INTRODUCTION

Cervicogenic headache differs from other headaches in its diagnosis and treatment.

Diagnostic criteria for cervicogenic headache were introduced by Sjaastad et al. (1). In accordance with these criteria undiagnosed patients are blocked with local anaesthetics and the subsequent diagnosis is based on the relief of pain obtained. Greater occipital nerve (GON) block, cervical nerve (especially C2/C3 nerves) blocks, minor occipital nerve (MON) block and cervical facet joint blocks are used for the diagnosis and treatment of cervicogenic headache (1-6).

In the diagnosis of cervicogenic headache, greater occipital nerve (GON), cervical nerve, minor occipital nerve, and cervical facet joint blocks are used. In our study we compared the GON and C2/C3 nerve blocks in the diagnosis and treatment of cervicogenic headache. In both cases, repeated blocks proved to have a long-lasting effect in the treatment of this disorder, with both GON and C2/C3 blocks being found to be equally effective.

KEY WORDS: Cervicogenic headache, C2 nerve block, C3 nerve block, greater occipital nerve block, regional anaesthesia.

Presented as an oral presentation at the “13th International Cervicogenic Study Group Meeting” in Rome and as a poster at the “7th ESA Annual Meeting”, Amsterdam 1999.
MATERIALS AND METHODS

With the approval of the ethics committee, 28 patients diagnosed with cervicogenic headache on the basis of the cervicogenic headache diagnostic criteria (5) were enrolled in the study. Physical and neurological examinations of all the patients were performed, as were X-rays of the cervical spine. Prior to the diagnostic block, patients were monitored for a month to establish pain frequency and degree. The degree of pain was measured by visual analogue scale (VAS) and patients were informed about the VAS procedure. Two groups (GON and C_2/C_3) were randomly formed. Both the diagnostic and the therapeutic blocks were performed unilaterally.

**GON blockade group**

The diagnostic block of the GON was performed 2 cm laterally and 2 cm below the protuberantia occipitalis externa by using 2 ml 1% lidocaine in a painful period (10). Patients were observed for 30 minutes to monitor possible side effects of the block and degree of pain. The block was considered successful in the presence of sensory deficit in the innervation area of the nerve and a VAS score decrease of >50%. After the diagnostic block the patients were monitored for a week to establish frequency and degree of pain. Then, the therapeutic block was performed using 2 ml 0.25% bupivacaine. The patients were observed for 45 minutes, again to monitor possible side effects. They were then followed up to monitor the frequency and degree of pain for a week. Then, the C_2/C_3 nerve block with 2 ml 0.25% bupivacaine was repeated and patients were followed up for a period of two months to monitor pain frequency and degree.

The first and the second groups were compared to each other. The results were evaluated statistically according to the Mann Whitney U and Wilcoxon matched pairs signed rank tests.

**RESULTS**

In both groups a considerable decrease in the frequency and degree of pain was seen in the first week after the diagnostic block, in the first week after the first therapeutic block, and in the first and second months following the second therapeutic block. Comparison of the two groups revealed no significant statistical differences, except for pain frequency in the first week following the first therapeutic block, which was significantly reduced in the C_2/C_3 group compared with the GON group (p<0.005).

The results are shown in Tables I and II.
C\textsubscript{2}/C\textsubscript{3} nerve and GON blocks in cervicogenic headache treatment

Table I - Frequency of pain (mean ± SD)

<table>
<thead>
<tr>
<th></th>
<th>GON (no. = 14)</th>
<th>C\textsubscript{2}/C\textsubscript{3} (no. = 14)</th>
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<tbody>
<tr>
<td>Before the diagnostic block</td>
<td>27.1 ± 5.8</td>
<td>27.1 ± 7.3</td>
</tr>
<tr>
<td>1\textsuperscript{st} week after the diagnostic block</td>
<td>3.2 ± 2.3*</td>
<td>3.8 ± 2.4*</td>
</tr>
<tr>
<td>1\textsuperscript{st} week after the 1\textsuperscript{st} therapeutic block</td>
<td>2.4 ± 1.9*</td>
<td>1.3 ± 1.3*,**</td>
</tr>
<tr>
<td>1\textsuperscript{st} month after the 2\textsuperscript{nd} therapeutic block</td>
<td>3.6 ± 3.0*</td>
<td>2.1 ± 1.7*</td>
</tr>
<tr>
<td>2\textsuperscript{nd} month after the 2\textsuperscript{nd} therapeutic block</td>
<td>2.3 ± 2.1*</td>
<td>1.6 ± 1.6*</td>
</tr>
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</table>

* p < 0.005; ** p < 0.05 (compared to GON group).

