

# Manevra: Redefining Arthroscopy

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## Project Background

Knee arthroscopy is a minimally invasive procedure performed more than 1.77 million times yearly<sup>1</sup>. Though efficient and low-risk, these procedures are known for awkward positioning and difficult visualization of certain joint spaces like the posterior compartment of the knee. The Gillquist maneuver accesses this space by inserting the scope between the medial femoral condyle and posterior cruciate ligament or above the medial meniscus<sup>2</sup>.

25% of Gillquist maneuvers result in damage to the knee and often fail to provide sufficient visualization, leading to many procedures being conducted without visualization<sup>3</sup>.

This project improves upon the rigid arthroscope by adding flexibility to improve visualization.

## Design Requirements

### Must Haves:

1. Increase visualization compared to the rigid arthroscope
2. Not larger than 4-6 mm in diameter
3. Does not significantly increase learning curve

## Need Statement

Orthopedic surgeons need a more effective method of accessing the posterior compartment while performing arthroscopic knee surgery that **increases visualization within the posterior joint space**.

## Testing/Results

### Angled Visualization Model

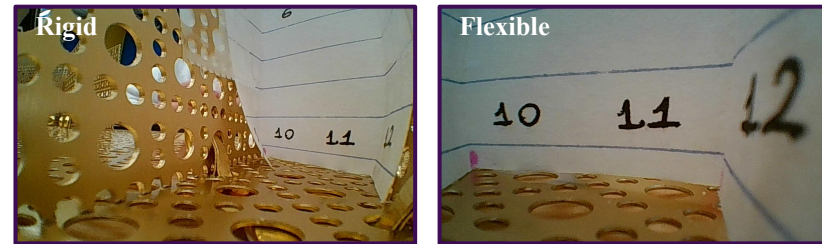


Figure 1: Sample results from angled visualization tests

The flexible prototype acquired greater visualization at a closer proximity for all angled mazes.

### Gillquist Maneuver Model

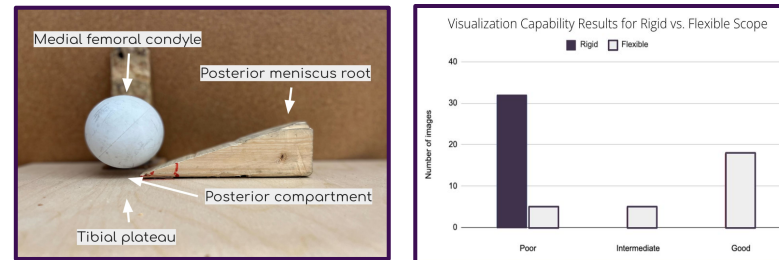


Figure 2: Anatomical box model based on Gillquist maneuver: inserting the scope under the medial femoral condyle and over the medial meniscus.

Testing with the box model resulted in a minimal learning curve and fewer collisions for the flexible scope. The flexible scope demonstrated better visualization capacity of the back of the box than the rigid scope.

## Final Device Design

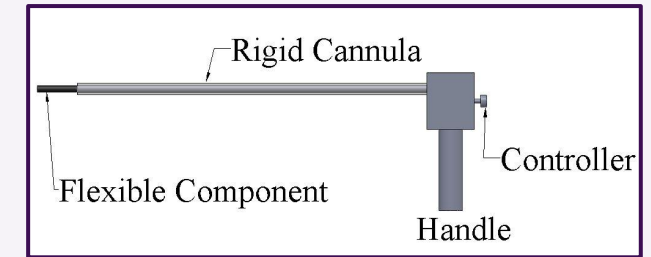


Figure 3: Final design

The final device design is a fully flexible scope with a maneuverable tip (with at least 130 degrees of rotation) encased within a rigid cannula. The flexible tip will be controlled with a lever in one-hand controlling up-down motion and with manual rotation for right-left movement.

## Future Directions

Improve rigid borescope to represent angled lens

Transition to medical grade ureteroscope

Test borescope in cadavers with clinician assistance

## References

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