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MSK INJECTION ABSTRACTS

CONTENTS

Neck/Upper Spine

Ultrasound-guided facet joint injections in the middle to lower cervical spine: a CT-controlled sonoanatomic study. Galiano K, Obwegeser AA, Bodner G, et al.

Clin J Pain. Jul-Aug 2006;22(6):538-543.

Abstract

OBJECTIVES: The aim of this study was to investigate the efficacy of ultrasound as a guiding tool for simulated cervical facet joint injections in cadavers.

METHODS: A total of 40 ultrasound examinations at 5 levels (C6-7 to C2-3) were performed on 4 embalmed cadavers. The zygapophyseal joints were located with ultrasound. First, the transverse processes of C6 and C7 were established and the facet joint of C6-7 was demonstrated. The midpoint of this joint space, defined as the middle of its cranio-caudal extension on its lateral surface, was taken as a reference point. Ipsilateral distances (A, B, C, and D) between this point and each one of the 4 facet joints of the cervical spine up to the facet joints C2-3 were then computed. Subsequently, coronal computed tomography (CT) scans were taken to verify these distances. In a second experiment, a spinal needle was advanced under ultrasound guidance to the zygapophyseal joints from C2-3 to C6-7 on both sides of 1 cadaver. The exact placement of the needle tips was again verified by CT.

RESULTS: In 4 attempts, a depiction of the joint space was not possible. Ultrasound and CT provided the same mean measurements of 1.2+/-0.2 cm, 2.0+/-0.3 cm, 3.0+/-0.2, and 4.0+/-0.5 cm for distances A, B, C, and D, respectively. All 10 needle tips were located in the joint space during simulated facet joint injections, as also verified by CT.

DISCUSSION: This preclinical study suggests that ultrasound is a useful guiding tool for facet joint injections in the cervical spine.

Ultrasound-guided supraclavicular block: outcome of 510 consecutive cases. Perlas A, Lobo G, Lo N, Brull R, Chan VW, Karkhanis R.

Reg Anesth Pain Med. Mar-Apr 2009;34(2):171-176.

Abstract

INTRODUCTION: Supraclavicular brachial plexus block provides consistently effective anesthesia to the upper extremity. However, traditional nerve localization techniques may be associated with a high risk of pneumothorax. In the present study, we report block success and clinical outcome data from 510 consecutive patients who received an ultrasound-guided supraclavicular block for upper extremity surgery.

METHODS: After institutional review board approval, the outcome of 510 consecutive patients who received an ultrasound-guided supraclavicular block for upper extremity surgery was reviewed. Real-time ultrasound guidance was used with a high-frequency linear probe. The neurovascular structures were imaged on short axis, and the needle was inserted using an in-plane technique with either a medial-to-lateral or lateral-to-medial orientation.

RESULTS: Five hundred ten ultrasound-guided supraclavicular blocks were performed (50 inpatients, 460 outpatients) by 47 different operators at different levels of training over a 24-month period. Successful surgical anesthesia was achieved in 94.6% of patients after a single attempt; 2.8% required local anesthetic supplementation of a single peripheral nerve territory; and 2.6% received an unplanned general anesthetic. No cases of clinically symptomatic pneumothorax developed. Complications included symptomatic hemidiaphragmatic paresis (1%), Horner syndrome (1%), unintended vascular punctures (0.4%), and transient sensory deficits (0.4%).

CONCLUSIONS: Ultrasound-guided supraclavicular block is associated with a high rate of successful surgical anesthesia and a low rate of complications and thus may be a safe alternative for both inpatients and outpatients. Severe underlying respiratory disease and coagulopathy should remain a contraindication for this brachial plexus approach.

Ultrasound-guided trigger point injections in the cervicothoracic musculature: a new and unreported technique. Botwin KP, Sharma K, Saliba R, Patel BC.

Pain Physician. Nov-Dec 2008;11(6):885-889.

Abstract

BACKGROUND: Myofascial pain is defined as pain that originates from myofascial trigger points in skeletal muscle. It is prevalent in regional musculoskeletal pain syndromes, either alone or in combination with other pain generators. The myofascial pain syndrome is one of the largest groups of under diagnosed and under treated medical problems encountered in clinical practice. Trigger points are commonly seen in patients with myofascial pain which is responsible for localized pain in the affected muscles as well as referred pain patterns. Correct needle placement in a myofascial trigger point is vital to prevent complications and improve efficacy of the trigger point injection to help reduce or relieve myofascial pain. In obese patients, these injections may not reach the target tissue. In the cervicothoracic spine, a misguided or misplaced injection can result in a pneumothorax. Here, we describe an ultrasound-guided trigger point injection technique to avoid this potential pitfall. Office based ultrasound-guided injection techniques for musculoskeletal disorders have been described in the literature with regard to tendon, bursa, cystic, and joint pathologies. For the interventionalist, utilizing ultrasound yields multiple advantages technically and practically, including observation of needle placement in real-time, ability to perform dynamic studies, the possibility of diagnosing musculoskeletal pathologies, avoidance of radiation exposure, reduced overall cost, and portability of equipment within the office setting. To our knowledge, the use of ultrasound guidance in performing trigger point injection in the cervicothoracic area, particularly in obese patients, has not been previously reported.

METHODS: A palpable trigger point in the cervicothoracic musculature was localized and marked by indenting the skin with the tip of a plastic needle cover. The skin was then sterile prepped. Then, using an ultrasound machine with sterile coupling gel and a sterile latex free transducer cover, the musculature in the cervicothoracic spine where the palpable trigger point was detected was visualized. Then utilizing direct live ultrasound guidance, a 25-gauge 1.5 inch needle connected to a 3 mL syringe was placed into the muscle at the exact location of the presumed trigger point. This guidance helps confirm needle placement in muscle tissue and not in an adipose tissue or any other non-musculature structure.

RESULTS: The technique is simple to be performed by a pain management specialist who has ultrasound system training.

CONCLUSION: Ultrasound-guided trigger point injections may help confirm proper needle placement within the cervicothoracic musculature. The use of ultrasound-guided trigger point injections in the cervicothoracic musculature may also reduce the potential for a pneumothorax by an improperly placed injection.

Shoulder/Arm/Hand

Accuracy of ultrasound-guided versus palpation-guided acromioclavicular joint injections: a cadaveric study. Peck E, Lai JK, Pawlina W, Smith, J.

PM R. Sep;2(9):817-821.

Abstract

OBJECTIVE: To describe a technique for sonographically guided acromioclavicular joint (ACJ) injections and compare its accuracy to palpation-guided injections in a cadaveric model.

DESIGN: Prospective laboratory investigation.

SETTING: Procedural skills laboratory at a tertiary medical center.

