Nerve Blocks

Policy

*Please see amendment for Pennsylvania Medicaid at the end of this CPB.*

Aetna considers the following nerve blocks medically necessary:

- Femoral nerve blocks for acute post-operative pain after knee replacement surgery
- Intercostal nerve blocks for acute intercostal pain, and for chronic intercostal neuritis as part of a comprehensive pain management program
- IPACK block for pain control following anterior cruciate ligament repair or total knee arthroplasty
- Peripheral nerve blocks (continuous or single-injection) for the treatment of (i) acute pain, and (ii) for chronic pain only as part of an active component of a comprehensive pain management program
- Peripheral nerve blocks for the treatment of chronic pain post-herniorrhaphy to avoid more aggressive treatments (e.g., surgery)
- Popliteal block for open reduction internal fixation of ankle fracture
- Transversus abdominis plane (TAP) block for abdominal surgery
- Ultrasound (US)-guided celiac plexus block for inoperable pancreatic cancer and abdominal pain requiring opioid analgesics, and as a “last resort” for pain from chronic pancreatitis that are refractory to high doses of opiates
- US-guided supraclavicular block as regional anesthesia during surgeries and/or post-operative pain control to the distal two-thirds of the upper extremity, or from the mid-humerus to the fingertips.
Aetna considers the following nerve blocks experimental and investigational (not an all-inclusive list) because their effectiveness for these indications has not been established:

- Cluneal nerve block
- Combined infraclavicular-suprascapular blocks for shoulder surgery
- Ganglion impar block (see CPB 0016 - Back Pain: Invasive Procedures ../1_99/0016.html)
- Geniculare nerve block
- Greater occipital nerve blocks for the diagnosis and treatment of neck and upper back pain
- Intelicath (a nerve-blocking device) for the treatment of chronic pelvic pain
- Intercostal nerve blocks for the sole treatment of chronic intercostal neuritis
- Nerve hydrodissection for the treatment of peripheral nerve entrapment
- Obturator nerve block for treatment of chronic pain
- Occipital nerve block for the treatment of occipital neuralgia
- Paravertebral block for treatment of chronic pain
- Pedicle screw block/hardware block of spinal instrumentation
- Peripheral nerve blocks as sole treatment for chronic pain
- Peripheral nerve blocks (e.g., greater occipital (GON), supratrochlear (STN), and supraorbital (SON) nerve blocks) for the treatment of post-herpetic neuralgia, and prevention or treatment of headaches including (migraine headaches and treatment-refractory migraine in pregnancy), and for the treatment of short-lasting unilateral neuralgiform headaches.
- Repetitive peripheral nerve blocks for chronic non-malignant pain
- Saphenous nerve block for the treatment of saphenous neuralgia
- Spinal accessory nerve block for the treatment of neck pain and upper back pain
- Stellate ganglion block for ulcerative colitis
- Suboccipital nerve block for suboccipital neuralgia
- Superior hypogastric nerve block for neurogenic pelvic pain and pain relief following abdominal hysterectomy
- Suprascapular nerve blocks for the treatment of cervical spondylosis, chronic upper extremity pain, and hemiplegic shoulder pain in individuals with chronic stroke
- TAP block for post-operative analgesia following lumbar fusion
- US-guided erector spinae plane (ESP) block for the management of chronic myofascial pain syndrome, and post-operative pain.

**Note:** The use of a peripheral nerve block for pain is not a reason for a hospital stay if members have an otherwise uncomplicated out-patient procedure.
A nerve block is a form of regional anesthesia. Peripheral nerve blocks (PNBs) entail the injection of corticosteroids, local anesthetics, neurolytic agents and/or sclerosing agents into or near peripheral nerves or nerve ganglion resulting in the temporary interruption of conduction of impulses in peripheral nerves or nerve trunks (somatic and sympathetic nerves). Peripheral nerve blocks attempt to block pain signals and in theory provide prolonged relief from pain.

Examples of peripheral nerve blocks include, but may not be limited to, cluneal nerve block, ganglion impar block, genicular nerve block or obturator nerve block. The cluneal nerve is a sensory nerve located in the upper portion of the buttocks, consisting of a superior, medial and inferior branch. The genicular nerve is a sensory nerve that surrounds the knee and provides innervation for the joint. An obturator nerve block is an injection of a steroid, an anesthetic or a combination of both, near the obturator nerve, which is primarily a motor nerve arising from the third and fourth lumbar nerves, with distribution to the hip and thigh; this type injection is most commonly used as part of regional anesthesia for knee surgery.

For the treatment of headache disorders, the greater occipital nerve block (GON) is the most widely used target of the peripheral nerve blocks (PNB). Other commonly targeted nerves are the lesser occipital nerve (LON) and several branches of the trigeminal nerve: the supratrochlear (STN), supraorbital (SON) and auriculotemporal (ATN) nerves (Robbins and Blumenfeld, 2017).

Peripheral nerve blocks can either be “single-injection” -- refers to one-time injection of local anesthetic to the target nerve for peri-operative analgesia and/or surgical anesthesia, or “continuous” -- refers to the percutaneous insertion of a catheter directly adjacent to the target peripheral nerve(s). The latter approach is to provide prolonged nerve block by continuous infusion of local anesthetic for longer procedures, as well as post-operative analgesia. Continuous PNB (cPNB) is primarily used for inpatient procedures, but can also be used in outpatients (Jeng and Rosenblatt, 2012).
Neuropathic pain is a type of pain that can result from injury to nerves, either in the peripheral or central nervous system. Neuropathic pain can occur in any part of the body and is frequently described as a hot, burning sensation. It can result from diseases that affect nerves (such as diabetes) or from trauma, or, because chemotherapy drugs can affect nerves, it can be a consequence of cancer treatment. Among the many neuropathic pain conditions some that can cause neuropathic pain of the extremities are diabetic neuropathy, reflex sympathetic dystrophy syndrome, phantom limb and post-amputation pain. Chronic pain persists over a longer period of time than acute pain and is resistant to most medical treatments. A peripheral nerve block may be performed to diagnose and/or treat neuropathic pain.

Aguirre et al (2012) stated that the most common use of cPNBs is in the peri- and post-operative period but different indications have been described like the treatment of chronic pain such as cancer-induced pain, complex regional pain syndrome or phantom limb pain. The documented benefits strongly depend on the analgesia quality and include decreasing baseline/dynamic pain, reducing additional analgesic requirements, decrease of post-operative joint inflammation and inflammatory markers, sleep disturbances and opioid-related side effects, increase of patient satisfaction and ambulation/functioning improvement, an accelerated resumption of passive joint range-of-motion, reducing time until discharge readiness, decrease in blood loss/blood transfusions, potential reduction of the incidence of post-surgical chronic pain and reduction of costs. Evidence deriving from randomized controlled trials suggests that in some situations there are also prolonged benefits of regional anesthesia after catheter removal in addition to the immediate post-operative effects. Unfortunately, there are only few data demonstrating benefits after catheter removal and the evidence of medium- or long-term improvements in health-related quality of life (QOL) measures is still lacking.

In a review on “Evidence-based interventions for chemotherapy-induced peripheral neuropathy”, Visovsky et al (2007) examined the literature on the prevention or treatment of chemotherapy-induced peripheral neuropathy (CIPN), which included pilot studies, clinical trials, systematic reviews of the literature, and case studies. The Oncology Nursing Society Putting Evidence Into Practice® (PEP) CIPN Team consisted of 2 advanced practice nurses, 2 staff nurses, and a nurse researcher. The CIPN Team chose not to include animal model-based studies because applicability and generalizability to human populations has not been established. No meta-analyses addressing the prevention or treatment of CIPN were found in the literature. The team searched Medline, the National Library of Medicine's database. Search terms included chemotherapy-induced peripheral neuropathy, peripheral neuropathy, and neuropathy. Search terms specific to known CIPN interventions also were explored, including human leukemia inhibitory factor, nerve growth factor, neurotrophin-3, exercise and chemotherapy-induced peripheral neuropathy, exercise and neuropathy, diabetes and peripheral neuropathy, vitamin E, tricyclic antidepressants (TCAs), amifostine, calcium/magnesium infusions, carbamazepine,
glutathione, alpha lipoic acid, and glutamine. Other search terms were alternative therapy, complementary therapies, herbal therapies, plants-medicinal, herb(s), herbal(s), acupuncture, electric nerve stimulation, high-frequency external muscle stimulation, transelectrical nerve stimulation, spinal cord stimulation, anodyne therapy, pulsed infrared light therapy, social support, psychosocial support, educational interventions, patient education, patient safety, safety, injury, accidents, safety management, protective devices, and capsaicin. The authors concluded that CIPN remains a significant problem for patients receiving chemotherapy for cancer. At present, no interventions for CIPN can be recommended for practice. No rigorously designed studies, meta-analyses, or systematic reviews support any of the interventions discussed, and risk of harm may out-weigh potential benefits.

The American Society of Anesthesiologists Task Force on Chronic Pain Management and the American Society of Regional Anesthesia and Pain Medicine’s practice guidelines on “Chronic pain management” (2010) stated that “Peripheral somatic nerve blocks should not be used for long-term treatment of chronic pain”.

Hartemann et al (2011) stated that the prevalence of painful diabetic neuropathy (PDN) is approximately 20 % in patients with type-2 diabetes and 5 % in those with type-1 diabetes. Patients should be systematically questioned concerning suggestive symptoms, as they are not usually volunteers. As PDN is due to small-fiber injury, the 10 g monofilament pressure test as well as the standard electrophysiological procedures may be normal. Diagnosis is based on clinical findings: type of pain (burning discomfort, electric shock-like sensation, aching coldness in the lower limbs); time of occurrence (mostly at rest and at night); and abnormal sensations (such as tingling or numbness). The DN4 questionnaire is an easy-to-use validated diagnostic tool. Three classes of drugs are of equal value in treating PDN: (i) TCAs; (ii) anticonvulsants; and (iii) selective serotonin-reuptake inhibitors (SSRIs). These compounds may be prescribed as first-line therapy following pain assessment using a visual analog scale (VAS). If the initial drug at its maximum tolerated dose does not lead to a decrease in pain of at least 30 %, another drug class should be prescribed; if the pain is decreased by 30 % but remains greater than 3/10, a drug from a different class may be given in combination.

The American Academy of Neurology (AAN), American Association of Neuromuscular and Electrodiagnostic Medicine, American Academy of Physical Medicine and Rehabilitation (Bril et al, 2011) developed a scientifically sound and clinically relevant evidence-based guideline for the treatment of PDN. The basic question that was asked was: “What is the efficacy of a given treatment (pharmacological: anticonvulsants, antidepressants, opioids, others; non-pharmacological: electrical stimulation, magnetic field treatment, low-intensity laser treatment, Reiki massage, others) to reduce pain and improve physical function and QOL in patients with...
PDN”? A systematic review of literature from 1960 to August 2008 was performed, and studies were classified according to the AAN classification of evidence scheme for a therapeutic article. Recommendations were linked to the strength of the evidence. The results indicated that pregabalin is established as effective and should be offered for relief of PDN (Level A). Venlafaxine, duloxetine, amitriptyline, gabapentin, valproate, opioids (morphine sulfate, tramadol, and oxycodone controlled-release), and capsaicin are probably effective and should be considered for treatment of PDN (Level B). Other treatments have less robust evidence, or the evidence is negative. Effective treatments for PDN are available, but many have side effects that limit their usefulness. Few studies have sufficient information on their effects on function and QOL.

The South African Expert Panel’s clinical practice guidelines for management of neuropathic pain (Chetty et al, 2012) stated that neuropathic pain (NeuP) is challenging to diagnose and manage, despite ongoing improved understanding of the underlying mechanisms. Many patients do not respond satisfactorily to existing treatments. There are no published guidelines for diagnosis or management of NeuP in South Africa. A multi-disciplinary expert panel critically reviewed available evidence to provide consensus recommendations for diagnosis and management of NeuP in South Africa. Following accurate diagnosis of NeuP, pregabalin, gabapentin, low-dose TCAs (e.g., amitriptyline) and SSRIs (e.g., duloxetine and venlafaxine) are all recommended as first-line options for the treatment of peripheral NeuP. If the response is insufficient after 2 to 4 weeks, the recommended next step is to switch to a different class, or combine different classes of agent. Opioids should be reserved for use later in the treatment pathway, if switching drugs and combination therapy fails. For central NeuP, pregabalin or amitriptyline are recommended as first-line agents. Companion treatments (e.g., cognitive behavioral therapy and physical therapy) should be administered as part of a multi-disciplinary approach. Dorsal root entry zone rhizotomy (DREZ) is not recommended to treat NeuP.

In an evidence-based guideline on “Neuropathic pain interventional treatments”, Mailis and Taenzer (2012) states that “Based on limited evidence that selective transforaminal nerve root blocks (extraforaminal root injections, periradicular steroid injections, intraforaminal oxygen-ozone injections and epidural perineural autologous conditioned serum injections can provide up to 8 to 12 weeks of relief from lumbar radicular pain, the task force cannot justify a general recommendation, but suggests that these interventions be used with caution depending on the circumstances, with full disclosure to the patient of the limited evidence and potential risks. Evidence quality: Fair; Certainty: Moderate; Strength of recommendation: Grade C (May recommend depending on circumstances. At least moderate certainty with small net benefit).
Furthermore, UpToDate reviews on “Treatment of diabetic neuropathy” (Feldman and McCulloch, 2012), “Overview of lower extremity peripheral nerve syndromes” (Rutkove, 2012), and “Epidemiology, clinical manifestations, diagnosis, and treatment of HIV-associated peripheral neuropathy” (Nardin and Freeman, 2012) do not mention the use of PNBs.

In summary, there is currently insufficient evidence to support the use of peripheral nerve blocks in the treatment of peripheral neuropathy or other indications.

The Work Loss Data Institute’s guideline on “Neck and upper back (acute & chronic)” (2013) listed greater occipital nerve block (diagnostic and therapeutic) as one of the interventions/procedures that are under study and are not specifically recommended.

In a Cochrane review, Chan et al (2014) evaluated the benefits and risks of femoral nerve block (FNB) used as a post-operative analgesic technique relative to other analgesic techniques among adults undergoing total knee replacement (TKR). These investigators searched the Cochrane Central Register of Controlled Trials (CENTRAL) 2013, Issue 1, MEDLINE, EMBASE, CINAHL, Web of Science, dissertation abstracts and reference lists of included studies. The date of the last search was January 31, 2013. These researchers included randomized controlled trials (RCTs) comparing FNB with no FNB (intravenous patient-controlled analgesia (PCA) opioid, epidural analgesia, local infiltration analgesia, and oral analgesia) in adults after TKR. They also included RCTs that compared continuous versus single-shot FNB. Two review authors independently performed study selection and data extraction. They undertook meta-analysis (random-effects model) and used relative risk ratios (RRs) for dichotomous outcomes and mean differences (MDs) or standardized mean differences (SMDs) for continuous outcomes. They interpreted SMDs according to rule of thumb where 0.2 or smaller represents a small effect, 0.5 a moderate effect and 0.8 or larger, a large effect.

