

Minimally Invasive Magnetic Vocal Fold Manipulator

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Technology description

Unmet Need

Vocal cord paralysis results in a compromised airway, hindering speaking and breathing. To alleviate the effects of paralysis, surgical operations can manipulate the position of the vocal cords by moving them to the side (lateralization) or center (medialization) of the airway. Current state of the art procedures achieve vocal cord lateralization by destroying vocal fold tissue, which is irreversible and increases stress on native vocal fold tissue. These procedures do not allow for adjustment of the vocal cord position to optimize the patient's voice quality following the procedure. Also, many vocal fold lateralization techniques are associated with post-operative complications, including fistulas. Approximately 16,000 patients develop vocal cord paralysis following thyroid surgery in the United States annually, and certain surgeries, such as cardiothoracic operations, have estimated rates of post-operative vocal cord paralysis exceeding 20%. Hence, there is a need for a fully reversible and adjustable method to manipulate vocal cords (through both lateralization and medialization) in patients with permanent vocal fold paralysis that minimizes stress on native tissue and lowers the risk of post-operative complications such as fistulas.

Technology Overview

A magnetic device is implanted into the arytenoid cartilage adjacent to the vocal cords through a minimally invasive "keyhole" procedure, alongside a magnetic piston that is implanted in the throat. The magnetic interaction between the implant and the piston allows the device to reversibly move the vocal process region of the arytenoid cartilage, thus lateralizing the arytenoid. Medialization can be achieved by reversing the device's polarity to push the arytenoid implant medially. Unlike existing procedures which are irreversible and not adjustable, the device can alter the degree of lateralization or medialization for different patients by implanting magnets of differing strengths and polarity. The magnetic system enables fully adjustable and reversible lateralization and medialization of the vocal cords, which allows the final position of the vocal cord to be modified to maximize the quality of the patient's voice following the procedure. Compared to existing devices that use larger screws, the amount of tissue stress created by the magnetic implant is significantly less. Additionally, in contrast to current procedures, which require device components to be introduced at great depth into the soft tissue, the magnetic system can act across soft tissue without disrupting the tissue integrity, which reduces the likelihood of post-operative complications like fistula formation.

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