

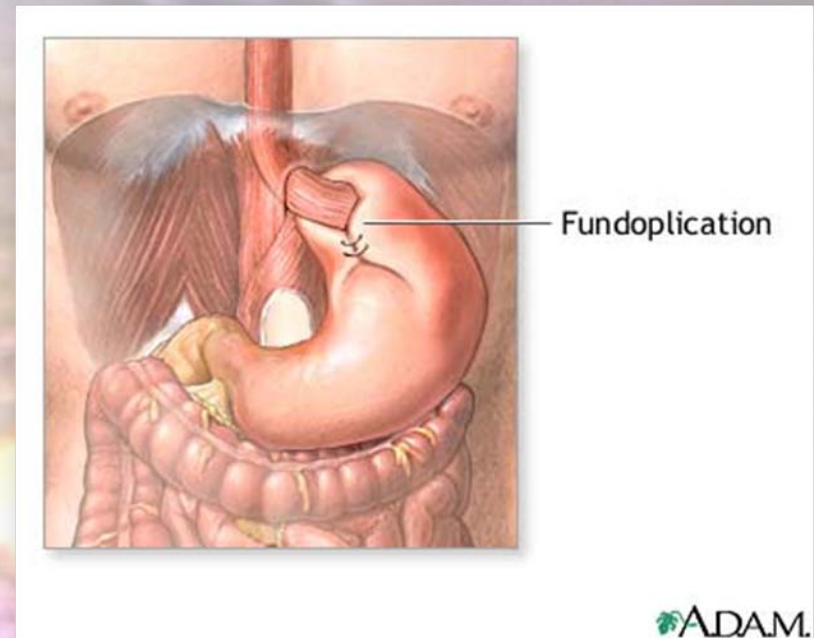
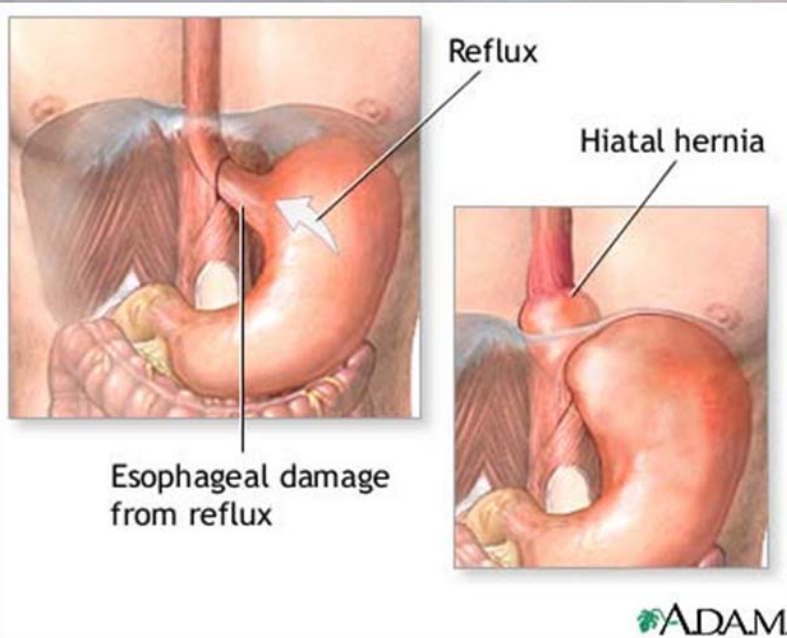
SILS Liver Retractor



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Client: Dr. Jon Gould
Advisor: Professor Mitch Tyler**

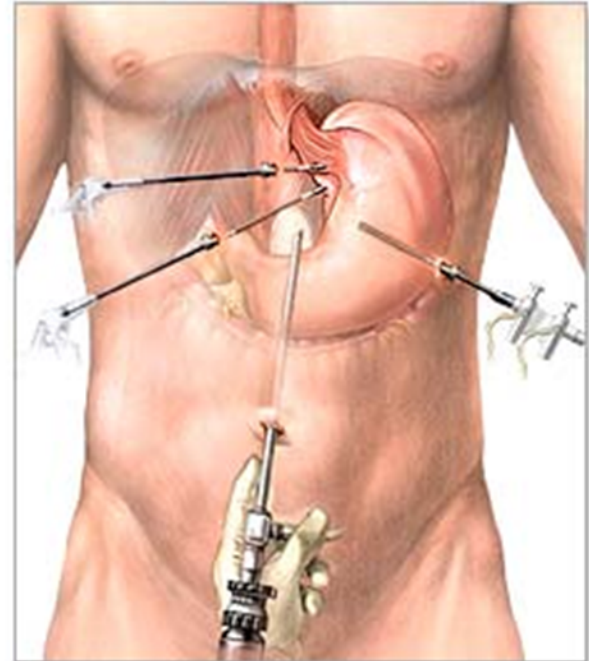
Nissen Fundoplication

- Treatment for chronic heartburn by GERD
- Daily problem for 15 million Americans
- Upper stomach wrapped around esophagus



Where it's going

- Single Incision
- Stomach & Esophagus Junction
- Liver
 - Floppy
 - Variable size