These investigators included 45 eligible RCTs (2,710 participants) from 47 publications; 20 RCTs had more than 2 allocation groups. A total of 29 RCTs compared FNB (with or without concurrent treatments including PCA opioid) versus PCA opioid, 10 RCTs compared FNB versus epidural, 5 RCTs compared FNB versus local infiltration analgesia, 1 RCT compared FNB versus oral analgesia and 4 RCTs compared continuous versus single-shot FNB. Most included RCTs were rated as low or unclear risk of bias for the aspects rated in the risk of bias assessment tool, except for the aspect of blinding. These researchers rated 14 (31 %) RCTs at high-risk for both participant and assessor blinding and rated 8 (18 %) RCTs at high-risk for one blinding aspect. Pain at rest and pain on movement were less for FNB (of any type) with or without a concurrent PCA opioid compared with PCA opioid alone during the first 72 hours post-operation. Pooled results demonstrated a moderate effect of FNB for pain at rest at 24 hours (19 RCTs, 1,066 participants, SMD -0.72, 95% confidence interval [CI]: -0.93 to -0.51, moderate-quality evidence).
and a moderate to large effect for pain on movement at 24 hours (17 RCTs, 1,017 participants, SMD -0.94, 95% CI: -1.32 to -0.55, moderate-quality evidence). Pain was also less in each FNB subgroup: single-shot FNB, continuous FNB and continuous FNB + sciatic block, compared with PCA. Femoral nerve block also was associated with lower opioid consumption (IV morphine equivalent) at 24 hours (20 RCTs, 1,156 participants, MD -14.74 mg, 95% CI: -18.68 to -10.81 mg, high-quality evidence) and at 48 hours (MD -14.53 mg, 95% CI: -20.03 to -9.02 mg), lower risk of nausea and/or vomiting (RR 0.47, 95% CI: 0.33 to 0.68, number needed to treat for an additional harmful outcome (NNTH) 4, high-quality evidence), greater knee flexion (11 RCTs, 596 participants, MD 6.48 degrees, 95% CI: 4.27 to 8.69 degrees, moderate-quality evidence) and greater patient satisfaction (four RCTs, 180 participants, SMD 1.06, 95% CI: 0.74 to 1.38, low-quality evidence) compared with PCA. The authors could not demonstrate a difference in pain between FNB (any type) and epidural analgesia in the first 72 hours post-operation, including pain at 24 hours at rest (6 RCTs, 328 participants, SMD -0.05, 95% CI: -0.43 to 0.32, moderate-quality evidence) and on movement (6 RCTs, 317 participants, SMD 0.01, 95% CI: -0.21 to 0.24, high-quality evidence). No difference was noted at 24 hours for opioid consumption (5 RCTs, 341 participants, MD -4.35 mg, 95% CI: -9.95 to 1.26 mg, high-quality evidence) or knee flexion (6 RCTs, 328 participants, MD -1.65, 95% CI: -5.14 to 1.84, high-quality evidence). However, FNB demonstrated lower risk of nausea/vomiting (4 RCTs, 183 participants, RR 0.63, 95% CI: 0.41 to 0.97, NNTH 8, moderate-quality evidence) and higher patient satisfaction (2 RCTs, 120 participants, SMD 0.60, 95% CI: 0.23 to 0.97, low-quality evidence), compared with epidural analgesia. Pooled results of 4 studies (216 participants) comparing FNB with local infiltration analgesia detected no difference in analgesic effects between the groups at 24 hours for pain at rest (SMD 0.06, 95% CI: -0.61 to 0.72, moderate-quality evidence) or pain on movement (SMD 0.38, 95% CI: -0.10 to 0.86, low-quality evidence). Only 1 included RCT compared FNB with oral analgesia. These researchers considered this evidence insufficient to allow judgment of the effects of FNB compared with oral analgesia. Continuous FNB provided less pain compared with single-shot FNB (4 RCTs, 272 participants) at 24 hours at rest (SMD -0.62, 95% CI: -1.17 to -0.07, moderate-quality evidence) and on movement (SMD -0.42, 95% CI: -0.67 to -0.17, high-quality evidence). Continuous FNB also demonstrated lower opioid consumption compared with single-shot FNB at 24 hours (3 RCTs, 236 participants, MD -13.81 mg, 95% CI: -23.27 to -4.35 mg, moderate-quality evidence). Generally, the meta-analyses demonstrated considerable statistical heterogeneity, with type of FNB, allocation concealment and blinding of participants, personnel and outcome assessors reducing heterogeneity in the analyses. Available evidence was insufficient to allow determination of the comparative safety of the various analgesic techniques. Few RCTs reported on serious adverse effects such as neurological injury, post-operative falls or thrombotic events. The authors concluded that following TKR, FNB (with or without concurrent treatments including PCA opioid) provided more effective analgesia than PCA opioid alone, similar analgesia to epidural analgesia and less nausea/vomiting compared with
PCA alone or epidural analgesia. The review also found that continuous FNB provided better analgesia compared with single-shot FNB; RCTs were insufficient to allow definitive conclusions on the comparison between FNB and local infiltration analgesia or oral analgesia.

Bauer et al (2014) noted that pain following TKR is a challenging task for healthcare providers. Concurrently, fast recovery and early ambulation are needed to regain function and to prevent post-operative complications. Ideal post-operative analgesia provides sufficient pain relief with minimal opioid consumption and preservation of motor strength. Regional analgesia techniques are broadly used to answer these expectations. Femoral nerve blocks are performed frequently but have suggested disadvantages, such as motor weakness. The use of lumbar epidurals is questioned because of the risk of epidural hematoma. Relatively new techniques, such as local infiltration analgesia or adductor canal blocks, are increasingly discussed. The present review discussed new findings and weighted between known benefits and risks of all of these techniques for TKR. Femoral nerve blocks are the gold standard for TKR. The standard use of additional sciatic nerve blocks remains controversial. Lumbar epidurals possess an unfavorable risk/benefit ratio because of increased rate of epidural hematoma in orthopedic patients and should be reserved for lower limb amputation; peripheral regional techniques provide comparable pain control, greater satisfaction and less risk than epidural analgesia. Although motor weakness might be greater with FNBs compared with no regional analgesia, new data pointed towards a similar risk of falls after TKR, with or without peripheral nerve blocks. Local infiltration analgesia and adductor canal blockade are promising recent techniques to gain adequate pain control with a minimum of undesired side-effects. The authors concluded that FNBs are still the gold standard for an effective analgesia approach in knee arthroplasty and should be supplemented (if needed) by oral opioids. An additional sciatic nerve blockade is still controversial and should be an individual decision. Moreover, they stated that large-scale studies are needed to reinforce the promising results of newer regional techniques, such as local infiltration analgesia and adductor canal block.

An UpToDate review on “Total knee arthroplasty” (Martin et al, 2014) states that “Increasingly, patients are managed with femoral nerve blocks in order to reduce the complications and the delay in rehabilitation associated with general anesthesia and with indwelling epidural catheters. Patient-controlled analgesia (PCA) can be useful in the post-arthroplasty setting. Subsequently, oral opioid analgesics may be used. Pain control after total knee replacement has improved considerably with increasing use of multimodal pain management strategies. This typically includes “preemptive” management with acetaminophen, cyclooxygenase-2 (COX-2)-selective nonsteroidal antiinflammatory drugs (NSAIDs), femoral nerve blocks, regional anesthetics, and periarticular injections”.

Proprietary
Law et al (2015) compared paravertebral block (PVB) with general anesthesia/systemic analgesia, neuraxial blocks, and other PNBs. These investigators analyzed 14 RCTs from PubMed, MEDLINE, CENTRAL, EMBASE, and CINAHL up to February 2015, without language restriction, comparing PVB under sedation with general anesthesia/systematic analgesia (135 versus 133 patients), neuraxial blocks (191 versus 186 patients), and other PNBs (119 versus 117 patients). These researchers investigated pain scores, consumption of post-operative analgesia, incidence of post-operative nausea and vomiting (PONV), length of hospital stay, post-anesthesia care unit bypassing rate, time to perform blocks, intra-operative hemodynamics, and incidence of urinary retention. Joint hypothesis testing was adopted for pain and analgesics, PONV, and hemodynamic variables. All analyses were performed with RevMan 5.2.11 (Cochrane Collaboration, Copenhagen). Hartung-Knapp-Sidik-Jonkman method was used for post-hoc testing. Paravertebral block reduced PONV (nausea: RR = 0.22; 95 % CI: 0.05 to 0.93; numbers needed to treat [NNT] = 4.5; I = 15 % and vomiting: RR = 0.15; 95 % CI: 0.03 to 0.76; NNT = 8.3; I = 0 %) compared with general anesthesia/systematic analgesia (quality of evidence [QoE]: high). Compared with neuraxial blocks, PVB resulted in less post-operative nausea (RR = 0.34 [95 % CI: 0.13 to 0.91], NNT = 8.3, I = 0 %) and urinary retention (RR = 0.14 [95 % CI: 0.05 to 0.42], NNT = 7.4, I = 0 %) than neuraxial blocks (QoE: high). More time was needed to perform PVB than neuraxial blocks (standardized mean difference = 1.90 [95 % CI: 0.02 to 3.77], I = 92 %; mean difference = 5.33 minutes; QoE: moderate). However, the available data could not reject the null hypothesis of non-inferiority on all pain scores and analgesic requirements for both PVB versus general anesthesia/systematic analgesia and PVB versus neuraxial blocks (QoE: low), as well as on hemodynamic outcomes for PVB versus neuraxial blocks (QoE: moderate). This systematic review showed that PVB decreased post-operative pain scores and analgesic requirement as compared with ilio-inguinal block and transversus abdominis plane block. The authors concluded that this meta-analysis showed that PVB provides an anesthesia with fewer undesirable effects for inguinal herniorrhaphy. The choice between general anesthesia/systematic analgesia, neuraxial blocks, PVB, and other PNBs should be based on time available to perform the block and a complete coverage over the relevant structures by the blocks.

Treatment of Migraine Headaches

The American Migraine Foundation defines intractable headache as a type of headache, such as a migraine or another kind of headache that can include a combination of two or more different headache types, which is refractory to treatment. Of primary headaches (headaches that are not due to an underlying cause such as a brain tumor, infection, etc) the most common type of intractable headaches are migraines and tension headaches.
Ashkenazi et al (2010) stated that interventional procedures such as PNBs and trigger point injections (TPIs) have long been used in the treatment of various headache disorders. There are, however, little data on their effectiveness for the treatment of specific headache syndromes. Moreover, there is no widely accepted agreement among headache specialists as to the optimal technique of injection, type, and doses of the local anesthetics used, and injection regimens. The role of corticosteroids in this setting is also being debated. These investigators performed a PubMed search of the literature to find studies on PNBs and TPIs for the treatment of headaches. They classified the abstracted studies based on the procedure performed and the treated condition. These researchers found few controlled studies on the effectiveness of PNBs for headaches, and virtually none on the use of TPIs for this indication. The most widely examined procedure in this setting was greater occipital nerve block, with the majority of studies being small and non-controlled. The techniques, as well as the type and doses of local anesthetics used for PNBs, varied greatly among studies. The specific conditions treated also varied, and included both primary (e.g., migraine, cluster headache) and secondary (e.g., cervicogenic, post-traumatic) headache disorders. Trigeminal (e.g., supraorbital) nerve blocks were used in few studies. Results were generally positive, but should be taken with reservation given the methodological limitations of the available studies. The procedures were generally well-tolerated. The authors concluded that there is a need to perform more rigorous clinical trials to clarify the role of PNBs and TPIs in the management of various headache disorders, and to aim at standardizing the techniques used for the various procedures in this setting.

Levin (2010) stated that nerve blocks and neurostimulation are reasonable therapeutic options in patients with head and neck neuralgias. In addition, these peripheral nerve procedures can also be effective in primary headache disorders, such as migraine and cluster headaches. Nerve blocks for headaches are generally accomplished by using small subcutaneous injections of amide-type local anesthetics (e.g., lidocaine and bupivacaine). Targets include the greater occipital nerve, lesser occipital nerve, auriculo-temporal nerve, supra-trochlear and supraorbital nerves, spheno-palatine ganglion, cervical spinal roots, and facet joints of the upper cervical spine. The author concluded that although definitive studies examining the usefulness of nerve blocks are lacking, reports suggested that this area deserves further attention in the hope of acquiring evidence of effectiveness.

Govindappagari et al (2014) described the use of PNBs in a case series of pregnant women with migraine. A retrospective chart review of all pregnant patients treated with PNBs for migraine over a 5-year period was performed. Injections targeted greater occipital, auriculo-temporal, supraorbital, and supra-trochlear nerves using local anesthetics. Peripheral nerve blocks were performed 27 times in 13 pregnant women either in a single (n = 6) or multiple (n = 7) injection series. Mean patient age was 28 years and gestational age was 23.5 weeks, and all women had migraine, including 38.5 % who had chronic migraine. Peripheral nerve blocks were performed
for status migrainosus (51.8%) or short-term prophylaxis of frequent headache attacks (48.1%). Before PNBs were performed, oral medications failed for all patients and intravenous medications failed for most. In patients with status migrainosus, average pain reduction was 4.0 (± 2.6 standard deviation [SD]) (p < 0.001) immediately post-procedure and 4.0 (± 4.4 SD) (p = 0.007) 24 hours post-procedure in comparison to pre-procedure pain. For patients receiving PNBs for short-term prophylaxis, immediate mean pain score reduction was 3.0 (± 2.1 SD). No patients had any serious immediate, procedurally related adverse events, and the 2 patients who had no acute pain reduction ultimately developed pre-eclampsia and had post-partum headache resolution. The authors concluded that PNBs for treatment-refractory migraine may be an effective therapeutic option in pregnancy. This was a small (n = 13) retrospective study; these findings need to be validated by well-designed studies.

An UpToDate review on “Headache in pregnant and postpartum women” (Lee et al, 2017) states that “Peripheral nerve blocks may also be effective. In a series of 13 pregnant women with migraine refractory to medication, injection of local anesthetic into one or more peripheral nerves (e.g., occipital, auriculo-temporal, supraorbital, supra-trochlear) resulted in elimination of pain in seven women, pain reduction in two women, and no response in four women. Six patients received a single injection; the other seven patients received two to five sequential nerve blocks. There were no adverse maternal or fetal effects. Given the small number of patients in this study, larger studies should be performed to better define the efficacy of this approach”.

Furthermore, UpToDate reviews on “Overview of peripheral nerve blocks” (Jeng and Rosenblatt, 2017) and "Nerve blocks of the scalp, neck, and truck: Techniques" (Rosenblatt and Lai, 2017) do not mention headache/migraine as an indication of PNBs.

Greater Occipital Nerve (GON) Blockade for Headaches

Inan et al (2015) assessed the efficacy of greater occipital nerve (GON) blockade in chronic migraine (CM) treatment in a randomized, multicenter, double-blind, and placebo-controlled study. Patients with CM were randomly divided into two groups of 42. GON blockade was administered four times (once per week) with saline in group A or bupivacaine in group B. After 4 weeks of treatment, blinding was removed; in group A, GON blockade was achieved using bupivacaine, while group B continued to receive bupivacaine, and blockade was administered once per month, then followed for 2 months. Primary endpoint was the difference in number of headache days, duration of headache, and pain scores. They noted that 72 of 84 patients completed the study. After 1 month of treatment, number of headache days had decreased from 16.9 ± 5.7 to 13.2 ± 6.7 in group A (P = 0.035) and from 18.1 ± 5.3 to 8.8 ± 4.8 in group B (P < 0.001), (P = 0.004, between groups); duration of headache (hour) had decreased from 24.2 ± 13.7 to 21.2 ± 13.4 in group A (P = 0.223) and from 25.9 ± 16.3 to 19.3 ± 11.5 in group B (P <
Gul et al (2017) evaluated the efficacy of greater occipital nerve (GON) blockade in chronic migraine in a placebo-controlled, randomized study using a control group. The authors state that GON blockade with local anesthetics is an effective treatment for a group of headaches, such as cervicogenic headache, cluster headache, occipital neuralgia, and migraine. The investigators included 44 patients with chronic migraine and randomly divide the patients into two groups, as group A (bupivacaine) and group B (placebo). GON blockade was administered four times (once per week) with bupivacaine or saline. After 4 weeks of treatment, patients were followed up for 3 months, and findings were recorded once every month for comparing each month's values with the pretreatment values. The primary endpoint was the difference in the frequency of headache (headache days/month). VAS pain scores were also recorded. A total of 44 patients completed the study; no severe adverse effects were reported. Group A showed a significant decrease in the frequency of headache and VAS scores at the first, second, and third months of follow-up. Similarly, group B showed a significant decrease in the frequency of headache and VAS scores at the first month of follow-up, but second and third months of follow-up showed no significant difference. The authors concluded that their results suggest that GON blockade with bupivacaine was superior to placebo, has long-lasting effect than placebo, and was found to be effective for the treatment of CM; however, more studies are needed to better define the safety and cost-effectiveness of GON blockade in chronic migraine.