METHODS: A single experienced operator completed 10 sonographically guided and 10 palpation-guided ACJ injections in unembalmed cadavers. Injection order was randomized and all injections were completed with diluted colored latex. Co-investigators blinded to the injection technique dissected each specimen and graded colored latex location as accurate (in the ACJ), partially accurate (within and outside the ACJ), or inaccurate (no latex in the ACJ).

MAIN OUTCOME MEASUREMENTS: Direct assessment of injected dye within the ACJ via dissection.

RESULTS: All 10 sonographically guided ACJ injections accurately placed latex into the ACJ (100% accuracy), whereas only 4 of 10 (40%) palpation-guided injections accurately placed latex within the ACJ (P = .0054).

CONCLUSIONS: This cadaveric investigation suggests that sonographic guidance can be used to inject the ACJ with a high degree of accuracy, and should be considered superior to palpation guidance. Clinicians should consider using sonographic guidance to inject the ACJ when diagnostic specificity is paramount or when otherwise clinically indicated.

Ultrasound guidance improves the success rate of a perivascular axillary plexus block. Sites BD, Beach ML, Spence BC, et al.

Acta Anaesthesiol Scand. Jul 2006;50(6):678-684.

Abstract

BACKGROUND: Traditional approaches to performing brachial plexus blocks via the axillary approach have varying success rates. The main objective of this study was to evaluate if a specific technique of ultrasound guidance could improve the success of axillary blocks in comparison to a two injection transarterial technique.

METHODS: Fifty-six ASA physical status I-III patients presenting for elective hand surgery were prospectively randomized to receive an axillary block performed by either a transarterial technique (Group TA) or an ultrasound-guided perivascular approach (Group US). Both groups received a total of 30 ml of 1.5% lidocaine (225 mg) with 5 microg/ml epinephrine. Patients were then evaluated for block onset in specific nerve distributions and whether or not the block acted as a surgical anesthetic.

RESULTS: Group TA sustained more failures defined as conversion to general anesthesia or the inability to localize the artery [Group TA eight patients (29%) vs. Group US in which 0 patients required conversion to general anesthesia (0%) $P < 0.01$]. Group US demonstrated a reduction in performance times vs. Group TA (7.9 +/- 3.9 min vs. 11.1 +/- 5.7 min, $P < 0.05$). By 30 min post-injection, there were no significant differences between groups TA and US in terms of the proportion of patients demonstrating a complete motor or sensory loss.

CONCLUSION: Ultrasonographic guidance improves the overall success rate of axillary blocks in comparison to a transarterial technique.

The outcome of ultrasound-guided needle decompression and steroid injection in calcific tendinitis. Yoo JC, Koh KH, Park WH, Park JC, Kim SM, Yoon YC.

J Shoulder Elbow Surg. Dec 1 2009.

Abstract

HYPOTHESIS: Needle lavage is frequently performed before consideration of surgical removal in shoulders with calcific tendinitis because this may avoid surgery. However, its role in nonoperative treatment has not been fully investigated in terms of clinical and radiographic response. We hypothesized that needle decompression and subacromial steroid injection would show good clinical results in chronic calcific tendinitis patients.

MATERIALS AND METHODS: Thirty-five shoulders in 30 consecutive patients with painful calcific tendinitis were treated by ultrasound-guided needle decompression and subacromial corticosteroid injection. Patients were prospectively evaluated using American Shoulder and Elbow Surgeons (ASES) and Constant scores at 1, 3, and 6 months after the intervention. Size and morphology of the calcific deposits were compared with those in baseline radiographs at each visit.

RESULTS: At 6 months after the index procedure, 25 shoulders (71.4%) showed ASES and Constant score improvements from 48.0 and 53.7 to 84.6 and 87.9, respectively ($P < .01$). Ten shoulders (28.6%) showed no symptom relief at the last follow-up. In shoulders with pain improvement, the mean size of calcific deposits reduced from 13.6 to 5.6 mm ($P < .01$), and in shoulders with no pain improvement or that underwent operation, mean size was 13.1 mm at initial visits and 12.7 mm at final visits ($P = .75$).

DISCUSSION: Shoulders showing little evidence of deposit size reduction at 6 months after needle decompression are less likely to achieve symptomatic improvement and may be considered as candidates for surgical removal.

CONCLUSION: Needle decompression with subacromial steroid injection is effective in 71.4% of calcific tendinitis within 6 months. The size of calcific deposits in patients that achieved symptom relief was reduced. LEVEL OF EVIDENCE: Level 4; Case series, treatment study.

Glenohumeral joint injection: a comparative study of ultrasound and fluoroscopically guided techniques before MR arthrography. Rutten MJ, Collins JM, Maresch BJ, et al.

Eur Radiol. Mar 2009;19(3):722-730.

Abstract

To assess the variability in accuracy of contrast media introduction, leakage, required time and patient discomfort in four different centres, each using a different image-guided glenohumeral injection technique. Each centre included 25 consecutive patients. The ultrasound-guided anterior (USa) and posterior approach (USp), fluoroscopic-guided anterior (FLa) and posterior (FLp) approach were used. Number of injection attempts, effect of contrast leakage on diagnostic quality, and total room, radiologist and procedure times were measured. Pain was documented with a visual analogue scale (VAS) pain score. Access to the joint was achieved in all patients. A successful first attempt significantly occurred more often with US (94%) than with fluoroscopic guidance (72%). Leakage of contrast medium did not cause interpretative difficulties. With US guidance mean room, procedure and radiologist times were significantly shorter ($p < 0.001$). The USa approach was rated with the lowest pre- and post-injection VAS scores. The four image-guided injection techniques are successful in injection of contrast material into the glenohumeral joint. US-guided injections and especially the anterior approach are significantly less time consuming, more successful on the first attempt, cause less patient discomfort and obviate the need for radiation and iodine contrast.

Ultrasound-guided first annular pulley injection for trigger finger. Bodor M., Flossman T.

J Ultrasound Med. Jun 2009;28(6):737-743.

Abstract

OBJECTIVE: The purpose of this study was to develop an ultrasound-guided first annular (A1) pulley injection technique for trigger finger with documentation of outcomes at 1 year.

METHODS: We performed a short-axis injection into a triangle bordered by the A1 pulley, the flexor digitorum superficialis and profundus tendons and volar plate, and the distal metacarpal bone with a 10-mg median dose of triamcinolone acetonide and 2% lidocaine. This was a prospective study of 50 of 52 consecutive trigger fingers from 24 patients recruited from a physical medicine and rehabilitation private practice.

RESULTS: All patients were available for follow-up, with 94% (47 of 50) of fingers having complete resolution of symptoms at 6 months, 90% (37 of 41) at 1 year, 65% (17 of 26) at 18 months, and 71% (12 of 17) at 3 years after a single injection.

