Renal Clamp

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Point of Interest

- Client Information
- Background
- Problem Statement
- Competition
- Alternative Designs
- Design Criteria
- Design Matrix
- Final Design
- Future Work
- Conclusions
- Questions

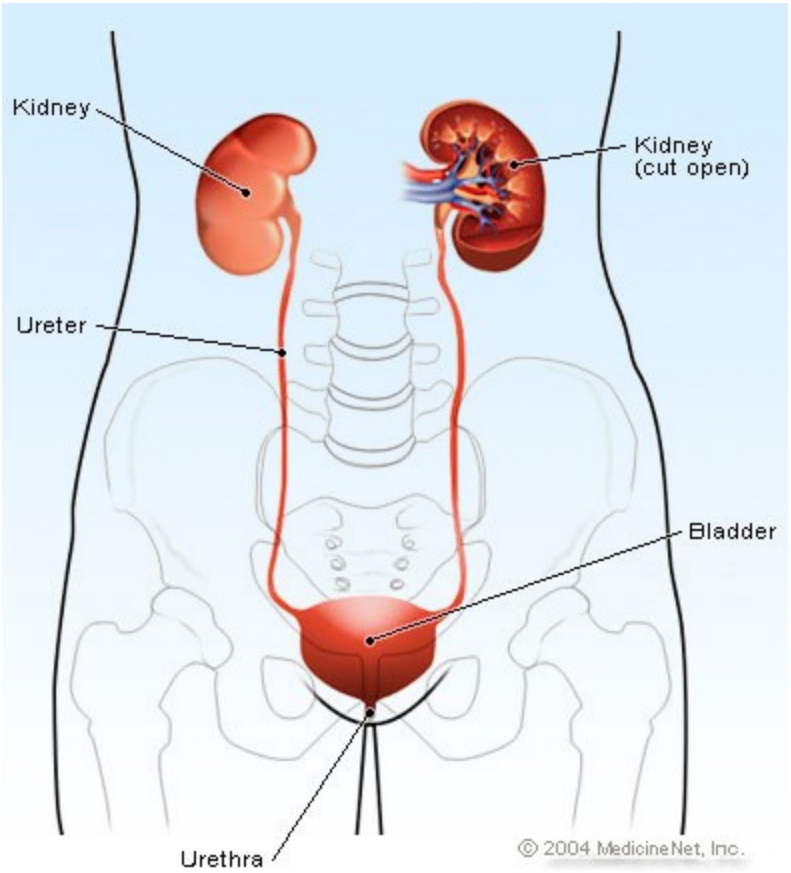
Client Information

- Dr. E Jason Abel
- UW- Madison
  - Urologic Surgeon
  - Specializes in urologic malignancies
  - Focus on kidney cancer

http://www.urology.wisc.edu/system/assets/775/Abel_Jason_ForWeb_2012_profile.jpg?1329471542

Background

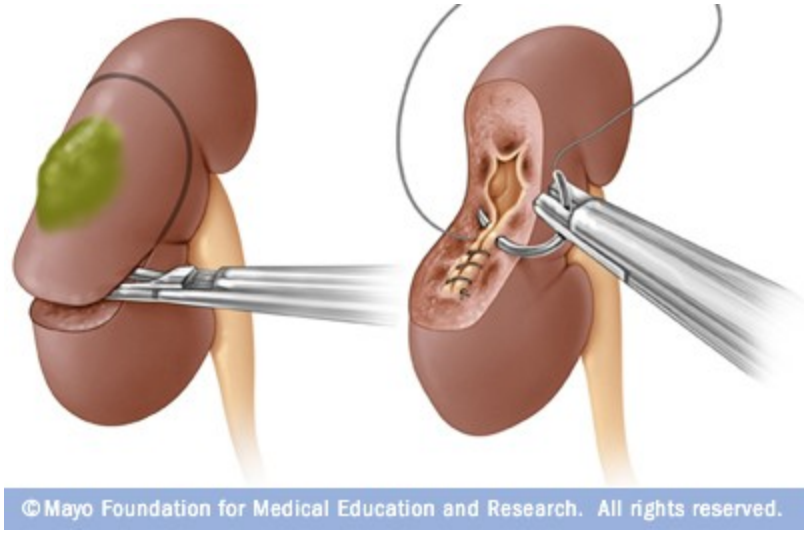
- Kidney Cancer
- Nephrectomy
  - Full vs. Partial
  - Open vs. Laparoscopic
- Clamping
  - Vessel
  - Parenchymal



http://images.emedicinehealth.com/images/illustrations/urinary_structures.jpg

Problem Statement

- Selective renal occlusive clamp
  - Prevents global ischemia
- Robotic and laparoscopic
- Partial nephrectomy surgery



http://www.mayoclinic.com/images/image_popup/mcdc7_partial_nephrectomy.jpg

Competition

- Traditional open surgery clamps[4]

- Laparoscopic vascular clamps[5]

- Simon Renal Pole Clamp[6]

