

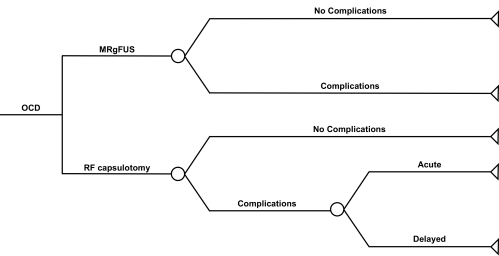
Introduction

Meta-analytic techniques recently supported neuroablation as a promising therapy for treatment-refractory obsessive-compulsive disorder (OCD) with a more favorable complication rate than deep brain stimulation. Moreover, these pooled findings suggested that bilateral radiofrequency (RF) capsulotomy had marginally greater efficacy than unilateral ablation, stereotactic radiosurgery, and cingulotomy. MR-guided focused ultrasound (MRgFUS) capsulotomy is an emerging therapy for OCD, with preliminary data suggesting safety and efficacy. As a clinical trial is being developed, our study examined the cost and clinical parameters necessary for MRgFUS capsulotomy to be a more cost-effective alternative to RF capsulotomy.

Methods

We created a decision analytical model of MRgFUS with RF capsulotomy for OCD (**Figure 1**). Outcome parameters included percent surgical improvement in Yale-Brown Obsessive Compulsive Scale (Y-BOCS) score, complications, and side effects. The analysis compared measured societal costs, derived from Medicare reimbursement rates, and effectiveness, based on published RF data. Theoretical risks of MRgFUS capsulotomy were based on published essential tremor outcomes. Sensitivity analysis yielded cost, effectiveness, and complication rate as critical MRgFUS parameters defining the cost-effectiveness threshold.

Figure 1 - Decision tree comparing MgFUS and RF capsulotomy for treatment-refractory OCD.

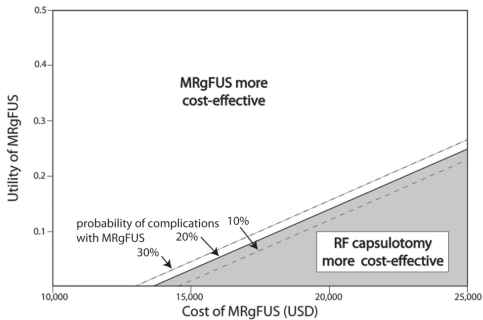


Possible outcomes of each treatment are listed. Acute complications of RF capsulotomy prolong hospital stays and increase costs. OCD, obsessive compulsive disorder; MRgFUS, magnetic resonance guided focused ultrasound; RF, radiofrequency.

Results

Literature search identified eight publications (162 subjects). The average reduction of preoperative Y-BOCS score was 56.6% after RF capsulotomy, with a 22.6% improvement in utility. Complications occurred in 16.2% of RF cases. In 1.42% of cases, complications were considered acute-perioperative and incurred additional hospitalization cost. The adverse events in the other 14.8% of cases did not incur further costs, although they impacted utility. Rollback analysis of RF capsulotomy yielded an expected effectiveness of 0.212 QALYs/year at an average cost of \$24,099. MRgFUS capsulotomy was more cost-effective under a range of possible cost and complication rates (**Figure 2**).

Figure 2 - MRgFUS capsulotomy is a cost-effective therapy for treatment-refractory OCD under a wide range of parameters.



MRgFUS capsulotomy is a cost-effective therapy for treatment-refractory OCD under a wide range of parameters. Sensitivity analysis of each MRgFUS parameter yielded effectiveness (utility of MRgFUS), cost (USD) and complication rate (%) as the most important parameters in determining the cost-effectiveness threshold between MRgFUS and RF capsulotomy.

Conclusions

Using a decision-making analytical model under multiple parameters of complication rate and procedure cost, these findings support the cost-effectiveness of MRgFUS over RF capsulotomy. These findings rely on the calculated utility of RF capsulotomy as determined by published data and reported complications.

Sensitivity analysis revealed three factors: cost, effectiveness, and complication rate as critical MRgFUS parameters determining cost-effectiveness, and there are multiple areas that could potentially enhance the cost-effectiveness of this procedure. As the MRgFUS complication rates and long-term impacts on utility remain to be examined, it is possible that effectiveness and costs of MRgFUS will change over time as this non-invasive technology improves and becomes widely available.

Future clinical trials for OCD should evaluate MRgFUS capsulotomy against other neurosurgical interventions, such as DBS, SRS, and RF ablation. These studies would benefit from careful assessment of the acute and long-term efficacy and complications of MRgFUS, the most important factors impacting the scalability of MRgFUS capsulotomy as a major therapy for OCD.

References

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