CONCLUSIONS: Our ultrasound-guided A1 pulley injection technique is a highly effective and minimally invasive treatment option for trigger finger with a 90% success rate at 1 year for complete resolution of symptoms after a single injection. Assuming similar patient populations, our results were statistically significant ($P < .01$) compared with the 56% to 57% success rates recently reported for blind injections.

Ultrasound-guided injection of triamcinolone and bupivacaine in the management of De Quervain's disease. Jeyapalan K, Choudhary S.

Skeletal Radiol. Nov 2009;38(11):1099-1103.

Abstract

OBJECTIVE: The aim of this study was to describe the technique and usefulness of ultrasound-guided intrasynovial injection of triamcinolone and bupivacaine in treatment of de Quervain's disease.

MATERIALS AND METHODS: A total of 17 patients with symptomatic De Quervain's disease were included in this study. The procedure involved confirmation of diagnosis with ultrasound followed by guided injection of a mixture of 20 mg of triamcinolone (40 mg/ml) and 1 ml of 0.5% bupivacaine. Ultrasound guidance with a high resolution 15-Mhz footprint probe was used for injection into the first dorsal extensor compartment tendon sheath (E1). The response to ultrasound-guided injection was ascertained at the post procedure outpatient clinic appointment according to the follow-up clinic notes.

RESULTS: There were 14 female and 3 male patients aged 29 to 74 years. Mean duration of symptoms was 8.9 months. One patient had an atypical septum in the first extensor compartment and the extensor pollicis brevis alone was involved. The mean post-injection follow-up was at 6.75 weeks. One patient was lost to follow-up. Fifteen out of 16 patients had significant symptomatic relief (93.75%). There were no immediate or delayed complications. Recurrence of symptoms was seen in 3 (20%) patients.

CONCLUSION: Ultrasound-guided injection of triamcinolone and bupivacaine is safe and useful in controlling symptoms of De Quervain's disease. Correct needle placement with ultrasound guidance avoids intratendinous injection as well as local complications like fat atrophy and depigmentation.

Comparative survey of pain-alleviating effects between ultrasound-guided injection and blind injection of lidocaine alone in patients with painful shoulder. Hashiuchi T, Sakurai G, Sakamoto Y, Takakura Y, Tanaka Y.

Arch Orthop Trauma Surg. Sep 12 2009.

Abstract

BACKGROUND: Complaints of shoulder pain are very frequent in clinical practice. To relieve this type of pain, intra-subacromial bursa (SAB) injection therapy is commonly employed. Injection procedures include blind and ultrasound-guided injection. In clinical practice, blind injection is routinely performed. However, the SAB is a very thin tissue. Poor response to blind injection may be due to a misplaced injection. It is assumed that ultrasound-guided injections are more effective than blind injections. The purpose of this study was to compare pain-alleviating effects between ultrasound-guided injection and blind injection with lidocaine alone.

MATERIALS AND METHODS: The subjects were 16 patients (20 shoulders) in whom pain was possibly derived from inflammation of the SAB. Initially, ultrasound-guided injection was performed with 2 ml of 1% lidocaine. After 1 week, blind injection was conducted in the same patient. They subjectively expressed the grade of pain at each time point (before and 1, 5, 10, 15, 20, 25, and 30 min after injection) as pain scores. We calculated the amelioration rate by dividing differences between the scores at each time point and before injection by the pre-injection score.

RESULTS: Pain scores of ultrasound-guided injection were lower than blind injection. Ultrasound-guided injection achieved higher mean amelioration rates compared to blind injection, showing significant differences at all time points ($P < 0.01$).

CONCLUSIONS: Ultrasound-guided technique achieved higher effectiveness compared to blind technique.

Ultrasound-guided, minimally invasive, percutaneous needle puncture treatment for tennis elbow. Zhu J, Hu B, Xing C, Li

J. Adv Ther. Oct 2008;25(10):1031-1036.

Abstract

INTRODUCTION: This report evaluates the efficacy of percutaneous needle puncture under sonographic guidance in treating lateral epicondylitis (tennis-elbow).

METHODS: Ultrasound-guided percutaneous needle puncture was performed on 76 patients who presented with persistent elbow pain. Under a local anesthetic and sonographic guidance, a needle was advanced into the calcification foci and the calcifications were mechanically fragmented. This was followed by a local injection of 25 mg prednisone acetate and 1% lidocaine. If no calcification was found then multiple punctures were performed followed by local injection of 25 mg prednisone acetate and 1% lidocaine. A visual analog scale (VAS) was used to evaluate the degree of pain pre-and posttreatment at 1 week to 24 weeks. Elbow function improvement and degree of self-satisfaction were also evaluated.

RESULTS: Of the 76 patients, 55% were rated with excellent treatment outcome, 32% good, 11% average, and 3% poor. From 3 weeks posttreatment, VAS scores were significantly reduced compared with the pretreatment score ($P<0.05$) and continued to gradually decline up to 24 weeks posttreatment. Sonography demonstrated that the calcified lesions disappeared completely in 13% of the patients, were reduced in 61% of the patients, and did not change in 26% of the patients. Color Doppler flow signal used to assess hemodynamic changes showed a significant improvement after treatment in most patients.

CONCLUSION: Ultrasound-guided percutaneous needle puncture is an effective and minimally invasive treatment for tennis elbow. Sonography can be used to accurately identify the puncture location and monitor changes.

Ultrasound-guided intra-articular injection of the trapeziometacarpal joint: description of technique. Umphrey GL, Brault JS, Hurdle MF, Smith J.

Arch Phys Med Rehabil. Jan 2008;89(1):153-156.

Abstract

OBJECTIVE: To describe a new technique to perform an ultrasound-guided intra-articular injection of the trapeziometacarpal (TMC) joint.

DESIGN: Ultrasound-guided injection of the TMC joint was completed on fresh frozen cadaver hand specimens using diatriazoate meglumine contrast. A fluoroscopic posteroanterior image of the TMC joint was then obtained to verify intra-articular placement of the contrast.

SETTING: Anatomy lab in a medical college.

SPECIMENS: Seventeen fresh frozen cadaver hand specimens.

INTERVENTIONS: Not applicable.

MAIN OUTCOMES MEASURE: Verification of this technique was confirmed using fluoroscopy and contrast.

RESULTS: Sixteen (94%) of 17 joints injected showed contrast material within the TMC joint with a single cutaneous puncture. One intra-articular injection was initially misplaced into the scaphotrapeziotrapezoid joint.

CONCLUSIONS: Ultrasound may be used to accurately perform intra-articular TMC injections. Ultrasound provides a viable alternative to fluoroscopy when accurate injection into the TMC joint is required for diagnostic or therapeutic purposes.

Hip/Lower Spine

Ultrasound guidance improves a continuous popliteal sciatic nerve block when compared with nerve stimulation. Bendtsen TF, Nielsen TD, Rohde CV, Kibak K, Linde F.

Reg Anesth Pain Med. Mar-Apr;36(2):181-184.