Ambrosini et al (2005) discuss their double-blind, placebo-controlled study evaluating suboccipital injection with a mixture of rapid and long-acting steroids in cluster headache. The authors state that oral steroids can interrupt bouts of cluster headache (CH) attacks, but recurrence is frequent and may lead to steroid-dependency. They note that suboccipital steroid injection may be an effective alternative. The aim of their study was to assess the preventative effect on CH attacks of an ipsilateral steroid injection in the region of the greater occipital nerve (GON). Sixteen episodic (ECH) and 7 chronic (CCH) CH outpatients were included. ECH patients were in a new bout since no more than 1 week. After a one-week run-in period, patients were allocated by randomization to the placebo or verum arms and received on the side of attacks a suboccipital injection of a mixture of long- and rapid-acting betamethasone (n=13; Verum-group) or physiological saline (n=10; Plac-group). Acute treatment was allowed at any time, additional preventative therapy if attacks persisted after 1 week. Three investigators performed the injections, while four others, blinded to group allocation, followed the patients.
Follow-up visits were after 1 and 4 weeks, thereafter patients were followed routinely. Eleven Verum-group patients (3 CCH) (85%) became attack-free in the first week after the injection compared to none in the Plac-group (P=0.0001). Among them eight remained attack-free for 4 weeks (P=0.0026). Remission lasted between 4 and 26 months in five patients. A single suboccipital steroid injection completely suppresses attacks in more than 80% of CH patients. The authors state that this effect was maintained for at least 4 weeks in the majority of them.

Kashipazha et al (2014) discuss preventive effect of greater occipital nerve (GON) block on severity and frequency of migraine headaches. They conducted a randomized double-blinded controlled trial on 48 patients suffering from migraine headaches. A syringe containing 1.0 mL of lidocaine 2%, 0.5 mL of either saline (control group, N = 24) or triamcinolone 0.5 mL (intervention group, N = 24) was prepared for each patient. Patients were assessed prior to the injection, and also 2 weeks, 1 month, and 2 months thereafter for severity and frequency of pain, times to use analgesics and any appeared side effects. They found no significant differences in pain severity, pain frequency, and analgesics use between the two groups at the four study time points including at baseline, and 2, 4, and 8 weeks after the intervention. However, in both groups, the indices of pain severity, pain frequency, and analgesics use were significantly reduced at the three time points after the intervention compared with before the intervention. The authors concluded that GON block, with triamcinolone in combination with lidocaine or normal saline with lidocaine, results in reducing pain severity and frequency, as well as use of analgesics up to two months after the intervention; however any difference attributed to the drug regimens by assessing of the trend of pain characteristics changes.

Cuadrado et al (2017) discuss a double-blind, randomized, placebo-controlled clinical trial on the short-term effects of greater occipital nerve blocks (GON) in chronic migraine. The authors state that GON blocks are widely used for the treatment of headaches, but quality evidence regarding their efficacy is scarce. The authors aim was to assess the short-term clinical efficacy of GON anesthetic blocks in chronic migraine (CM) and to analyze their effect on pressure pain thresholds (PPTs) in different territories. Thirty-six women with CM were treated either with bilateral GON block with bupivacaine 0.5% (n = 18) or a sham procedure with normal saline (n = 18). Headache frequency was recorded a week after and before the procedure. PPT was measured in cephalic points (supraorbital, infraorbital and mental nerves) and extracephalic points (hand, leg) just before the injection (T0), one hour later (T1) and one week later (T2). The authors reported that the anesthetic block was superior to placebo in reducing the number of days per week with moderate-or-severe headache (MANOVA; p = 0.027), or any headache (p<0.004). Overall, PPTs increased after anesthetic block and decreased after placebo; after the intervention, PPT differences between baseline and T1/T2 among groups were statistically significant for the supraorbital (T0-T1, p = 0.022; T0-T2, p = 0.031) and infraorbital sites (T0-T1, p = 0.013; T0-T2, p = 0.005). The authors concluded that GON anesthetic blocks appear to be
effective in the short term in CM, as measured by a reduction in the number of days with moderate-to-severe headache or any headache during the week following injection. GON block is followed by an increase in PPTs in the trigeminal area, suggesting an effect on central sensitization at the trigeminal nucleus caudalis. This trial is registered at ClinicalTrials.gov (NCT02188394).

Dilli et al (2015) conducted a randomized, double-blinded, placebo-controlled study on occipital nerve block for the short-term preventive treatment of migraine. Patients with chronic and episodic migraine (more than one attack per week) were treated with either 2.5mL bupivacaine 0.5% plus 20mg methylprednisolone (n=33 patients), or with placebo (2.75mL saline and 0.25mL lidocaine 1% [n=30 patients]). An evaluation 4 weeks after the procedure did not find any significant changes in the frequency of moderate to severe headache days in either group with respect to its baseline data. The study had a small sample size and the procedure was performed once, compared to the multiple times in other studies. This study's placebo treatment included a small amount of anesthetic. The study was registered with ClinicalTrial.gov (NCT00915473).

Karadas et al (2017) evaluate the GON block in the treatment of triptan-overuse headache in a randomized comparative study. The study investigated the efficiency of a single and repeated GON block using lidocaine in the treatment of triptan-overuse headache (TOH). In the study, 105 consecutive subjects diagnosed with TOH were evaluated. The subjects were randomized into three groups. In Group 1 (n=35), only triptan was abruptly withdrawn. In Group 2 (n=35), triptan was abruptly withdrawn and single GON block was performed. In Group 3 (n=35), triptan was abruptly withdrawn and three-stage GON block was performed. All patients were injected bilaterally with a total amount of 5 cc 1% lidocaine in each stage. During follow-up, the number of headache days per month, the severity of pain (VAS), the number of triptans used, and hsCRP and IL-6 levels were recorded three times; in the pretreatment period, in the second month post-treatment, and in the fourth month post-treatment. They were then compared. The authors reported that there was a statistically significant difference in the post-treatment fourth month in comparison with the pretreatment period in Group 3 (P<.05). Compared to Group 1, the number of headache days, VAS, and decrease in triptan need in Group 3 was statistically significant compared to Group 2 (P<.05). Compared to pretreatment, in the fourth month post-treatment, both hsCRP and IL-6 levels were lower only in Group 3 (P<.05). They concluded that repeated GON block in addition to the discontinuation of medication has significant efficacy for TOH cases.

Blumenfeld et al (2013) provide a narrative review on expert consensus recommendations for the performance of PNB for headaches. The authors note that the American Headache Society Special Interest Section for PNBs and other Interventional Procedures convened meetings
during 2010-2011 featuring formal discussions and agreements about the procedural details for occipital and trigeminal PNBs. A subcommittee then generated a narrative review detailing the methodology. PNB indications may include select primary headache disorders, secondary headache disorders, and cranial neuralgias. Special procedural considerations may be necessary in certain patient populations, including pregnancy, the elderly, anesthetic allergy, prior vasovagal attacks, an open skull defect, antiplatelet/anticoagulant use, and cosmetic concerns. PNBs described include greater occipital, lesser occipital, supratrochlear, supraorbital, and auriculotemporal injections. Technical success of the PNB should result in cutaneous anesthesia. Targeted clinical outcomes depend on the indication, and include relief of an acute headache attack, terminating a headache cycle, and transitioning out of a medication-overuse pattern. Reinjection frequency is variable, depending on the indications and agents used, and the addition of corticosteroids may be most appropriate when treating cluster headache. The authors concluded that these recommendations from the American Headache Society Special Interest Section for PNBs and other Interventional Procedures members for PNB methodology in headache disorder treatment are derived from the available literature and expert consensus. With the exception of cluster headache, there is a paucity of evidence, and further research may result in the revision of these recommendations to improve the outcome and safety of these interventions.

Santos et al (2017) discuss consensus recommendations for PNB (e.g.; GON blockade) in headaches. The authors derived at their consensus based on an “exhaustive” literature review and analysis, as well as based on their own clinical experience. The levels of evidence and grades of recommendation were defined according to the classification proposed by the Centre for Evidence Based Medicine at the University of Oxford. The authors included a published study by Ruiz Pinero et al (2015) on chronic migraine prevention utilizing GON and supraorbital nerve (SON) blockade. This was a prospective, open non-controlled study in 60 patients which included a single intervention. At 3 months, 23 patients (38.3%) had responded completely to treatment (pain-free period of at least 2 weeks), and 24 patients (40%) showed a partial response (50% reduction in pain intensity and/or days with pain during at least 2 weeks). Thirteen patients (21.7%) did not respond. Although small sample size and short-term follow up, Santos et al assigned a LOE II, Grade B recommendation and stated that GON blockade may be effective as prophylaxis for chronic migraines based on reductions in number, duration, or intensity of the attacks in the weeks or months following the intervention; however, they note that addition of corticosteroids has not been shown to increase the efficacy of anesthetic block for preventing migraines.

Santos et al (2017) also evaluated case studies involving GON blockade for symptomatic treatment of migraines. After their review of the literature of case series, the authors assigned the indication a LOE IV recommendation and state that GON blockade may be a treatment
alternative for refractory episodes.

Santos et al (2017) discuss their recommendations after a literature review on GON blockade for cluster headaches (CH). The authors evaluated 2 case series (n = 19, n = 15), a retrospective study (n = 60), 2 prospective open studies (n = 14, n = 83), and 2 prospective blind studies (n = 23, n = 43). Although sample sizes were small, the authors concluded that anesthetic block of the GON is an effective treatment for CH.

In and UpToDate review on "Short-lasting unilateral neuralgiform headache attacks: Treatment" (Matharu and Cohen, 2017) state that due to the small sample size of patients studies, treatment of short-lasting unilateral neuralgiform headache with GON blockage procedures, should be considered investigational.

In an UpToDate review on "Cluster headache: Treatment and prognosis" (May, 2017) states that in some cases, GON blockade or local glucocorticoid injection are effective, at least temporarily, for patients with refractory chronic cluster headache. However, the article referenced Peres, et al (2002) study that evaluated GON block treatment for cluster headache in 14 patients. Four patients (28.5%) had a good response, five (35.7%) a moderate, and five (35.7%) had no response. The referenced article contained a small sample size.

In an UpToDate review on "Preventive treatment of migraine in adults" and "Acute treatment of migraine in adults" (Bajwa and Smith, 2017) do not mention the use of GON blockage therapy for preventive or acute treatment of migraine in adults.

Peripheral Nerve Blocks for the Treatment of Facial Pain and Headaches

Kleen and Levy (2016) stated that PNBs are an increasingly viable therapeutic option for selected groups of headache patients, particularly those with intractable headache or facial pain. Greater occipital nerve block, the most widely used local anesthetic procedure in headache conditions; adverse effects are few and infrequent. These procedures can result in rapid relief of pain and allodynia, and effects last for several weeks or months. The authors concluded that the use of nerve block procedures and potentially onabotulinum toxin therapy should be expanded for patients with intractable headache disorders who may benefit, although more studies are needed for clinical safety and effectiveness.

Treatment of Hip Fracture

Abou-Setta and colleagues (2011) reviewed and synthesized the evidence on pain management interventions in non-pathological hip fracture patients following low-energy trauma. Outcomes
include pain management (short- and long-term), mortality, functional status, pain medication use, mental status, health-related quality of life (QOL), quality of sleep, ability to participate in rehabilitation, return to pre-fracture living arrangements, health services utilization, and adverse effects. Comprehensive literature searches were conducted in 25 electronic databases from 1990 to present. Searches of the grey literature, trial registries, and reference lists of previous systematic reviews and included studies were conducted to identify additional studies. Study selection, quality assessment, data extraction, and grading of the evidence were conducted independently and in duplicate. Discrepancies were resolved by consensus or third-party adjudication. Meta-analyses were conducted where data were available and deemed appropriate. In total, 83 studies were included (69 trials, 14 cohort studies). Most participants were females older than 75 with no cognitive impairment. The methodological quality of cohort studies was generally moderate; most trials were at high or unclear risk of bias. Included studies were grouped into 8 intervention categories: (i) systemic analgesia, (ii) anesthesia, (iii) complementary and alternative medicine, (iv) multi-modal pain management, (v) nerve blocks, (vi) neurostimulation, (vii) rehabilitation, and (viii) traction. Most studies examined peri- and post-operative pain management, albeit from few perspectives such as reported pain, mortality, and adverse effects. Long-term pain was not reported, and other outcomes were reported infrequently. Nerve blockade was effective for relief of acute pain; however, most studies were limited to either assessing acute pain or use of additional analgesia and did not report on how nerve blockades may affect rehabilitation such as ambulation or mobility if the blockade has both sensory and motor effects. Acupressure, relaxation therapy, and transcutaneous electrical neurostimulation may be associated with potentially clinically meaningful reductions in pain, but further evidence is warranted before any firm conclusions are reached. While the strength of evidence is insufficient to make firm conclusions, post-operative physical therapy may improve pain control, and intravenous parecoxib, a systemic analgesic not available in North America, may be a possible alternative to traditional intramuscular injections of opiates and older non-steroidal anti-inflammatory drugs (NSAIDs). Pre-operative traction and spinal anesthesia (with or without additional agents) did not consistently reduce pain or complications in any demonstrable way compared with standard care. Although most studies reported on adverse effects, they were short-term and not adequately powered to identify significant differences. None of the included studies exclusively examined participants from institutional settings or with cognitive impairment, which reduces the generalizability of results to the overall hip fracture patient population. The authors concluded that for most interventions in this review there were sparse data available, which precluded firm conclusions for any single approach or for the optimal overall pain management following hip fracture.
Sahota et al (2014) noted that hip fractures are very painful leading to lengthy hospital stays. Conventional methods of treating pain are limited. Non-steroidal anti-inflammatory drugs are relatively contraindicated and opioids have significant side effects. Regional anesthesia holds promise but results from these techniques are inconsistent. Trials to date have been inconclusive with regard to which blocks to use and for how long; inter-patient variability remains a problem. This is a single center study conducted at Queen’s Medical Centre, Nottingham; a large regional trauma center in England. It is a pragmatic, parallel arm, RCT. Sample size will be 150 participants (75 in each group). Randomization will be web-based, using computer generated concealed tables (service provided by Nottingham University Clinical Trials Unit). There is no blinding. Intervention will be a femoral nerve block (0.5 ml/kg 0.25 % levo-bupivacaine) followed by ropivacaine (0.2 % 5 ml/hr) infused via a femoral nerve catheter until 48 hours post-surgery. The control group will receive standard care. Participants will be aged over 70 years, cognitively intact (abbreviated mental score of 7 or more), able to provide informed consent, and admitted directly through the Emergency Department from their place of residence. Primary outcomes will be cumulative ambulation score (from day 1 to 3 post-operatively) and cumulative dynamic pain scores (day 1 to 3 post-operatively). Secondary outcomes will be cumulative dynamic pain score pre-operatively, cumulative side effects, cumulative calorific and protein intake, EUROQOL EQ-5D score, length of stay, and rehabilitation outcome (measured by mobility score). The authors stated that many studies have shown the effectiveness of regional blockade in neck of femur fractures, but the techniques used have varied. This study aims to identify whether early and continuous femoral nerve block can be effective in relieving pain and enhancing mobilization.