Alternative Design: Modified Bulldog Clamp

- Spring clamping mechanism
- Modifications
  - Length
  - Spring
  - Curvature

Alternative Design: Crisscross Design

- Clamping Mechanism
  - Johns Hopkins
- Removable Sliding Tubing

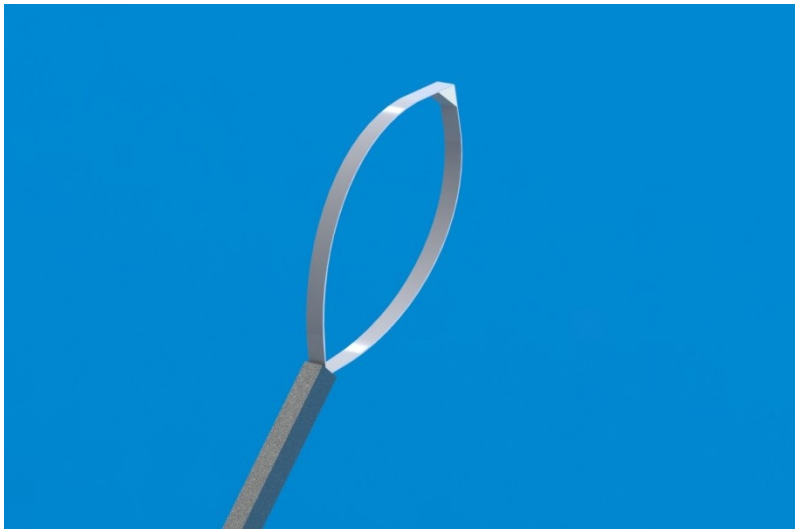
http://pillinginstruments.com/images/products/hi-res/SR_353002.jpg

Alternative Design: Zip-Tie Design

- Wire ribbon
- Locking mechanism
- Quick release

Alternative Design: Loop Design

- Wire ribbon
- Adjustable
- Independent actuators



Design Criteria

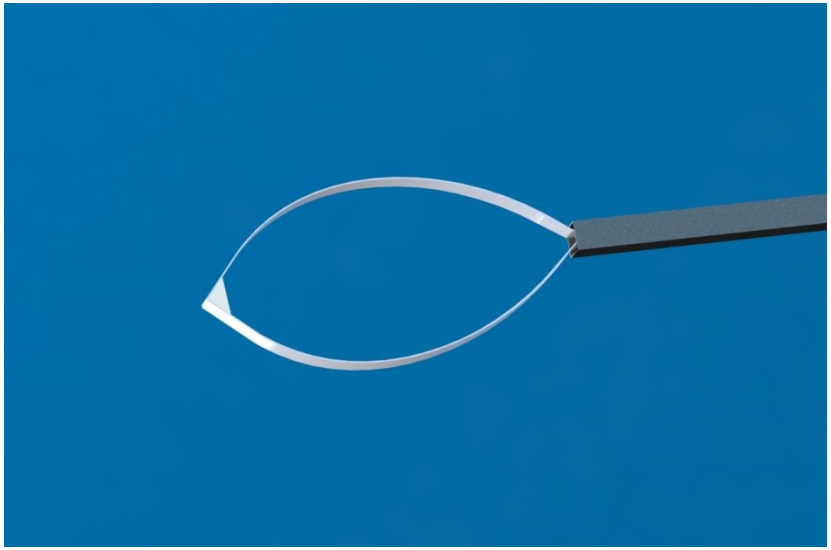
- Safety
- Ease of placement
- Force distribution
- Maintenance
- Cost
- Manufacturability
- Client Preference

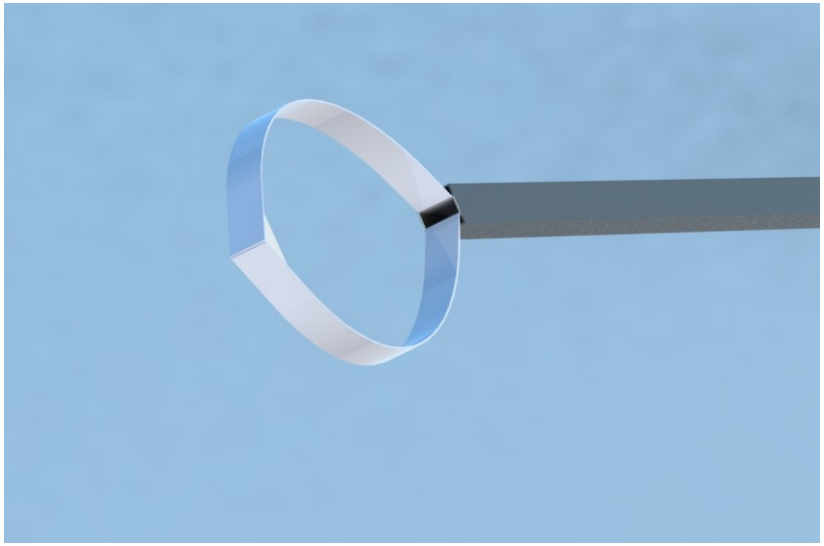
Design Matrix

	Weight	Modified Bulldog	**Loop**	Zip-tie	Crisscross
Safety	.20	3	**4**	4	2
Ease of placement	.15	3	**4**	1	3
Force distribution	.30	3	**3**	2	2
Cost	.05	2	**4**	5	3
Maintenance	.10	3	**4**	3	3
Manufacturability	.10	3	**4**	4	2
Client Preference	.10	2	**5**	3	4
Total:	1.00	2.85	**3.8**	2.8	2.5

Final Design

- Loop Design





Future Work

- Find materials
- Build an accurate prototype
- Test on animal model
- Iterative design

Conclusions

- Benefits of laparoscopic, partial nephrectomy
- Loop design
- Functional end this semester
- Laparoscopic next semester

Acknowledgements

- Dr. Abel- UW Hospital
- Paul Thompson– BME Department
- Prof. Vanderby- BME Department
- Prof. Thelen- BME Department

References

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Questions