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Treatment of overactive bladder syndrome with tibial nerve stimulation: technical aspects of newer methods

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Introduction

Chronic Overactive Bladder Syndrome (OAB) places a heavy social strain on its patients. It is a problem that has a substantial negative impact on patients' quality of life and entails high financial expenditures for both patients and our healthcare system. Patients with OAB have urine urgency, frequently accompanied by frequency and nocturia, with or without urgency incontinence, according to the ICS terminology, in the absence of a urinary tract infection or other evident disease. Tibial nerve stimulation is a treatment option for OAB. Since the act of stimulating energy streams is extremely similar to actual tibial nerve activation, acupuncture is possibly the oldest kind of neuromodulation. Chinese medicine first used this method more than 2000 years ago. The technical elements, benefits, shortcomings, and restrictions of the most recent posterior tibial nerve stimulation applications will be the main topics of this review. Based on current uses, we will research the best configuration of tibial nerve stimulation. We believe that a patient-friendly, at-home procedure for tibial nerve stimulation is the best option. From our perspective, an implant should be simple to implant and equipped with an external energy source. The implant is preferable if it has a lengthy lifespan free of surgical revisions, no leads, and a low risk of migration. Additionally, there shouldn't be any conflict with other tests or therapies, and the treatment should be affordable [1,2].

Description

There are currently no published studies on this neuromodulation device in the area of OAB. An ongoing study is a prospective, multicenter, randomised, double-blinded one. The eCoin is one of the newest implantable neuromodulation gadgets (Valencia Technologies Corp., Valencia, California). A leadless, battery-powered device is implanted under local anaesthesia to the medial portion of the lower thigh during the eCoin's minimally invasive open procedure. The item has a nickel-sized titanium case that is 23 mm in diameter and 2.4 mm thick. The device automatically administers 30-minute treatment sessions every two days for 12 weeks after implantation. The intensity of treatment is then reduced to once every 15 days. A therapy session begins automatically when the device is turned on, therefore the patient is not required to initiate it. Patients can use an external controller to change the amplitude during therapy sessions from 0.5 to 15 mA. 20 pulses per second and a 0.2 ms pulse width are also fixed parameters. Recently, MacDiarmid et al. reported their findings from the first six months (N = 46). Based on their 3-day voiding diaries, 67 percent of the patients throughout the first six months on FU were deemed responders. Eleven of these patients stated that they had no more UUI episodes over the six months following their discharge. Patients reported a threefold increase in the minimal meaningful difference based on the baseline and six-month follow-up I-QOL and PGI-I scores [3].

Two occurrences of the device being explanted were reported by Macdiarmid et al. in relation to safety concerns. Following cellulitis, one patient wanted to have their organs removed, and the second because they noticed device migration 1 cm posteriorly, which prevented stimulation.The minimally invasive chronic device from StimGuard LLC is another implanted device. Through a 5 mm skin incision, patients receive an implanted stimulator with an attached receiver. The patient wears a small, external, rechargeable transmitter as the energy source. The external energy source is worn close to the implant's internal antenna and is connected to an external antenna [4]. The system employs an open-loop design, which denotes that the energy sent from the wearable to the electrode is steady without being primarily monitored by an external device. Patients are instructed to utilise the implant overnight, with a maximum 8-hour therapy duration.The ability for patients to receive therapy overnight is this device's key advantage. However, as this small-scale data indicates, migration may be a significant issue. Currently, a study contrasting Medtronic Interstim and StimGuard CAN-stim is being done.

Conclusion

In conclusion, advancements in tibial nerve stimulation technology for the treatment of OAB are imminent. The most recent innovations centre on tiny, battery-free gadgets that are simple to use and may be placed in the least intrusive or noninvasive ways. The activation software must to be adaptable when it comes to fine-tuning and should be capable of providing feedback on the application and improvement of the stimulation parameters. We draw the conclusion that the optimal implant has not yet been discovered based on our ideal model of tibial nerve stimulation. The Bluewind RENOVA system and the Stimguard, however, are very close to ideal in terms of the benefits and drawbacks of the implant. Our view needs to be supported by evidence of the effectiveness and safety over a longer period of time in bigger scale trials, as well as the advantages of computerised feedback and the potential for many variable treatment plans.

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