



Editorial comment

Nerve block—A reliable diagnostic tool?

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Local anaesthetics have potent inhibitory effects on nerve transmission in nociceptive nerve fibres, and are widely used to relieve acute pain. Sometimes, the pain relieving effect outlasts the duration of the local anaesthetic blockade [1], and repeated nerve blocks have been applied in an attempt to stop vicious cycles following chronic pain. Apart from that, reversible nerve blocks are mainly applied as a diagnostic tool to localise peripheral pain generators. In this issue of Scandinavian Journal of Pain, Curatolo and Bogduk present a highly relevant and learned review of diagnostic blocks [2].

Curatolo and Bogduk [2] differentiate between *test blocks*, *diagnostic* and *prognostic* blocks: (1) A *test block* does not distinguish one source of pain from another; but serves to test if the blocked nerve is responsible for mediating the pain related signals. (2) A *diagnostic block* is used to identify the anatomical structure that is suspected to be the source of pain. (3) A *prognostic block* tests whether a treatment will be successful or not. If the prognostic block is positive, a treatment of the primary lesion or a nerve ablation will most likely relieve the pain for a prolonged period.

Peripheral nerve blocks vs neuraxial blocks and specific sympathetic blocks: Several peripheral nerves have been targeted such as the occipital, trigeminal, intercostal, ileoinguinal, genitofemoral, and obturator nerves. These nerves are located superficially and are easy to access. Epidural and subarachnoid injections of local anaesthetics may have effects on both peripheral and central pain conditions, and they are not suitable for diagnosing more localised pain. Even peripheral nerve blocks may influence central pain conditions. Sympathetic inhibitors (guanethidine and phentolamine) and local anaesthetics injected close to sympathetic ganglia have been used to test for sympathetically maintained pain.

Chronic pain arising from spinal tissues and structures; importance of “comparative blocks”: Several spinal pain conditions are common and often difficult to differentiate from each other. The clinical features overlap and the pain generators may vary in the same patient. Image guided block procedures, targeting the facet joints, or their nerve supply, spinal nerves, and intervertebral discs have been described. To diagnose cervical zygapophysial joint pain comparative medial branch blocks are preferred [3]. The evidence level is high (Evidence level I–II according to the modified U.S. Preventive

Services Task Force System) [4]. The rates of false positive results are significantly reduced when cervical medial branch blocks are repeated using a local anaesthetic with another duration of action; this is a “comparative control block” [2,4]. Repeated blocks will on the other hand raise the number of false negative results [5]. At the lumbar level facet joint pain is less frequent; false positive results are therefore more of a problem even with comparative blocks [6], and placebo controls are recommended.

A gold standard needed: Unfortunately, there is no comparative “gold standard” for medial branch blocks. Radiological imaging, magnetic resonance, CT, SPECT and radionuclide bone scanning [6–10] have not found any convincing associations between facet joint osteoarthritis and low back pain so we have to employ comparative blocks and rely on the patient’s ability to differentiate between clinically significant and insignificant pain relief.

Validity of diagnostic nerve blocks: An important take home message is that prevalence, false positive rates, sensitivity and specificity are mandatory information for assessing the validity of any nerve block. Most research has been focused on spinal pain and spinal interventions. For most other pain conditions, the prevalence is not established. More research is therefore needed before we can assess the validity of other prognostic nerve blocks. *Criteria for a successful diagnostic block:* To be able to decide, from a diagnostic block, whether an anatomical structure is the cause of pain, four criteria have to be fulfilled [11]:

1. The structure must have an exact peripheral location with a nerve supply.
2. It should be capable of causing pain similar to that seen clinically in normal volunteers.
3. It must be susceptible to painful disease or injuries.
4. The diagnostic technique that abolishes the pain, should block the sensory function of only the intended nerve, so the pain relief should be attributable only to the block of that nerve.

How specific is a medial branch nerve block?: The medial branches of the ramus dorsalis of a spinal nerve contain sensory and motor fibres and innervate several potentially painful structures. A medial branch block will consequently stop signals both from the zygapophysial joint, signals to and from the medial posterior muscles (multifidus, interspinales), and from the ligaments between the spinal processes. It may consequently relieve pain from any of these structures. Curatolo and Bogduk point out that there is

no well established cause of chronic neck pain from the posterior neck muscles, but the mechanisms for chronic neck and low back pain are obscure. According to the authors no studies have identified the pathology responsible for zygapophysial joint pain [2], and changes seen on computed tomography do not correlate with the joint being painful [8,9]. Indahl and co-workers have demonstrated a close interplay between zygapophysial joints, intervertebral discs, and the deep multifidus lumbar muscles [12]. In experimental animal studies stimulation of the annulus fibrosus induced reactions in the multifidus muscle at multiple levels and on the contralateral side, whereas stimulation of the facet joint capsule caused reactions mainly on the same side and at the same segmental level as the stimulation [12]. Injection of lidocaine into the facet joint was associated with a reduced electromyographic response to stimulation. The most drastic reduction was seen when they stimulated the facet joint capsule. After injections of physiologic saline into lumbar zygapophysial joints, Indahl and coworkers also demonstrated a rapid reduction of the stimulation from intervertebral disc to the paraspinal lumbar multifidus muscles [13].

Thus, both the zygapophysial joint and the intervertebral disc seem to play important roles in the control of deep spinal muscles [12,14]. The zygapophysial joints may have a regulating function, controlling the neuromuscular balance in the lumbar motion segment. Blocking the medial branches or injecting local anaesthetics into the nucleus pulposus will not only reduce the nociceptive input from the joint or the disc, but may also change the tonus in deep paraspinal muscles.

Therefore, a medial branch block or intradiscal infiltration cannot be considered selective diagnostic blocks. Until we know more about the exact mechanisms, I would recommend the expression “zygapophysial joint related pain” rather than “zygapophysial joint pain”, and “disc related low back pain” rather than “discogen low back pain”.

The complexity is probably even more pronounced in the ileosacral joint which has a multisegmental innervation [15].

Context sensitive therapeutic effects of nerve blocks? Although we may not define the cause or mechanism of the pain with certainty, we and the patient can still enjoy the fact that a nerve block provides meaningful pain relief and may predict an effect of a specific interventional treatment. The nerve blocks can furthermore be used therapeutically in a cognitive treatment setting to provide the patient with an understanding of potential pain mechanisms. If a medial branch block provides substantial pain relief, this should indicate no harmful pathology, and we can encourage the patients to more active mobilisation. If the block does not provide pain relief, this gives the clinician an opportunity to discuss other non-interventional cognitive behavioural approaches.

Spinal nerve and (nerve) root blocks: Spinal nerve blocks have been used to diagnose radicular pain. The technique was used to predict the success of surgery, but the evidence is not very strong, and serious complications have occurred [16–18].

Complications to nerve blocks: It should always be born in mind that any nerve block may worsen pain and lead to complications. It is important that such dilemmas are discussed with the patients in advance. Transforaminal nerve blocks [19–22] and atlanto-axial joint infiltration [23] have caused spinal cord injury and even death, and intradiscal injections can cause long lasting discitis [24].

To be able to perform precise nerve blocks in a safe manner, pain physicians need training with different guiding techniques, e.g., nerve stimulation, X-ray, CT and ultrasound [25–27]. This can reduce the risk of permanent tissue and nerve injury.

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