Nathanson Retractor

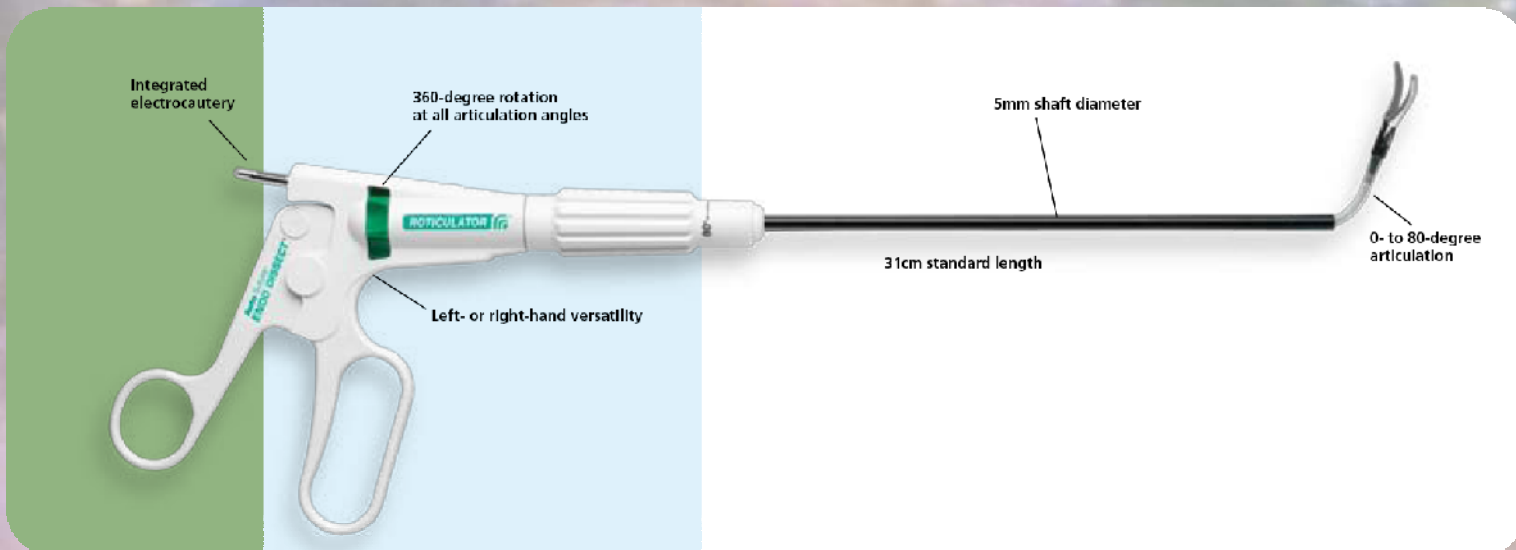


Tools of the trade

- Covidien Roticulator™
- Limited range of motion
- Arms are crossed



<http://www.covidien.com/imageServer.aspx?contentID=12628&contentype=application/pdf>



<http://www.covidien.com/imageServer.aspx?contentID=12628&contentype=application/pdf>

Liver Flopping



Motivation

- Decrease # of incisions
 - Cosmetic
 - Less risk of infection
 - Patient satisfaction



Problem Statement

- Use in single incision surgery
- Retract left liver lobe to abdominal wall
- Expose gastroesophageal junction
- Safely deployed and removed
- Fit through laparoscopic port



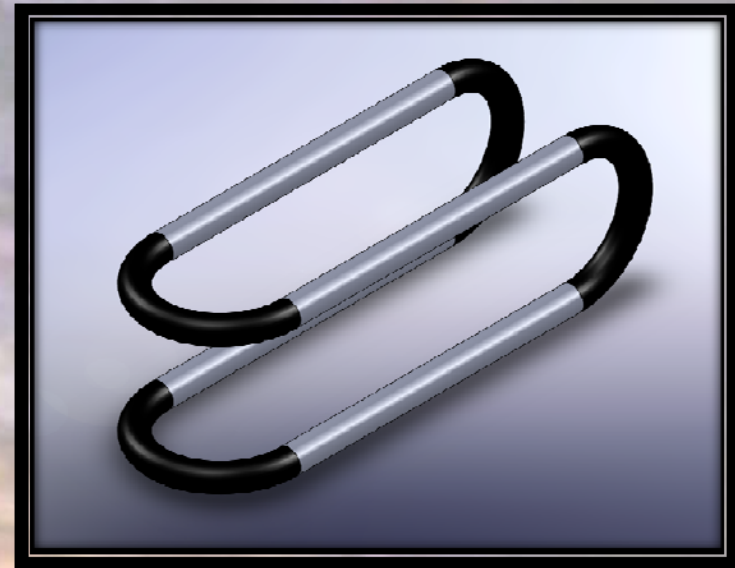
PDS

- <5 minute deployment
- Within 1 cm of abdominal wall
- Distribute weight of liver
- Fit through 12 mm port
- Non-toxic
- Sterilizable