Abstract

BACKGROUND AND OBJECTIVES: Continuous sciatic nerve blockade at the popliteal level effectively alleviates postoperative pain after major foot and ankle surgery. No randomized controlled trials have previously compared the success rate of continuous sciatic nerve sensory blockade between ultrasound and nerve stimulation guidance. In the current study, we tested the hypothesis that ultrasound-guided catheter placement improves the success rate of continuous sciatic nerve sensory blockade compared with catheter placement with nerve stimulation guidance.

METHODS: After research ethics committee approval and informed consent, 100 patients scheduled for elective major foot and ankle surgery were randomly allocated to popliteal catheter placement either with ultrasound or nerve stimulation guidance. The primary outcome was the success rate of sensory block the first 48 postoperative hours. Successful sensory blockade was defined as sensory loss in both the tibial and common peroneal nerve territories at 1, 6, 24, and 48 hrs postoperatively.

RESULTS: The ultrasound group had significantly higher success rate of sensory block compared with the nerve stimulation group (94% versus 79%, P=0.03). Ultrasound compared with nerve stimulation guidance also entails reduced morphine consumption (median of 18 mg [range, 0-159 mg] versus 34 mg [range, 0-152 mg], respectively, P=0.02), fewer needle passes (median of 1 [range, 1-6] versus 2 [range, 1-10], respectively, P=0.0005), and greater patient satisfaction (median numeric rating scale 9 [range, 5-10] versus 8 [range, 3-10)] respectively, P=0.0006) during catheter placement.

CONCLUSION: Ultrasound guidance used for sciatic catheter placement improves the success rate of sensory block, number of needle passes, patient satisfaction during catheter placement, and morphine consumption compared with nerve stimulation guidance.

Effectiveness of ultrasound-guided corticosteroid injection for the treatment of gluteus medius tendinopathy. Labrosse JM, Cardinal E, Leduc BE, et al.

AJR Am J Roentgenol. Jan;194(1):202-206.

Abstract

OBJECTIVE: The objective of our study was to evaluate the effectiveness of ultrasound-guided corticosteroid injection for the treatment of gluteus medius tendinopathy.

SUBJECTS AND METHODS: We prospectively evaluated 54 consecutive patients (48 women, six men; mean age, 54.7 years; mean body mass index, 26 kg/m2) with a clinical diagnosis of gluteus medius tendinopathy. Pain assessment using a 10-cm visual analog scale (VAS) was obtained as part of the initial clinical evaluation of all patients. A hip ultrasound study was performed followed by a gluteus medius peritendinous ultrasound-guided injection of 30 mg of triamcinolone combined with 3 mL of bupivacaine 0.5% using an anterior oblique coronal plane. One month after treatment, participants were reassessed clinically, and they were asked to quantify their pain using the VAS pain score and their satisfaction with the outcome of the injection using a 4-point rating scale (very satisfied, somewhat satisfied, somewhat dissatisfied, or very dissatisfied). Statistical analysis included a paired Student's t test (comparison of pain levels before and after treatment, p=0.05) and a multivariate analysis of covariance.

RESULTS: There was a 55% average reduction of pain level before versus after treatment (mean VAS pain score, 6.4 vs 2.9 cm, respectively; p<0.001). One month after treatment, 72% of the patients showed a clinically significant improvement in pain level, which was defined as a reduction in the VAS pain score of >or=30%. Seventy percent of patients were satisfied with the results of the intervention. No correlation was shown between treatment outcome and any of the clinical variables or ultrasound findings.

CONCLUSION: Our study shows that a peritendinous ultrasound-guided corticosteroid injection may be an effective treatment of gluteus medius tendinopathy.

Ultrasound-guided popliteal block distal to sciatic nerve bifurcation shortens onset time: a prospective randomized double-blind study. Prasad A, Perlas A, Ramlogan R, Brull R, Chan V.

Reg Anesth Pain Med., May-Jun;35(3):267-271.

Abstract

BACKGROUND AND OBJECTIVES: Popliteal sciatic nerve block (SNB) in combination with saphenous nerve block provides anesthesia and analgesia for foot and ankle surgeries. Landmark-based and image-guided techniques, to date, aim at blocking the sciatic nerve proximal to its bifurcation. Sciatic nerve block is usually associated with a long onset time (30-60 mins). We hypothesized that SNB distal to its bifurcation (blocking its 2 main branches tibial and common peroneal nerves separately) is associated with a shorter onset time than blockade proximal to its bifurcation.

METHODS: Fifty patients scheduled for major elective foot or ankle surgery were randomly allocated to receive ultrasound-guided SNB 5 cm proximal to (group P) or 3 cm distal to (group D) its bifurcation in the popliteal fossa. Thirty milliliters of a standardized local anesthetic solution of equal volumes of 2% lidocaine and 0.5% bupivacaine with 1:200,000 epinephrine was used. Sensory and motor assessments were performed every 5 mins by a blinded observer until complete sensory and motor blockade developed in both tibial and common peroneal nerve territories.

RESULTS: All patients in both groups developed a complete block. Patients in group D presented a 30% shorter onset of both sensory (21.4 [SD, 9.9] vs 31.4 [SD, 13.9] mins) (P = 0.005) and motor block (21.5 [SD, 11.3] vs 32.4 [SD, 14.9] mins) (P = 0.006) than patients in group P. Procedure time, procedure-related discomfort, and patient satisfaction were similar in both groups.

CONCLUSIONS: Our data suggest that popliteal SNB distal to the bifurcation has a shorter onset time than SNB proximal to its bifurcation, and therefore, it may be a good option when a fast onset for a surgical block is required.

Ultrasound guidance for facet joint injections in the lumbar spine: a computed tomography-controlled feasibility study. Galiano K, Obwegeser AA, Bodner G, et al.

Anesth Analg. Aug 2005;101(2):579-583, table of contents.

Abstract

We conducted this study to develop an ultrasound-guided approach for facet joint injections of the lumbar spine. Five zygapophyseal joints (L1-S1) on each side of 5 embalmed cadavers were examined by ultrasound for a total of 50 examinations. The joint space was demonstrated under ultrasound guidance. The midpoint of the joint space, defined as the middle of its cranio-caudal extension on its dorsal surface, was taken as a reference point, and its position was computed from its depth and lateral distance from the spinous process. Forty-two of 50 approaches could be clearly visualized. Subsequently, these distances were compared to those obtained by computed tomography (CT). To assess the efficacy of ultrasound in the needle placement, all lumbar facet joints were approached in one embalmed cadaver. The exact placement of the needle tips was again evaluated by CT. Ultrasound and CT measurements showed the same mean depth and lateral distance to the reference point, 3.15 +/- 0.5 cm and 1.9 +/- 0.6 cm, respectively. Pearson's coefficient of correlation was 0.86 ($P < 0.0001$) between ultrasound and CT. All 10 needle tips were within the joint space during simulated facet joint injections. We conclude that ultrasound guidance might be a useful adjunct for facet joint injections in the lumbar spine.

