CO2 Laser-Assisted Posterior Semicircular Canal Ablation for Benign Paroxysmal Positional Vertigo

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ABSTRACT

Objectives: The objective of this study was to analyze a new technique, CO2 laser-assisted posterior semicircular canal ablation (LAPSCCA), in the treatment of refractory benign paroxysmal positional vertigo.

Study Design: Prospective study of patients with disabling BPPV who failed conservative therapy.

Methods: Patients noted to have been treated with at least three Epley maneuvers without success and continuing to have disabling symptoms were enrolled in this study. Patients underwent pre- and post-operative electronystagmography. The surgical technique is modified from Parnes and involves plugging each end of the fenestrated posterior semicircular canal with bone grafts and fibrin glue. The CO2 fiberoptic (Omniguide) laser is then used at a setting of 2 watts to incise between the cut ends of the canal to completely section the membranous labyrinth.

Results: All six patients had excellent relief of positional vertigo symptoms.

Conclusions: LAPSCCA is an excellent treatment option for patients with intractable BPPV.

METHODS AND MATERIALS

Patients were enrolled in the study who were between 18 and 65 years old. All patients had undergone at least three Epley maneuvers without significant improvement in BPPV, over a period of at least 6 months. All patients underwent pre- and postoperative audiometry, including speech reception threshold, pure tone levels, and word recognition scores. All patients were counseled on the procedure as well as its potential risks. The procedure is similar to the original description by Parnes and McClure. A cortical mastoidectomy is performed through a postauricular approach. Bone dust and bone chips are collected during the mastoidectomy. After opening the antrum, the horizontal semicircular canal is identified for orientation. A line through the axis of the horizontal semicircular canal (Donaldson’s line) is followed posteriorly to approximate the midpoint of the perpendicularly oriented posterior semicircular canal. Drilling is continued in this area with progressively smaller diamond burs and suction irrigation apparatus until the canal is blue-lined. Egglshell-thin bone is left over a 5mm segment of the PSC endothelium at the termination of drilling. A small pick is used to gently remove the thin bone to open into the labyrinth (Figure 1). The lumen of the canal on each side is filled with bone dust, autologous fibrin glue, and a small bone graft (Figures 2 and 3). The CO2 fiberoptic (Omniguide) laser is then used at a setting of 2 watts to incise between the cut ends of the canal to completely section the membranous labyrinth. The entire operative site is then covered with temporalis fascia affixed with autologous fibrin glue.

RESULTS

All six patients had excellent relief of positional vertigo symptoms. One patient had persistent imbalance that lasted for 8 weeks and slowly subsided. This was the first patient in the study and bone wax was used in the surgery instead of fibrin glue. It is theorized that the bone wax produced an inflammatory response which resulted in persistent symptoms. Hearing was preserved in all six patients.

CONCLUSIONS

LAPSCCA is an excellent treatment option for patient with intractable BPPV. In the past, several ways of occluding and/or ablating the PSCC have been advocated. Parnes and McClure’s initial description was to place moist bone pate within the PSC with placement of fascia over it. Subsequent modifications include the use of fibrin glue, bone wax, periosteam, blood clot, fascia, the laser (CO2 or argon), or a combination of these. Interestingly, Anthony uses the laser to penetrate the final thickness of bone around the canal, as well as on the endothelium ultimately leading to fibrotic obliteration. The present series of cases takes advantage of the CO2 laser in an entirely different way. After plugging both ends of the PSCC with bone and autologous fibrin glue, the laser is used to incise between both cut ends of the canal. This is a “belt-and-suspenders” approach to destroy the connection between the cut ends, making re-canalization of the PSCC impossible. The continuity of the PSCC is conclusively destroyed.

Although LAPSCCA is an excellent treatment modality for refractory BPPV, it should be emphasized that the vast majority of patients with this disorder are treated successfully without surgery. In our practice, only approximately one percent of the hundreds of patients that we see for BPPV go to surgery.

REFERENCES