

Gallbladder Removal Device for Laparoscopic Surgery



Alex Bryant, Ashley Smith, Stephen Wallace
 Department of Bioengineering, Rice University
 Team Lith-X: teamlithx@gmail.com



Improving Gallbladder Removal

Team Lith-X's goal was to advance the quality of care for gallbladder removal patients.

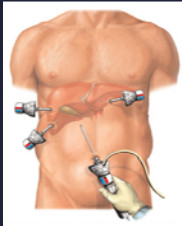


Figure 1. Four port laparoscopic setup.

- Standard laparoscopic removal uses at least one 10mm port
- Incisions often must be extended in cases with larger gallstones
- Results in undue pain and longer recovery time
- No specialized tools exist to crush gallstones

Reducing incision size from 10mm to 5mm is proven to reduce pain and recovery time.

The Next Step

How can surgeons remove a stone-filled gallbladder through a 5mm port?



Figure 2. Visualization of the removal challenge.

An effective solution would be highly marketable and would significantly improve quality of care:

- Gallstones cause extreme pain and block bile ducts
- 700,000+ gallbladders removed annually
- Total cost over \$5 billion per year

Design Objectives

- Effective gallbladder removal with a small incision to decrease postoperative pain
- Increased safety and decreased risk of hernia
- Faster patient recovery due to smaller incision
- Quicker removal procedure than current techniques

Device Operation

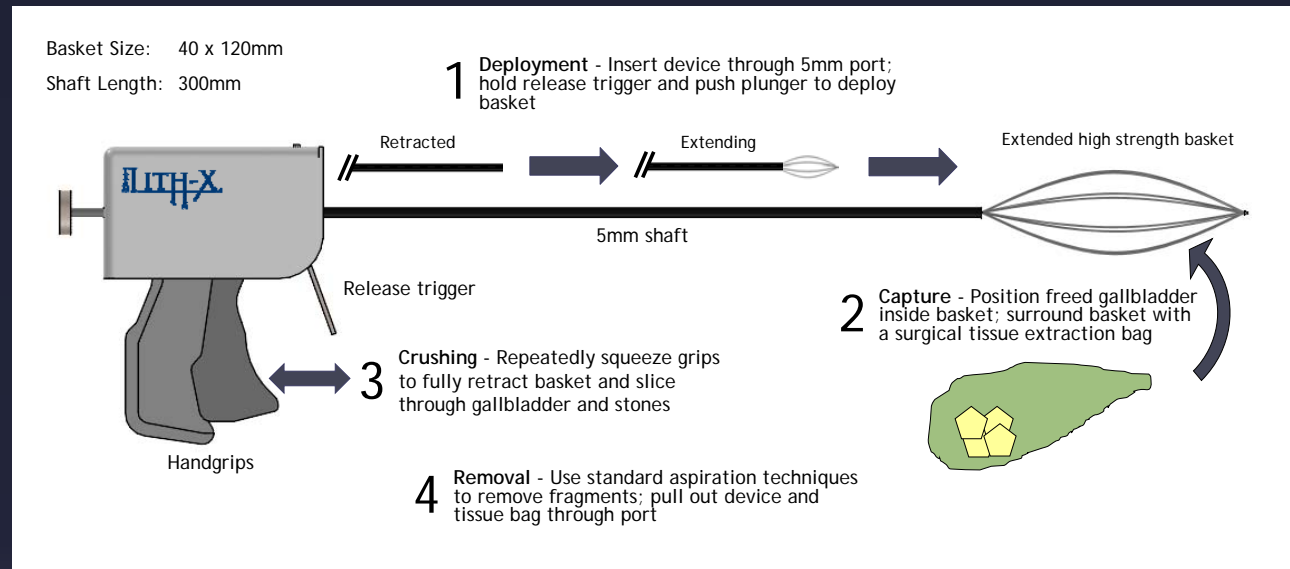


Figure 3. Overview of device components and removal procedure.

Validation with a Simulated Gallbladder

Setup

- TUMS substituted for gallstones based on mechanical testing
- Chicken skin substituted for gallbladder based on thickness and elasticity
- TUMS sutured in skin pouch to simulate whole gallbladder with stones
- Basket retracted to crush sample; pieces crushed repeatedly to target size



Figure 4: Validation setup (top) with expanded views of basket with simulated gallbladder before (left) and after testing (right).

Key Results

- Manual force sufficient to effectively crush both stones and tissue
- Shaft becomes difficult to redeploy due to tissue debris trapped in shaft
- Wires, joints, mechanism strong enough for single use without failure

Conclusions

- Team Lith-X has developed a unique device for removing gallbladder and stones through a 5mm port while meeting all design objectives.
- Reduced incision size should improve safety over current laparoscopic techniques
- Quicker procedure benefits both patients and surgeons

Acknowledgements and References

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