IMPLICATIONS: This study was designed to develop an ultrasound-guided approach to the facet joints of the lumbar spine and to assess its feasibility and accuracy by means of a comparison to computed tomography images. The imaging study demonstrated a significant correlation between ultrasound and computed tomography measurements. During simulated facet injection, ultrasound guidance consistently resulted in accurate needle placement.

Open pilot study of ultrasound-guided intra-articular injection of hylan G-F 20 (Synvisc) in the treatment of symptomatic hip osteoarthritis. Migliore A, Tormenta S, Martin LS, et al.

Clin Rheumatol. Jun 2005;24(3):285-289.

Abstract

Patients suffering from hip osteoarthritis (OA) are frequently symptomatic, and the disease can result in significant limitation of patients' activity and high social costs. Hip OA is generally managed with systemic treatments such as nonsteroidal anti-inflammatory drugs (NSAIDs) and/or symptomatic slow acting drugs. Viscosupplementation with hyaluronan (HA) or its derivatives, which aims to restore the physiological and rheological features of the synovial fluid to improve symptoms, is now a routinely prescribed treatment for OA of the knee. However, few data exist in the literature regarding the use of viscosupplementation in the treatment of hip OA. The objective of this prospective, open, uncontrolled pilot study was to investigate the safety and effectiveness of intra-articular injection, under ultrasound control, of hylan G-F 20 for the treatment of OA of the hip.

Twelve patients (> or =40 years old) with symptomatic hip OA were treated with one injection of 2 ml of hylan G-F 20 under ultrasound guidance. During the study, patients were evaluated for safety and efficacy using the Lequesne index, a visual analogue scale (VAS) measure of hip OA pain and analysis of NSAID consumption.

Patients treated with hylan G-F 20 in this study showed clinically significant reductions in Lequesne and VAS scores and in the consumption of NSAIDs up to 3 months after the injection. In the 12 patients treated (total of 14 injections), no systemic adverse events were observed. Three patients reported mild, local pain post-injection. This study demonstrates the potential of ultrasound-guided intra-articular injections of a viscosupplement into the hip joint and gives positive preliminary information about the safety and efficacy of hylan G-F 20 for the treatment of symptomatic hip OA.

Office-based ultrasound-guided intra-articular hip injection: technique for physiatric practice. Smith J, Hurdle MF.

Arch Phys Med Rehabil. Feb 2006;87(2):296-298.

Abstract

Intra-articular hip injections are commonly used in the evaluation and treatment of hip disorders. Although these injections are typically performed with fluoroscopic guidance, ultrasound provides a viable alternative for ensuring accurate intra-articular needle placement. This report describes the technique for performing ultrasound-guided intra-articular hip injections in the context of an office-based physiatric practice. Ultrasound offers several advantages over fluoroscopy, including accessibility, compact size, lack of ionizing radiation exposure, and visualization of neurovascular and other soft-tissue structures. With appropriate training and experience, interested physiatrists can consider implementing ultrasound-guided injections into their clinical practices.

Ultrasound-guided piriformis injection: technique description and verification. Smith J, Hurdle MF, Locketz AJ, Wisniewski SJ.

Arch Phys Med Rehabil. Dec 2006;87(12):1664-1667.

Abstract

Piriformis injections are commonly used in the evaluation and treatment of patients presenting with buttock pain syndromes. Because of its small size, deep location, and relation to adjacent neurovascular structures, the piriformis is traditionally injected by using electromyographic, fluoroscopic, computed tomographic, or magnetic resonance imaging guidance. This report describes and verifies a technique for performing ultrasound-guided piriformis injections. Ultrasound offers several advantages over traditional imaging approaches, including accessibility, compact size, lack of ionizing radiation exposure, and direct visualization of neurovascular structures. With appropriate training and experience, interested physiatrists can consider implementing ultrasound-guided piriformis injections into their clinical practices.

Ultrasound guided fascia iliaca block: a comparison with the loss of resistance technique. Dolan J, Williams A, Murney E, Smith M, Kenny GN.

Reg Anesth Pain Med. Nov-Dec 2008;33(6):526-531.

Abstract

BACKGROUND AND OBJECTIVES: The aim of this study was to compare the efficacy of fascia iliaca block, performed by loss of resistance and ultrasound guidance techniques.

METHODS: Eighty patients undergoing either unilateral hip or knee joint replacement surgery were randomly assigned to undergo fascia iliaca compartment block by either loss of resistance or ultrasound guidance. Sensation in the anterior (femoral nerve), lateral (lateral cutaneous nerve) and medial (femoral and variable contribution from obturator nerve) aspects of the thigh were assessed prior to block placement. Femoral motor block (knee extension) was also evaluated. Obturator motor block (hip adduction) was measured using a sphygmomanometer. Sensation and motor function were reassessed after block placement.

RESULTS: Using ultrasound guidance, there was a statistically significant increase in the incidence of sensory loss in the medial aspect of the thigh from 60% to 95% (P = .001). Complete loss of sensation in the anterior, medial, and lateral aspects of the thigh increased from 47% to 82% of patients using ultrasound (P = .001). Ultrasound-guided fascia iliaca block resulted in a statistically significant increase in the incidence of femoral (P = .006) and obturator (P = .033) nerve motor block.

CONCLUSIONS: Ultrasound-guided fascia iliaca block increased the frequency of sensory loss in the medial aspect of the thigh. Ultrasound guidance also increased the frequency of femoral and obturator motor block.

Accuracy of ultrasound-guided versus fluoroscopically guided contrast-controlled piriformis injections: a cadaveric study. Finnoff JT, Hurdle MF, Smith J.

J Ultrasound Med. Aug 2008;27(8):1157-1163.

Abstract

OBJECTIVE: The purpose of this study was to compare the accuracy of ultrasound-guided piriformis injections with fluoroscopically guided contrast-controlled piriformis injections in a cadaveric model.

METHODS: Twenty piriformis muscles in 10 unembalmed cadavers were injected with liquid latex using both fluoroscopically guided contrast-controlled and US-guided injection techniques. All injections were performed by the same experienced individual. Two different colors of liquid latex were used to differentiate injection placement for each procedure, and the injection order was randomized. The gluteal regions were subsequently dissected by an individual blinded to the injection technique. Colored latex seen within the piriformis muscle, sheath, or both was considered an accurate injection.

RESULTS: Nineteen of 20 ultrasound-guided injections (95%) correctly placed the liquid latex within the piriformis muscle, whereas only 6 of the 20 fluoroscopically guided contrast-controlled injections (30%) were accurate (P = .001). The liquid latex in 13 of the 14 missed fluoroscopically guided contrast-controlled piriformis injections and the single missed ultrasound-guided injection was found within the gluteus maximus muscle. In the single remaining missed fluoroscopically guided contrast-controlled piriformis injection, the liquid latex was found within the sciatic nerve.

