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Evaluation of endoscopic dorsal ramus rhizotomy in managing facetogenic chronic low back pain

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ABSTRACT

Objective: To study the effectiveness of surgical dorsal endoscopic rhizotomy for the treatment of facetogenic chronic low back pain.
Methods: From April 2011 to November 2011, 58 patients who were diagnosed with lumbar facetogenic chronic low back pain (CLBP) and thereafter experienced >80% reliefs of pain with two comparative lumbar medial branch blocks were recruited in the study. Of those 58 patients, 45 cases (the operation group) received dorsal endoscopic rhizotomy, and the remaining 13 cases (the conservative group) received conservative treatment. Patients' preoperative and postoperative VAS score, percentage of pain relief and the MacNab score were analyzed and compared. Anatomic variations and any possible complications were recorded.
Results: In the operation group, VAS scores of pain (low back/referred) at any time point postoperatively were significantly lower than that before MBB ($P < 0.05$), which, however, showed no significant difference as compared to the scores after MBB ($P > 0.05$). In the conservative group, VAS scores of pain (low back/referred) at any time point postoperatively with conservative treatment decreased significantly compared with that before MBB ($P < 0.05$) and were significantly higher than that after MBB ($P < 0.05$). Percentage of pain relief in the operation group at any time point postoperatively were significantly higher than that in the conservative group ($P < 0.01$). The MacNab scores of 1 year follow-up in the operation group were higher than that in the conservative group. In addition, four separate newly identified anatomical variations of medial branch anatomy were observed and reported.
Conclusion: Dorsal endoscopic rhizotomy is safe and effective for the facetogenic CLBP, and can achieve better clinical outcome than the conservative treatment.

1. Introduction

The lumbar facet or zygapophysial joints are paired diarthrodial articulations between posterior elements of adjacent vertebrae [1]. It consists of a distinct joint space capable of accommodating between 1 and 1.5 ml of fluid, a synovial membrane, hyaline cartilage surfaces, and a fibrous capsule [2]. The facet joint capsule and the surrounding structures are innervated [3]. Chemical or mechanical stimulation of the facet joints and their nerve supply may elicit back and/or leg pain [4]. Facet joints have been implicated as a source of chronic pain with an overall prevalence of 31% (circa. 21–41%) in a heterogeneous patient population with chronic low back pain (CLBP) [5].

Chronic low back pain of facet joint origin may be managed by intra-articular lumbar facet joint injections [6,7], lumbar facet joint nerve blocks [8,9], and radiofrequency neurotomy [10,11]. However, there have been disparities in the previous reports regarding the varying outcome parameters of the different treatment modalities [3,12–15].

A recent narrative review by Bogduk [16] suggested that lumbar medial branch neurotomy remains as the only effective treatment available for CLBP. The theoretical basis of neurotomy lies in the fact that facet joint surgery deadens the medial branches and cuts off their afferent pathways which are the source of the chronic low back pain. A one-year follow-up study showed that the effectiveness of percutaneous neurotomy of medial branches is only 43–80%. Anatomical variations of the dorsal medial branch anatomy, incorrect placement of electrode, incomplete ablation, and nerve regeneration are important factors that should be taken

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into account when deciding or moderating the effectiveness of medial branch neurotomy. The aims of our study were to evaluate the effectiveness of dorsal endoscopic rhizotomy and compare it with the conservative treatment for the treatment of facetogenic chronic low back pain with respect to VAS scores, percentage of pain relief, and MacNab scores.

2. Methods

2.1. Participants

This study was approved by the ethics committee of the First Affiliated Hospital of PLA's General Hospital (China), and written informed consent was obtained from all participants. From April 2011 to November 2011, 58 patients who were diagnosed as lumbar facetogenic chronic low back pain (CLBP) and registered at the Department of Orthopedics Surgery of the First Affiliated Hospital of PLA's General Hospital were included in a prospective 1-year follow-up. The inclusion criteria were: (1) patients with chronic low back pain of at least 3 months' duration, (2) patients with mechanical low back pain especially elicited by movement of torsion/rotation and from flexion to extension, (3) patients with spine diseases of degenerative lumbar instability, lumbar degenerative spondylolisthesis, degenerative lumbar scoliosis, and/or lumbar facet joint osteoarthritis, and (4) patients who experienced >80% relief of pain with two comparative lumbar medial branch blocks (lidocaine and bupivacaine). The exclusion criteria were: (1) patients with radicular pain (defined as neurological findings of nerve root dysfunction), or with cauda equina syndrome and (2) patients with a known specific etiology for low back pain such as infection, tumor, or trauma. Considering referred pain, patients can be divided into three groups: (1) patients whose pain was only in the lower back (group A); (2) patients whose pain was predominantly in the low back, yet also radiated into the buttocks and legs (group B); and (3) patients whose pain was predominantly in the low back, yet has vastly spread into the knee or even lower (group C).