Infra-Orbital Nerve Blocks for the Management of Post-Operative Pain Following Cleft Lip Repair

In a Cochrane review, Feriani and associates (2016) evaluated the effects of infra-orbital nerve block for the management of post-operative pain following cleft lip repair in children. These investigators searched the following databases: Cochrane Central Register of Controlled Trials (CENTRAL, the Cochrane Library, Issue 6, 2015), Medline, Embase, and Literatura Latino-Americana e do Caribe em Ciências da Saúde (LILACS) from inception to June 17, 2015. There were no language restrictions. They searched for ongoing trials in the following platforms: the metaRegister of Controlled Trials; ClinicalTrials.gov (the US National Institutes of Health Ongoing Trials Register), and the World Health Organization International Clinical Trials Registry Platform (on June 17, 2015). These investigators checked reference lists of the included studies to identify any additional studies. They contacted specialists in the field and authors of the included trials for unpublished data. These researchers included RCTs that tested peri-operative infra-orbital nerve block for cleft lip repair in children, compared with other types of analgesia procedure, no intervention, or placebo (sham nerve block). They considered the type of drug, dosage, and route of administration used in each study. For the purposes of this review, the term
“peri-operative” refers to the 3 phases of surgery: (i) pre-operative, (ii) intra-operative, and post-operative, (iii) and commonly includes ward admission, anesthesia, surgery, and recovery. Two review authors independently identified, screened, and selected the studies, assessed trial quality, and performed data extraction using the Cochrane Pain, Palliative and Supportive Care Review Group criteria. In case of disagreements, a 3rd review author (EMKS) was consulted. The authors assessed the evidence using Grading of Recommendations, Assessment, Development and Evaluation (GRADE). These researchers included 8 studies involving 353 children in the review. These studies reported different types of interventions (lignocaine or bupivacaine), observation times, and forms of measuring and describing the outcomes, making it difficult to conduct meta-analyses. In the comparison of infra-orbital nerve block versus placebo, there was a large effect in mean post-operative pain scores (the first primary outcome) favoring the intervention group (SMD -3.54, 95 % CI: -6.13 to -0.95; very low-quality evidence; 3 studies; 120 children). Only 1 study reported the duration of analgesia (in hours) (second primary outcome) with a difference favoring the intervention group (MD 8.26 hours, 95 % CI: 5.41 to 11.11; very low-quality evidence) and less supplemental analgesic requirements in the intervention group (RR 0.05, 95 % CI: 0.01 to 0.18; low-quality evidence). In the comparison of infra-orbital nerve block versus intravenous analgesia, there was a difference favoring the intervention group in mean post-operative pain scores (SMD -1.50, 95 % CI: -2.40 to -0.60; very low-quality evidence; 2 studies; 107 children) and in the time to feeding (MD -9.45 minutes, 95 % CI: -17.37 to -1.53; moderate-quality evidence; 2 studies; 128 children). No significant adverse events (AEs; third primary outcome) were associated with the intervention, although 3 studies did not report this outcome; 5 out of 8 studies found no unwanted side effects after the nerve blocks. Overall, the included studies were at low or unclear risk of bias. The reasons for down-grading the quality of the evidence using GRADE related to the lack of information about randomization methods and allocation concealment in the studies, very small sample sizes, and heterogeneity of outcome reporting. The authors concluded that there is low-to very low-quality evidence that infra-orbital nerve block with lignocaine or bupivacaine may reduce post-operative pain more than placebo and intravenous analgesia in children undergoing cleft lip repair. They stated that further studies with larger samples are needed; and future studies should standardize the observation time and the instruments used to measure outcomes, and stratify children by age group.

Lateral Femoral Cutaneous Nerve Blocks after Total Hip Arthroplasty

In a prospective, randomized, blinded, placebo-controlled trial, Thybo and colleagues (2016) hypothesized that an lateral femoral cutaneous nerve (LFCN) block would reduce movement-related pain after total hip arthroplasty (THA) in patients with moderate-to-severe pain. A total of 60 patients with VAS score greater than 40 mm during 30-degree active flexion of the hip on either the 1st or 2nd post-operative day after THA were included in this trial. Group A received
an LFCN block with 8 ml of 0.75 % ropivacaine followed after 45 mins by an additional LFCN block with 8 ml of saline. Group B received an LFCN block with 8 ml of saline followed after 45 mins by an additional LFCN block with 8 ml of 0.75 % ropivacaine. These researchers found a difference of 17 mm (95 % CI: 4 to 31 mm; p < 0.02) in VAS pain score during 30-degree flexion of the hip 45 mins after the 1st block (primary outcome) in favor of group A. No other significant difference between groups regarding pain during mobilization and at rest was found. The overall non-responder rate (less than 15 mm pain reduction) was 42 %. The authors concluded that LFCN block reduced movement-related pain in patients with moderate-to-severe pain after THA. Moreover, they state that the substantial non-responder rate (42 %) limited recommendations of this block as part of a standard analgesic treatment regimen.

Liposomal Bupivacaine Peripheral Nerve Blocks for the Management of Post-Operative Pain

In a Cochrane review, Hamilton and colleagues (2016) evaluated the analgesic effectiveness and adverse effects of liposomal bupivacaine infiltration PNB for the management of patients with post-operative pain. These researchers identified randomized trials of liposomal bupivacaine PNB for the management of post-operative pain. They searched the Cochrane Central Register of Controlled Trials (CENTRAL) (2016, Issue 1), Ovid Medline (1946 to week 1 of January 2016), Ovid Medline In-Process (January 14, 2016), Embase (1974 to January 13, 2016), ISI Web of Science (1945 to January 14, 2016), and reference lists of retrieved articles. These investigators sought unpublished studies from Internet sources, and searched clinical trials databases for ongoing trials. The date of the most recent search was January 15, 2016. Randomized, double-blind, placebo- or active-controlled clinical trials of a single-dose of liposomal bupivacaine administered as a PNB in adults aged 18 years or over undergoing elective surgery at any surgical site were selected for analysis. The authors included trials if they had at least 2 comparison groups for liposomal bupivacaine PNB compared with placebo or other types of analgesia. Two review authors independently considered trials for inclusion in the review, assessed risk of bias, and extracted data. They performed analyses using standard statistical techniques as described in the Cochrane Handbook for Systematic Reviews of Interventions, using Review Manager 5. They planned to perform a meta-analysis, however there were insufficient data to ensure a clinically meaningful answer; as such they have produced a “Summary of findings” table in a narrative format, and where possible they assessed the evidence using GRADE. These researchers identified 7 studies that met inclusion criteria for this review; 3 were recorded as completed (or terminated) but no results were published. Of the remaining 4 studies (299 participants): 2 investigated liposomal bupivacaine transversus abdominis plane (TAP) block, 1 liposomal bupivacaine dorsal penile nerve block, and 1 ankle block. The study investigating liposomal bupivacaine ankle block was a phase II dose-escalating/de-escalating trial presenting pooled data that these investigators could not use in
their analysis. The studies did not report primary outcome, cumulative pain score between 0 and 72 hours, and secondary outcomes, mean pain score at 12, 24, 48, 72, or 96 hours. One study reported no difference in mean pain score during the 1st, 2nd, and 3rd post-operative 24-hour periods in participants receiving liposomal bupivacaine TAP block compared to no TAP block. Two studies, both in people undergoing laparoscopic surgery under TAP block, investigated cumulative post-operative opioid dose, reported opposing findings. One found a lower cumulative opioid consumption between 0 and 72 hours compared to bupivacaine hydrochloride TAP block and 1 found no difference during the 1st, 2nd, and 3rd post-operative 24-hour periods compared to no TAP block. No studies reported time to 1st post-operative opioid or percentage not requiring opioids over the initial 72 hours. No studies reported a health economic analysis or patient-reported outcome measures (outside of pain). The review authors sought data regarding AEs but none was available, however there were no withdrawals reported to be due to AEs. Using GRADE, these researchers considered the quality of evidence to be very low with any estimate of effect very uncertain and further research very likely to have an important impact on the confidence in the estimate of effect. All studies were at high risk of bias due to their small sample size (fewer than 50 participants per arm) leading to uncertainty around effect estimates. Additionally, inconsistency of results and sparseness of data resulted in further down-grading of the quality of the data. The authors concluded that a lack of evidence has prevented an assessment of the effectiveness of liposomal bupivacaine administered as a PNB. At present there is a lack of data to support or refute the use of liposomal bupivacaine administered as a PNB for the management of post-operative pain. They stated that further research is very likely to have an important impact on the confidence in the estimate of effect and is likely to change the estimate.

Thoracic Paravertebral Blocks in Abdominal Surgery

El-Boghdal and associates (2016) stated that thoracic paravertebral blocks (TPVBs) have an extensive evidence base as part of a multi-modal analgesic strategy for thoracic and breast surgery and have gained popularity with the advent of ultrasound guidance. However, this role is poorly defined in the context of abdominal surgery. These investigators performed a systematic review of RCTs to clarify the impact of TPVB on peri-operative analgesic outcomes in adult abdominal surgery. They identified 20 published trials involving a total of 1,044 patients that met inclusion criteria; however there was significant heterogeneity in terms of type of surgery, TPVB technique, comparator groups and study quality. Pain scores and opioid requirements in the early post-operative period were generally improved when compared with systemic analgesia, but there was insufficient evidence for any definitive conclusions regarding comparison with epidural analgesia or other peripheral block techniques, or the benefit of continuous TPVB techniques. The reported primary block failure rate was 2.8 % and the incidence of complications was 1.2 % (6/504); there were no instances of pneumothorax. The authors
concluded that TPVB appeared to be a promising analgesic technique for abdominal surgery in terms of safety and effectiveness. However, they stated that further well-designed and adequately powered studies are needed to confirm its utility, particularly with respect to other regional anesthesia techniques.

**Ultrasound-Guided Forearm Peripheral Nerve Blocks for the Treatment of Digit Injuries (e.g., Phalanx Fracture or Interphalangeal Joint Dislocation)**

Amini and colleagues (2016) noted that phalanx fractures and interphalangeal joint dislocations commonly present to the emergency department (ED). Although these orthopedic injuries are not complex, the 4-point digital block used for anesthesia during the reduction can be painful. Additionally, cases requiring prolonged manipulation or consultation for adequate reduction may require repeat blockade. In a case-series study, these investigators reported the findings of 4 patients who presented after mechanical injuries resulting in phalanx fracture or interphalangeal joint dislocations. These patients received an ultrasound (US)-guided PNB of the forearm with successful subsequent reduction. The authors concluded that to their knowledge, the use of US-guided PNBs of the forearm for anesthesia in reduction of upper extremity digit injuries in adult patients in the ED setting has not been described before. These preliminary findings need to be validated by well-designed studies.

Soberon and associates (2016) stated that limited data exist regarding the role of peri-neural blockade of the distal median, ulnar, and radial nerves as a primary anesthetic in patients undergoing hand surgery. In a prospective, randomized, pilot study, these researchers compared these techniques to brachial plexus blocks as a primary anesthetic in this patient population. A total of 60 patients scheduled for hand surgery were randomized to receive either an US-guided supra-clavicular, infra-clavicular, or axillary nerve block (brachial plexus blocks) or US-guided median, ulnar, and radial nerve blocks performed at the level of the mid-to- proximal forearm (forearm blocks). The ability to undergo surgery without analgesic or local anesthetic supplementation was the primary outcome. Block procedure times, post-anesthesia care unit length of stay (LOS), instances of nausea/vomiting, and need for narcotic administration were also assessed. The 2 groups were similar in terms of the need for conversion to general anesthesia or analgesic or local anesthetic supplementation, with only 1 patient in the forearm block group and 2 in the brachial plexus block group requiring local anesthetic supplementation or conversion to general anesthesia. Similar durations in surgical and tourniquet times were also observed. Both groups reported similarly low numerical rating scale pain scores as well as the need for post-operative analgesic administration (2 patients in the forearm block group and 1 in the brachial plexus block group reported numerical rating scale pain scores greater than 0 and required opioid administration in the post-anesthesia care unit). Block procedure characteristics were similar between the 2 groups. The authors concluded that forearm blocks may be used as
a primary anesthetic in patients undergoing hand surgery. They stated that further research is needed to determine the appropriateness of these techniques in patients undergoing surgery in the thumb or proximal to the hand.

Genicular Nerve Block for Pain Control after Total Knee Replacement

Gonzalez Sotelo and colleagues (2017) evaluated the peri-articular distribution of genicular nerve blocks in a fresh cadaver model and described the technique in a preliminary group of patients submitted to total knee arthroplasty (TKA). In the anatomical phase, 4 genicular nerves (superior medial, superior lateral, inferior medial and inferior lateral) were blocked with 4-ml of local anesthetic with iodinated contrast and methylene blue in each (16 mls in total). It was performed on a fresh cadaver and the distribution of the injected medium was evaluated by means of a CT-scan and coronal anatomical sections on both knees. The clinical phase included 12 patients scheduled for TKA. Ultrasound-guided block of the 4 genicular nerves was performed pre-operatively and their clinical effectiveness evaluated by assessing pain after the reversal of the spinal block and at 12 hours after the block. Pain was measured using the numerical scale and the need for rescue analgesia was evaluated. A wide peri-articular distribution of contrast was observed by CT-scan, which was later evaluated in the coronal sections. The distribution followed the joint capsule without entering the joint, both in the femur and in the tibia. The pain after the reversal of the subarachnoid block was 2 ± 1, requiring rescue analgesia in 42 % of the patients. At 12 hours, the pain according to the numerical scale was 4 ± 1, 33 % needed rescue analgesia. The authors concluded that the administration of 4-ml of local anesthetic at the level of the 4 genicular nerves of the knee produced a wide peri-articular distribution. They stated that these preliminary findings in a series of 12 patients undergoing TKA appeared to be clinically effective; however, extensive case series and comparative studies with local infiltration techniques with anesthetics are needed to support these encouraging results.

Combined Infraclavicular-Suprascapular Blocks for Shoulder Surgery

Tran and colleagues (2017) noted that shoulder surgery can result in significant post-operative pain. Interscalene brachial plexus blocks (ISBs) constitute the current criterion standard for analgesia but may be contraindicated in patients with pulmonary pathology due to the inherent risk of phrenic nerve block and symptomatic hemi-diaphragmatic paralysis. Although US-guided ISB with small volumes (5 ml), dilute local anesthetic (LA) concentrations, and LA injection 4 mm lateral to the brachial plexus have been shown to reduce the risk of phrenic nerve block, no single intervention can decrease its incidence below 20 %. Ultrasound-guided supraclavicular blocks with LA injection postero-lateral to the brachial plexus may anesthetize the shoulder without incidental diaphragmatic dysfunction, but further confirmatory clinical trials are needed.
Ultrasound-guided C7 root blocks also appeared to offer an attractive, diaphragm-sparing alternative to ISB. However, additional large-scale studies are needed to confirm their effectiveness and to quantify the risk of peri-foraminal vascular breach. Combined axillary-suprascapular nerve blocks may provide adequate post-operative analgesia for minor shoulder surgery but do not compare favorably to ISB for major surgical procedures. One intriguing solution lies in the combined use of infraclavicular brachial plexus blocks and suprascapular nerve blocks. Theoretically, the infraclavicular approach targets the posterior and lateral cords, thus anesthetizing the axillary nerve that supplies the anterior and posterior shoulder joint, as well as the subscapular and lateral pectoral nerves (both of which supply the anterior shoulder joint), whereas the suprascapular nerve block anesthetizes the posterior shoulder. The authors concluded that future randomized trials are needed to validate the effectiveness of combined infraclavicular-suprascapular blocks for shoulder surgery.

