized to one of the study's groups. The subjects' overall, mean age was 84 years, with 63% living at home before admission. The rates of delirium were 29.6% in the melatonin group and 25.5% in the placebo group ($p=0.4$). A smaller proportion of patients in the melatonin group experienced delirium lasting more than two days, as compared with those in the placebo group ($p=0.02$).

Conclusion: This study of elderly patients admitted for acute hip fracture found no evidence that melatonin reduces the incidence of delirium.

De Jonghe, A., et al. Effect of Melatonin on Incidence of Delirium among Patients with Hip Fracture: A Multicenter, Double-Blind, Randomized, Controlled Trial. **CMAJ.** 2014, October 7; 186(14): E547-E556.

TOTAL JOINT REPLACEMENT COMPLICATIONS AND ANTICOAGULANT THERAPY BRIDGING

To reduce the risk of perioperative bleeding, oral anti-coagulation is often interrupted prior to major surgery. In 2012, the American College of Chest Physicians (ACCP) updated practice guidelines to include suggestions for bridging therapy of

patients undergoing elective surgery. This study was designed to determine whether bleeding complication rates are higher among patients requiring bridging prior to total hip arthroplasty (THA) or total knee arthroplasty (TKA).

Patients receiving primary unilateral THA or TKA between 2011 and 2012 were included, who required bridging therapy according to the protocol based on the ACCP guidelines. Bleeding complications in this group were compared with a previously performed cohort study undergoing surgery by the same group of surgeons.

Major surgical bleeding occurred in 12 of the 13 bridged patients. Of those, nine developed a hematoma, leading to prolonged immobilization. Bleeding complications resulted in intervention in nine patients, with seven (54%) receiving blood transfusions, compared to 0.3% in the total group ($p<0.05$). The mean lengths of stay were 14.2 days in the bridging group and 5.3 days in the control group ($p<0.05$).

Conclusion: This study demonstrates a high rate of complications among patients undergoing hip or knee replacement surgery who received low molecular weight heparin bridging therapy prior to surgery.

Leijtens, B., et al. High Complication Rate after Total Knee and Hip Replacement Due to Perioperative Bridging of Anticoagulant Therapy Based on the 2012 ACCP Guideline **Arch Orthop Trauma Surg.** 2014, September; 134(9):1335-1341.

CLOSTRIDIUM DIFFICILE AND LUMBAR SPINE SURGERY

Lumbar spine surgery has been found to decrease pain and improve functional status among patients with degenerative spine disease, including spinal stenosis. Clostridium difficile (C diff) colitis is among the potential infections occurring after spine surgery, and is on the rise. The purpose of this study was to investigate the incidence and impact of C diff infection after lumbar spine surgery.

The Nationwide Inpatient Sample database, administered by the Agency for Healthcare Research and Quality was filtered for spine surgery procedures and diagnoses of C diff. Hospital characteristics reviewed

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included length of stay, mortality rate, comorbidity index and hospital charges.

Overall, the percentage of patients undergoing lumbar spine surgery who developed C diff was 0.11%. Factors associated with an increased risk of developing C diff infection included procedure type (lumbar spine fusion and fusion revision) uninsured or Medicaid status, older age and greater chronic disease burden, including diabetes, congestive heart failure and renal failure. Additionally, smaller hospital size was associated with a decreased risk, while large urban hospitals presented a greater risk. Overall, C diff infections resulted in an increased hospital stay by eight days, with hospital charges increased twofold, and inpatient mortality from 0.11% to four percent.

Conclusion: This study of patients undergoing lumbar spine surgery found that C diff infections cause significant morbidity and increased use of hospital care resources.

Skovrlj, B., et al. Clostridium Difficile Colitis in Patients Undergoing Lumbar Spine Surgery. *Spine*. 2014; 39(19): E1167-E1173.

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