CONCLUSIONS: In this cadaveric model, ultrasound-guided piriformis injections were significantly more accurate than fluoroscopically guided contrast-controlled injections. Despite the use of bony landmarks and contrast, most of the fluoroscopically attempted piriformis injections were placed superficially within the gluteus maximus. Clinicians performing piriformis injections should be aware of the potential pitfalls of fluoroscopically guided contrast-controlled piriformis injections and consider using ultrasound guidance to ensure correct needle placement.

Ultrasound-guided versus computed tomography-controlled facet joint injections in the lumbar spine: a prospective randomized clinical trial. Galiano K, Obwegeser AA, Walch C, Schatzer R, Ploner F, Gruber H.

Reg Anesth Pain Med. Jul-Aug 2007;32(4):317-322.

Abstract

BACKGROUND AND OBJECTIVES: Facet joint injections are widely used for alleviation of back pain. Injections are preferentially performed as fluoroscopy or computed tomography (CT)-controlled interventions. Ultrasound provides real-time monitoring, does not produce ionizing radiation, and is broadly available.

METHODS: We studied feasibility, accuracy, time-savings, radiation doses, and pain relief of ultrasound-guided facet joint injections versus CT-controlled interventions in a prospective randomized clinical trial. Forty adult patients with chronic low back pain were consecutively enrolled and evenly assigned to an ultrasound or a CT- group.

RESULTS: Eighteen subjects from the group randomized to ultrasound were judged to be feasible for this type of approach. In 16 of them the facet joints were clearly visible and all of the associated facet joint injections were performed correctly. The duration of procedure and radiation dose was 14.3 +/- 6.6 minutes and 14.2 +/- 11.7 mGy.cm in the ultrasound group, and 22.3 +/- 6.3 minutes and 364.4 +/- 213.7 mGy.cm in the CT group. Both groups showed a benefit from facet joint injections.

CONCLUSIONS: The ultrasound approach to the facet joints in the lumbar spine is feasible with minimal risks in a large majority of patients and results in a significant reduction of procedure duration and radiation dose.

Ultrasound-guided obturator nerve block: a preliminary report of a case series. Helayel PE, da Conceicao DB, Pavei P, Knaesel JA, de Oliveira Filho GR.

Reg Anesth Pain Med. May-Jun 2007;32(3):221-226.

Abstract

BACKGROUND AND OBJECTIVES: Obturator-nerve block improves analgesia for knee surgery. Traditional techniques rely on surface landmarks, which can be variable and result in excessive performance times and multiple needle passes. The objective of this study was to evaluate a novel ultrasound-guided technique for localizing the obturator nerve. METHODS: A total of 22 patients undergoing anterior cruciate ligament repair had ultrasound-guided obturator-nerve blocks. Needles were directed under real-time ultrasound guidance. Endpoint for injection consisted of identifying contact of the tip of an insulated needle to nerve confirmed by adductor muscles' contraction. Local anesthetic was injected, and block was evaluated within 30 minutes. After that, ultrasound-guided sciatic-femoral blocks were placed for surgical purposes. Data collected included: time required for nerve identification, minimum stimulating current, number of attempts for correct identification, preblock and postblock adductor muscles' strength, sensory-nerve block, and quality of surgical anesthesia.

RESULTS: In 91% of cases, the obturator nerve was correctly identified on first attempt within 30 +/- 23 seconds, as a hyperechoic flat or lip-shaped structure with internal hypoechoic dots. Minimal intensity of current to nerve stimulation was 0.30 +/- 0.08 mA. All patients exhibited decreases in adductor strength. Sensory territories were variable, with no cutaneous distribution in 32% of the patients. Small-dose opioid supplementation was required in 14% of the patients, but none required general anesthesia to complete surgery.

CONCLUSIONS: These preliminary data suggest that ultrasound-guided obturator-nerve identification and block are technically easy and highly successful.

Ultrasound-guided steroid injection for obturator neuralgia. Shankar H.

Pain Pract. Jul-Aug 2008;8(4):320-323.

Abstract

Obturator neuralgia (ON) presents with pain in the groin, medial thigh, and sometimes the medial aspect of the knee. The causes include trauma, obturator hernia, pelvic cancer, pelvic surgery, hip surgery, following pelvic fractures, endometriosis, retroperitoneal hematoma, pregnancy, and delivery. Ultrasound (US) guidance facilitates real-time imaging, identification of vascular structures, and improves patient comfort in situations where nerve stimulation can be unpleasant. This is a case report of ON successfully treated with US-guided steroid injection. A 55-year-old man was referred to the pain clinic with groin pain and allodynia in the medial thigh and knee following a fall. He had tried multiple other therapies and none of them provided significant relief. Using a 10-5-MHz multi-frequency, 38-mm linear array transducer, the obturator nerve was scanned in both longitudinal and transverse directions. Under real-time imaging 10 mg of medroxy-progesterone in a volume of 1 mL was injected. Following the injection, a small area of the medial side of knee was still tender to light touch. A second injection was placed inferiorly and provided pain relief for more than 5 months. This successful demonstration of US guidance in ON may further encourage US guidance in pain clinic interventions.

Knee

Accuracy of ultrasound-guided versus unguided pes anserinus bursa injections. Finnoff JT, Nutz DJ, Henning PT, Hollman JH, Smith J.

PM R. Aug;2(8):732-739.

Abstract

OBJECTIVE: To compare the accuracy of ultrasound (US)-guided versus unguided pes anserinus bursa injections in a cadaveric model.

DESIGN: Single blind, prospective study.

SETTING: Academic institution procedural skills laboratory.

PARTICIPANTS: Twenty-four unembalmed, unpaired adult cadaveric lower extremity specimens.

METHODS: A single investigator performed 12 US-guided and 12 unguided pes anserinus bursa injections using colored liquid latex into 24 unembalmed adult cadaveric lower extremity specimens. The order of the injection techniques was randomized. The specimens were subsequently dissected by a co-investigator blinded to the injection technique used for each injection.

MAIN OUTCOME MEASURES: The injections were graded for accuracy as follows: accurate (all injectate contained within the pes anserinus bursa), accurate with overflow (injectate within the pes anserinus bursa, but also located in adjacent structures), or inaccurate (injectate not within the pes anserinus bursa). The accuracy of the 2 approaches was compared using Pearson chi(2) test with Williams' correction for the small sample size (P = .05).

RESULTS: The accuracy rate was 92% (11 of 12 specimens) in the US-guided condition and 17% (2 of 12 specimens) in the unguided condition. One US-guided injection was considered accurate with overflow, whereas 4 unguided injections were accurate with overflow. The US-guided injection technique was significantly more accurate than the unguided technique (Williams-corrected chi(2) = 12.528, P < .01).