Intellicath (a Nerve-Blocking Device)

According to Endometriosis News, there is a new approach to treating chronic pelvic pain (CPP) that aims to block pain at its source in the nervous system, rather than through the use of conventional oral medications or creams. The approach targets the plexus of nerves connected with a pain area. This treatment consists of blocks directed to the plexus of nerves that serve the area, or a short-term, continuous block, lasting up to 10 days. The method supposedly leads to long-term relief, and uses Intellicath, the proprietary, patent-pending device.

Stellate Ganglion Block for Ulcerative Colitis

Zhao and colleagues (2017) examined the safety and effectiveness of stellate ganglion block for the treatment of patients with chronic ulcerative colitis (UC). A total of 120 randomly selected patients with chronic UC treated from January 2014 to January 2016 were included in this study. These patients were divided into 2 groups: (i) control group (n = 30), patients received oral sulfasalazine treatment; and (ii) experimental group (n = 90), patients received stellate ganglion block treatment. Clinical symptoms and disease activity in these 2 groups were compared before and after treatment using endoscopy. Blood was collected from patients on day 0, 10, 20 and 30 after treatment. Enzyme-linked immunosorbent assay (ELISA) was performed to determine interleukin-8 (IL-8) level. The changes in IL-8 level post-treatment in the 2 groups were compared using repeated measures analysis of variance. After treatment, clinical symptoms and disease activity were shown to be alleviated by endoscopy in both the control and experimental groups. However, patients in the control group did not have obvious abdominal pain relief. In addition, the degree of pain relief in the experimental group was statistically better than that in the control group (p < 0.05). Ten days after treatment, IL-8 level was found to be
significantly lower in the experimental group than in the control group, and the difference was statistically significant \( p < 0.05 \). In addition, AEs were significantly higher in the control group than in the experimental group, and the difference was statistically significant \( \chi^2 = 33.215, p = 0.000 \). The authors concluded that the application of stellate ganglion block is a new method for treating chronic UC -- it relieved clinical symptoms in patients, reduced the level of inflammatory factors, and also had a positive impact on the disease to a certain extent. The authors stated that this study had several drawbacks -- small sample size was small, and IL-8 levels in patients included into this study were not compared with healthy subjects. Thus, further studies with a larger sample size are needed.

Superior Hypogastric Nerve Block

Elkins and associates (2017) stated that pelvic neuralgias frequently cause severe pain and may have associated bladder, bowel, or sexual dysfunctions that also impact QOL. These researchers examined the etiology, epidemiology, presentation and treatment of common causes of neurogenic pelvic pain, including neuralgia of the border nerves (ilio-inguinal, ilio-hypogastric, and genito-femoral), pudendal neuralgia, clunealgia, sacral radiculopathies caused by Tarlov cysts, and cauda equina syndrome. Treatment of pelvic neuralgia includes conservative measures (e.g., lifestyle modification, pelvic physical therapy, and medications) with escalation to more invasive and novel treatments (e.g., cryoablation, nerve blocks, radiofrequency ablation, neuromodulation and neurectomy/neurolysis) if conservative treatments are ineffective.

In a randomized, double-blind, placebo-controlled, clinical trial, Rapp and colleagues (2017) examined if superior hypogastric plexus block performed during abdominal hysterectomy decreases post-operative opioid consumption and pain. A total of 68 women scheduled for total abdominal hysterectomy for a benign indication were included in this study; 20 ml of ropivacaine 7.5 mg/ml or saline was injected retro-peritoneally in the area of the superior hypogastric plexus during the hysterectomy. Subjects were individually randomized to either intervention; subjects, caregivers, and those assessing the outcomes were blinded to group assignment. The primary outcomes were post-operative opiate consumption and patients’ self-assessment of pain (VAS scores); secondary outcomes were mobilization and side effects related to opiate consumption. The trial was completed with 38 women randomized to ropivacaine and 37 women randomized to saline. Analysis was performed on 35 women in the ropivacaine group and 33 women in the saline group. The post-operative opioid consumption was significantly lower in the ropivacaine group than in the placebo group (median of 55.8 and 72.4 mg, respectively, \( p = 0.032 \)). The proportion of women scoring VAS less than 4 at 2 hours after block was significantly higher in the ropivacaine group (63 %) than in the placebo group (25 %) \( p = 0.015 \). No side effects or important AEs occurred during the trial. The authors concluded that superior hypogastric plexus
block is a new method in this context and a promising contribution to post-operative pain treatment following abdominal hysterectomy.

Suprascapular Nerve Block for Hemiplegic Shoulder Pain in Individuals with Chronic Stroke

In a pilot study, Jeon and associates (2014) evaluated the relative effectiveness of 3 injections methods: (i) suprascapular nerve block (SSNB) alone, (ii) intra-articular steroid injection (IAI) alone, and (iii) SSNB + IAI on relief of hemiplegic shoulder pain. These researchers recruited 30 patients with hemiplegic shoulder pain after stroke; SSNB was performed in 10 patients, IAI in 10 patients, and a combination of 2 injections in 10 patients; all were Ultrasound-guided. Each patient's maximum passive range of motion (ROM) in the shoulder was measured, and the pain intensity level was assessed with a VAS. Repeated measures were performed on pre-injection, and after injection at 1 hour, 1 week, and 1 month. Data were analyzed by Kruskal-Wallis and Friedman tests. All variables that were repeatedly measured showed significant differences in shoulder ROM with time (p < 0.05), but there was no difference according injection method. In addition, VAS was statistically significantly different with time, but there was no difference by injection method. Pain significantly decreased until a week after injection, but pain after a month was relatively increased. However, pain was decreased compared to pre-injection. The authors concluded that the 3 injection methods significantly improved shoulder ROM and pain with time, but no statistically significant difference was found between them.

The authors stated that the main drawbacks of this pilot study included small number of subjects (n = 10 in each group), lack of control group, and short (4-week) follow-up, and lack of control of neurodevelopmental therapy for hemiplegic patients. They stated that these limitations prevented an absolute determination of the effects of injection; broader and long-term follow-up studies are needed.

In a pilot study, Picelli and colleagues (2017) evaluated the effects of suprascapular nerve block on pain intensity, spasticity, shoulder passive ROM, and QOL in chronic stroke patients with hemiplegic shoulder pain. A total of 10 chronic stroke patients (over 2 years from onset) with hemiplegic shoulder pain graded greater than or equal to 30 mm on the VAS underwent suprascapular nerve block injection with 1 ml of 40 mg/ml methylprednisolone and 10 ml 0.5 % bupivacaine hydrochloride. Main outcome was the VAS evaluated before and after nerve block at 1 hour, 1 week, and 1 month. Secondary outcomes were the modified Ashworth scale and the shoulder elevation, abduction, and external rotation passive ROM evaluated before the nerve block and after 1 hour as well as the American Chronic Pain Association QOL Scale evaluated before and after nerve block at 1 month. The VAS significantly improved after nerve block at 1
hour (p = 0.005) and 1 week (p = 0.011). Significant improvements were found at 1 hour after nerve block in the modified Ashworth scale (p = 0.014) and the passive ROM of shoulder abduction (p = 0.026), flexion (p = 0.007), and external rotation (p = 0.017). The American Chronic Pain Association QOL Scale significantly improved at 1 month after nerve block (p = 0.046). The authors concluded that the findings of this pilot study supported the use of suprascapular nerve block for treating hemiplegic shoulder pain in chronic stroke patients. These preliminary findings need to be validated by well-designed studies.

Occipital Nerve Block for the Treatment of Occipital Neuralgia

Tobin and Flitman (2009) stated that occipital nerve block (ONB) is a promising treatment for headaches; however, its indications, selection criteria, and best techniques are unclear. These investigators summarized in narrative format what is known about ONBs and what needs to be learned. MD Consult and Google Scholar were searched using the terms occipital, suboccipital, block, and injection to identify relevant articles that were reviewed. This process was repeated for all additional pertinent articles identified from these articles, and so on, until no additional articles were identified. A total of 21 articles were identified. The authors concluded that ONB is an effective treatment for cervicogenic headache, cluster headache, and occipital neuralgia. While a randomized, double-blinded, placebo-controlled clinical trial is lacking, multiple open label studies reported favorable results for migraine. Two other possible uses of ONB worthy of further study are: (i) as a rescue treatment and (ii) as an adjunctive treatment for medication over-use headache. ONB may be effective for tension headache, but only under very specific circumstances. ONB is either ineffective or only effective under as yet unstudied circumstances for hemicrania continua and chronic paroxysmal hemicrania. Some practitioners use occipital nerve (ON) tenderness to palpation (TTP) or reproduction of headache pain with ON pressure (RHPONP) as selection criteria for identifying appropriate patients. While only a clinical trial can produce a definitive answer, current evidence suggested that these selection criteria are not necessary for cervicogenic headache or cluster headache. Occipital neuralgia by definition involves TTP of the ONs. Whether RHPONP or ON TTP predicts success in migraine is unclear, and may relate to whether steroids are used. A single blinded randomized controlled trial evaluating local anesthetic with steroids versus local anesthetic alone for transformed migraine reported slightly worse results with steroids, but there are several alternate explanations for this finding other than steroids being counterproductive. The technique of repetitive ONBs deserves further study. This review did not provide specific data to support the use of ONB for the treatment of occipital neuralgia.

Dach et al (2015) noted that several studies have presented evidence that blocking peripheral nerves is effective for the treatment of some headaches and cranial neuralgias, resulting in reduction of the frequency, intensity, and duration of pain. These investigators described the role
of nerve block in the treatment of headaches and cranial neuralgias, and the experience of a tertiary headache center regarding this issue. They also reported the anatomical landmarks, techniques, materials used, contra-indications, and side effects of peripheral nerve block, as well as the mechanisms of action of lidocaine and dexamethasone. The authors concluded that the nerve block can be used in primary (migraine, cluster headache, and nummular headache) and secondary headaches (cervicogenic headache and headache attributed to craniotomy), as well as in cranial neuralgias (trigeminal neuropathies, glossopharyngeal and occipital neuralgias). In some of them this procedure is necessary for both diagnosis and treatment, while in others it is an adjuvant treatment. The block of the greater occipital nerve with an anesthetic and corticosteroid compound has proved to be effective in the treatment of cluster headache.

Regarding the treatment of other headaches and cranial neuralgias, controlled studies are still needed to clarify the real role of peripheral nerve block (PNB).

Hascalovici and Robbins (2017) provided demographical and clinical descriptions of patients aged 65 years old and older who were treated with PNBs for headache at the authors' institution and evaluated the safety and efficacy of this treatment. These researchers performed a retrospective, single-center, chart review of patients at least 65 years of age who received PNBs over a 6-year period. A total of 64 patients were mostly women (78 %) with an average age of 71 years (range of 65 to 94). Representative headache diagnoses were chronic migraine 50 %, episodic migraine 12.5 %, trigeminal autonomic cephalalgia 9.4 %, and occipital neuralgia 7.8 % (n = 5). Average number of headache days/month was 23. Common co-morbidities were hypertension 48 %, hyperlipidemia 42 %, arthritis 27 %, depression 47 %, and anxiety 33 %; 89 % were prescribed at least 1 medication fulfilling the Beers criteria. The average number of PNBs per patient was 4; PNBs were felt to be effective in 73 % for all headaches, 81 % for chronic migraine, 75 % for episodic migraine, 67 % for chronic tension type headache, 67 % for new daily persistent headache, and 60 % for occipital neuralgia. There were no adverse events (AEs) related to PNBs reported. The authors concluded that PNBs might be a safe and effective alternative headache management strategy for older adults. Medical and psychiatric co-morbidities, medication over-use, and Beers list medication rates were extraordinarily high, giving credence to the use of peripherally administered therapies in the geriatric population that may be better tolerated and safer.

In a prospective, open-label study, Pingree et al (2017) investigated the analgesic effects of an ultrasound (US)-guided greater occipital nerve (GON) block at the level of C2, as the nerve courses superficially to the obliquus capitis inferior muscle. Patients with a diagnosis of occipital neuralgia or cervicogenic headache were recruited for the study. Ultrasound-guided GON blocks at the level of C2 were performed by experienced clinicians according to a standardized protocol. Numeric rating scale pain scores were recorded pre-injection and at 30 minutes, 2 weeks, and 4 weeks after injection. A total of 14 injections were performed with a mean
procedure time of 3.75 minutes. Anesthesia in the GON distribution was achieved for 86% of patients at 30 minutes post-injection. Compared with baseline, numeric rating scale scores decreased by a mean of 3.78 at 30 minutes ($p < 0.001$), 2.64 at 2 weeks ($p = 0.006$), and 2.21 at 4 weeks ($p = 0.01$). There were no significant AEs reported during the study period. The authors concluded that this prospective, open-label study demonstrated successful blockade of the GON at the level of C2 using a novel US-guided technique. Significant reductions in pain scores were observed over the 4-week study period, and no AEs were reported. They stated that the results of this study provided important preliminary data for future randomized trials involving patients with occipital neuralgia and cervicogenic headache.

Spinal Accessory Nerve Block for the Treatment of Neck Pain and Upper Back Pain

Taguchi et al (2000) described the radiologic anatomy for selective medial branch block for low back pain (LBP) resulting from facet joints. A groove between the mammillary process and the accessory process (M-A groove) was chosen as the target point for this nerve block. The position of M-A groove was constant on X-rays at each level of the lumbar spine. Confirming this position under the fluoroscope, the medial branch nerves can be blocked selectively. The authors concluded that this method clarified the features of LBP related to the medial branch.

Townsley et al (2011) reported the 1st description of ultrasound (US)-guided spinal accessory nerve blockade using single-shot and subsequently continuous infusion (via a peri-neural catheter) local anesthetic techniques, for the diagnosis and treatment of myofascial pain affecting the trapezius muscle. A 38-year old man presented with a 2-year history of incapacitating left suprascapular pain after a fall onto his out-stretched hand. The history and clinical examination was suggestive of myofascial pain affecting the trapezius muscle. This had been unresponsive to pharmacological therapy, physiotherapy or suprascapular nerve blockade. Following identification of the spinal accessory nerve in the posterior triangle of the neck, these investigators performed US-guided nerve blocks, first using a single injection of local anesthetic and subsequently using a continuous infusion via a peri-neural catheter, to block the nerve and temporarily relieve the patient's pain. The authors demonstrated that the spinal accessory nerve is identifiable in the posterior triangle of the neck and can be blocked successfully using US guidance. They stated that this technique can aid the diagnosis and treatment of myofascial pain originating from the trapezius muscle.

There is currently insufficient evidence to support the use of spinal accessory nerve block for treatment of neck pain and upper back pain.

Ultrasound-Guided Erector Spinae Plane (ESP) Block for the Management of Post-Operative Pain
Restrepo-Garces et al (2017) noted that the erector spinae plane (ESP) block is a regional anesthetic technique involving local anesthetic injection in a para-spinal plane deep to the erector spinae muscle. Originally described for thoracic analgesia when performed at the T5 transverse process, the ESP block can provide abdominal analgesia if performed at lower thoracic levels because the erector spinae muscles extend to the lumbar spine. A catheter inserted into this plane can extend analgesic duration and can be an alternative to epidural analgesia. In this case-report, these investigators described using bilateral ESP catheters inserted at the T8 level to provide effective peri-operative analgesia for major open lower abdominal surgery.

