

Clinical Relevance for the Veteran

SUMMARY OF SCIENTIFIC/TECHNICAL PAPERS IN THIS ISSUE

Continuous Regional Analgesia by Intra-neural Block Has No Effect on Postoperative Opioid Requirements and Phantom Limb Pain Following Amputation.

Andrew M. Elizaga, MD; Douglas G. Smith, MD; Sam R. Sharar, MD; W. Thomas Edwards, PhD, MD; Sigvard T. Hansen, Jr., MD (*p. 179*)

Purpose of the Work. Continuous regional analgesia (pain killer) by local anesthetic administration into a nerve sheath is a new technique for postoperative pain control in patients who have undergone amputation surgery. **Procedures.** Although data on this technique is sparse, two studies have reported on its effectiveness, safety, and advantages over opioids not given orally in controlling both acute and post-amputation phantom pain. Because of these two encouraging reports, we undertook a similar study in a heterogeneous patient population (trauma, infection, chronic deformity, and vascular insufficiency) undergoing limb amputations. We attempted to assess the effectiveness of this technique in the management of postoperative pain and in preventing phantom pain. **Results.** Unfortunately, we found that single-nerve intraneural infusion of local anesthetic seems ineffective in reducing postoperative opioid requirements, and we were unable to detect a difference in the effectiveness of postoperative analgesia (pain killers), incidence of side-effects related to opioid use, incidence of phantom pain, or intensity of the pain experience in patients who developed phantom pain. **Relevance to Veteran Population.** Amputation surgery and phantom pain are very relevant veteran issues. Since two previously published reports have found this technique effective, we hope this contradictory report will stimulate further study and investigation.

Andrew M. Elizaga, MD

Biomechanical Assessment of Below-Knee Residual Limb Tissue.

Arthur F.T. Mak, PhD; George H.W. Liu, BS; S.Y. Lee, BD (*p. 188*)

The Purpose of the Work. This research is to measure the indentation properties of the soft tissues at different pressure-tolerant sites around the proximal tibiae of nondisabled young adults and persons with below-knee amputation. The effects of muscular activities and the changes in the properties measured before, and 6 months after, discharge were also studied. **Subjects/Procedures.** Six nondisabled subjects and 8 subjects with amputation were tested using a special indentation apparatus and three sites were assessed for each subject. Effective degrees of elasticity were obtained from the data. **Results.** The lateral tissues between the tibia and fibula were stiffer than those on the medial side. Aged residual limb tissues were only about 55–60% as stiff as the normal young tissues. Muscle activities could increase the degree of elasticity by up to 45% for the nondisabled young subjects versus up to only about 20% for the aged subjects with amputation. Significant though small increases in stiffness were also measured with time after amputation. **Relevance to Veteran Population.** Results from this study provide objective and quantitative information for a rational approach to below-knee prosthetic designs.

Arthur F.T. Mak, PhD

Joint Angle Parameters in Gait: Reference Data for Normal Subjects, 10–79 Years of Age.

Tommy Öberg, MD, PhD; Alek Karsznia, PT, PhD; Kurt Öberg, PhD (*p. 199*)

Purpose of the Work. In the laboratory, gait analysis is often completed with goniometry (a clinical measuring device is used to measure joint angles in degrees). Reference data for basic gait parameters were presented in a previous article. The

aim of this study was to provide such reference data for joint angle parameters. **Subjects.** Two hundred and thirty-three nondisabled subjects: 116 men and 117 women, 10–79 years of age. **Procedures.** The measurements were made in a gait laboratory with electrogoniometers with Lamoreaux type of exoskeleton. **Results.** A series of reference tables for slow, normal, and fast speed are presented. Means, standard deviations, coefficients of variation, 95% confidence intervals, and 95% prediction intervals were calculated. We found minor changes with age, no differences between right and left side, significant sex difference, and significant changes with increasing gait speed. **Relevance to Veteran Population.** If gait analysis is used for evaluation of disabled people, a comparison must be made with data from nondisabled people. This study provides such normative data for joint angle parameters. The reference data in this paper are considered valid in an indoor laboratory situation.

Tommy Öberg, MD, PhD

Pressure Redistribution by Molded Inserts in Diabetic Footwear: A Pilot Study.

Marilyn Lord, PhD and Riad Hosein, BEng
(p. 214)

Purpose of the Work. Shoe inserts molded to the contours of the foot sole may be recommended to redistribute pressure away from localized peaks, particularly where the pressure levels are such that the foot is at risk of developing ulcers. To justify the expense of these custom-made orthoses, we investigated whether they were more effective than a simple, flat cushioning insert. **Subjects/Procedures.** Six established wearers of orthopedic shoes accommodating custom-molded inserts were approached by our Diabetic Foot Clinic. An alternative flat insert was made for each subject. The pressure distribution between foot and insert was measured during walking for both designs. **Results.** In a comparison of maximum pressure recorded at sites of localized pressure peaks, molded inserts yielded low-

er values than flat inserts. **Relevance to Veteran Population.** More objective, quantitative assessment of the claims for various footwear designs is needed to enable clinicians and wearers to make appropriate and cost-effective choices. It is hoped that by redistributing plantar pressure in orthopedic shoes of diabetic patients at risk of plantar ulceration, amputation surgery may be prevented in the future.
Marilyn Lord, PhD

Cardiorespiratory Status and Movement Capabilities in Adults with Limb Amputation.

Sergey F. Kurdibaylo, MD (p. 222)

Purpose of the Work. The objective of the paper is the study of cardiac and respiratory functions in subjects with various levels of upper and lower limb amputation, estimation of motor activity and allowable loadings. **Subjects.** 230 subjects with limb amputation were examined in balanced wheelchair ergometry testing. The causes of all amputations were traumatic injuries. **Procedures.** The examination of cardiac and respiratory functions was carried out by electrocardiography, polycardiography, tachooscillography, echocardiography (M-operating condition); the examination of external respiration was undertaken by spirometry and pneumotachometry. **Results.** The examination of results reveals marked peculiarities in blood circulation in lower-limb disabled depending on body mass reduction. The reduction in respiratory capabilities in upper-limb disabled was revealed. A decline in work capacity was revealed in all subjects examined showing a direct relationship to amputation defect. The adequate physical activities were calculated as the allowable loadings for the disabled with various levels of amputation. The criteria of movement capabilities for disabled were developed as well as physical endurance criteria. **Relevance to Veteran Population.** Specific methods of exercise for amputees are given; marked increase in working capacity and physical fitness by using trainers is revealed.
Sergey F. Kurdibaylo, MD