CONCLUSIONS: Despite its superficial location, unguided pes anserinus bursa injections rarely place the injectate within the pes anserinus bursa, whereas US-guided pes anserinus bursa injections have a high degree of accuracy. Therefore, clinicians should consider using US-guidance for diagnostic or therapeutic pes anserinus bursa injections when indicated.

Sonographically Guided Posteromedial Approach for Intra-articular Knee Injections**: A Safe, Accurate, and Efficient Method."**. Tresley, J, Jose, J

J Ultrasound Med** 34**(4): 721-6.

Abstract

Osteoarthritis of the knee can be a debilitating and extremely painful condition. In patients who desire to postpone knee arthroplasty or in those who are not surgical candidates, percutaneous knee injection therapies have the potential to reduce pain and swelling, maintain joint mobility, and minimize disability. Published studies cite poor accuracy of intra-articular knee joint injections without imaging guidance. We present a sonographically guided posteromedial approach to intra-articular knee joint injections with 100% accuracy and no complications in a consecutive series of 67 patients undergoing subsequent computed tomographic or magnetic resonance arthrography. Although many other standard approaches are available, a posteromedial intra-articular technique is particularly useful in patients with a large body habitus and theoretically allows for simultaneous aspiration of Baker cysts with a single sterile preparation and without changing the patient's position. The posteromedial technique described in this paper is not compared or deemed superior to other standard approaches but, rather, is presented as a potentially safe and efficient alternative.

Foot/Ankle

Ultrasound-guided versus nonguided tibiotalar joint and sinus tarsi injections: a cadaveric study. Wisniewski SJ, Smith J, Patterson DG, Carmichael SW, Pawlina W.

PM R. Apr;2(4):277-281.

Abstract

OBJECTIVE: To compare the relative accuracy rates of ultrasound (US)-guided versus nonguided ankle (tibiotalar) joint and sinus tarsi injections in a cadaveric model.

DESIGN: Prospective human cadaveric study with injection technique randomized and accuracy assessed by skilled observers blinded to injection technique.

SETTING: Procedural skills laboratory in a tertiary care academic medical center.

METHODS: Twelve embalmed and 8 unembalmed cadavers (40 ankles) were used for this investigation. Using a predetermined randomization process, 1 ankle of each cadaver was injected with US guidance and the other without. Tibiotalar joint injections were performed via an anterior approach and sinus tarsi injections performed via an anterolateral approach. All injections were performed by the senior author using a 22-gauge, 1.5-inch needle to place 3 mL of 50% diluted blue latex solution into the target area. Two anatomists blinded to the injection technique dissected each ankle and determined injection accuracy based on previously agreed upon criteria.

MAIN OUTCOME MEASUREMENTS: Injection accuracy, where an accurate injection delivered injectate within the tibiotalar joint or into the mid-portion of the sinus tarsi. RESULTS: The accuracy rate for US-guided tibiotalar joint injections was 100% (20/20) versus 85% (17/20) for nonguided injections. The accuracy rate for US-guided sinus tarsi injections was 90% (18/20) versus 35% (7/20) for nonguided injections.

CONCLUSIONS: In this cadaveric study, US guidance produced superior accuracy compared with nonguided injections with respect to both the tibiotalar joint and sinus tarsi. Although further research is

warranted, clinicians should consider US guidance to optimize injectate placement into these areas when optimal accuracy is necessary for diagnostic or therapeutic purposes.

Ultrasound-guided Interdigital Neuroma Injections: Short-term Clinical Outcomes after a Single Percutaneous Injection-Preliminary Results. Sofka CM, Adler RS, Ciavarra GA, Pavlov H.

HSS J. Feb 2007;3(1):44-49.

Abstract

PURPOSE: To describe the procedure of ultrasound-guided Morton's neuroma and recurrent stump neuroma injections and early clinical outcomes after a single injection.

MATERIALS AND METHODS: Retrospective review of 44 percutaneous ultrasound-guided neuroma injections in 24 patients who had completed clinical outcomes questionnaires. A 10-point pain scale [scale of 1 (no pain) to 10 (severe pain)] in a 7-day pain log format was distributed to patients at the time percutaneous neuroma injection was performed.

RESULTS: Neuromas were clearly visualized with sonography as hypoechoic nodules and were distinguishable from other causes of forefoot pain, such as metatarsophalangeal joint synovitis and intermetatarsal bursae. The sizes of the neuromas injected ranged between 4 and 19 mm. Postinjection, all neuromas displayed increased echogenicity and/or the appearance of fluid surrounding it, confirming localization of the therapeutic mixture. We arbitrarily subdivided the pain ratings into symptomatic (greater than 4) and asymptomatic (less than or equal to 4) for statistical analysis. Average pain level pre injection was 5.2 and average pain level was 3.7 at 7 days post single injection, with 62% of the initially symptomatic patients asymptomatic on day 7 ($p < 0.000001$). Overall, 76% of the total number of neuromas injected once were asymptomatic on day 7.

CONCLUSION: Ultrasound can be used to accurately target Morton's neuromas and, therefore, appropriately direct therapeutic interventions, with good short-term clinical results.

Ultrasound improves the success rate of a sural nerve block at the ankle. Redborg KE, Sites BD, Chinn CD, et al.

Reg Anesth Pain Med. Jan-Feb 2009;34(1):24-28.

Abstract

BACKGROUND AND OBJECTIVES: During ankle block performance, anesthetizing the sural nerve is important for generating complete anesthesia of the lateral aspect of the foot. We hypothesized that an ultrasound-guided perivascular approach, utilizing the lesser saphenous vein as a reference, would prove more successful than a conventional approach based on surface landmarks.

METHODS: Eighteen healthy volunteers were prospectively randomized into this controlled and blinded study. Each subject was placed prone and the right ankle was randomized to receive either an ultrasound-guided perivascular sural nerve block (group US) or a traditional landmark-based sural nerve block (group TRAD). The subject's left ankle then received the alternate approach. The ultrasound technique relied on injecting local anesthetic circumferentially around the lesser saphenous vein. All blocks were performed with 5 mL of 3% chloroprocaine. We evaluated sensory block to ice and pinprick. Secondary outcome variables included performance times, number of needle passes, participant satisfaction, and presence of any complications.

RESULTS: At the midfoot position, testing at 10 minutes after block placement revealed a loss of sensation to ice in 94% (complete in 78% and partial in 16%) in the US group versus 56% in the TRAD group (complete in 28%, partial in 28%) ($P < .01$). Complete loss of sensation to ice persisted in 33% of the US group as compared with 6% in the TRAD group at 60 minutes ($P < .05$). A similar pattern was observed when the blocks were tested with pinprick. Ultrasound-guided blocks took longer to perform on average than the traditional blocks (mean difference of 102 seconds, $P < .001$). The ultrasound block was subjectively felt to be denser by 88% of the subjects ($P = .001$).

