Fluoroscopy-guided Lumbar Sympathetic Block with Bupivacaine and Depot Methyl Prednisolone for Pain Relief in Buerger’s Disease—Our Experience

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ABSTRACT

Background: Buerger’s disease (BD) is a common peripheral vascular disease resulting in severe rest pain, leg ulcer, and claudication pain leading to decreased quality of life and disability. Lumbar chemical sympathectomy is now being used to relieve pain in BD.

Purpose of this study was to assess the effectiveness of lumbar sympathetic block (LSB) in relieving rest pain, ulcer healing, decreased swelling and improvement in claudication distance (CD) for a considerable period.

Materials and methods: This was a prospective observational study on thirty-two consecutive patients, who attended our pain clinic. Each patient received LSB bilaterally under fluoroscopy at L3 level with bupivacaine (0.25%) 10 ml and depot methylprednisolone (20 mg) on each side. As per our departmental protocol, the procedure was repeated for three times at an interval of 6 weeks. We compared the pain by visual analog scale (VAS), CD, healing of leg ulcer, pedal swelling following each injection.

Results: Visual analog scale and claudication distance were improved significantly after second and third compared to first intervention (p < 0.05) but no significant differences observed between second and third intervention. Healing of leg ulcers and decreased pedal swelling were observed after each block.

Conclusion: Multiple doses of fluoroscopy guided LSB with bupivacaine and depot methyl prednisolone is safe and effective in relieving rest pain, improving CD, promoting ulcer healing in patients of BD when conservative therapies are ineffective but how many doses will be optimal is still a matter of debate.

Keywords: Buerger’s disease, Bupivacaine, Depot methyl prednisolone, Fluoroscopy, Lumbar sympathetic block,

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Purpose of this study was to assess the effectiveness of lumbar sympathetic block in relieving rest pain, ulcer healing, decrease swelling and improvement in claudication distance (CD) for a considerable period.

MATERIALS AND METHODS

After approval from the institutional ethics committee and obtaining informed written consent from the patients, we have recruited 32 male patients with BD attending our pain clinic. Patients with ASA physical status 1 and 2, aged between 25 and 50 years, with history of smoking, rest pain, claudication pain, leg ulcer or foot ulcer not responding to oral medications were included in our study. All of them had absence of dorsalis pedis artery pulsation and partial thrombosis of major vessels like popliteal, anterior and posterior tibial artery of the affected limb revealed in color Doppler study.

We have excluded the patients who had grossly infected ulcer or gangrene or peripheral vascular disease related to other cause, uncontrolled diabetes mellitus, coagulopathy, seizure disorder, difficulty in prone positioning and known allergic to used drugs. After proper history taking and performing investigations like complete hemogram, blood sugar, creatinine, coagulation profiles, electrocardiogram, color Doppler study, patients are taken for fluoroscopy guided interventions.

All patients followed proper fasting guidelines. In the theater a peripheral venous access was secured, baseline monitors were attached like pulse oximetry, noninvasive blood pressure and ECG. A total of 500 ml of crystalloid were infused during the procedure. Patients were positioned prone and a pillow was placed under the abdomen to reduce the lumbar lordosis as much as possible. Patients were drapped aseptically and local anesthesia infiltration done with 1% 2 ml lignocaine after localization of the point of entry by fluoroscopy. A 22 G 15 cm long spinal needle was introduced under c-arm guidance along the lateral border of the L3 vertebral body to reach the anterolateral aspect of the L3. Depth of needle insertion was managed by lateral view. Proper positioning of needle tip was confirmed by using radiopaque contrast material iohexol (Omnipaque 300). Diagnostic block was done using 1% lignocaine (10 ml). Successful diagnostic block was assessed by reducing rest pain and increased skin temperature more than 2°C within 30 minutes. Therapeutic block was given using bupivacaine (0.25%) 10 ml and depot methylprednisolone (20 mg) on each side under fluoroscopy guidance. This procedure was repeated on the other side. After the procedure patients were monitored for 4 hours and discharged accordingly (Figs 1 and 2).

After first block, another two blocks were repeated on every 6 weeks interval. After each block VAS, claudication distance and ulcer diameter were assessed after 6 weeks before doing next intervention by a blind observer. Each patient received analgesics, antibiotics and anti-platelet drugs as before the intervention. Anti-platelet drugs were discontinued for appropriate duration on each occasion before the intervention.

STATISTICAL ANALYSIS

The sample size was calculated based on significant pain relief. Considering a probability of 0.05 to be significant with a power of 80%, 32 patients were studied.

STATISTICAL METHODS

The Chi-square test, Fisher’s exact test, t-test, and paired t-test were used for statistical analysis.

Chi-square test was used to test the differences in proportions. Fisher’s exact test was used wherever applicable; a paired t-test was used to compare the
pre- and post-treatment results of average pain scores at baseline vs 6, 12 and 18 weeks respectively for comparison of mean scores between groups, t-test was performed.

RESULTS

In our study, 32 patients were enrolled and their demographic characteristics are listed in Table 1. Mean age of the patients was 38.94 ± 6.83 (27–51) years. Before intervention, mean visual analog scale (VAS) was 9.37 ± 0.66, mean CD was 24.53 ± 11.80 m and mean ulcer diameter was 3.34 ± 0.82 cm. Among the 32 patients 93.8% patients were smoker. There were involvement of great toe in all cases with involvement of other toes and foot in some patients.