Forero et al (2017) stated that post thoracotomy pain syndrome (PTPS) remains a common complication of thoracic surgery with significant impact on patients' quality of life (QOL). Management usually involves a multi-disciplinary approach that includes oral and topical analgesics, performing appropriate interventional techniques, and coordinating additional care such as physiotherapy, psychotherapy and rehabilitation. A variety of interventional procedures have been described to treat PTPS that is inadequately managed with systemic or topical analgesics. Most of these procedures are technically complex and are associated with risks and complications due to the proximity of the targets to neuraxial structures and pleura. The ultrasound (US)-guided ESP block is a novel technique for thoracic analgesia that promises to be a relatively simple and safe alternative to more complex and invasive techniques of neural blockade. These researchers examined the application of the ESP block in the management of PTPS and reported their preliminary experience to illustrate its therapeutic potential. The ESP block was performed in a pain clinic setting in a cohort of 7 patients with PTPS following thoracic surgery with lobectomy or pneumonectomy for lung cancer. The blocks were performed with US guidance by injecting 20 to 30 ml of ropivacaine, with or without steroid, into a fascial plane between the deep surface of erector spinae muscle and the transverse processes of the thoracic vertebrae. This para-spinal tissue plane is distant from the pleura and the neuraxis, thus minimizing the risk of complications associated with injury to these structures. The patients were followed-up by telephone 1 week after each block and reviewed in the clinic 4 to 6 weeks later to evaluate the analgesic response as well as the need for further injections and modification to the overall analgesic plan. All the patients had excellent immediate pain relief following each ESP block, and 4 out of the 7 patients experienced prolonged analgesic benefit lasting 2 weeks or more. The ESP blocks were combined with optimization of multi-modal analgesia, resulting in significant improvement in the pain experience in all patients. No complications related to the blocks were seen. The authors concluded that these findings observed in this case series indicated that the ESP block may be a valuable therapeutic option in the management of PTPS. Its immediate analgesic efficacy provided patients with temporary symptomatic relief while other aspects of chronic pain management were optimized, and it may also often confer prolonged
analgesia. Moreover, these researchers stated that further studies are needed to validate these findings. This was a small (n = 7) study; and its findings were confounded by the use of multi-modal analgesia.

Yamak Altinpulluk et al (2018) noted that effective post-operative analgesia after emergency caesarean section is important because it provides early recovery, ambulation and breast-feeding. The US-guided ESP block has been originally described for providing thoracic analgesia at the T5 transverse process by Forero et al (2017). These investigators performed post-operative bilateral ESP blocks with 20 ml bupivacaine 0.25 % at the level of the T9 transverse process in a pregnant woman after caesarean section. In this report, the authors described that bilateral ESP block at T9 level provided effective and long-lasting post-operative analgesia for lower abdominal surgery. This was a single-case study.

Melvin et al (2018) stated that severe post-operative pain following spine surgery is a significant cause of morbidity, extended length of facility stay, and marked opioid usage. The ESP block anesthetizes the dorsal rami of spinal nerves that innervate the para-spinal muscles and bony vertebra. These investigators described the use of low thoracic ESP blocks as part of multi-modal analgesia in lumbosacral spine surgery. They performed bilateral ESP blocks at the T10 or T12 level in 6 cases of lumbo-sacral spine surgery: 3 lumbar decompressions, 2 sacral laminoplasties, and 1 coccygectomy. Following induction of general anesthesia, single-injection ESP blocks were performed in 3 patients while bilateral continuous ESP block catheters were placed in the remaining 3. All 6 patients had minimal post-operative pain and very low post-operative opioid requirements. There was no discernible motor or sensory block in any of the cases and no interference with intra-operative somatosensory evoked potential (SSEP) monitoring used in 2 of the cases. The authors concluded that the ESP block could contribute significantly to a peri-operative multi-modal opioid-sparing analgesic regimen and enhance recovery after lumbo-sacral spine surgery. This was a small (n = 6) study; and its findings were confounded by the use of multi-modal analgesia.

that bilateral US-guided ESPB led to effective analgesia and a decrease in analgesia requirement in first 12 hours in patients undergoing LC. This was a small study (total of 30 subjects) and its findings were confounded by the use of multi-modal analgesia.

In a single-blinded, randomized controlled study, Gurkan et al (2018) evaluated the analgesic effect of US-guided ESP block in breast cancer surgery. A total of 50 ASA I-II patients aged 25 to 65 years and scheduled for elective breast cancer surgery were included in the study. Patients were randomized into 2 groups, ESP and control. Single-shot US-guided ESP block with 20 ml 0.25 % bupivacaine at the T4 vertebral level was performed pre-operatively to all patients in the ESP group. The control group received no intervention. Patients in both groups were provided with intravenous patient-controlled analgesia device containing morphine for post-operative analgesia. Morphine consumption and NRS pain scores were recorded at 1, 6, 12 and 24 hours post-operatively. Morphine consumption at post-operative hours 1, 6, 12 and 24 decreased significantly in the ESP group (p < 0.05 for each time interval). Total morphine consumption decreased by 65 % at 24 hours compared to the control group (5.76 ± 3.8 mg versus 16.6 ± 6.92 mg). There was no statistically significant difference between the groups in terms of NRS scores. The authors concluded that these findings showed that US-guided ESP block exhibited a significant analgesic effect in patients undergoing breast cancer surgery. Moreover, they stated that further studies comparing different regional anesthesia techniques are needed to identify the optimal analgesia technique for this group of patients. The findings of this study were also confounded by the use of patient-controlled analgesia devices.

Hannig et al (2018) noted that post-operative pain after laparoscopic cholecystectomy can be severe. Despite multi-modal analgesia regimes, administration of high doses of opioids is often necessary. This can further lead to several adverse effects such as drowsiness and respiratory impairment as well as post-operative nausea and vomiting (PONV). This will hinder early mobilization and discharge of the patient from the day surgery setting and is sub-optimal in an early recovery after surgery setting. The ultrasound-guided Erector Spinae Plane (ESP) block is a novel truncal inter-fascial block technique providing analgesia of the thoracic or abdominal segmental innervation depending on the level of administration. Local anesthetic penetrates anteriorly presumably through the costotransverse foramina to the paravertebral space. These researchers demonstrated the analgesic efficacy of the ESP block in a case series of 3 patients scheduled for ambulatory laparoscopic cholecystectomy. They stated that these findings must be validated in future randomized controlled trials (RCTs).

The authors stated that there are several unanswered questions to address. First, the ESP block has so far only been described in case reports, and the promising results must be validated in future RCTs. Second, the optimal time for block placement should be considered. In general, this is the best achieved pre-operatively in the awake patient. About 3/4 of the patients

Proprietary
experienced moderate-to-severe pain some time during the post-operative period. A minority of the patients experienced excruciating pain. Third, optimal volume and concentration of local anesthetic are unknown. Previous authors have mainly used ropivacaine 0.5 % 20 ml providing analgesia for about 20 hours reducing opioid consumption to about 1/3. A similar reduction from the expected opioid usage was observed in this 3 cases. The opioid sparing potential may be especially advantageous in the ambulatory setting, where pain and/or PONV may delay or even prevent same-day discharge. Lastly, additives like glucocorticoids can be considered, which presumably would extend block duration beyond 24 hours.

In a prospective, single-center, single-blinded, randomized controlled trial (RCT), Krishna et al (2019) examined the analgesic efficacy of bilateral ESP block compared with conventional treatment for pain after cardiac surgery in adult patients. A total of 106 patients undergoing elective cardiac surgery with cardiopulmonary bypass were included in this study. Patients were randomized into 2 groups. Patients in group 1 (ESP block group, n = 53) received US-guided bilateral ESP block with 3 mg/kg of 0.375 % ropivacaine before anesthesia induction at the T6 transverse process level. Patients in group 2 (paracetamol and tramadol group, n = 53) received paracetamol (1 gm every 6 hours) and tramadol (50 mg every 8 hours) intravenously in the post-operative period. The primary study outcome was to evaluate pain at rest using an 11-point NRS. Mann-Whitney U test was used for comparing NRS scores. The post-operative pain level after extubation and duration of analgesia during which NRS was less than 4 of 10 was compared between the groups. The median pain score at rest after extubation in group 1 was 0 of 10 until hour 6, 3 of 10 at hour 8, and 4 of 10 at hours 10 and 12 post-extubation. These were significantly less in comparison with group 2 (p = 0.0001). Patients in group 1 had a significantly higher mean duration of analgesia (8.98 ± 0.14 hours), during which NRS was less than 4 of 10, compared with group 2 (4.60 ± 0.12 hours) (p = 0.0001). The authors concluded that ESP block safely provided significantly better pain relief at rest for longer duration as compared to intravenous paracetamol and tramadol.

Ultrasound-Guided Celiac Plexus Block

An UpToDate review on “Endoscopic ultrasound-guided celiac plexus and ganglia interventions” (Levy and Wiersema, 2019) states that “Pain relief lasting for up to 24 weeks has been observed in approximately 70 % of patients. Initial studies also suggest that EUS-CPB may also have a role in the treatment of pain related to chronic pancreatitis. However, its role is still being defined and randomized controlled studies as have been performed for pancreas cancer are lacking. Initial data suggest that in patients with moderate-to-severe pain secondary to pancreatic cancer or chronic pancreatitis, direct celiac ganglia injection is safe and effective in initial pain
management. Prospective, controlled, and comparative trials are needed to confirm the safety and assess the long-term efficacy of this approach to pain management compared with conventional techniques. Until then, this approach cannot be recommended for routine practice”.

IPACK Block for Pain Control Following Anterior Cruciate Ligament Repair / Total Knee Arthroplasty

Thobhani et al (2017) stated that novel regional techniques, including the adductor canal block (ACB) and the local anesthetic infiltration between the popliteal artery and capsule of the knee (IPACK) block, provide an alternative approach for controlling pain following TKA. This study compared 3 regional techniques (femoral nerve catheter [FNC] block alone, FNC block with IPACK, and ACB with IPACK) on pain scores, opioid consumption, performance during physical therapy, and hospital length of stay (LOS) in patients undergoing TKA. All patients had a continuous peri-neural infusion, either FNC block or ACB. Patients in the IPACK block groups also received a single injection 30-ml IPACK block of 0.25% ropivacaine. Pain scores and opioid consumption were recorded at post-anesthesia care unit (PACU) discharge and again at 8-hour intervals for 48 hours. Physical therapy performance was measured on post-operative days (POD) 1 and 2, and hospital LOS was recorded. These researchers found no significant differences in the 3 groups with regard to baseline patient demographics. Although these investigators observed no differences in pain scores between the 3 groups, opioid consumption was significantly reduced in the FNC with IPACK group. Physical therapy performance was significantly better on POD 1 in the ACB with IPACK group compared to the other 2 groups. Hospital LOS was significantly shorter in the ACB with IPACK group. The authors concluded that the findings of this study demonstrated that an IPACK block reduced opioid consumption by providing effective supplemental analgesia following TKA compared to the FNC-only technique; ACB with IPACK provided equivalent analgesia and improved physical therapy performance, allowing earlier hospital discharge.

The authors stated that this study had several drawbacks. Because these investigators identified no patients who would fit the criteria to receive ACB only during the study period, this study lacked a group that received ACB only, which would allow better analysis of the contribution of the IPACK block to an ACB. Because the ACB has gained attention by providing adequate analgesia to the anterior knee while minimizing motor impairment, addition of the IPACK block could improve posterior knee analgesia without sacrificing distal motor and sensory impairment. Comparing ACB only to ACB with IPACK block should be a goal for future research. Nevertheless, no prior publications had described the effects of the IPACK block for addressing posterior knee pain following TKA, and thus the opioid-sparing effect of the IPACK block when combined with the FNC block is a novel finding. Retrospective studies may suffer from assignment bias, possibly resulting in baseline differences between groups. However, the
consecutive enrollment of patients in this study may have limited selection bias. In addition, this trial was a descriptive study of the benefits of a novel approach to regional analgesia for a common surgical procedure. An investigator needs to know a clinical delta, the difference in expectation that one regional technique provides compared to another technique, to calculate sample size. Because of the novel approach of this study, such information was not available, so this study could suffer from assignment bias. However, a strength of this study is that it allowed other investigator groups to validate these findings, and when needed, to use these findings to calculate a clinical delta for the appropriate sample size needed for a prospective randomized controlled trial.

Sankineani et al (2018) noted that ACB is a peripheral nerve blockade technique that provides good pain control in patients undergoing TKA, which however does not relieve posterior knee pain. The recent technique of an ultrasound (US)-guided local anesthetic infiltration of the interspace between popliteal artery and the capsule of posterior knee (IPACK) has shown promising results in providing significant posterior knee analgesia without affecting the motor nerves. These researchers carried out a prospective study from September 2016 to March 2017 in 120 patients undergoing unilateral TKA. The initial 60 consecutive patients received ACB+IPACK (Group 1, n = 60), and the subsequent 60 patients received ACB alone (Group 2, n = 60). All patients were evaluated with visual analog scale (VAS) score for pain recorded at 8 hours, POD 1 and POD 2 after the surgery. The secondary outcome measures assessed were the range of movement (ROM) and ambulation distance. VAS score showed significantly (p < 0.005) better values in ACB + IPACK group compared to the ACB group. The mean ROM of knee and ambulation distance also showed significantly better values in ACB + IPACK group compared to the ACB group. The authors concluded that ACB + IPACK is a promising technique that offered improved pain management in the immediate post-operative period without affecting the motor function around the knee joint resulting in better ROM and ambulation compared to ACB alone. This was a relatively small study (n = 60 in the ACB + IPACK group); and its findings were confounded by the combined use of ACB and IPACK.

Kim et al (2019) stated that peri-articular injections (PAIs) are becoming a staple component of multi-modal joint pathways. Motor-sparing peripheral nerve blocks, such as the infiltration between the popliteal artery and capsule of the posterior knee (IPACK) and the ACB, may augment PAI in multi-modal analgesic pathways for TKA, but supporting literature remains rare. These researchers hypothesized that the addition of ACB and IPACK to PAI would lower pain on ambulation on POD 1 compared to PAI alone. This triple-blinded, randomized-controlled trial included 86 patients undergoing unilateral TKA. Patients either received (i) a PAI (control group, n = 43) or (ii) an IPACK with an ACB and modified PAI (intervention group, n = 43). The primary outcome was pain on ambulation on POD 1; secondary outcomes included numeric rating scale (NRS) pain scores, patient satisfaction, and opioid consumption. The intervention group
reported significantly lower NRS pain scores on ambulation than the control group on POD 1 (difference in means [95 % confidence interval (CI)]: -3.3 [-4.0 to -2.7]; p < 0.001). In addition, NRS pain scores on ambulation on POD 0 (-3.5 [-4.3 to -2.7]; p < 0.001) and POD 2 (-1.0 [-1.9 to -0.1]; p = 0.033) were significantly lower. Patients in the intervention group were more satisfied, had less opioid consumption (p = 0.005, post-anesthesia care unit, p = 0.028, POD 0), less intravenous opioids (p < 0.001), and reduced need for intravenous patient-controlled analgesia (p = 0.037). The authors concluded that the addition of IPACK and ACB to PAI significantly improved analgesia and reduced opioid consumption after TKA compared to PAI alone. They stated that this study strongly supported IPACK and ACB use within a multi-modal analgesic pathway. This was a relatively small study (n = 43 in the ACB + IPACK + PAI group); and its findings were confounded by the combined use of ACB, IPACK and PAT.

Currently, there is a lack of evidence regarding the use of IPACK block following ACL repair.

Transversus Abdominis Plane (TAP) Block for Abdominal Surgery

Tsai and colleagues (2017) stated that transversus abdominis plane (TAP) block is a regional technique for analgesia of the antero-lateral abdominal wall. These investigators highlighted the nomenclature system and recent advances in TAP block techniques and proposed directions for future research. Ultrasound guidance is now considered the gold standard in TAP blocks. It is easy to acquire US images; it can be used in many surgeries involving the anterolateral abdominal wall. However, the efficacy of US-guided TAP blocks is not consistent, which might be due to the use of different approaches. The choice of technique influenced the involved area and block duration. To investigate the actual analgesic effects of TAP blocks, these researchers unified the nomenclature system and clarified the definition of each technique. Although a single-shot TAP block is limited in duration, it is still the candidate of the analgesic standard for abdominal wall surgery because the use of the catheter technique and liposomal bupivacaine may overcome this limitation.

