rectangular geometry. Pairwise comparisons with statistical significance are denoted with asterisks. The other pairwise comparisons did not reach statistical significance.

Supplementary Figure 1. Two example solutions from simulations of normal vocal fold model. Each simulation generated 400 ms of voicing. Simulated at SPL = 70 dB for solution 1, 55 dB for solution 2. **A.** Microphone signal. **B.** Spectrogram, with F_0 = 116 Hz in both solutions. **C.** Subglottal pressure. **D.** Glottal flow. **E.** Intraglottal pressure. **F.** Glottal area. Compared to solution 2, solution 1 demonstrates several better outcome features. Earlier phonation onset and shorter time to reach steady state oscillations suggest greater ease of phonation, and larger SPL at comparable subglottal pressure indicates greater efficiency.

Supplementary Figure 2. Effect of resection depth on **A**: subglottal pressure, Ps; **B**: fundamental frequency, F_0; **C:** sound pressure level, SPL; and **D:** phonation onset time, PO. Means were calculated across all accepted solutions. The vertical bar denotes standard deviation. All pairwise comparisons with statistical significance are denoted with asterisks.

Video Legend

Animations of vocal fold oscillations based on finite element modeling. An animation of vibrating vocal folds is based on the physics of self-sustained oscillation. Each simulation generated a 400-ms signal. The video shows two example simulations which were selected out of the entire pool of over 16000 solutions generated. One simulation shows a normal vocal fold model and the other after subligamental resection. Both simulations are shown in superior and coronal views. Note that the normal vocal fold shows larger amplitude oscillations than the operated vocal fold. Note that this is a raw display of displacement and velocity of tissue points within the finite element model, and that no image enhancement was used.