Effect of each successive block (Graph 1) on pain score was compared with baseline score (VAS 0). After giving the first block, VAS score was improved significantly to 6.56 ± 0.71 (p < 0.05). It has been observed that with each successive block VAS was improved significantly to 2.63 ± 0.87 and 1.25 ± 0.88 after the 2nd and 3rd intervention respectively.

Effect of LSB also observed on claudication distance (CD) (Graph 2). Pre-intervention distance (CD 0) compared with successive block (CD1, CD2, CD3) and the difference between them is statistically significant (p < 0.05). Mean CD was 69.53 ± 36.64 m, 363.44 ± 168.38 m, 524.22 ± 195.04 m 1st, 2nd and 3rd intervention respectively.

Ulcer diameter (UD) (Graph 3) showed a significant decrease after each block. Pre-block measurement of mean ulcer diameter 3.34 ± 0.82 cm improved significantly to 2.68 ± 0.82 cm (UD1), 1.04 ± 0.573 cm (UD2), 0.48 ± 0.34 cm (UD3) respectively in the consecutive three interventions done at 6 weeks intervals.

DISCUSSION

Thromboangiitis obliterans the Winiwarter-Buerger disease, is a vaso-occlusive disease of unknown etiology which typically affects medium-sized vessels of the extremity of young male smokers.8

Lumbar chemical sympathetic block can benefit patients with critical limb ischemia but proper selection of cases are very important as stated by Nesagikar et al.9 Good response is expected if there is no evidence of a somatic neuropathy with extensive tissue damage. Deep infection or gangrene is a bad prognostic sign and predicts failure of block.9 In our study we have excluded the patients who had gangrene and severe infections.

Sympathetic nervous system is implicated in neuropathic, vascular and visceral pain.10,11 Results of surgical sympathectomy is highly variable and unpredictable.9,12

Table 1: Baseline characteristics

<table>
<thead>
<tr>
<th>Age (year)</th>
<th>Weight (kg)</th>
<th>VAS 0</th>
<th>CD 0 (m)</th>
<th>UD 0 (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>38.94</td>
<td>52.50</td>
<td>9.38</td>
<td>24.53</td>
</tr>
<tr>
<td>SD</td>
<td>6.839</td>
<td>6.522</td>
<td>0.660</td>
<td>11.802</td>
</tr>
</tbody>
</table>

Graph 1: Visual analog scale

Graph 2: Claudication distance

Graph 3: Ulcer diameter
Chemical lumbar sympathectomy is an easy alternative than surgical lumbar sympathectomy in providing desired outcome in patients with peripheral vascular disease of the lower limbs. Its nature of being minimally invasive is the obvious reason for being preferred to open surgery.\textsuperscript{12,13} Results of chemical neurolysis were satisfactory as stated by Singh R and Shukla A.\textsuperscript{14}

Phenols and alcohols have been used for chemical neurolysis in lumbar sympathetic block for many years. But there are few limitations for using them for permanent neurolysis.\textsuperscript{14} Phenol destroys both the motor and sensory nerve fibers at a concentration more than 6%. On the other hand therapeutic blocks of phenol are not permanent due to neural regeneration. At higher concentration it may cause neuritis as similar to alcohol.\textsuperscript{15} Most frequent complications of neurolytic LSB are genitofemoral neuralgia (5–7%), unexplained cardiac arrest, periureteric fibrosis, impotency and spinal paralysis.\textsuperscript{16} We have used long acting steroid in our case to avoid the side effects of phenol.

Although there are inconsistent reports regarding the effectiveness of chemical lumbar sympathectomy with long acting steroids, they are commonly used modalities in treating ischemic pain and ulcers with less side effects.\textsuperscript{16}

Our study has shown that chemical lumbar sympathectomy with local anesthetic and long acting steroid under fluoroscopic guidance is effective in reducing pain associated with ischemic ulcers significantly.

Lumbar sympathectomy acts as a vasodilator by decreasing sympathetic tone, so improving tissue oxygenation. This principle underlies its use in ulcer healing. It also decreases pain by interrupting sympathetic–nociceptive coupling and by a direct neurolytic action on nociceptive fibers. Although surgical sympathectomy is still being carried out, lumbar chemical sympathectomy has largely replaced it.\textsuperscript{9,17}

Chemical lumbar sympathectomy was effective in contributing to healing of ulcers (observed as healing or decrease in the size of the wound or clear demarcation of dead and healthy tissue) in more than 70% of cases.\textsuperscript{17,18} Our findings were comparable to the findings of many other studies.

Steroid were utilized in neural blockade since 1950s.\textsuperscript{19}

The effects of steroid are,\textsuperscript{19,20} decreased central sensitization of dorsal horn nociceptive neurones (wind down theory), inhibit synthesis of proinflammatory substance and neuronal peptides and suppress ongoing neuronal discharge.

Our study results were supported by Bhattarai et al, in decreasing rest pain and healing of ulcer of ischemic lower limbs.\textsuperscript{21}

There is no consensus among the interventional pain management specialists with regards to type, dosage, frequency, total number of injections. Depot steroids are safe for nerve block. Dose, frequency and number of injections are still a debate but steroid injections in low dose with local anesthetic at 4 to 6 weeks interval provides better result than single dose,\textsuperscript{22} so we gave three injections at 6 weeks interval.

The limitations of the study were: this was a monocentric observational study with limited scope of ethnical racial evaluation, single arm, single blinded with chance of bias. Sample size was small and long term follow-up was required.

CONCLUSION

Multiple doses of fluoroscopy-guided LSB with bupivacaine and depot methylprednisolone is safe and effective in relieving rest pain, improve CD, promoting ulcer healing in patients with BD when conservative therapies are ineffective.

REFERENCES