Nerve Hydrodissection for Peripheral Nerve Entrapment

Nerve hydrodissection entails the injection of fluid (e.g., saline, dextrose water, or local anesthetic) through the nerve block needle to separate tissue planes, in order to maneuver the block needle to the desired target.

In a prospective, randomized, double-blinded, non-inferiority trial, Dufour et al (2012) tested the hypothesis that median nerve block effectiveness is not reduced when circumferential perineural hydrodissection with dextrose 5 % in water (D5W) preceded local anesthetic (LA) injection. Patients scheduled for hand surgery were randomized to receive an US-guided median nerve
block at the elbow to achieve circumferential perineural spread with either 6-ml of D5W followed by 6-ml of LA (lidocaine 1.5 % with epinephrine 1:200,000) (D5W-LA group) or with 6-ml of LA alone (LA group). The primary outcome was onset time of successful anesthesia defined by a complete abolition of light touch sensation for the index finger. Data from 95 patients were analyzed: 43 in the D5W-LA group and 52 in the LA group. Non-inferiority tests were significant (all p < 0.05) for a critical limit of 7 mins between D5W-LA and LA groups for onset time of the primary criterion, light touch block at index finger (mean ± SD, respectively: 23.9 ± 7.4 and 22.0 ± 7.9 mins; 95 % confidence interval [CI]: -5.9 to 2.1 mins), and for cold block at index fingertip, sensory blocks at thenar eminence, and motor block. Success rate at 30 mins (defined as complete abolition for cold and light touch at index finger) was noted in 100 % and 98.1 % (95 % CI: -6 % to 10 %) and 95.2 % and 96.2 % (95 % CI: -13 % to 9 %) of patients for the D5W-LA and the LA groups. The authors concluded that performing an US-guided perineural circumferential hydrodissection with D5W into which LA was injected left nerve block outcome unchanged. The assumption that this procedure may reduce the risk of intra-vascular injection and systemic toxicity remains to be demonstrated.

Fader et al (2015) noted that symptomatic neuromas of the sural nerve are a rare but significant cause of pain and debilitation in athletes. Presentation is usually in the form of chronic pain and dysesthesias or paresthesia of the lateral foot and ankle. Treatment traditionally ranges from conservative measures, such as removing all external compressive forces, to administration of NSAIDs, vitamin B6, tricyclic antidepressants, antiepileptics, or topical anesthetics. These researchers reported a case of sural nerve entrapment in a 34-year old male triathlete with a history of recurrent training-induced right-sided gastrocnemius strains. The patient presented with numbness in the right lateral foot and ankle that had persisted for 3 months, after he was treated unsuccessfully with extensive non-operative measures, including anti-inflammatory drugs, activity modification, and a dedicated physical therapy program of stretching and strengthening. Orthopedic assessment showed worsening pain with forced passive dorsiflexion and manual pressure applied over the distal aspect of the gastrocnemius. Plain radiographs showed normal findings, but in-office US imaging showed evidence of sural nerve entrapment with edema and neuromatous scar formation in the absence of gastrocnemius or soleus pathology. Percutaneous US-guided hydrodissection of the sural nerve at the area of symptomatic neuroma and neural edema was performed the same day. The patient had complete relief of symptoms and full return to the pre-injury level of participation in competitive sports. The authors concluded that the findings of this case report showed that hydrodissection, when performed by an experienced physician, could be an effective, minimally invasive technique for neurolysis in the setting of sural nerve entrapment, resulting in improvement in clinical symptoms. This was a single-case study; its findings need to be validated by well-designed studies.
Cass (2016) stated that nerve hydrodissection is a technique used when treating peripheral nerve entrapments. It involves using an anesthetic or solution such as saline to separate the nerve from the surrounding tissue, fascia, or adjacent structures. The author concluded that there were no high-level studies to determine the need or effectiveness of hydrodissection or to establish its safety. Low-level studies showed some safety and effectiveness for the technique, but further research is needed.

Popliteal Block for Open Reduction Internal Fixation of Ankle Fracture

In a prospective randomized study, Goldstein et al (2012) compared post-operative pain control in patients treated surgically for ankle fractures who receive popliteal blocks with those who received general anesthesia alone. All patients being treated with open reduction internal fixation for ankle fractures who met inclusion criteria and consented to participate were enrolled. Patients were randomized to receive either general anesthesia (GETA) or intravenous sedation and popliteal block. Patients were assessed for duration of procedure, total time in the operating room, and post-operative pain at 2, 4, 8, 12, 24, and 48 hours after surgery using a VAS. A total of 51 patients agreed to participate in the study; 25 patients received popliteal block, while 26 patients received GETA. There were no anesthesia-related complications. At 2, 4, and 8 hours post-operatively, patients who underwent GETA demonstrated significantly higher pain. At 12 hours, there was no significant difference between the 2 groups with regard to pain control. However, by 24 hours, those who had received popliteal blocks had significantly higher pain with no difference by 48 hours. The authors concluded that popliteal block provided equivalent post-operative pain control to general anesthesia alone in patients undergoing operative fixation of ankle fractures. However, patients who receive popliteal blocks experienced a significant increase in pain between 12 and 24 hours. Recognition of this “rebound pain” with early narcotic administration may allow patients to have more effective post-operative pain control.

Goldstein et al (2013) noted that previous studies have demonstrated the efficacy of popliteal block anesthesia in decreasing post-operative narcotic administration, nausea, and LOS in patients undergoing foot and ankle surgeries. These researchers compared the amount of narcotic medication administered, the need for anti-emetic medication, post anesthesia care unit (PACU) LOS, and discharge status in patients treated surgically for ankle fractures who received popliteal blocks with those who received GETA. All patients being treated with open reduction and internal fixation for ankle fractures were randomized to receive either GETA or popliteal block. Post-operatively, data were collected on the duration of time in the PACU before discharge to home or to a hospital floor. Additional information was collection on the amount of anti-emetic and pain medication in the PACU. A total of 51 patients agreed to participate in the study. There was no significant difference between the 2 groups with regards to the need for anti-emetic medication, the amount of pain medication received in the PACU, or amount of time...
spent in the PACU. Patients who received a popliteal block were no more likely to be discharged to home from the PACU than those who received GETA. The authors concluded that while previous studies have demonstrated the efficacy of popliteal block in decreasing anti-emetic and pain medication administration in the PACU, these investigators found no difference in the amount of medication administered. They found that popliteal block patients were no more likely to be discharged to home than those who received general anesthesia.

Saphenous Nerve Block for Saphenous Neuralgia

Luerssen et al (1983) reported the findings of 6 patients representing 7 cases of spontaneous (non-traumatic) saphenous neuralgia secondary to entrapment of the nerve in the sub-sartorial canal. All patients complained of medial knee and leg pain. Clinical findings included tenderness over the sub-sartorial canal and sensory changes in the cutaneous distribution of 1 or both terminal branches of the saphenous nerve. The diagnosis was confirmed by saphenous nerve block in all cases. All patients were treated operatively, which resulted in symptomatic improvement. All 6 patients initially underwent external neurolysis; however, 3 patients required saphenous neurectomy for recurrent symptoms. Saphenous neuralgia should be considered in the differential diagnosis of medial lower extremity pain.

Tsai et al (2010) noted that the saphenous nerve, a branch of the femoral nerve, is a pure sensory nerve that supplies the antero-medial aspect of the lower leg from the knee to the foot. There is limited evidence of the effectiveness of US-guided techniques to block the saphenous nerve. In a retrospective, case-series study, these investigators examined the efficacy of an US-guided sub-sartorial approach to saphenous nerve block. During a 4-month period, all patients receiving a sub-sartorial saphenous nerve block for lower extremity (LE) surgery at the authors' institution had their medical records reviewed. Patient demographics and data were recorded, including block characteristics, intra-operative anesthetic management, pre-block, post-block, and post-operative pain scores, as well as post-operative analgesic dosing. Pre-operative block success was defined by minimal intra-operative analgesic administration and a pain score of 0 in the PACU not requiring analgesic supplementation. Post-operative block success was defined by reduction of pain score to 0 without need for additional analgesic dosing. A total of 39 consecutive patients were identified as receiving an US-guided sub-sartorial saphenous nerve block. Overall, this US-guided technique was found to have a 77 % success rate. The authors concluded that this case series showed that an US-guided sub-sartorial approach to saphenous nerve blockade was a moderately effective way to anesthetize the antero-medial LE. The success rate was based on stringent criteria with an end-point of post-operative analgesia. Moreover, they stated that a randomized prospective study would provide a more definitive answer regarding the efficacy of this technique for surgical anesthesia.
Supraorbital Nerve Block for Post-Herpetic Neuralgia

Yamashiro et al (1990) reported the case of a 58-year old man who had been suffering from intractable left ophthalmic post-herpetic neuralgia (PHN) for 7 years. He has also been treated for polyarteritis nodosa for 10 years. For pain relief, he was treated initially with frequent (4 times a day) stellate ganglion block (SGB) and peripheral ophthalmic nerve block for a month without relief. Then supra-orbital nerve block (SONB) with neurolytics, transcutaneous electrical nerve stimulation (TENS) and acupuncture were done with a slight relief of his pain. Recently, his pain became worse even with imipramine 75-mg and carbamazepine 100-mg a day, which relieved effectively the patient from the pain for the last 3 years. The pain was so severe to disturb his usual activities of daily living (ADL). Gasserian ganglion block with methyl prednisolone acetate 10-mg was carried out. After the block, his ADL improved markedly; 3 months after the block, he had no spontaneous pain and slight pain with light touch on the injured skin did not annoy him. Several days before the block, electric stimulation to control his pain was tested. Stimulation with the electricity (4.5 mA, 10-cycle and 400 microseconds) brought him complete relief from the pain during the stimulation. Trigeminal SEP showed no response to the stimulation of injured skin.

Ohtsuka et al (1992) noted that low-level laser therapy (LLLT) near the stellate ganglion was given for a 68-year old woman with PHN, suffering from burning pain in the right forehead for 11 years; SGB and supraorbital nerve block (SONB) with oral medication were not effective to relieve this pain. The laser irradiation induced warm sensation in her face followed by an excellent pain relief. Thermograms illustrated a remarkable increase from 30.6 degrees C to 31.5 degrees C in temperature of her right face. The irradiation near the right carotid artery also had the similar effect. The results implied that the irradiation with LLLT of the stellate ganglion and/or the carotid artery increased a facial blood flow and relieved facial neuralgia.

Eker et al (2011) stated that acute herpes zoster (AHZ) causes PHN in 48 to 75 % of patients. Nerve blocks performed in the acute phase of HZ may treat the pain and prevent PHN development. These researchers presented pain relief with modified van-Lint block in 2 cases with AHZ involving vesicles on the traces of the supraorbital and supratrochlear nerves. This study entailed 2 women, 72 and 66 years old, with AHZ involving vesicles on the traces of the supraorbital and supratrochlear nerves starting from the right peri-ocular region to the scalp presented with symptoms such as hypoesthesia, dizziness, burning, throbbing, and severe pain. Their initial VAS scores for pain were 9 and 10, respectively. Supraorbital and supratrochlear nerve blockade with modified van-Lint technique was planned, as the classical nerve block sites were covered with active vesicles. Following the nerve blocks, VAS scores of both patients decreased to 1 immediately. Vesicles were faded and scabbed, symptoms such as hypoesthesia, burning and throbbing had recovered, dizziness was relieved, and VAS scores
were 4 and 5, respectively, after 1 week. VAS scores were 1 and 2, respectively, after the 2nd injection, and all symptoms were resolved, and no additional analgesic was needed during a 3-month follow-up. The authors concluded that modified van-Lint block with 5-ml 1% lidocaine may provide successful pain relief in AHZ involving vesicles on the traces of the supraorbital and supratrochlear nerves.

Furthermore, an UpToDate review on “Postherpetic neuralgia” (Ortega, 2019) does not mention nerve block as a therapeutic option.

Suprascapular Nerve Block for Cervical Spondylosis

An UpToDate review on “Treatment and prognosis of cervical radiculopathy” (Robinson and Kothari, 2019) does not mention nerve block as a therapeutic option.

Transversus Abdominis Plane (TAP) Block for Post-Operative Analgesia Following Lumbar Fusion

Transversus abdominis plane (TAP) block is a peripheral block that entails nerves of the anterior abdominal wall. The block has been developed for post-operative pain control after gynecologic and abdominal surgery. The initial technique described the lumbar triangle of Petit as the landmark used to access the TAP in order to facilitate the deposition of local anesthetic solution in the neurovascular plane. Other techniques include US-guided access to the neurovascular plane via the mid-axillary line between the iliac crest and the costal margin, and a subcostal access termed the “oblique subcostal” access.

Petersen and colleagues (2010) performed a systematic search of the literature and identified a total of 7 RCTs examining the effect of TAP block on post-operative pain, including a total of 364 patients, of whom 180 received TAP blockade. The surgical procedures included large bowel resection with a mid-line abdominal incision, caesarean delivery via the Pfannenstiel incision, abdominal hysterectomy via a transverse lower abdominal wall incision, open appendectomy and laparoscopic cholecystectomy. Overall, the results were encouraging and most studies have demonstrated clinically significant reductions of post-operative opioid requirements and pain, as well as some effects on opioid-related side effects (sedation and post-operative nausea and vomiting). Moreover, the authors concluded that further studies are needed to support the findings of the primary published trials and to establish general recommendations for the use of a TAP block.
Abdallah et al (2012) stated that US guidance has led a surge of interest in TAP block for post-operative analgesia following abdominal surgery. Despite or because of the numerous descriptive applications and techniques that have recently populated the literature, results of comparative studies for TAP block have been inconsistent. In a systematic review, these investigators addressed many unanswered questions, specifically the following: what are the effects of surgical procedure, block dose, block technique, and block timing on TAP block analgesia? A total of 18 intermediate-quality to good-quality randomized trials that included diverse surgical procedures were identified. Improved analgesia was noted in patients undergoing laparotomy for colorectal surgery, laparoscopic cholecystectomy, and open and laparoscopic appendectomy. There was a trend toward superior analgesic outcomes when 15-ml of local anesthetic or more was used per side compared with lesser volumes. All 5 trials investigating TAP block performed in the triangle of Petit and 7 of 12 trials performed along the mid-axillary line demonstrated some analgesic advantages; 8 of 9 trials using pre-incisional TAP block and 4 of 9 with post-incisional block revealed better analgesic outcomes. The authors concluded that although the majority of trials reviewed suggested superior early pain control, these researchers were unable to definitively identify the surgical procedures, dosing, techniques, and timing that provide optimal analgesia following TAP block. The authors concluded that the understanding of the TAP block and its role in contemporary practice remains limited.

Currently, there is a lack of evidence regarding the use of TAP block for post-operative analgesia following lumbar fusion.

