
Epidural steroids as a pharmacological approach

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ABSTRACT

Cervicogenic headache is a relatively common pain syndrome related to functional and/or degenerative alterations of the cervical spine tract. Administration of steroid represents an effective therapy for this headache, due to the anti-inflammatory effects combined with its direct analgesic effects on the C fibers. The epidural injection of steroids, while requesting skilled personnel for its execution, gives short term (2-month) pain relief with few risks or side effects. Moreover, epidural steroids allow reduction of analgesic drug consumption.

Introduction

The Cervicogenic Headache International Study Group elaborated diagnostic criteria in 1998 (1) (Table I). The differential diagnosis includes: whiplash-induced or post-traumatic headache, migraine without aura, migraine wors-

ened by analgesic abuse, and tension-type headache (2).

The cervical spine and associated muscular support compose a complex structure with many sites for the generation of pain. The compression of nerves may result in pain: the sites of the compression are the intervertebral foramina, the spinal canal, the interscalene space and the course of the occipital nerves through the trapezius muscle. Impairment of free movements of the ligaments, discs and joints may lead to irritation of sensitive structures of the joints and soft tissue, to reflex muscle spasm, irritation and contraction of periosteal muscle insertion points, and to ischemia (3). Degenerative processes associated with osteophytes may lead to restriction of the spinal canal which causes pressure on the long ascending and descending tracts, as well as the cervical nerve roots. Irritation of the cervical nerve roots at any point from their origin in the spinal cord to their paths to the occipital muscles can result in pain referred to the head and neck or upper extremity (4). The continuous irritation of the most commonly involved nerve roots (C2, C3, and C4) produce inflammation and secondary swelling. All of these phenomenon can perpetuate pain.

Techniques that have been found to be useful in the diagnosis and treatment of cervicogenic headache include (5-9): trigger point injection; occipital nerve blocks; facet/paravertebral nerve blocks

to assess and treat the inflamed facets which cause pain; and provocative discography (injection of dye into a cervical disc) which reproduces the headache, and immediately afterwards, alleviating discography (injection of local anesthetic which alleviates the headache).

Administration of steroids into the cervical epidural space

The epidural space is a potential space extending from the base of the skull to the sacrum. It contains epidural fat tissue, the venous plexus, arteries and nerve roots. It does not communicate directly with the spinal fluid. Thus, drugs injected into the epidural space may act at the nerve roots and surrounding tissues (discs and facets).

Steroidal antiinflammatory drugs administered into the epidural space reduce inflammation and swelling. Inflammation of the nerve roots leads to early changes including edema, fibrin deposition, capillary dilation, leukocyte migration, and phagocytic activity. Late changes include capillary and fibroblast proliferation, deposition of collagen, adhesions leading to decreased mobility of the nerve root, increased inflammation, pain, muscle spasm, and misalignment of the facet joints leading to a positive feedback loop. Epidural administration of steroids suppresses early and late inflammatory changes. The antiinflammatory class of steroid medications (glucocorticoids) inhibits the action of phos-

Table I. Diagnostic criteria for cervicogenic headache, as proposed by the Cervicogenic Headache International Study Group in 1998 (ref. 1).

I. Signs and symptoms of neck involvement

- (1) Precipitation of usual head pain by neck movements and/or sustained head positioning, and/or by external pressure over the upper cervical or occipital region on the symptomatic side.
- (2) Restriction of the range of movements of motion of the neck.
- (3) Ipsilateral neck, shoulder, or arm pain of a rather vague nonradicular nature or, occasionally, arm pain with a radicular origin.

II. Confirmatory effect of diagnostic anesthetic blocks

III. Unilaterality of head pain, without sideshift

Point 1 alone, or Points 2 and 3 together, are sufficient for positivity in group I.

pholipase A2, which causes the release of arachidonic acid from cell membranes (10, 11). Leukotrienes and prostaglandins, the final products of the metabolism of arachidonic acid, sensitize nerve endings to the action of chemical and mechanical stimuli, thereby enhancing pain generation. Steroids also have an effect on the membrane of C-fibres to block their nociceptive transmission (12). Their association with local anesthetic agents does not increase the percentage of success of analgesia, while the number of injections increases the short-term success rate to 50-70%.

Recent reports suggest that short-term good results are a prognostic factor for the improvement during the ensuing year. Patients with a favorable initial response reported higher "return to work" rates, fewer sleep disturbances, greater pain reduction, and a lower intake of analgesic drugs (13).

Factors which predict a poor outcome two weeks after epidural steroids are: (a) a greater number of previous treatments for pain; (b) more medications taken; (c) pain not necessarily increased by activities; and (d) pain increased by coughing. Factors that predict no benefit one year after treatment include: (a) pain that does not interfere with activities; (b) unemployment due to pain; and (c) pain not decreased by medication (14). Other possible factors influencing treatment response include: duration of symptoms, age, smoking habit, lower level of education, a psychological component of pain, the location of the injection, and work-related injury (15).

Studies of cervical epidural corticosteroid injection have reported the safety and short-term effectiveness of this therapeutic modality for cervical degenerative disease refractory to conservative treatment (16, 17).

Technique (18, 19)

A direct approach with the patient in either a sitting or supine position, the loss of resistance (using saline or local anesthetic), and aspiration with the needle (Tuohy/Crawford) after penetration into the epidural space are recommended. To identify better the level of inflammation and confirm the needle position, fluor-

oscopy may be utilized, although it has not been shown to improve the results of epidural steroid injection therapy.

A variety of techniques can be employed: posterior epidural interlaminar injection, transforaminal epidural injection; radiologic documentation of medication; patients with a difficult anatomy can undergo the procedure; fine needles can be used, thus minimizing the risk.

The gold standard for epidural steroid injection therapy is to provide up to three treatments at one- or two-week intervals. The provision of 4 or more treatments is not associated with any increased benefit to the patient.

Contra-indications to this therapy include the allergy to steroid medication, the concurrent use of anticoagulant medications, or the presence of a bleeding disorder, a septicemia, or a local infection at the site of injection (20).

Direct complications of epidural injection include (20, 21): vasovagal syncope, mild facial flushing, stiff neck, upper extremity weakness, paresthesias, post-lumbar puncture headache, epidural hematoma or abscess, and retinal hemorrhage. Unadvised administration of steroids into the sub-arachnoid space may produce chemical (due to the pharmaceutical composition of these drugs) or bacterial meningitis, CSF fistula and neurological complications. Systemic effects (Cushing's syndrome, suppression of cortisol production for up to 3 months, hyperglycemia, hypertension) are rare and may be avoided by limiting the dose.

Conclusions

The risks of epidural cervical steroid treatment in properly selected patients are low, their benefits are clearly suggested (although not proven), and there is a physiologic rationale for this treatment. Controversy exists due to the fact that its effect is often temporary, and may vary in the individual patient. Therefore epidural steroids should not be used as a single modality for the treatment of cervicogenic headache, but rather integrated into a comprehensive treatment program.

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