The patients were randomly divided into two groups (each with 45 and 13 cases, respectively), i.e., the operation group comprising of 45 cases received dorsal endoscopic rhizotomy, and the conservative group consisting of 13 cases received conservative treatment, which includes non-steroidal anti-inflammatory drugs (NSAIDs), physical therapy and cognitive-behavioral therapy.

2.2. Operative technique

Patients were placed in the prone position on the table platform, and made sure that their lumbar kyphosis and abdomen not be pressed. Local anesthesia (1 ml of 0.5% lidocaine) and mild sedation with fentanyl or midazolam were carried out. Surgical loci were determined according to the scope of the medial branch block which was performed under fluoroscopy. The target point is at the junction of the base of superior articular processes (SAP) and the transverse process (Fig. 1a and b). An 18-G needle was docked onto the target point. The anteroposterior fluoroscopic view and the lateral view were obtained with the maximal exposure of the target regions (Fig. 1c and d). Each target was injected with 2 ml of a mixture of contrast agents consisting of 1.6 ml of omnipaque and 0.4 ml of methylene blue. Then guide wire, soft tissue dilator and beveled working cannula were serially inserted. After checking the proper location of the cannula, forceps was used to remove the fatty tissue between muscles. RF probe was inserted through endoscope. Then, the soft tissue at base of the transverse process including the medial branch was removed in order to completely expose the

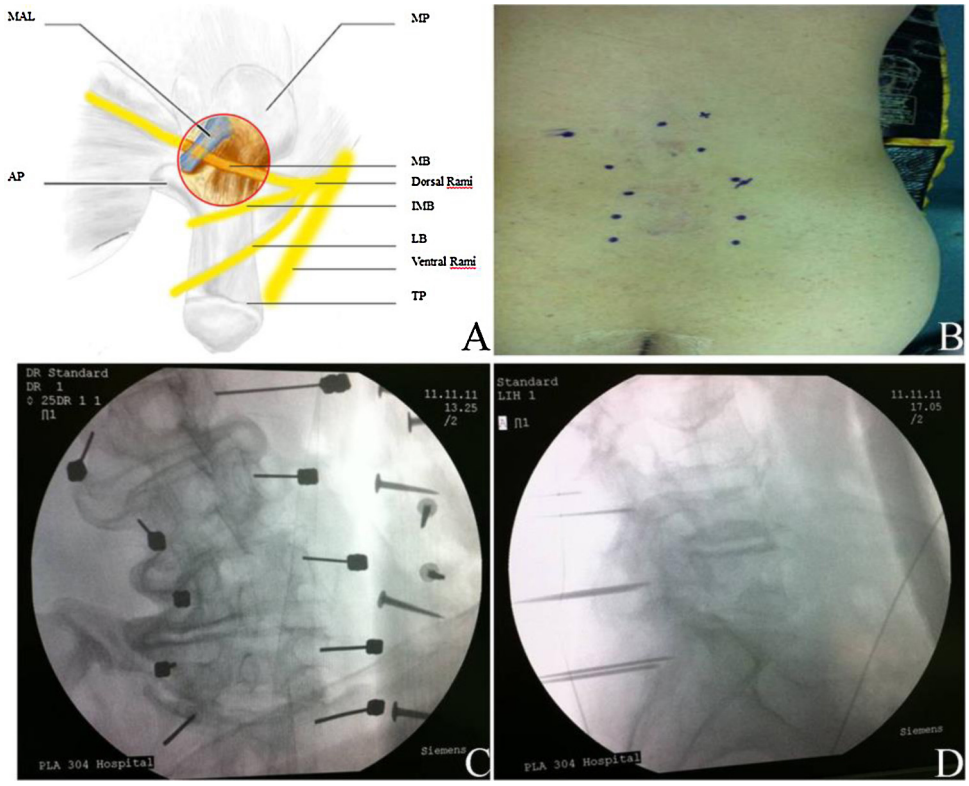

Fig. 1. Positioning the surgical points. (A) target point for dorsal endoscopic rhizotomy (TP, transerve process, AP, accessory process, MAL, mammillary-accessary ligament, MB, medial branch); (B) the skin entry point for dorsal endoscopic rhizotomy; (C) frontal view showing the puncture needle was docked into the target positions; (D) lateral view showing the puncture needle was docked into the dorsal region of the transverse process.