CPT Codes / HCPCS Codes / ICD-10 Codes

*Information in the [brackets] below has been added for clarification purposes. Codes requiring a 7th character are represented by "+":*

<table>
<thead>
<tr>
<th>Code</th>
<th>Code Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Femoral Nerve Blocks:</td>
</tr>
<tr>
<td></td>
<td>CPT codes covered if selection criteria are met:</td>
</tr>
<tr>
<td>64447</td>
<td>Injection of anesthetic agent; femoral nerve, single</td>
</tr>
<tr>
<td></td>
<td>ICD-10 codes covered if selection criteria are met (not all-inclusive):</td>
</tr>
<tr>
<td>G89.18</td>
<td>Other acute postprocedural pain [following knee replacement surgery]</td>
</tr>
<tr>
<td>M25.561 - M25.569</td>
<td>Pain in knee</td>
</tr>
<tr>
<td>Z96.651 - Z96.659</td>
<td>Presence of artificial knee joint [acute post-operative pain]</td>
</tr>
</tbody>
</table>

Intercostal Nerve Blocks:
<table>
<thead>
<tr>
<th>Code</th>
<th>Code Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CPT codes covered if selection criteria are met:</td>
</tr>
<tr>
<td>64420 - 64421</td>
<td>Intercostal nerve blocks</td>
</tr>
<tr>
<td></td>
<td>ICD-10 codes covered if selection criteria are met:</td>
</tr>
<tr>
<td>G54.8</td>
<td>Other nerve root and plexus disorders [intercostal neuritis]</td>
</tr>
<tr>
<td></td>
<td>IPACK block:</td>
</tr>
<tr>
<td>64450</td>
<td>Injection, anesthetic agent; other peripheral nerve or branch</td>
</tr>
<tr>
<td></td>
<td>Other CPT codes related to the CPB:</td>
</tr>
<tr>
<td>27447</td>
<td>Arthroplasty, knee, condyle and plateau; medial AND lateral compartments with or</td>
</tr>
<tr>
<td></td>
<td>without patella resurfacing (total knee arthroplasty)</td>
</tr>
<tr>
<td>29888</td>
<td>Arthroscopically aided anterior cruciate ligament repair/augmentation or</td>
</tr>
<tr>
<td></td>
<td>reconstruction</td>
</tr>
<tr>
<td></td>
<td>Peripheral Nerve Blocks:</td>
</tr>
<tr>
<td>64400 - 64450</td>
<td>Introduction/Injection of anesthetic agent(nerve block), diagnostic or</td>
</tr>
<tr>
<td></td>
<td>therapeuetic [not covered as sole treatment of chronic pain, for cluneal,</td>
</tr>
<tr>
<td></td>
<td>ganglion, genicular, and obturator nerve blocks for chronic pain or for</td>
</tr>
<tr>
<td></td>
<td>repetitive peripheral nerve blocks for chronic non-malignant pain]</td>
</tr>
<tr>
<td></td>
<td>ICD-10 codes covered if selection criteria are met:</td>
</tr>
<tr>
<td>G89.11 - G89.18</td>
<td>Acute pain</td>
</tr>
<tr>
<td>G89.21 - G89.29</td>
<td>Chronic pain</td>
</tr>
<tr>
<td></td>
<td>ICD-10 codes not covered for indications listed in the CPB (not all inclusive):</td>
</tr>
<tr>
<td>G43.001 - G43.919</td>
<td>Migraines</td>
</tr>
<tr>
<td>G44.001 - G44.89</td>
<td>Other headache syndromes</td>
</tr>
<tr>
<td>R51</td>
<td>Headache</td>
</tr>
<tr>
<td></td>
<td>Chronic Pain Post Herniorrhaphy:</td>
</tr>
<tr>
<td>64425</td>
<td>Injection, anesthetic agent; ilioinguinal, iliohypogastric nerves</td>
</tr>
<tr>
<td></td>
<td>ICD-10 codes covered if selection criteria are met (not all inclusive):</td>
</tr>
<tr>
<td>K40.00 - K46.9</td>
<td>Hernia [abdominal cavity]</td>
</tr>
<tr>
<td></td>
<td>Popliteal Block:</td>
</tr>
<tr>
<td>64450</td>
<td>Injection, anesthetic agent; other peripheral nerve or branch</td>
</tr>
<tr>
<td></td>
<td>Other CPT codes related to the CPB:</td>
</tr>
</tbody>
</table>

www.aetna.com/cpb/medical/data/800_899/0863.html#dummyLink2
<table>
<thead>
<tr>
<th>Code</th>
<th>Code Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>27814</td>
<td>Open treatment of bimalleolar ankle fracture (eg, lateral and medial malleoli, or lateral and posterior malleoli, or medial and posterior malleoli), includes internal fixation</td>
</tr>
</tbody>
</table>

**Transversus abdominis plane (TAP) block:**

CPT codes covered if selection criteria are met:

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>64486 - 64489</td>
<td>Transversus abdominis plane (TAP) block</td>
</tr>
</tbody>
</table>

Other CPT codes related to the CPB:

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>22900 - 22905</td>
<td>Abdominal surgery</td>
</tr>
</tbody>
</table>

**Ultrasound (US)-guided celiac plexus block:**

CPT codes covered if selection criteria are met:

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>64463</td>
<td>Paravertebral block (PVB) (paraspinous block), thoracic; continuous infusion by catheter (includes imaging guidance)</td>
</tr>
</tbody>
</table>

ICD-10 codes covered if selection criteria are met (not all-inclusive):

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C25.0 - C25.9</td>
<td>Malignant neoplasm of pancreas [for inoperable pancreatic cancer and abdominal pain]</td>
</tr>
<tr>
<td>K86.1</td>
<td>Other chronic pancreatitis [for requiring opioid analgesics, and as a &quot;last resort&quot; for pain from chronic pancreatitis that are refractory to high doses of opiates]</td>
</tr>
</tbody>
</table>

**US-guided supraclavicular block:**

CPT codes covered if selection criteria are met:

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>64415 - 64416</td>
<td>Injection, anesthetic agent; brachial plexus</td>
</tr>
<tr>
<td>76492</td>
<td>Ultrasonic guidance for needle placement (eg, biopsy, aspiration, injection, localization device), imaging supervision and interpretation</td>
</tr>
</tbody>
</table>

**Infraclavicular-Suprascapular Nerve Blocks:**

CPT codes not covered for indications listed in the CPB:

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>64415</td>
<td>Injection, anesthetic agent; brachial plexus, single</td>
</tr>
<tr>
<td>64418</td>
<td>Suprascapular nerve block</td>
</tr>
</tbody>
</table>

ICD-10 codes not covered for indications listed in the CPB (not all inclusive):

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>M25.511 - M25.519</td>
<td>Pain in shoulder</td>
</tr>
<tr>
<td>M79.601 - M79.603</td>
<td>Pain in arm, upper arm, forearm, hand and fingers</td>
</tr>
<tr>
<td>M79.621 - M79.646</td>
<td>Pain in arm, upper arm, forearm, hand and fingers</td>
</tr>
</tbody>
</table>

**Greater occipital nerve blocks:**

CPT codes not covered for indications listed in the CPB:

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>64405</td>
<td>Injection, anesthetic agent; greater occipital nerve</td>
</tr>
<tr>
<td>Code</td>
<td>Code Description</td>
</tr>
<tr>
<td>----------------------</td>
<td>----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>M47.21 - M47.24,</td>
<td>Cervical and thoracic spondylosis with or without myelopathy</td>
</tr>
<tr>
<td>M47.811 - M47.814</td>
<td></td>
</tr>
<tr>
<td>M50.00 - M50.03,</td>
<td>Intervertebral disc disorder with myelopathy, cervical and thoracic region</td>
</tr>
<tr>
<td>M51.04 - M51.05</td>
<td></td>
</tr>
<tr>
<td>M50.20 - M50.23,</td>
<td>Other intervertebral disc displacement, cervical or thoracic region</td>
</tr>
<tr>
<td>M51.24</td>
<td></td>
</tr>
<tr>
<td>M50.30 - M50.33,</td>
<td>Other cervical, thoracic and thoracolumbar intervertebral disc degeneration</td>
</tr>
<tr>
<td>M51.34 - M51.35</td>
<td></td>
</tr>
<tr>
<td>M51.44 - M51.45</td>
<td>Schmorl's nodes, thoracic region</td>
</tr>
<tr>
<td>M51.84</td>
<td>Other intervertebral disc disorders, thoracic region</td>
</tr>
<tr>
<td>M54.2</td>
<td>Cervicalgia</td>
</tr>
<tr>
<td>M54.81</td>
<td>Occipital neuralgia</td>
</tr>
<tr>
<td>M54.9</td>
<td>Dorsalgia, unspecified</td>
</tr>
<tr>
<td>M96.1</td>
<td>Postlaminectomy syndrome, not elsewhere classified [thoracic region]</td>
</tr>
</tbody>
</table>

**Nerve hydrodissection:**
CPT codes not covered for indications listed in the CPB:

**Nerve hydrodissection - no specific code:**

**Paravertebral blocks:**
CPT codes not covered for indications listed in the CPB:

<table>
<thead>
<tr>
<th>64461 - 64463</th>
<th>Paravertebral block (PVB) (paraspinous block), thoracic</th>
</tr>
</thead>
</table>

ICD-10 codes not covered for indications listed in the CPB (not all inclusive):

| G89.21 - G89.29       | Chronic pain                                                                     |

**Pedicle screw block/hardware block of spinal instrumentation:**
CPT codes not covered for indications listed in the CPB:

**Intelicath - no specific code:**

ICD-10 codes not covered for indications listed in the CPB (not all inclusive):

| R10.2                 | Pelvic and perineal pain                                                          |

**Supraorbital nerve block:**
CPT codes not covered for indications listed in the CPB:

<table>
<thead>
<tr>
<th>64400</th>
<th>Injection, anesthetic agent; trigeminal nerve, any division or branch [supraorbital nerve block]</th>
</tr>
</thead>
</table>

ICD-10 codes not covered for indications listed in the CPB (not all inclusive):

| B02.23                | Postherpetic polyneuropathy                                                       |

**Saphenous nerve block:**
CPT codes not covered for indications listed in the CPB:
<table>
<thead>
<tr>
<th>Code</th>
<th>Code Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>64450</td>
<td>Injection, anesthetic agent; other peripheral nerve or branch</td>
</tr>
<tr>
<td>M79.2</td>
<td>Neuralgia and neuritis, unspecified [saphenous neuralgia]</td>
</tr>
<tr>
<td></td>
<td><strong>Spinal accessory nerve block:</strong></td>
</tr>
<tr>
<td></td>
<td>CPT codes not covered for indications listed in the CPB:</td>
</tr>
<tr>
<td></td>
<td><strong>Spinal accessory nerve block</strong> - no specific code:</td>
</tr>
<tr>
<td></td>
<td>ICD-10 codes not covered for indications listed in the CPB (not all inclusive):</td>
</tr>
<tr>
<td>M54.2</td>
<td>Cervicalgia [neck pain]</td>
</tr>
<tr>
<td>M54.6</td>
<td>Pain in thoracic spine [upper back pain]</td>
</tr>
<tr>
<td></td>
<td><strong>Stellate ganglion block:</strong></td>
</tr>
<tr>
<td></td>
<td>CPT codes not covered for indications listed in the CPB:</td>
</tr>
<tr>
<td>64510</td>
<td>Injection, anesthetic agent; stellate ganglion (cervical sympathetic)</td>
</tr>
<tr>
<td></td>
<td>ICD-10 codes not covered for indications listed in the CPB (not all inclusive):</td>
</tr>
<tr>
<td>K51.00 - K51.919</td>
<td>Ulcerative colitis</td>
</tr>
<tr>
<td></td>
<td><strong>Suboccipital nerve block:</strong></td>
</tr>
<tr>
<td></td>
<td>CPT codes not covered for indications listed in the CPB:</td>
</tr>
<tr>
<td></td>
<td><strong>Suboccipital nerve block</strong> - no specific code:</td>
</tr>
<tr>
<td></td>
<td>ICD-10 codes not covered for indications listed in the CPB (not all inclusive):</td>
</tr>
<tr>
<td>M54.81</td>
<td>Occipital neuralgia [suboccipital]</td>
</tr>
<tr>
<td></td>
<td><strong>Superior hypogastric nerve block:</strong></td>
</tr>
<tr>
<td></td>
<td>CPT codes not covered for indications listed in the CPB:</td>
</tr>
<tr>
<td>64517</td>
<td>Injection, anesthetic agent; superior hypogastric plexus</td>
</tr>
<tr>
<td></td>
<td>ICD-10 codes not covered for indications listed in the CPB (not all inclusive):</td>
</tr>
<tr>
<td>R10.2</td>
<td>Pelvic and perineal pain [neurogenic]</td>
</tr>
<tr>
<td></td>
<td><strong>Suprascapular nerve block:</strong></td>
</tr>
<tr>
<td></td>
<td>CPT codes not covered for indications listed in the CPB:</td>
</tr>
<tr>
<td>64418</td>
<td>Injection, anesthetic agent; suprascapular nerve for cervical spondylosis</td>
</tr>
<tr>
<td></td>
<td>ICD-10 codes not covered for indications listed in the CPB (not all inclusive):</td>
</tr>
<tr>
<td>M47.812</td>
<td>Spondylosis without myelopathy or radiculopathy, cervical region</td>
</tr>
<tr>
<td></td>
<td><strong>TAP BLOCK:</strong></td>
</tr>
<tr>
<td></td>
<td>CPT codes not covered for indications listed in the CPB:</td>
</tr>
<tr>
<td>64493 - 64495</td>
<td>Injection(s), diagnostic or therapeutic agent</td>
</tr>
<tr>
<td></td>
<td>Other CPT codes related to the CPB:</td>
</tr>
<tr>
<td>22612</td>
<td>Arthrodesis, posterior or posterolateral technique, single level; lumbar (with lateral transverse technique, when performed) [not covered for TAP block for post-operative analgesia following lumbar fusion]</td>
</tr>
</tbody>
</table>
### Code Description

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>G89.11 - G89.28</td>
<td>Acute pain [post-operative analgesia]</td>
</tr>
</tbody>
</table>

**Ultrasound-guided erector spinae plane (ESP) block:**

CPT codes not covered for indications listed in the CPB:

Ultrasound-guided erector spinae plane (ESP) block - no specific code

Other CPT codes related to the CPB:

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>76998</td>
<td>Ultrasonic guidance, intraoperative</td>
</tr>
</tbody>
</table>

ICD-10 codes not covered for indications listed in the CPB (not all inclusive):

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>G89.18</td>
<td>Other acute postprocedural pain</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>M79.1</td>
<td>Myalgia [chronic myofascial pain syndrome]</td>
</tr>
</tbody>
</table>

---

The above policy is based on the following references:


8. Jeng CL, Rosenblatt MA. Overview of peripheral nerve blocks. UpToDate [serial online]. Waltham, MA: UpToDate; reviewed November 2012.


13. Rutkove SB. Overview of lower extremity peripheral nerve syndromes. UpToDate [serial online]. Waltham, MA: UpToDate; reviewed November 2012.


29. Lee M-J, Guinn D, Hickenbottom S. Headache in pregnant and postpartum women. UpToDate [online serial]. Waltham, MA: UpToDate; reviewed August 2017

30. Jeng CL, Rosenblatt MA. Overview of peripheral nerve blocks. UpToDate [online serial]. Waltham, MA: UpToDate; reviewed June 2017


100. Levy MJ, Wiersema MJ. Endoscopic ultrasound-guided celiac plexus and ganglia interventions. UpToDate [online serial]. Waltham, MA: UpToDate; reviewed July 2019.


102. Ortega E. Postherpetic neuralgia. UpToDate [online serial]. Waltham, MA: UpToDate; reviewed July 2019.

AETNA BETTER HEALTH® OF PENNSYLVANIA

Amendment to
Aetna Clinical Policy Bulletin Number: 0863 Nerve Blocks

For the Pennsylvania Medical Assistance plan:

1.) Occipital nerve block for short lasting unilateral neuralgiform headache attacks may be considered on a case by case basis.
2.) Suprascapular nerve blocks in the treatment of chronic upper extremity pain will be reviewed for medical necessity.