Table II - Degree of pain (mean ± SD) (VAS = 0-10)

<table>
<thead>
<tr>
<th></th>
<th>GON (no. = 14)</th>
<th>C\textsubscript{2}/C\textsubscript{3} (no. = 14)</th>
</tr>
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<tbody>
<tr>
<td>Before diagnostic block</td>
<td>5.8 ± 2.0</td>
<td>6.8 ± 1.9</td>
</tr>
<tr>
<td>1\textsuperscript{st} week after the diagnostic block</td>
<td>4.0 ± 1.7*</td>
<td>3.8 ± 2.7*</td>
</tr>
<tr>
<td>1\textsuperscript{st} week after the 1\textsuperscript{st} therapeutic block</td>
<td>3.4 ± 1.8**</td>
<td>2.7 ± 2.7***</td>
</tr>
<tr>
<td>1\textsuperscript{st} month after the 2\textsuperscript{nd} therapeutic block</td>
<td>3.3 ± 2.4*</td>
<td>2.1 ± 1.4***</td>
</tr>
<tr>
<td>2\textsuperscript{nd} month after the 2\textsuperscript{nd} therapeutic block</td>
<td>2.7 ± 2.2*</td>
<td>1.8 ± 1.8***</td>
</tr>
</tbody>
</table>

* p < 0.05; ** p < 0.01; *** p < 0.005.

Fig. 1 - GON blockade technique.

Fig. 2 - C\textsubscript{2}/C\textsubscript{3} blockade technique.
DISCUSSION

Cervicogenic headache is a syndrome. There are very many causes of the pain, which may originate at various levels including the lower part of the neck. The clinical picture and diagnostic criteria for cervicogenic headache were defined by Sjaastad et al. These criteria were accepted by the International Association for the Study of Pain (IASP) (1,4,5,12-16,17).

Bovin et al. (16) researched the efficacy of GON, C_2, C_3, C_4, C_5 nerve and C_2/C_3 facet joint blocks in the diagnosis of cervicogenic headache. In this study, GON blockade was completely effective in 4 of the 5 responders to C_2 nerve blockade; and 6 of the 9 cervicogenic headache patients had partial pain relief following C_3 nerve block. No patients responded completely to isolated blockade of the C_3, C_4, or C_5 nerves. The C_2/C_3 facet joint injection gave relief from pain in only 2 out of 9 patients. They argued that the GON is composed of the medial fibres from the dorsal ramus of the C_2 nerve and that a blockade of the C_2 nerve should relieve the pain in all patients who experience relief following a GON blockade. The C_2 blockade should also be effective whether the pain is mediated through the lesser occipital nerve (ventral ramus of C_2) or originates from deeper structures innervated by C_2 fibres (periosteum of the occiput, vertebrae, etc.) or from the C_2 nerve itself (16). Their results (with complete effect of GON blockade in 4 of the 5 patients showing the same response to C_2 blockade) suggest that the simpler GON blockade may be sufficient in many patients with cervicogenic headache.

According to Bovim et al. (16), no patients responded completely to isolated blockades of the C_3, C_4 and C_5 nerves. Combined C_2 and C_3 blocks provided effective pain relief and C_2/C_3 facet joint block was partially effective in providing pain relief (16).

Bogduk performed a C_2 ganglion block using 1% lidocaine and the patient’s pain was completely relieved for 3 hours. After this procedure, follow-up of the patient for four months showed that the patient experienced pain (treated with dextropropoxiphene) once a week, lasting three hours (18).

The results of other studies (1,7) revealed that in the occasional patient there was a protracted effect lasting not only for days, but also for weeks and this situation can be utilised therapeutically by giving local anaesthetic injections at set, e.g. weekly, intervals.

Pfaffenrath performed C_2 nerve block 5 times at weekly intervals and the results were successful. In this study 17 months’ pain relief was observed (14).

The results may be even more favourable by combining the local anaesthetics with corticosteroids (1,7).

Anthony (7) has speculated that repeated “combined injections” may give results comparable to some degree of demyelination.

In our study the C_2/C_3 blockade group did not fare better than the GON blockade group. Both blocks were effective in the diagnosis and the treatment of cervicogenic headache. We also found that repeated GON or C_2/C_3 nerve blocks using 2 ml 0.25% bupivacaine are effective in cervicogenic headache treatment.

REFERENCES

8. Özyalçýn S. Epidural steroid injection in cervicogenic headache. International Monitor of Regional Anaesthesia 1996;16 (abstract)