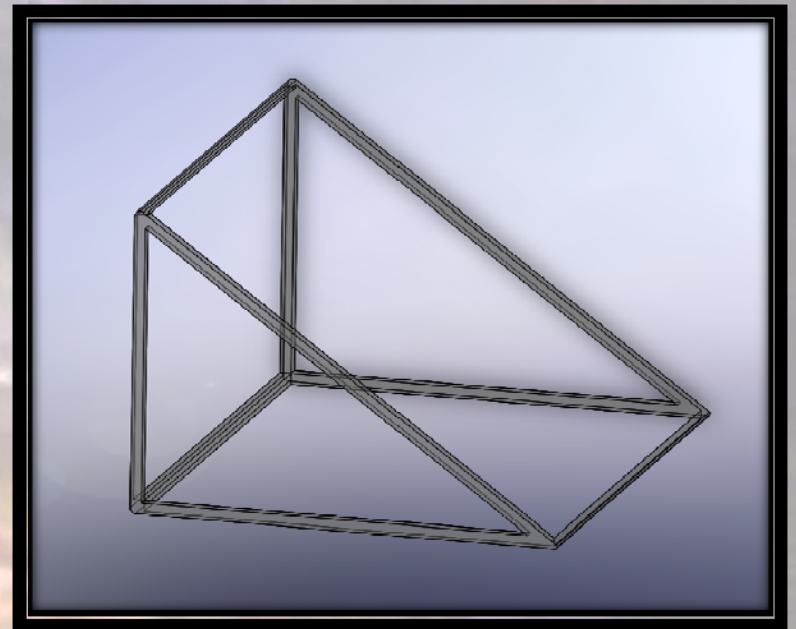
Design 1: Folded Ring

- Ring with 4 flexible joints
- Folded and closed during deployment
- Open with graspers inside patient
- Slide $\frac{1}{2}$ of ring under liver
- Fold other half over top of liver
- Pull 2 sutures on top half to retract liver



Design 2: Wedge

- Frame of triangular prism with flexible corners
- Collapsed during deployment
- Opened with graspers
- Slide through the liver with 1 point on top
- Pull 2 sutures on top to retract liver



Design 3: U-Shape

- Rod with 2 flexible joints
- Straightened during deployment
- Slide middle portion under liver
- Bend 2 ends over top of liver
- Pull 2 sutures on both ends to retract liver

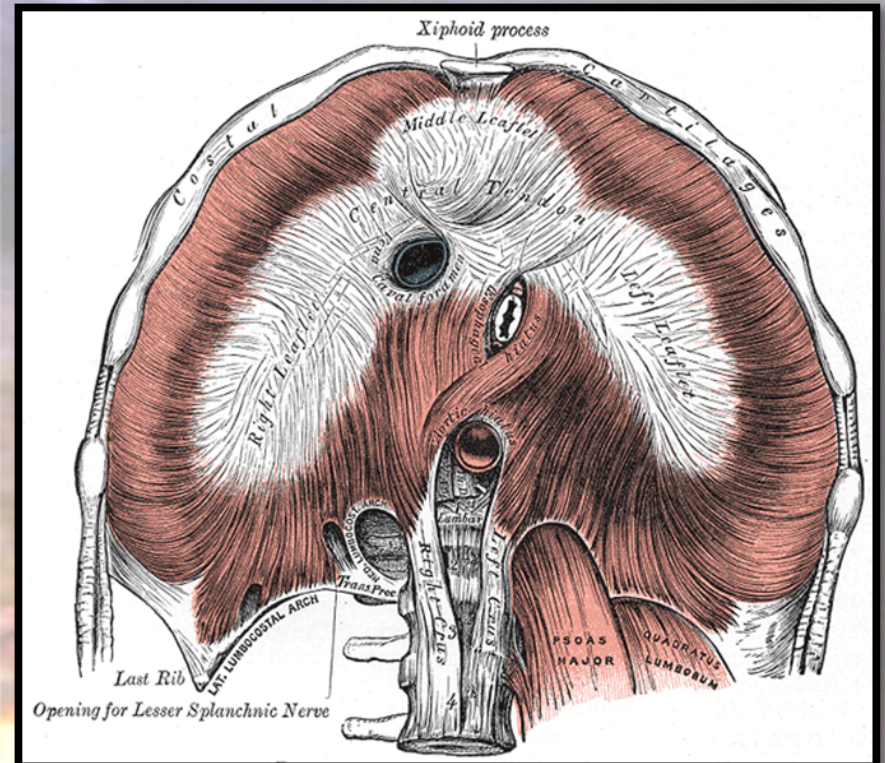


Design Matrix

Criteria	Weight	Wedge	U	Folded Ring
Ease of Use	10%	2.5	4.5	3.5
Support of Liver	25%	5	4.5	4
Risk For Trauma	30%	5	5	5
Time of Deployment	15%	2	5	4
Out of way of Surgical Field	20%	4.5	4.5	3
		4.2	4.725	4.05

Future Work

- Investigate using left crus of diaphragm
- Secure base of liver
- Expand deployment/retrieval mechanism



Questions?

