Spinal Anesthesia for Placement of Surgical Spinal Cord Stimulation Paddle Electrodes:
A Case Series

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BACKGROUND

Optimal placement of spinal cord stimulation paddle electrodes can be a challenge. Patient reporting of paresthesia coverage can improve placement of spinal cord stimulation paddle electrodes. Patient feedback can vary based on cultural factors as well as patient feedback. Patient feedback is an important component of the technical success of placing the lead. Optimal placement of a lead is essential to obtain the desired paresthesia coverage.

Two alternatives to spinal anesthesia are local/MAC anesthesia and general anesthesia using neurophysiologic monitoring, but each of these techniques has drawbacks. Under general anesthesia, the patient is unable to benefit from introversive patient feedback, but the sedation required for the procedure can aid the reliability of the intraoperative reporting and allow for diagnostics on an ongoing basis. Under spinal anesthesia, the patient is unable to perform all the steps of the procedure without undue stress. Present here is a single institution’s experience with the use of spinal anesthesia as a technique to perform this procedure.

METHODS

Retrospective analysis was performed on 128 consecutive cases of surgical paddle leads placed in awake patients under spinal anesthesia from June 2010 to March 2013. The paddle leads were placed surgically via laminotomy. In cases for which sedation was necessary, only small doses of desedative were administered. Patients were able to converse throughout the procedure with normal cognitive function. With the lead positioned, the intraoperative taping was used to confirm that all painful areas had paresthesia coverage and that the paddle was centered to the extent possible. If a permanent implantation was performed, patients confirmed that the coverage was equal or superior to the trial. Following the procedure, patients were recovered, the paddle was programmed, and they were discharged home.

RESULTS

The average age was 61, ranging from 26 to 88. Multi-column paddles were used in 126 patients with the remaining two receiving single column paddles. In 128 out of 128 cases, implantation was successful and associated with immediate patient confirmation of paresthesia coverage. The range of levels spanned T5-T12, but the majority of cases were on T8 and T9 (see chart below).

There were no significant complications related to the use of spinal anesthesia. In 125 cases (97.5%), patient feedback enabled successful implantation of SCS and in one case, feedback was used to identify a patient in whom SCS could not be used. There was a solitary case in which paresthesia coverage could not be felt by the patient. This was a placement at T12 and, in all likelihood, sensation at that level was dependent on nerve root, rather than spinal cord stimulation. In one patient, excessive somnolence precluded patient feedback and anatomic positioning alone was used for placement.

DISCUSSION

These data demonstrate that spinal anesthesia is safe and effective for SCS surgical paddle placement. Complications were rare for spinal anesthesia, which can be used successfully as high as T7 and as low as T12.

Intraoperative patient feedback is a considereable aid to the surgeon during paddle placement, because it can both confirm paresthesia coverage over the painful area and allow for optimal placement of the paddle. By centering the paddle over the area of optimal stimulation, maximal programming flexibility is preserved in dealing with any future clinical variability, such as with neuroplasticity.

Spinal anesthesia provided excellent intraoperative pain control for the placement of paddles in a broad range of the thoracic spine, covering the majority of commonly desirable locations. The procedure was safe and comfortable for both patient and surgeon to the high as T7, even in patients with cardiopulmonary illness. Patient anxiety was minimal and reassurance, although a few patients were a priori excluded from the series with extreme psychopathological anxiety disorder. Our one failure to obtain intraoperative confirmation of paresthesia was at a placement at T12. As spinal anesthesia operates at the root level neuromodulation (Lang et al, 1989) failure is probably explained by dominance of root stimulation at that level. Based on this observation, we would be reluctant to use spinal anesthesia for placement at, or below, T12.

The results presented agree with other published data. In a recent publication examining spinal anesthesia in SCS implantation (Sarno et al., 2012), all 10 patients reported immediate paresthesia over the whole painful region and 87.5% of patients reported “good” satisfaction at last follow up. Publication on alternatives to spinal anesthesia for SCS implantation report lower rates of effective coverage. One publication (Falowski et al., 2011) examined “awake” vs. “non-awake” procedures and found a statistically significant outcome favoring “non-awake”. However, “awake” patients in this study were not kept completely awake for the entirety of the procedure but were heavily sedated until trialing, when anesthesia was halted. Moreover, the success rate of general anesthesia presented by Falowski et al. (85.6%) is in line with another publication (Air et al., 2012) using general anesthesia in patients for whom awake procedures were not possible (94.2%). While clearly a two-armed, randomized clinical trial is needed to make any valid statements of comparison, our data raise the question as to whether spinal anesthesia might be more effective for placement in the T7-12 range.

CONCLUSIONS

We present a single institution, single surgeon series of 128 consecutive cases of spinal anesthesia for surgical placement of a spinal cord stimulation paddle electrode. This case series demonstrates that such a technique is safe and effective alternative for placement of the mid-thoracic spine. Real-time patient feedback aids in positioning the paddle so that it is centered over the optimal area for stimulating the painful region and optimized to treat future changes in the pain syndrome.

References