Endonasal Skull Base Surgery

**Causes of Skull Base Injury**
- Trauma
- Inevitable during some procedures

**Endonasal Approach**
- Minimally invasive
- Limited tool manipulability
- Graft placement can add up to 30 minutes

**Inadequate Graft Placement Complications**
- CSF leaks that lead to meningitis, brain hemorrhage, neurological deficits, or death

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Novel Tool Design

- Surgeon actuated rocker button
- Extends/retracts wire
- Shelf at tube tip
- Graft held by bent wire and shelf
- Excellent gripping, control, force application

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Current Surgical Tool Problems

**Poor tools lead to dropped grafts, decreased surgeon confidence, increased operating time**

**Forceps:**
- cannot reliably open and close in tight spaces
- good grip
- poor force application

**Blunt Tools:**
- good force application
- poor grip
- difficulty handling varying graft size, shape, rigidity

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Prototype & Testing

- 3D printed handle in two pieces
- Laser cut acrylic rocker button, tube insert
- Bent 2.15mm stainless steel hypotube

- Benchtop simulated graft placement experiment
- Surgeon noted better control and force application, and expects this design to decrease operating time

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References