CONCLUSIONS: Ultrasound guidance using the lesser saphenous vein as a reference point results in a more complete and longer lasting sural nerve block than does a traditional approach using surface landmarks.

Ultrasound improves the success rate of a tibial nerve block at the ankle. Redborg KE, Antonakakis JG, Beach ML, Chinn CD, Sites BD.

Reg Anesth Pain Med. May-Jun 2009;34(3):256-260.

Abstract

BACKGROUND: The tibial nerve provides the majority of sensation to the foot. Although multiple techniques have been described, there exists little evidence-based medicine evaluating different techniques for blocking the tibial nerve at the ankle. We hypothesized that an ultrasound (US)-guided tibial nerve block at the ankle would prove more successful than a conventional approach based on surface landmarks.

METHODS: Eighteen healthy volunteers were prospectively randomized into this controlled and blinded study. Each subject was placed prone, and one ankle was randomly assigned to receive either an US-guided tibial nerve block (group US) or a traditional landmark-based tibial nerve block (group LM). The subject's other ankle then received the alternate approach. All blocks were performed with 5 mL of 3% chloroprocaine. We evaluated sensory and motor blocks. A successful block was defined as complete loss of sensation to both ice and pinprick at 5 cutaneous sites. Secondary outcome variables included performance times, number of needle passes, participant satisfaction, and presence of any complications.

RESULTS: At 30 mins, the block was complete in 72% of participants in group US as compared with 22% in group LM. At all times, the proportion of complete blocks was higher in group US. Ultrasound-guided blocks took longer on average to perform than traditional blocks (159 vs 79 secs; $P < 0.001$). There were more needle redirects in group US, with 8 subjects requiring 3 or more redirects versus none in group LM. Subjects preferred the US block 78% of the time (95% confidence interval, 52%-95%).

CONCLUSIONS: In healthy volunteers, US guidance results in a more successful tibial nerve block at the ankle than does a traditional approach using surface landmarks.

Other

The ASRA evidence-based medicine assessment of ultrasound-guided regional anesthesia and pain medicine: Executive summary. Neal JM, Brull R, Chan VW, et al.

Reg Anesth Pain Med. Mar-Apr;35(2 Suppl):S1-9.

Abstract

OBJECTIVES: The American Society of Regional Anesthesia and Pain Medicine charged an expert panel to examine the evidence basis for ultrasound guidance as a nerve localization tool in the clinical practices of regional anesthesia and interventional pain medicine.

METHODS: The panel searched, examined, and assessed the literature of ultrasound-guided regional anesthesia (UGRA) from the past 20 years. The qualities of studies were graded using the Jadad score. Strength of evidence and recommendations were graded using an accepted rating tool.

RESULTS: The panel made specific literature-based assessments concerning the relative advantages and limitations of UGRA relative to traditional nerve localization methods as they pertained to block characteristics and complications. Assessments and recommendations were made for upper and lower extremity, neuraxial, and truncal blocks and include pediatrics and interventional pain medicine.

CONCLUSIONS: Ultrasound guidance improves block characteristics (particularly performance time and surrogate measures of success) that are often block specific and that may impart an efficiency advantage depending on individual practitioner circumstances. Evidence for UGRA impacting patient safety is currently limited to the demonstration of improvements in the frequency of surrogate events for serious complications.

A randomized controlled trial of the cost-effectiveness of ultrasound-guided intraarticular injection of inflammatory arthritis. Sibbitt WL, Jr., Band PA, Chavez-Chiang NR, Delea SL, Norton HE, Bankhurst AD.

J Rheumatol. Feb;38(2):252-263.

Abstract

OBJECTIVE: We studied whether sonographic needle guidance affected the outcomes of intraarticular (IA) injection for inflammatory arthritis.

METHODS: Joints with inflammatory arthritis (n = 244; 76% rheumatoid arthritis, 3% small joints, 51% intermediate, and 46% large) were randomized to injection by conventional palpation-guided anatomic injection (120 joints) or sonographic image-guided injection enhanced with a 1-handed reciprocating procedure device mechanical syringe (124 joints). A 1-needle, 2-syringe technique was used. After IA placement and synovial space dilation were confirmed by sonography, a syringe exchange was performed, and triamcinolone acetonide was injected with the second syringe through the indwelling IA needle. Baseline pain, procedural pain, pain at outcome (2 weeks and 6 months), responders, therapeutic duration, reinjection rates, total cost, and cost per responder were determined.

RESULTS: Relative to conventional palpation-guided methods, sonographic guidance for injection of inflammatory arthritis resulted in an 81% reduction in injection pain ($p < 0.001$), 35% reduction in pain scores at outcome ($p < 0.02$), 38% increase in the responder rate ($p < 0.003$), 34% reduction in the non-responder rate ($p < 0.003$), 32% increase in therapeutic duration ($p = 0.01$), 8% reduction ($7) in cost/patient/year, and a 33% ($64) reduction in cost/responder/year for a hospital outpatient ($p < 0.001$).

CONCLUSION: Sonographic needle guidance improves the performance, clinical outcomes, and cost-effectiveness of IA injections for inflammatory arthritis. (Clinical Trial Identifier NCT00651625).

Ultrasound-guided therapeutic procedures in the musculoskeletal system. del Cura JL.

Curr Probl Diagn Radiol. Sep-Oct 2008;37(5):203-218.

Abstract

Ultrasound allows the exploration of most of the musculoskeletal system, including lytic bone lesions. Its flexibility, availability, and low cost make it the best tool to guide interventional therapeutic procedures in any musculoskeletal system lesion visible on ultrasound. These techniques include drainages of abscesses, bursitis, hematomas or muscular strains, treatment of cystic lesions (ganglions, Baker's cysts), arthrocentesis, injection of substances in joints and soft tissues, and aspiration of calcific tendinitis. Although the puncture of joints for arthrocentesis and injection of substances are performed by clinicians using palpation, the use of ultrasound guidance improves the effectiveness of the technique especially for small or poorly accessible lesions and joints and for obese patients. Drainage can be performed using catheters or needles and can avoid a more aggressive approach most of the time. Intracavitary urokinase helps when the aim is to drain clotted hematomas or fibrinous collections. Injection of corticoids is useful in the treatment of ganglia, Baker's cysts, tendinitis, and noninfected arthritis. Calcific tendinitis of the shoulder can be effectively treated using percutaneous "lavage" with lidocaine. Calcifications usually disappear and symptoms improve in nearly 90% of the cases within a year. Most of these techniques are low cost and require only a moderate skill. Ultrasound-guided procedures are useful tools to effectively treat some diseases of the musculoskeletal system and should be routine in any imaging department.